

6º volume

2.001

## TRIBUNAL MARÍTIMO

Arco E

Processo 19489/01 - P 36

MANUAL DE OPERAÇÃO I

Representado(s): \_\_\_\_\_  
\_\_\_\_\_  
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### AUTUAÇÃO

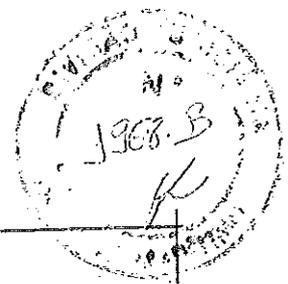
Aos 09 de fevereiro de dois mil e UM  
na Secretaria do Tribunal Marítimo autuo os presentes autos.

Do que fiz este termo

JOSE CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAIS

\_\_\_\_\_  
Diretor - Geral da Secretaria





**CERTIDÃO**

CERTIFICO que, nesta data for univado o 62 Solvís  
do Anexo B. 20, do processo 19489/03  
R. 36

O referido é verdade e dou fé.

Aos 09 de Julho de 2008 f.

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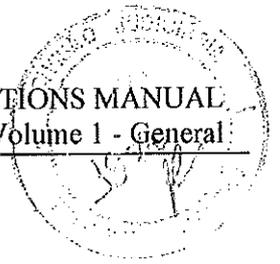
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DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAIS

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**IT IS THE RESPONSIBILITY OF THE OWNER'S REPRESENTATIVE TO ENSURE THAT THE INFORMATION CONTAINED WITHIN THIS MANUAL IS CORRECT THROUGHOUT THE LIFE OF P36.**

**REVISION CHANGE NOTICES**

Rev.	Location Changes	Brief Description of Change
A	General	Page numbers modified to indicate sections
	1.6.4	Deck Load Plans moved to Volume 7
	1.6.5	Tank data revised, laydown drawings in Sec 7.8
	1.6.8	Tank GA's & Capacity Plans moved to Sec 7.8

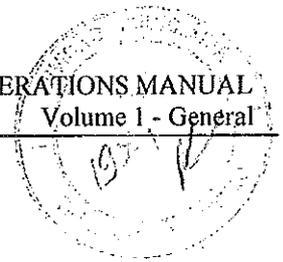
JOSE CARLOS PINHEIRO GUSMÃO  
DIRETOR  
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POSTO DE CONTROLE DE QUALIDADE  
DIVERSAS  
C. A. S. G. A. T. O. R. I. A. S.



## 1.1 GENERAL INFORMATION

### 1.1.1 Purpose of the Manual

The Operating Manual is meant to provide the crew with sufficient information and guidelines in order to operate Petrobras-36 FPU in a safe, efficient and controlled manner in accordance with applicable rules and regulations.

The Operating Manual should be used in conjunction with the rest of the QA documentation, the Process Equipment Manual and the Instruction Manuals from the different equipment suppliers/manufacturers, as well as the drawings and other information supplied.

This manual is to be used by the Section Superintendents and their assistants onboard to achieve and maintain safe working conditions for all personnel onboard P36.

The manual has been made on the assumption that the unit will be operated by experienced, certified and well qualified crews, and it deals primarily with the main procedures to be implemented to perform marine operations and safe offshore production operations.

Most of the operations described in this Operating Manual are described with regards to:

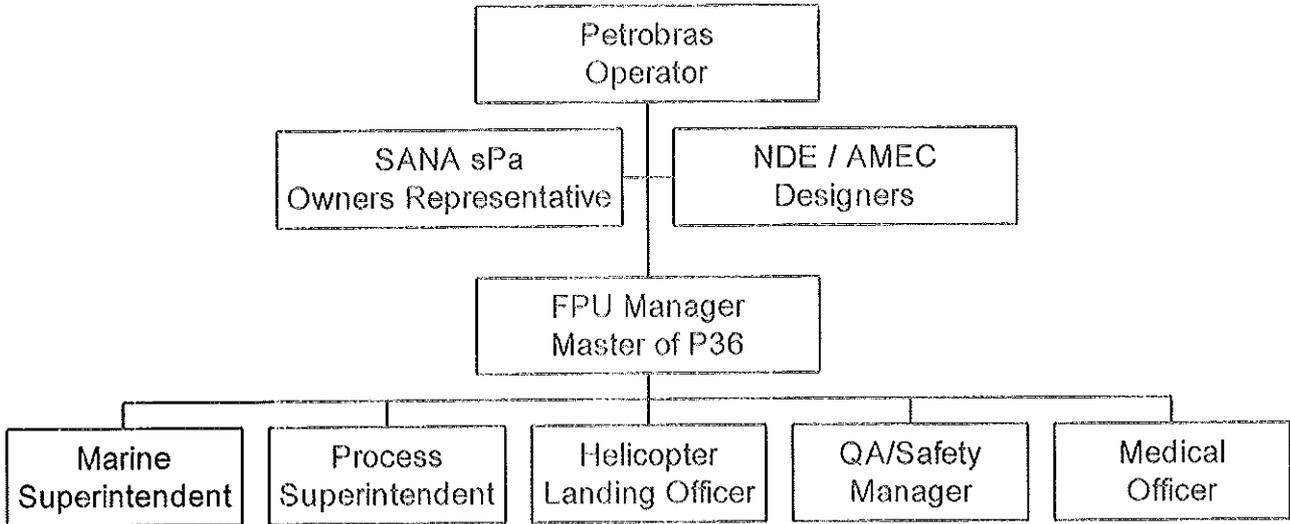
- Organisation: Responsibilities, Qualifications, Reporting routines
- Preparations: People involved, information regarding operation, checklists, general recommendations
- Checklists/Forms: To be filled in and usually signed by the management onboard
- Technical Data: Drawings/Specs that provide an overview of each system.
- References: To detail documentation, instruction books and other manuals etc.

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DEPARTAMENTO DE OPERAÇÕES  
DIVISÃO DE OPERAÇÕES DE BARRILAS

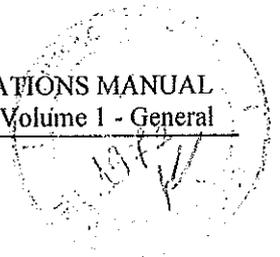
### 1.1.2 Organisation of Petrobras-36

Organisation of FPU Petrobras



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## 1.2 STRUCTURE OF MANUAL

### 1.2.1 Structure of the Manual

The complete Operating Manual consists of seven volumes as follows:

- Volume 1 - General
- Volume 2 - Organisation Survey and Maintenance Requirements
- Volume 3 - Safety
- Volume 4 - Equipment and System Description
- Volume 5 - Marine Operations
- Volume 6 - Emergency Safety Procedures
- Volume 7 - Stability Book

Detailed contents of this manual are shown below:

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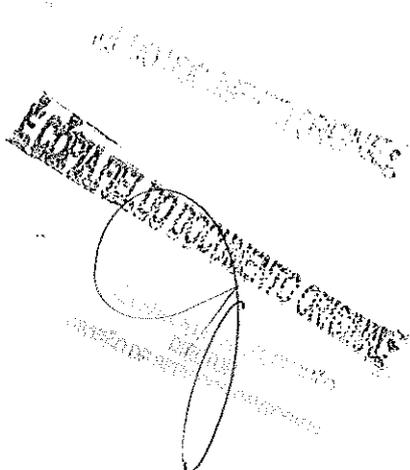
COMPANHIA PETROBRAS  
DIVISÃO DE PRODUÇÃO DE ÓLEO  
DISTRIBUIÇÃO DE PRODUTOS PETROBRAS

ET 3010.38 - 1200 - 941 - AMK - 924

OPERATING MANUAL - PROCESS

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- 1.1 GENERAL INFORMATION
  - 1.1.1 Purpose of the Manual
  - 1.1.2 Organisation of Petrobras-36
- 1.2 STRUCTURE OF MANUAL
  - 1.2.1 Structure of the Manual
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- 1.6 GENERAL DESCRIPTION OF THE UNIT
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  - 1.6.5 Ballasting and Storage Tanks
  - 1.6.6 Mooring & Riser Loads
  - 1.6.7 Colour Coding for Pipework
  - 1.6.8 General Arrangements & Layouts
- 1.7 GLOSSARY



1.2.1.2 Contents of Volume 2 – ORGANISATION SURVEY & MAINTENANCE REQUIREMENTS

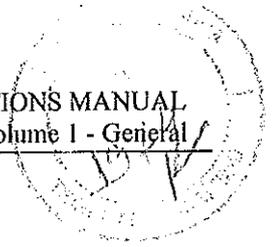
- 2.1 ORGANISATION
  - 2.1.1 Onshore Base Organisation – Contact Details
  - 2.1.2 Onboard Organisation - Names of Superintendents and Telephone Numbers
  - 2.1.3 Duties and Responsibilities in Daily Operations
  - 2.1.4 Duties and Responsibilities in Emergency Situations
  - 2.1.5 Subcontractors/Visitors
  - 2.1.6 Authorities Address and Telephone Number
- 2.2 SURVEY, MAINTENANCE AND SPARE PARTS SYSTEM REPORTS
  - 2.2.1 Survey
  - 2.2.2 Maintenance and Spare Part System
  - 2.2.3 Reports
- 2.3 CERTIFYING AUTHORITY REQUIREMENTS

SELO DO DOCUMENTO ORIGINAL:

JOSÉ CARLOS PIMENTEL GUEMÃO  
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DIVISÃO DE SERVIÇOS CARTORIAIS

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- 3.1 GENERAL SAFETY
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- 3.5.8 Bunkering
- 3.6 HAZARDOUS AREAS
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  - 3.8.4 Transportation
  - 3.8.5 Death

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ASSINATURA  
DIVISÃO DE SERVIÇOS CARTORIARI

JOSÉ CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIARI

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  - 4.1.1 Construction and Materials
  - 4.1.2 Cathodic Protection System
  - 4.1.3 Protective Coatings
  - 4.1.4 Watertight Doors and Hatches
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  - 4.5.2 Thrusters
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  - 4.5.4 Water Heaters
- 4.6 ELECTRICAL, NAVIGATION AND COMMUNICATION SYSTEM

COPIE DO DOCUMENT ORIGINAL  
DIRECCION DE SEGURIDAD Y SALUD  
DIRECCION DE OPERACIONES

- 4.6.1 Electric Power Generators and Distribution
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  - 4.8.4 Riser Monitoring System
  - 4.8.5 Riser Protection Nets

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DIVISÃO DE OPERAÇÕES

### 1.2.1.5 Contents of Volume 5 – MARINE OPERATIONS

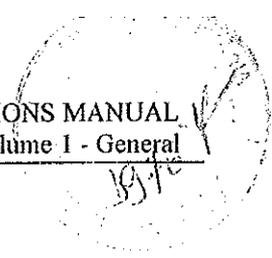
- 5.1 TRANSIT OPERATIONS
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  - 5.1.4 Departure Preparations(with checklists)
  - 5.1.5 Transit Condition
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  - 5.4.5 Stability and Loading Condition Calculation Procedure
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- 5.5 HELICOPTER OPERATIONS
  - 5.5.1 Organisation
  - 5.5.2 Preparations

EXEMPLAR DO DOCUMENTO ORIGINAL

EXEMPLAR DO DOCUMENTO ORIGINAL

EXEMPLAR DO DOCUMENTO ORIGINAL





- 5.5.3 Operational Limitations/Restrictions
- 5.5.4 Helicopter Deck Arrangement with Operation Sector
- 5.5.5 Approved Helicopter Types
- 5.5.6 Radio Communications
- 5.5.7 Stand-by Vessel
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  - 5.8.2 RISER INSTALLATION OPERATIONS
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  - 5.9.2 Checklist for Cleaning of Sea Chests
  - 5.9.3 Echo Sounder Maintenance
  - 5.9.4 Periodic Underwater Inspection
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DAVID  
CISMAO  
SILVAS CARTEIRAS

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  - 6.2.3 Areas of Responsibility Onboard
  - 6.2.4 Alerting Procedures
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- 6.3 EMERGENCY ACTION PLAN AND RESPONSIBILITY
  - 6.3.1 Introduction
  - 6.3.2 Standing Assignments in Any Emergency Situation
  - 6.3.3 Debriefing/Complementary Work
- 6.4 FIRE AND GAS DETECTION AND ALARMS
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  - 6.4.2 Automatic Actions upon Detection of Flammable Gas
  - 6.4.3 Gas Detected in Any Fire Zone
  - 6.4.4 Automatic Actions upon Detector Malfunction
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  - 6.7.5 Pulling Off Location
- 6.8 MAN OVERBOARD
- 6.9 POLLUTION
- 6.10 ADMINISTRATIVE SITUATIONS
  - 6.10.1 Medical Assistance in Cases of Serious Accidents

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JOSE CARLOS PINHEIRO CRUZ  
DIRETOR  
G-VA-80 DE SERVIÇOS MARÍTIMOS

- 6.10.2 Handling of Dead Persons
- 6.11 CRIMINAL ACTS
- 6.12 BOMB THREATS, HIJACKING ETC.
- 6.13 SEARCH/RESCUE ONBOARD AFTER AN EVACUATION
- 6.14 DANGEROUS RADIATION

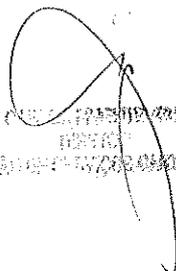
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JOSÉ CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAIS

1.2.1.7 Contents of Volume 7 – STABILITY BOOK

- 7.1 LOADING CASES FOR: TRANSIT, OPERATING, SURVIVAL & INSPECTION CONDITIONS
- 7.2 BALLASTING FROM DRAFT = 11.0M “TRANSIT CONDITION” TO DRAFT 18.0M “TRANSIT SURVIVAL CONDITION”
- 7.3 BALLASTING FROM DRAFT = 11.0M “ON SITE TRANSIT CONDITION” TO DRAFT = 18.0M “PRE-MOORING INSTALLATION CONDITION”
- 7.4 BALLASTING FROM DRAFT = 18.0M “PRE-MOORING INSTALLATION CONDITION” TO DRAFT = 22.0M “POST MOORING INSTALLATION”
- 7.5 BALLASTING FOR RISER INSTALLATION CONDITIONS
- 7.6 BALLASTING FROM DRAFT = 22.0M “OPERATING CONDITION” TO DRAFT =18.0M “INSPECTION CONDITION”
- 7.7 MAXIMUM ALLOWABLE V.C.G.
- 7.8 CAPACITY PLANS
- 7.9 HYDROSTATIC DATA
- 7.10 CAPACITIES AND CENTRES OF GRAVITY
- 7.11 LOADING CASES FOR SEA CHEST MAINTENANCE
- 7.12 BALLASTING FROM DRAFT 10.5M “TRANSIT TO INCLINING SITE CONDITION” TO DRAFT 19.2M “INCLINING TEST CONDITION”
- 7.13 STABILITY ANALYSIS - RINA (1999)
- 7.14 MANUAL CALCULATION OF DISPLACEMENT, TRIM AND STABILITY
- 7.15 OPERATIONS FOR DAMAGE CONTROL
- 7.16 INCLINING TEST REPORT AND LIGHTSHIP DETERMINATION
- 7.17 CROSS CURVES OF STABILITY

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DIRETORIA DE OPERAÇÕES

1970

### 1.3 STATUTORY DOCUMENTS

#### 1.3.1 Classification

The FPU with its equipment is designed and built under survey of the Registro Italiano Navale with the following classifications:

RINA 100-A-1.1-Nav.I.L.-PL (col) p Ice Notation 1D (Transit Only)

The significant design criteria on which the structural approval of the Unit is based are stated in paragraph 1.6.2.

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#### 1.3.2 Rules and Regulations

The following rules and regulations apply for the operations of the vessel.

**NOTE:** The application of Non-Italian rules and regulations is as required for the foreign flag vessel.

##### 1.3.2.1 General

IMO - SOLAS	Convention 1974 and 1978-1981-1983 Amendments
IMO	MODU Code 1980 & Amendments
Portomartec	Helicopter Deck Construction, Installation, Modification and Helicopter Operations on Offshore Platforms
Portomartec	Signalling on Offshore Platforms

### 1.3.2.2 Life Saving Appliances

DPC – Portomarinst 22.14	Life Saving Appliances Allotment
DPC Portomartec 20T8602	Lifebuoys
DPC Portomartec 20T8603	Life Jackets

### 1.3.2.3 Firefighting

Code of Federal Regulations.	DOT Title 49 – Transportation – Chapter 1 – Part 178, Shipping Container Specifications Subpart C
NFPA 10	Portable Fire Extinguishers
NFPA 11	Low Expansion Foam and Combined Agent Systems
NFPA 12	Carbon Dioxide Extinguishing Systems
NFPA 15	Water Spray Fixed Systems for Fire Protection
NFPA 20	Centrifugal Fire Pumps
DPC Portomartec 20T8604	Fire Protection Requirements For Materials And Appliances Used On Board Brazilian Ships

### 1.3.2.4 Classification of Hazardous Areas

IEC-79-0	Electrical Apparatus for Explosive Gas atmospheres – General Requirements
IEC 79-10	Electrical Apparatus of Explosive Gas Atmospheres – Classification of Hazardous Areas
API RP 500	Recommended Practice for Classification of locations for electrical installations at Petroleum facilities.

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DIVISÃO DE SERVIÇOS ADMINISTRATIVOS

1.3.2.5 *Fire & Gas Detection*

NFPA 72 E	Automatic Fire Detectors
API RP 14G	Recommended Practice For Fire Prevention And Control Of Open Type Offshore Production Platforms

1.3.2.6 *Structural*

IMO	MODU Code 1989 and Subsequent 1991 Amendments
Portomartec 2078502 A	Helicopter Deck Construction, Installation, Modification and Helicopter Operation on Offshore Platforms (Issued by Brazilian Authorities)
RINA	Rules for the Construction & Classification of Mobile Offshore Drilling Units and other similar units (1996)

CONFIRMAR DO DOCUMENTO ORIGINAL:

JOSE CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAIS

1.3.2.7 *Naval*

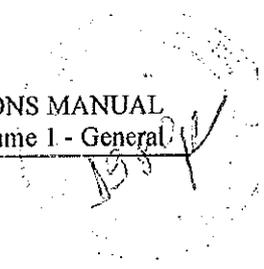
IMO	Code for the Construction and Equipment of Mobile Offshore Units Part 3 Chapter 2 July 1990
IMO	Convention On The International Regulations For The Prevention Of Collision At Sea, 1972, Incorporating Amendments Adopted By Resolution A646 (XII) and A626(15) (COLREG)
RINA	Rules for the Construction & Classification of Mobile Offshore Drilling Units and other similar units (1996)
Marpol	1973/78 ANNEX I, IV, & V and Amendments in Force International Convention for Tonnage Measurements
ILLC	International Load Line Convention 1966 inc. Amendments

1.3.2.8 *Process/Electrical/Piping/HVAC*

These codes are listed in the Process Plant Operating Manual and the Project Index of Applicable Standards (LI-3010.38-1200-940-PPC-002).

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RESERVADOS DIREITOS AUTORES  
DIVISÃO DE RECURSOS HUMANOS



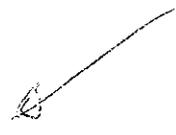
### 1.3.3 Certificates

The following certificates have been issued for this unit

Certificate	Issued By:
1. Builders Certificate including certificate for inclining test and deadweight determination	Builder
2. Mobile Offshore Drilling Unit Safety Certificate	RINA
3. Tonnage Measurement Certificate in accordance to the Oslo Convention of Tonnage Measurement of 1969	RINA
4. Tonnage Measurement Suez	RINA
5. Safety Construction Certificate	RINA
6. Safety Equipment Certificate	MMM
7. Radio Communication Certificate	MPT
8. Radio License	Owners Application
9. Load Line Certificate	RINA
10. Deratization or Fumigation Exemption Certificate	Local Authority
11. Navigation Lights Certificate	
12. All certificates required for Italian Registry and/or operation in Italian Waters and jurisdiction such as lifeboats, liferafts, davits, watertight doors, etc., including: <ul style="list-style-type: none"> <li>- declaration of qualified plant (IAQ2)</li> <li>- IOPP certificate</li> <li>- Medicine and medical equipment register</li> <li>- Manning Certificate</li> <li>- Narcotics Register</li> </ul>	RINA RINA MOH MMM MOH
13. Classification certificates issued by RINA including Interim Class Certificates without exceptions noted thereon and	RINA

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RINA  
 DIVISÃO DE REGISTRO DE NAVIOS



Certificate

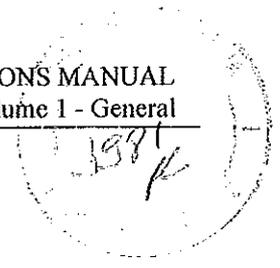
Issued By:

complying with all class notations stated elsewhere and covering hull, machinery and equipment, including cargo gear certificate

14. Individual certificates and data books (where necessary) for all equipment, components and systems which class and authorities require as both a drilling and production unit. Such certificates are RINA/ABS certificates. ABS/RINA
15. Documents of all stores and loose inventory including spare parts and consumables. Builder  
Certificates for spare parts where required by class and/or authorities Authorities
16. Register of Cargo Gear for all cranes and lifting appliance (other than the derrick) RINA
17. Certification by Nominated Brazilian Authorities

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#### 1.4 LIST OF RELATED MANUALS AND AVAILABILITY

The Operating Manual is a requirement of Petrobras 'General Technical Specification' (ET-3010.38-1200-940-PPC-001) issued for the upgrade and operation of the P36.

The Operating Manual is a main document among the number of manuals and instructions which are required for operation of the rig. Other manuals and instructions which are referred to and which are to be used together with the Operating Manual are:

- Central Documentation Register
- Commissioning Procedures
- Process Plant Operating Manual
- Maintenance Manuals (in vendor manuals held in library)
- Manuals/Handbooks etc. for Machinery and Equipment by vendors/manufacturers
- Design Reports
- Drawings

The central register of all documentation will be maintained by the FPU Manager.

The manual shall be available to the Section Superintendents and responsible personnel at all times and it is required that it be read and its provisions understood. A copy must be kept in the dayroom onboard available to all crew members.

The drawings, data books, instruction books and other technical as-built information can be found in the central file onboard.

**É CÓPIA FIEL DO DOCUMENTO ORIGINAL:**

  
DIVISÃO DE OPERAÇÃO  
DE BARRIL DE PETRÓLEO

## 1.5 AVAILABILITY OF UPDATED DOCUMENTS

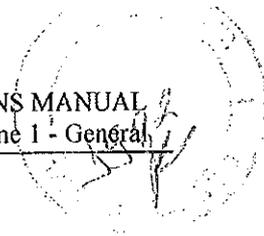
In order to maintain manuals and documents as an useful tool, updating based on practical experience and on new rules and regulations is essential. All comments or suggestions intending to update, correct or improve the contents of the manuals and documents should be forwarded via the Platform Manager to the owner/operator, who will be responsible for initiating periodic updating.

The Quality Assurance/Safety Manager is responsible for distributing updated pages to holders of controlled copies in accordance with the distribution list kept updated in the QA/Safety department.

The Quality Assurance/Safety Manager shall obtain the necessary approvals of updates from the relevant Authorities and Classification Societies before such updates are distributed to holders of controlled copies.

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APPROVED BY: [Signature]  
DATE: [Signature]



## 1.6 GENERAL DESCRIPTION OF THE UNIT

### 1.6.1 Main Data

The P36 has twin shaped lower hulls supporting four columns, a centre caisson and a box-type, watertight upper hull containing double bottom, second and main decks.

The lower hulls contain tanks (i.e. water ballast, fuel oil, drill water, voids, etc), chain lockers, water injection equipment, thruster rooms and pump rooms. The corner columns contain tanks (i.e. water ballast, potable water, voids, etc.), and the centre caisson contains voids and machinery spaces.

The upper hull has below deck machinery spaces, accommodation quarters on two levels for 104 men. The quarters are outfitted to be completely self-contained for the personnel on board, with changing facilities, hospital, offices, recreation rooms, galley, and messing facilities, and are equipped with electric power, potable and fire fighting water, and a complete sewage treatment facility. The substructure is complete with derrick, which is designated as a flare tower, and a raised helicopter deck, suitable for a Sikorsky S-61, is located at the forward port side of the unit. Mooring machinery, windlasses and winches are supported at second deck level. Two cranes of 50 tonnes and 22 tonnes capacity are located on the main deck.

Underneath the upper hull a riser (spider) deck has been added, from which the production and water injection riser bundles and export flowlines are supported.

Power generation and distribution for utilities service, production and ancillary equipment is provided from the Machinery Spaces.

Quarters are located at the forward end of the Unit. The production equipment are located aft. The vessel also includes warehouse and shop facilities.

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UNIVERSIDADE FEDERAL DO RIO DE JANEIRO  
INSTITUTO DE PESQUISA E DESENVOLVIMENTO  
DIVISÃO DE PESQUISA E DESENVOLVIMENTO

*Principal Dimensions (moulded)*

Length overall of platform	112.776 m
Breadth overall of platform	97.580 m
Overall height to top of derrick	119.150 m

*Upper Hull*

Length (inc. aft deck extension / excluding appendages )	83.104 m
Breadth (excluding appendages)	68.580 m
Elevation to Main Deck (at centre)	42.977 m
Elevation to Upper Hull	35.052 m

*Columns (over pontoons)*

Height	22.860 m
Width	13.716 m

*Central Caisson*

Height	24.384 m
Diameter (external)	21.946 m
Diameter (internal)	11.582 m

*Pontoons*

Length	112.776 m
Breadth (Amidships)	13.716 m
Breadth (at Ends)	18.288 m
Depth (Amidships)	9.144 m
Depth (at Ends)	12.192 m

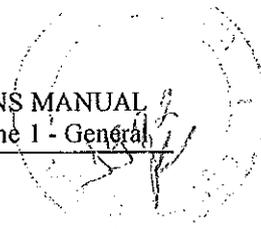
*Displacement and Draft*

Displacement (Transit draft – 11.0m)	37083 Tons
Displacement (Operating draft – 22.0m)	56503 Tons
Displacement (Inspection draft – 18.0m)	50390 Tons

Main dimensions above are shown on the Plot Plans in paragraph 1.6.7.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

PROJETO DE INSTALAÇÃO  
DIVISÃO DE OPERAÇÕES



## 1.6 GENERAL DESCRIPTION OF THE UNIT

### 1.6.1 Main Data

The P36 has twin shaped lower hulls supporting four columns, a centre caisson and a box-type, watertight upper hull containing double bottom, second and main decks.

The lower hulls contain tanks (i.e. water ballast, fuel oil, drill water, voids, etc), chain lockers, water injection equipment, thruster rooms and pump rooms. The corner columns contain tanks (i.e. water ballast, potable water, voids, etc.), and the centre caisson contains voids and machinery spaces.

The upper hull has below deck machinery spaces, accommodation quarters on two levels for 104 men. The quarters are outfitted to be completely self-contained for the personnel on board, with changing facilities, hospital, offices, recreation rooms, galley, and messing facilities, and are equipped with electric power, potable and fire fighting water, and a complete sewage treatment facility. The substructure is complete with derrick, which is designated as a flare tower, and a raised helicopter deck, suitable for a Sikorsky S-61, is located at the forward port side of the unit. Mooring machinery, windlasses and winches are supported at second deck level. Two cranes of 50 tonnes and 22 tonnes capacity are located on the main deck.

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Power generation and distribution for utilities service, production and ancillary equipment is provided from the Machinery Spaces.

Quarters are located at the forward end of the Unit. The production equipment are located aft. The vessel also includes warehouse and shop facilities.

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DIVISÃO DE OPERAÇÕES  
DESENVOLVIMENTO

*Principal Dimensions (moulded)*

Length overall of platform	112.776 m
Breadth overall of platform	97.580 m
Overall height to top of derrick	119.150 m

*Upper Hull*

Length (inc. aft deck extension / excluding appendages )	83.104 m
Breadth (excluding appendages)	68.580 m
Elevation to Main Deck (at centre)	42.977 m
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*Columns (over pontoons)*

Height	22.860 m
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*Central Caisson*

Height	24.384 m
Diameter (external)	21.946 m
Diameter (internal)	11.582 m

*Pontoons*

Length	112.776 m
Breadth (Amidships)	13.716 m
Breadth (at Ends)	18.288 m
Depth (Amidships)	9.144 m
Depth (at Ends)	12.192 m

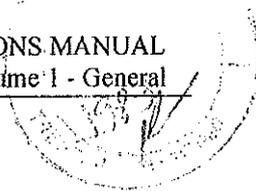
*Displacement and Draft*

Displacement (Transit draft – 11.0m)	37083 Tons
Displacement (Operating draft – 22.0m)	56503 Tons
Displacement (Inspection draft – 18.0m)	50390 Tons

Main dimensions above are shown on the Plot Plans in paragraph 1.6.7.

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DIVISÃO DE OPERAÇÕES



**1.6.2 Design/Limiting Environmental Conditions**

The structure of the unit is designed to operate and/or withstand the resultant forces and motion characteristics, which are affected by unit properties such as displacement, metacentric height and center of gravity , taking account of the following environmental conditions.

Operating Mode		Transit	Transit Survival	1 Yr. Operating	Survival Condition	Inspection Condition
Draft	Moulded (m)	11.0	18.0	22.0	22.0	18.0
Criteria	Return Period	Max Load on Braces	10 Yr.	1 Yr. @ Roncador	100 Yr. @ Roncador	1 Yr. @ Roncador
Wind-	1min mean (m/s)	35.0	41.7	21.2	41.7	21.2
Current	Surface (m/s)	n/a	n/a	1.9	2.5	1.9
Wave -	H <sub>s</sub> (m)	5.0	10.1	5.7	7.8	2.5
	T <sub>p</sub> (sec)	7.98 – 12.1	11.5-17.4	14.1 sec	16.2 sec	14.1 sec
	Direction (from)	n/a	n/a	SW	SW	SW

**NOTES:**

1. The worst damage/accidental flooding inclinations are heel (port/stbd) 8.6° and trim (fwd/aft) 10.1°.
2. For limiting conditions specific to operations (such as mooring installation or riser pull-in) refer to the relevant paragraph in volume 5.
3. During transit to the field, if weather conditions are experienced or forecast which may exceed the limiting design criteria for the transit draft (11.0m), the FPU is to move to the transit survival draft (18.0m).
4. In transit conditions, heavy wave slamming on the horizontal bracings is to be avoided as far as practicable at the discretion of the FPU manager.
5. During routine inspection of the fairleads, if weather conditions are experienced or forecast which may exceed the limiting design criteria for the inspection draft (18.0m), the unit is to move to the survival draught (22.0m).

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### 1.6.3 Loading Data and Load Plans

Stability Data for the following conditions are contained in Volume 7:

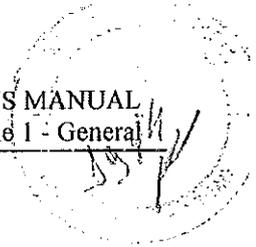
1. Transit Condition
2. Transit – Survival Condition
3. Pre-mooring installation
4. Post-mooring installation
5. Riser Installation (Various Stages)
6. Production
7. Fairlead Inspection

Specific loading conditions can be analysed using the Load Calculator Program – EASEACON – see Volume 5 of this manual.

### 1.6.4 Deck Loads

Deck Load Plans are included in Volume 7. For specific strong points reference should be made to the relevant structural design reports.

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DIRECCIÓN GENERAL DE CARACAS



### 1.6.5 Ballasting and Storage Tanks

The P36 has deadweight storage for the fluids and items shown on the following tables (for locations see capacity tables in volume 7):

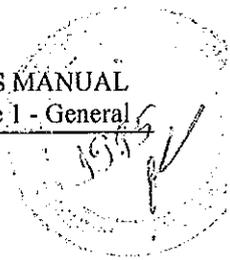
- Sea Water Ballast Tanks
- Fuel Oil (FO)
- Diesel Oil (DO)
- Lubricating Oil (LO)
- Drill Water (DW)
- Potable Water (PW)
- Void Spaces (VS)
- Miscellaneous
- Mooring Chain
- Non - Structural Tanks
- Stores
- Liquids for Production

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1.6.5.1 Sea Water Ballast Tanks

Compartment		Volume (m <sup>3</sup> )	Density (MT/m <sup>3</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
SW Ballast	1P	886.7	1.025	908.9	9.50	-24.47	6.78
SW Ballast	1S	886.7	1.025	908.9	9.50	24.47	6.78
SW Ballast	2P	877.6	1.025	899.5	6.78	-30.71	6.22
SW Ballast	2S	877.6	1.025	899.5	6.78	30.71	6.22
SW Ballast	3P	728.7	1.025	746.9	16.71	-30.88	6.16
SW Ballast	3S	728.7	1.025	746.9	16.71	30.88	6.16
SW Ballast	4P	798.3	1.025	818.2	13.73	-36.66	6.21
SW Ballast	4S	798.3	1.025	818.2	13.73	36.66	6.21
SW Ballast	5P	256.6	1.025	263.0	27.71	-22.82	2.99
SW Ballast	5S	256.6	1.025	263.0	27.71	22.82	2.99
SW Ballast	6P	523.9	1.025	537.0	28.19	-31.74	5.28
SW Ballast	6S	523.9	1.025	537.0	28.19	31.74	5.28
SW Ballast	7P	555.2	1.025	569.1	26.94	-36.18	6.12
SW Ballast	7S	555.2	1.025	569.1	26.94	36.18	6.12
SW Ballast	11P	644.7	1.025	660.8	51.06	-30.81	4.57
SW Ballast	11S	644.7	1.025	660.8	51.06	30.81	4.57
SW Ballast	13P	644.7	1.025	660.8	61.72	-30.81	4.57
SW Ballast	13S	644.7	1.025	660.8	61.72	30.81	4.57
SW Ballast	16P	249.7	1.025	255.9	85.17	-22.72	3.04
SW Ballast	16S	249.7	1.025	255.9	85.17	22.72	3.04
SW Ballast	17P	523.9	1.025	537.0	84.58	-31.74	5.28
SW Ballast	17S	523.9	1.025	537.0	84.58	31.74	5.28
SW Ballast	18P	555.2	1.025	569.0	85.84	-36.18	6.12
SW Ballast	18S	555.2	1.025	569.0	85.84	36.18	6.12
SW Ballast	19P	728.8	1.025	747.0	96.07	-30.88	6.16
SW Ballast	19S	728.8	1.025	747.0	96.07	30.88	6.16
SW Ballast	20P	768.2	1.025	787.4	98.66	-36.37	6.17
SW Ballast	20S	768.2	1.025	787.4	98.59	36.27	6.17
SW Ballast	21P	963.7	1.025	987.8	103.87	-24.48	6.69
SW Ballast	21S	963.7	1.025	987.8	103.87	24.48	6.69
SW Ballast	22P	1067.3	1.025	1094.0	106.75	-31.15	6.14
SW Ballast	22S	1067.3	1.025	1094.0	106.75	31.15	6.14
SW Ballast	23P	665.6	1.025	682.3	28.02	-27.55	16.00
SW Ballast	23S	665.6	1.025	682.3	28.02	27.55	16.00
SW Ballast	24P	980.8	1.025	1005.3	28.00	-26.33	14.37
SW Ballast	24S	980.8	1.025	1005.3	28.00	26.33	14.37
SW Ballast	25P	665.6	1.025	682.3	84.76	-27.55	16.00
SW Ballast	25S	665.6	1.025	682.3	84.76	27.55	16.00
SW Ballast	26P	980.8	1.025	1005.3	84.77	-26.33	14.37
SW Ballast	26S	980.8	1.025	1005.3	84.77	26.33	14.37
Chain Locker	1P	363.1	1.025	372.2	84.58	-30.41	5.29
Chain Locker	2P	363.1	1.025	372.2	28.2	-30.41	5.29
Chain Locker	3S	363.1	1.025	372.2	28.2	30.41	5.29
Chain Locker	4S	363.1	1.025	372.2	84.58	30.41	5.29
Chain Locker	5P	52.2	1.025	53.5	86.47	-31.12	16.76
Chain Locker	6P	52.2	1.025	53.5	26.31	-31.12	16.76
Chain Locker	7S	52.2	1.025	53.5	26.31	31.12	16.76
Chain Locker	8S	52.2	1.025	53.5	86.47	31.12	16.76
SW Ballast Total				30537.5	57.24	0.00	7.92



1.6.5.2 Fuel Oil (FO)

Fuel Oil	ID	Volume (m <sup>3</sup> )	Density (MT/m <sup>3</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
FO Tank	10P	611.3	0.960	586.8	51.05	-23.91	4.67
FO Tank	10S	611.3	0.960	586.8	51.05	23.91	4.67
FO Tank	12P	614.7	0.960	590.1	61.72	-23.86	4.64
FO Tank	12S	614.7	0.960	590.1	61.72	23.92	4.64
FO Overflow	P	17.1	0.960	16.4	78.94	-17.79	35.81
FO Overflow	S	15.8	0.960	15.1	78.87	22.86	35.81
Fuel Oil		2452.0		2385.4	56.70	0.04	5.06

1.6.5.3 Diesel Oil (DO)

Diesel Oil	ID	Volume (m <sup>3</sup> )	Density (MT/m <sup>3</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
DO Sludge	N1P	4.1	0.870	3.6	67.61	-15.62	35.81
DO Sludge	N1S	4.1	0.870	3.6	78.58	10.10	35.81
DO Settle	N1P	121.2	0.870	105.5	74.52	-13.90	39.39
DO Day Tk	N2P	127.2	0.870	110.7	74.60	-17.44	39.37
DO Day Tk	N3S	84.5	0.870	73.5	82.01	15.62	38.10
DO Settl	N4S	84.5	0.870	73.5	79.15	15.62	38.10
DO Service		12.9	0.870	11.2	48.01	-21.15	47.01
Diesel Oil		341.2		381.6	76.08	-3.55	39.05

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 DIVISÃO DE OPERAÇÕES DE CUMPRIMENTO DE OBRIGACIONES

1.6.5.4 Drill Water (DW)

Drill Water Tanks (Process FW)	ID	Volume (m <sup>3</sup> )	Density (MT/m <sup>3</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
Drill Water Tanks	8p	276.5	1.000	276.5	40.25	-23.31	4.41
Drill Water Tanks	8S	276.5	1.000	276.5	40.25	23.31	4.41
Drill Water Tanks	9P	248.7	1.000	248.7	40.53	-31.35	4.38
Drill Water Tanks	9S	248.7	1.000	248.7	40.53	31.35	4.38
Drill Water Tanks	14P	272.3	1.000	272.3	72.39	-24.38	4.56
Drill Water Tanks	14S	272.3	1.000	272.3	72.39	24.38	4.56
Drill Water Tanks	15P	260.3	1.000	260.3	72.34	-30.45	4.62
Drill Water Tanks	15S	260.3	1.000	260.3	72.34	30.45	4.62
Drill Water Tanks (Process FW)		2115.5		2115.5	56.49	0.00	4.49

1.6.5.5 Lubricating Oil (LO)

Lub Oils	ID	Volume (m <sup>3</sup> )	Density (MT/m <sup>3</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
Drains Storage Tank Port	N1P	451.4	0.900	406.3	84.85	-22.94	25.23
Drains Storage Tank Stbd	N1S	451.4	0.900	406.3	84.85	22.94	25.23
Waste Oil	N1P	19.2	1.000	19.2	80.72	-24.55	25.15
Waste Oil	N1S	19.2	1.000	19.2	80.72	24.55	25.15
Air Compressors LO Storage	T65101	0.9	0.9	0.8	78.47	-1.35	40.72
Mooring Winch LO Storage	T65105	0.3	0.9	0.3	78.17	-30.43	40.77
Mooring Winch LO Storage	T65106	0.3	0.9	0.3	34.65	-30.07	40.87
Mooring Winch LO Storage	T65107	0.3	0.9	0.3	23.33	28.10	40.87
Mooring Winch LO Storage	T65108	0.3	0.9	0.3	91.04	30.07	40.96
En. Gen. LO Storage	T65109	0.6	0.9	0.5	48.60	-22.17	45.00
WI Room LO Storage	T65110	0.9	0.9	0.8	35.87	-22.20	3.43
WI Room LO Storage	T65111	0.9	0.9	0.8	35.87	22.20	3.44
Turbine Lube Oil Consule 'C'	UQ-122308	16.7	0.9	15.0	89.67	24.55	49.23
Turbine Lube Oil Consule 'B'	UQ-122306	16.7	0.9	15.0	89.68	9.55	49.24
Turbine Lube Oil Consule 'A'	UQ-122304	16.7	0.9	15.0	89.71	-5.45	49.25
Lub Oils		995.7		900.0	84.77	0.46	26.43

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1.6.5.6 Void Spaces (VS)

Void Spaces	ID	Volume (m <sup>3</sup> )	Density (MT/m <sup>3</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
VOID SPACE	N.27P	33.9	1.025	34.7	33.53	-21.3	5.33
VOID SPACE	N.27S	33.9	1.025	34.7	33.53	21.3	5.33
VOID SPACE	N.28P	33.9	1.025	34.7	79.25	-21.3	5.33
VOID SPACE	N.28S	33.9	1.025	34.7	79.25	21.3	5.33
VOID SPACE	N.29P	138.7	1.025	142.1	19.06	-30.1	15.24
VOID SPACE	N.29S	138.7	1.025	142.1	19.06	30.1	15.24
VOID SPACE	N.29aP	162.7	1.025	166.8	28.2	-35.7	18.36
VOID SPACE	N.29aS	162.7	1.025	166.8	28.2	35.7	18.36
VOID SPACE	N.30P	138.7	1.025	142.1	93.72	-30.1	15.24
VOID SPACE	N.30S	138.7	1.025	142.1	93.72	30.1	15.24
VOID SPACE	N.30aP	162.7	1.025	166.8	84.58	-35.7	18.36
VOID SPACE	N.30aS	162.7	1.025	166.8	84.58	35.7	18.36
VOID SPACE	N.31P	47.6	1.025	48.8	84.58	-30.0	22.10
VOID SPACE	N.31S	47.6	1.025	48.8	84.58	30.0	22.10
VOID SPACE	N.32P1	233.0	1.025	238.8	23.75	-16.8	25.15
VOID SPACE	N.32S1	233.0	1.025	238.8	23.75	16.8	25.15
VOID SPACE	N.32P2	234.0	1.025	239.9	32.47	-23.1	25.30
VOID SPACE	N.32S2	234.0	1.025	239.9	32.47	23.1	25.30
VOID SPACE	N.32P3	466.0	1.025	477.6	28.19	-26.1	25.15
VOID SPACE	N.32S3	466.0	1.025	477.6	28.19	26.1	25.15
VOID SPACE	N.33P1	246.5	1.025	252.7	80.29	-31.4	25.15
VOID SPACE	N.33S1	246.5	1.025	252.7	80.29	31.4	25.15
VOID SPACE	N.33P2	246.5	1.025	252.7	88.88	-31.4	25.15
VOID SPACE	N.33S2	246.5	1.025	252.7	88.88	31.4	25.15

Void Spaces	ID	Volume (m <sup>3</sup> )	Density (MT/m <sup>3</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
VOID SPACE	N.34	353.0	1.025	361.8	50.56	0.0	12.95
VOID SPACE	N.35	353.0	1.025	361.8	62.22	0.0	12.95
VOID SPACE	N.36	58.0	1.025	59.5	56.39	-7.5	27.43
VOID SPACE	N.37P	127.0	1.025	130.2	48.65	-9.2	38.86
VOID SPACE	N.37S	110.2	1.025	113.0	48.56	9.1	38.98
VOID SPACE	N.38P	127.0	1.025	130.2	64.13	-9.2	38.86
VOID SPACE	N.38S	110.2	1.025	113.0	64.22	9.1	38.98
VOID SPACE	N.39	1370.6	1.025	1404.9	28.2	0.0	35.81
VOID SPACE	N.40	1939.4	1.025	1987.9	51.56	-5.1	35.81
VOID SPACE	N.41	215.4	1.025	220.8	56.39	24.0	35.81
VOID SPACE	N.42P	430.7	1.025	441.5	56.39	-30.9	35.81
VOID SPACE	N.42S	430.7	1.025	441.5	56.39	30.1	35.81
VOID SPACE	N.43	1865.3	1.025	1911.9	80.91	2.6	35.81
VOID SPACE	N.44	436.4	1.025	447.3	56.39	0.8	35.81
VOID SPACE	N.45P	220.9	1.025	226.5	93.72	-22.9	30.10
VOID SPACE	N.45S	220.9	1.025	226.5	93.72	22.9	30.10
VOID SPACE	N.45aP	178.7	1.025	183.2	93.72	-35.0	22.71
VOID SPACE	N.45aS	179.7	1.025	184.2	93.72	35.0	22.71
VOID SPACE	N.46P	220.9	1.025	226.5	19.06	-22.9	30.10
VOID SPACE	N.46S	220.9	1.025	226.5	19.06	22.9	30.10
VOID SPACE	N.46aP	178.7	1.025	183.2	19.06	-35.0	22.71
VOID SPACE	N.46aS	179.7	1.025	184.2	19.06	35.0	22.71
VOID SPACE	N.50P	47.4	1.025	48.6	16.77	-24.8	0.76
VOID SPACE	N.50S	47.4	1.025	48.6	16.77	24.8	0.76
VOID SPACE	N.51P	47.4	1.025	48.6	96.01	-24.8	0.76
VOID SPACE	N.51S	47.4	1.025	48.6	96.01	24.8	0.76
VOID SPACE	N.52P	142.4	1.025	146.0	71.57	-15.0	12.19
VOID SPACE	N.52S	142.4	1.025	146.0	71.57	15.0	12.19
VOID SPACE	N.53P	142.4	1.025	146.0	41.22	-15.0	12.19
VOID SPACE	N.53S	142.4	1.025	146.0	41.22	15.0	12.19
VOID SPACE	N.54	290.0	1.025	297.3	84.58	0.0	12.19
VOID SPACE	N.55	290.0	1.025	297.3	28.19	0.0	12.19
VOID SPACE	N.56	2575.5	1.025	2639.9	51.11	0.0	24.64
VOID SPACE	N.57	2575.5	1.025	2639.9	61.67	0.0	24.64
VOID SPACE	N.58S	200.0	1.025	205.0	42.3	15.0	12.19
VOID SPACE	N.58P	200.0	1.025	205.0	42.3	-15.0	12.19
VOID SPACE	N.59S	200.0	1.025	205.0	70.48	15.0	12.19
VOID SPACE	N.59P	200.0	1.025	205.0	70.48	-15.0	12.19
VOID SPACE	N.60	3143.5	1.025	3222.1	56.39	-0.6	24.76
VOID SPACE	N.61P	487.1	1.025	499.3	70.89	-27.4	10.67
VOID SPACE	N.61S	487.1	1.025	499.3	70.89	27.4	10.67
VOID SPACE	N.62S	115.9	1.025	118.8	27.69	29.9	14.50
VOID SPACE	N.62P	115.9	1.025	118.8	27.69	-29.9	14.50
VOID SPACE	N.63S	115.9	1.025	118.8	84.58	29.9	14.50
VOID SPACE	N.63P	115.9	1.025	118.8	84.58	-29.9	14.50
VOID SPACE	N.64S	252.0	1.025	258.3	27.69	29.9	22.95
VOID SPACE	N.64P	252.0	1.025	258.3	27.69	-29.9	22.95
VOID SPACE	N.65S	252.0	1.025	258.3	84.58	29.9	22.95
VOID SPACE	N.65P	252.0	1.025	258.3	84.58	-29.9	22.95
CHAIN LOCKER	9P	113.3	1.025	116.1	93.73	-34.8	15.40
CHAIN LOCKER	10P	113.3	1.025	116.1	19.05	-34.8	15.40
CHAIN LOCKER	11S	113.3	1.025	116.1	19.05	34.8	15.40
CHAIN LOCKER	12S	113.3	1.025	116.1	93.73	34.8	15.40
Void Spaces		27149.37		27827.8	56.00	-0.08	25.14

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JOSE CARLOS PINHEIRO GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTÓGRAFOS

1.6.5.7 Potable Water (PW)

Potable Water	ID	Volume (m <sup>3</sup> )	Density (MT/m <sup>3</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
Pot Water Tk	1P	194.0	1.000	194.0	84.58	-29.99	25.91
Pot Water Tk	1S	194.0	1.000	194.0	84.58	29.99	25.91
Pot Water Day Tk		15.2	1.000	15.2	78.87	4.98	38.10
Potable Water		403.1		403.1	84.36	0.19	26.37

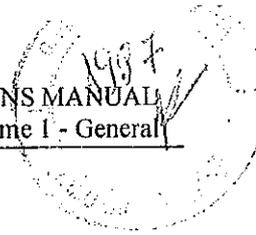
1.6.5.8 Miscellaneous Tanks

Miscellaneous Tanks	ID	Volume (m <sup>3</sup> )	Density (MT/m <sup>3</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
Bilge Holding Tank	P	5.27	1.000	5.3	78.49	-26.31	0.76
Bilge Holding Tank	S	5.27	1.000	5.3	78.49	26.31	0.76
W.I.L ring Drain Tank	P	2.80	1.000	2.8	77.13	-30.77	1.22
W.I.L ring Drain Tank	S	2.80	1.000	2.8	77.13	30.77	1.22
Deaerator Tower (Port)	C-51001	37.96	1.000	38.0	85.08	-23.73	27.60
Deaerator Tower (Starb)	C-52001	37.96	1.000	38.0	85.08	23.73	27.60
Auxiliary Generator DO	GE-514001	1.15	0.870	1.0	54.39	-12.50	53.00
Aft Column Separator Tank	NIP	13.80	1.000	13.8	79.72	-26.29	35.10
Aft Column Separator Tank	NIS	13.80	1.000	13.8	79.72	26.29	35.10
Miscellaneous Tanks		120.8		120.7	82.65	-0.10	25.96

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1.6.5.9 Mooring Chain

Chain Onboard	ID	Max Length	Weight per metre	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
Chain Locker - Port Aft (Winch 2)	1aP	450.0	180.5	85.3	87.52	-30.50	4.60
Chain Locker - Port Aft (Winch 4)	1fP	450.0	180.5	85.3	81.65	-30.50	4.60
Chain Locker - Port Aft (Winch 3)	5P	450.0	180.5	85.3	86.47	-31.12	16.19
Chain Locker - Port Aft (Winch 1)	9P	450.0	180.5	85.3	91.05	-33.48	13.72
Chain Locker - Port Fwd (Winch 5)	2aP	450.0	180.5	85.3	31.13	-30.50	4.60
Chain Locker - Port Fwd (Winch 7)	2fP	450.0	180.5	85.3	25.26	-30.50	4.60
Chain Locker - Port Fwd (Winch 6)	6P	450.0	180.5	85.3	26.31	-31.12	16.19
Chain Locker - Port Fwd (Winch 8)	10P	450.0	180.5	85.3	21.73	-33.48	13.72
Chain Locker - Stbd Aft (Winch 13)	4fS	450.0	180.5	85.3	81.65	30.50	4.60
Chain Locker - Stbd Aft (Winch 15)	4aS	450.0	180.5	85.3	87.52	30.50	4.60
Chain Locker - Stbd Aft (Winch 14)	8S	450.0	180.5	85.3	86.47	31.12	16.19
Chain Locker - Stbd Aft (Winch 16)	12S	450.0	180.5	85.3	91.05	33.48	13.72
Chain Locker - Stbd Fwd (Winch 10)	3fS	450.0	180.5	85.3	25.26	30.50	4.60
Chain Locker - Stbd Fwd (Winch 12)	3aS	450.0	180.5	85.3	31.13	30.50	4.60
Chain Locker - Stbd Fwd (Winch 11)	7S	450.0	180.5	85.3	26.31	31.12	16.19
Chain Locker - Stbd Fwd (Winch 9)	11S	450.0	180.5	85.3	21.73	33.48	13.72
Chain Onboard		7200.0		1364.6	56.39	0.00	9.78



1.6.5.10 Non- Structural Tanks

Non Structural Tanks	ID	Volume (m <sup>3</sup> )	Density (MT/m <sup>3</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
Fwd clmn p-tk	T05001A	83.5	1.316	109.9	25.00	26.70	27.00
Fwd clmn p-tk	T05001B	83.5	1.316	109.9	28.15	24.23	27.00
Fwd clmn p-tk	T05001A	83.5	1.316	109.9	28.15	-24.23	27.00
Fwd clmn p-tk	T05001B	83.5	1.316	109.9	25.00	-26.70	27.00
Helifuel Refuel	A58001	7.9	1.000	7.9	34.55	-12.53	43.92
Helifuel Disp	A58002	0.1	1.000	0.1	25.91	-19.20	45.10
Incinerator DO Day Tank	T59305	0.2	0.870	0.2	21.66	26.76	43.94
FW Chem Dosing Tank	T55101	2.0	1.000	2.0	63.02	-5.30	52.91
FW Cooling Expansion Tank	T55102	0.5	1.000	0.5	64.97	-6.20	52.91
Oily Water Separators	V-66201 & 2	1.6	0.900	1.4	80.77	0.00	29.80
Glycol Sump Tank	TQ-123301	18.6	1.080	20.1	55.23	21.53	37.08
Tank Top Sump Tank	V-533605	16.0	1.000	16.0	76.22	6.44	46.47
Non Structural Tanks		380.9		487.8	29.85	0.87	28.48

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1057  
 DIVISÃO DE PRODUÇÃO  
 DIVISÃO DE OPERAÇÃO  
 DIVISÃO DE MANUTENÇÃO

1.6.5.11 Helicopter & Laydown Areas

Helicopter & Laydown Areas	ID	Area (m <sup>2</sup> )	Load Cap. (kN/m <sup>2</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
Helicopter	HD	623.1		24.0	21.10	-35.80	48.90
Tote Tank Laydown	LD-01	57.3	13.0	76.0	37.14	10.07	43.00
Misc Laydown 1	LD-02	56.6	13.0	75.0	38.55	-3.52	43.00
Misc Laydown 2	LD-03	40.2	13.0	53.3	39.27	-11.28	43.00
Compression A Laydown	LD-04	44.6	13.0	59.1	95.42	0.43	43.00
Compression B Laydown	LD-05	42.7	13.0	56.5	95.44	15.43	43.00
Compression C Laydown	LD-06	48.1	13.0	63.8	95.44	30.80	43.00
Turbine A Laydown	LD-07	15.0	13.0	19.9	73.34	-5.46	43.00
Turbine B Laydown	LD-08	15.0	13.0	19.9	73.34	9.54	43.00
Turbine C Laydown	LD-09	15.0	13.0	19.9	73.34	24.54	43.00
Pig Launcher Laydown	LD-10	50.9	13.0	67.4	106.05	-19.00	36.58
Multipurpose Court	LD-11	160.0	13.0	212.0	30.37	1.29	43.00
Helicopter & Laydown Areas				747.0	58.12	1.96	42.61

1.6.5.12 Crew & Stores @ Tank Top

Crew & Stores @TT	ID	Area (m <sup>2</sup> )	Load Cap. (kN/m <sup>2</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
Pump Store Aft	TT-01	6.1	13.0	8.0	63.51	9.85	37.88
Pump Store Fwd	TT-02	6.1	13.0	8.0	49.26	9.85	37.88
Mech Store 1	TT-03	32.1	13.0	42.5	88.40	-31.10	37.88
Mech Store 2	TT-04	23.4	13.0	31.0	81.40	-32.18	37.88
Mech Workshop	TT-05	75.1	13.0	99.6	85.97	-23.86	37.58
Production Warehouse	TT-06	38.8	13.0	51.4	88.61	24.15	37.58
Production Warehouse	TT-07	39.5	13.0	52.3	80.51	24.00	37.58
Store	TT-08	61.6	13.0	81.7	82.90	31.44	37.88
Store	TT-09	45.5	13.0	60.3	69.19	-5.33	37.88
Electrical Workshop	TT-10	24.6	13.0	32.5	75.27	-8.16	37.78
Electrical Store	TT-11	32.8	13.0	43.5	75.27	-1.02	37.78
Hydraulic Workshop	TT-12	23.5	13.0	31.1	75.37	4.83	37.68
Central Caisson Laydown Area	TT-13	6.0	9.0	5.5	61.89	-2.75	37.58
Starboard Forward Laydown Area	TT-14	21.6	9.0	19.8	37.67	22.62	37.58
Instrumentation Workshop	TT-15	46.3	13.0	61.3	73.19	23.30	37.58
<b>Crew &amp; Stores @TT</b>		<b>482.8</b>		<b>628.6</b>	<b>78.11</b>	<b>3.04</b>	<b>37.72</b>

1.6.5.13 Crew & Stores @ 2nd Deck

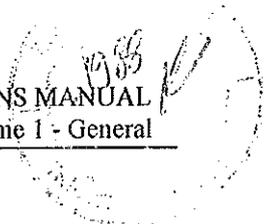
Crew & Stores @ SD	ID	Area (m <sup>2</sup> )	Load Cap. (kN/m <sup>2</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
Weld Shop	SD-01	94.1	13.0	124.7	84.58	-24.00	40.62
Production Warehouse	SD-02	39.0	13.0	51.6	88.60	24.00	41.12
Warehouse	SD-03	113.1	13.0	149.9	85.73	-15.62	41.12
Open Store	SD-04	81.8	13.0	108.4	69.43	-0.23	41.02
Dry Store 1	SD-05	45.1	13.0	59.8	40.21	8.48	40.52
Dry Store 2	SD-06	34.6	13.0	45.9	37.21	15.03	40.52
Chilling Room / Freezer	SD-07	46.7	13.0	61.8	42.47	15.03	41.02
Crew & Effects				30.0	45.72	0.00	41.82
<b>Crew &amp; Stores @ SD</b>		<b>454.4</b>		<b>632.1</b>	<b>68.98</b>	<b>-3.15</b>	<b>40.93</b>

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ANEXO 01 - PLANILHA DE CARGAS  
 DIVISÃO DE OPERAÇÕES  
 DIVISÃO DE OPERAÇÕES

1.6.5.14 Crew & Stores @ Main Deck

Crew & Stores @ MD	ID	Area (m <sup>2</sup> )	Load Cap. (kN/m <sup>2</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
Paint Locker	MD-01	21.0	13	27.8	65.89	8.51	43.87
Deck Locker	MD-02	21.0	13	27.8	48.89	8.51	43.87
Marine Equipment Storage	MD-03	34.7	13	45.9	48.89	8.51	43.87
<b>Crew &amp; Stores @ MD</b>		<b>76.7</b>		<b>101.6</b>	<b>53.55</b>	<b>8.51</b>	<b>43.87</b>



1.6.5.15 Liquids for Production

Process Content	ID	Volume (m <sup>3</sup> )	Density (MT/m <sup>3</sup> )	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
Oil Separation – Train A	UQ-122301	550.9	0.850	468.3	92.29	-28.51	47.27
Oil Separation – Train B	UQ-122302	550.5	0.850	467.9	92.28	-18.53	47.34
Oil Separation – Heating	UQ-122303	92.7	0.850	78.8	77.27	-20.01	47.49
Production Caisson	TD-533601	52.2	0.900	47.0	64.74	-16.71	19.81
Turbine Cooling Water	UQ-122308	5.6	1.000	5.6	89.67	24.55	49.23
Turbine Cooling Water	UQ-122306	5.6	1.000	5.6	89.68	9.55	49.24
Turbine Cooling Water	UQ-122304	5.6	1.000	5.6	89.71	-5.45	49.25
Gas/Cond. Chemical Injection Package	UQ-682503	42.8	0.900	38.5	58.48	13.14	44.98
Oil Chemical Injection (Skid 2)	UQ-682501-02	31.5	0.900	28.4	61.79	13.04	37.74
Sea Water Chemical Injection	UQ-682502	21.3	0.900	19.2	54.46	18.66	37.36
Oil Chemical Injection (Skid 1)	UQ-682501-01	18.3	0.900	16.5	50.68	17.60	37.52
Chemical Injtn Package (Water Inj)	A42001	1.9	0.900	1.7	61.56	17.80	38.33
Chemical Injection Package (Prod)	A42002	1.7	0.900	1.5	55.56	13.40	38.33
Heating Med Exp Vessel	V-512501	20.3	0.935	19.0	48.12	2.33	63.78
Cooling Med Exp Vessel	V-512401	6.8	1.000	6.8	48.10	-3.22	63.78
Skim Pile Matrix Separator	V-66212	11.8	0.900	10.6	59.51	-13.30	43.92
Glycol Regeneration Package	UQ-123302	12.4	1.080	13.4	57.13	16.93	45.38
TEG Contactor Towers	UQ-123301	7.7	1.080	8.3	57.44	12.87	48.38
Safety Gas KO Drum Package	V-122301	14.9	0.975	14.5	62.88	30.50	45.96
Drains Treatment Package	A45001	14.4	1.000	14.4	97.69	14.72	39.08
Fuel Gas Treatment Package	UQ-513501	9.4	1.000	9.4	97.93	23.08	38.55
LP KO Drum Package + Pumps	UQ-541202	9.6	0.820	7.9	63.87	-16.36	44.21
Booster Comp Process Pkg	A30003	6.4	1.000	6.4	56.94	22.68	46.10
Caisson Pumps Antifouling Package	UQ-512101	8.0	1.025	8.2	32.98	15.20	44.42
Seawater Supply Pumps contents	B-511102A/B/C	58.5	1.025	59.9	56.39	5.25	20.00
Water Injection System (inc Piping)	UQ-125101	48.1	1.025	49.3	74.40	0.00	17.67
Process Piping & Valves		121.3	0.860	104.4	60.46	-0.54	40.07
HP Flare KO Drum Skid	A43001	10.2	0.820	8.4	59.66	-21.60	44.79
Cooling Medium Package	UQ-512401-01	26.8	1.000	26.8	26.81	17.04	48.23
Heating Medium Package & Piping	UQ-512501-01	44.9	0.965	43.3	31.81	23.90	46.56
Process Gas Module 'C'	UQ-122309	12.3	0.650	8.0	79.28	31.85	48.86
Process Gas Module 'B'	UQ-122307	12.3	0.650	8.0	79.28	16.85	48.86
Process Gas Module 'A'	UQ-122305	12.3	0.650	8.0	79.28	2.06	48.86
Industrial Water System Piping		49.1	1.000	49.1	56.39	0.00	43.00
Process Content				1668.6	78.65	-11.65	43.74

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### 1.6.6 Mooring & Riser Loads

The unit has been designed to support the following vertical mooring line and riser hang-off load components at Roncador Field, i.e. no environmental loading included.

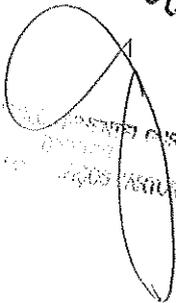
#### 1.6.6.1 Mooring Line Vertical Loads (Pre-tension only)

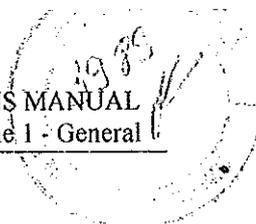
Vertical Mooring Forces	ID	Line Tension (M.T)	Top Angle (Deg)	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
Mooring Line (Winch 8)	P1	140.0	49.87	107.0	24.63	-38.00	18.29
Mooring Line (Winch 7)	P2	140.0	49.52	106.5	28.19	-38.00	18.29
Mooring Line (Winch 6)	P3	140.0	49.26	106.1	31.75	-38.00	18.29
Mooring Line (Winch 5)	P4	140.0	48.88	105.5	35.31	-38.00	18.29
Mooring Line (Winch 4)	P5	140.0	45.35	99.6	81.02	-38.00	18.29
Mooring Line (Winch 3)	P6	140.0	45.82	100.4	84.58	-38.00	18.29
Mooring Line (Winch 2)	P7	140.0	46.31	101.2	88.14	-38.00	18.29
Mooring Line (Winch 1)	P8	140.0	47.00	102.4	91.70	-38.00	18.29
Mooring Line (Winch 9)	S1	140.0	52.93	111.7	24.63	38.00	18.29
Mooring Line (Winch 10)	S2	140.0	53.20	112.1	28.19	38.00	18.29
Mooring Line (Winch 11)	S3	140.0	53.33	112.3	31.75	38.00	18.29
Mooring Line (Winch 12)	S4	140.0	53.42	112.4	35.31	38.00	18.29
Mooring Line (Winch 13)	S5	140.0	53.36	112.3	81.02	38.00	18.29
Mooring Line (Winch 14)	S6	140.0	53.51	112.6	84.58	38.00	18.29
Mooring Line (Winch 15)	S7	140.0	53.54	112.6	88.14	38.00	18.29
Mooring Line (Winch 16)	S8	140.0	53.45	112.5	91.70	38.00	18.29
Vertical Mooring Forces				1727.2	57.85	1.54	18.29

Note:

The above tensions are based on 140 te line pre-tension at Roncador Field Location

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1.6.6.2 Riser Bundles – Static Vertical Loads

Connected Risers	ID	Weight (M.T)	LCG (m)	TCG (m)	VCG (m)
P-1-10	N1,N2,N3	163.5	24.34	-15.27	8.80
P-1-16	N4,N5,N6	163.5	24.34	-12.27	8.80
P-1-08	N7,N8,N9	163.5	24.34	14.75	8.80
FUTURE	N10,N11	109.7	24.34	17.37	6.50
<b>Separator</b>					
I-1-01	E1,E2	108.6	41.26	18.57	6.22
P-1-09	E3,E4,E5	166.0	43.64	18.57	6.32
P-1-13	E6,E7,E8	166.0	46.64	18.57	6.32
LOC A	E9,E10,E11	166.0	49.64	18.57	6.32
P-1-04	E12,E13,E14	166.0	52.64	18.57	6.32
I-1-03	E15,E16	108.6	55.26	18.57	6.22
I-1-04	E17,E18	108.6	57.26	18.57	6.22
P-1-07	E19,E20,E21	166.0	59.64	18.57	6.32
P-1-18	E22,E23,E24	166.0	62.64	18.57	6.32
P-1-12	E25,E26,E27	166.0	65.64	18.57	6.32
P-1-19	E28,E29,E30	166.0	68.64	18.57	6.32
P-1-01	E31,E32,E33	166.0	71.64	18.57	6.32
<b>Separator</b>					
I-1-05	S1,S2	108.6	92.44	15.13	29.25
P-1-05	S3,S4,S5	166.9	92.44	12.75	29.25
P-1-11	S6,S7,S8	166.9	92.44	9.75	29.25
P-1-17	S9,S10,S11	166.9	92.44	6.75	29.25
P-1-06 (M/Fld) Riser 6"	S12	93.8	92.44	5.00	29.25
P-1-14 (M/Fld) Riser 6"	S13	93.8	92.44	3.50	29.25
P-1-03 (M/Fld) Riser 6"	S14	93.8	92.44	2.50	29.25
Inj. Quim. (M/Fld) Riser UMB6"	S15	14.4	92.44	1.50	29.25
Service Manifold Riser 4"	S16	51.9	92.44	0.50	29.25
Control Umb (M/F) Riser UMB12"	S17	21.1	92.44	-0.50	29.25
Gas Lift Riser 6"	S18	72.3	92.44	-1.50	29.25
P-1-20 (M/Fld) Riser 6"	S19	93.8	92.44	-2.50	29.25
P-1-02 (M/Fld) Riser 6"	S20	93.8	92.44	-4.00	29.25
P-1-15 (M/Fld) Riser 6"	S21	93.8	92.44	-5.00	29.25
I-1-02	S22,S23	108.6	92.44	-6.87	29.25
FUTURE (WI) FI/I1	S24,S25	108.6	92.44	-8.87	29.25
SPARE (FI / LOC H)	S26,S27,S28	166.9	92.44	-11.25	29.25
SPARE (RJS-513)	S29,S30,S31	166.9	92.44	-14.25	29.25
Optical Cable	S32	11.6	92.44	-16.00	29.25
<b>Separator</b>					
SPARE	W1	0.0	0.00	0.00	0.00
SCR-GAS Riser 10" RG-02	RG-2	150.9	71.63	-36.29	6.00
Electr. Cable	W3	25.8	62.17	-18.57	6.50
FUEL GAS - FSO Riser 6" RG-01	W4	72.3	61.17	-18.57	6.18
OIL C - EXPORT Riser 10" RO-03	W5	144.9	53.59	-18.57	6.50
OIL B - EXPORT Riser 10" RO-02	W6	144.9	52.29	-18.57	6.50
SCR - OIL EXPORT Riser 10" RO-01	RO-1	198.2	48.77	-36.29	6.00
<b>Separator</b>					
Connected Risers		5051.6	66.26	2.77	15.15

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### 1.6.7 Colour Coding for Pipework

Colour Coding of Pipes is as per the Petrobras Paint & Cathodic Protection Specification (ET-3010.38-1200-940-PPC-002) and the original Fincantieri Operations Manual (section 1.2.6).

All existing pipe work with the exception of Process piping remains as per the Fincantieri Pipe Colour Code. All new piping and existing process piping is painted as per the revised Brasoil Specification.

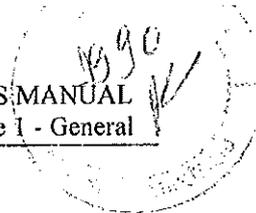
#### 1.6.7.1 Existing Pipework Colour Codes

For existing pipework the systems are coloured coded using the following method:

- coloured circumferential self adhesive bands with the band colour in accordance with the following table and the product identifier in accordance with the relevant P & ID.
- Colour bands have a white arrow indication the direction of flow with black text for non-sour service and red text for sour service.
- The colour bandings are placed along each pipe at 3000mm pitch in congested areas and 6000mm pitch on long free pipe runs i.e. pipe racks.
- All colours are standard colours in accordance with BS-4800 as shown in the following tables.

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**BS-4800 Pipework Colour Codes**

Text		Service	Existing Band Colour (BS-4800)
Red	Black		
	AC	Combustion Air	Light Blue
	AI	Instrument Air	Light Blue
	AU	Utility Air	Light Blue
	BB	Bulk Barites	Black
	BC	Bulk Cement	Black
	BM	Bulk Oil Based Mud	Black
	CA	Anifoam	Violet
	CB	Scale Inhibitor	Violet
	CC	Polyelectrolyte	Violet
	CD	Oxygen Scavenger	Violet
	CE	Biocide	Violet
	CF	Hydrate Inhibitor	Violet
	CG	Demulsifier	Violet
	CH	Hypochlorite	Violet
	CM	Chemical Inj. Methanol	Violet
	CO	Carbon Dioxide	Yellow
CPX		Process Condensate	Yellow
DCX		Closed Drain	Black
	DM	Mud Drain	Black
	DO	Open Drain	Black
	EX	Engine Exhaust	Yellow
	FD	Diesel Fuel	Brown
FHX		HP Flare	Yellow
	FK	Kill Fluid	Black
FLX	FL	LP Flare	Yellow
	FM	Heating Medium	Green
GFX		Fuel Gas	Yellow
	GI	Inert Gas	Yellow
GLX	GL	Glycol	Violet
GPX		Process Gas	Yellow
	HA	Halon	Yellow
OCX		Crude Oil	Brown
	OH	Hydraulic Oil	Brown
	OL	Lube oil	Brown
OSX	OS	Seal oil	Brown
PHX		HP Wellhead Production	Brown
PLX		LP Wellhead Production	Brown
PTX		Test Wellhead Production	Brown
	RF	Freon Refrigerant	Yellow
	RP	Propane Refrigerant	Yellow
VAX	VA	Atmospheric Vent	Yellow
	WC	Cooling Medium	Green
	WD	Fresh Water	Green
	WF	Fire Water	Red
	WO	Produced Water	Green
	WI	Injection Water	Green
	WP	Potable Water	Green
	WS	Sea Water	Green

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1.6.7.2 New Pipe Colour Codes

For new pipe work the system used is in accordance with Brasoil Specifications using the following methods:

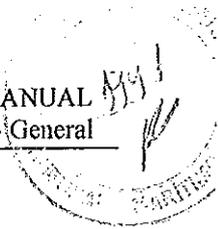
Painted colour strips (3 x 50 mm) are provided each 9 metres length and wherever necessary for piping identification (branches, valves, bulkheads etc), as follows:

Network or Fluid	Function or Feature	2 <sup>nd</sup> Strip	1 <sup>st</sup> & 3 <sup>rd</sup> Strip
Firefighting	Salt Water Foam CO <sub>2</sub>	Petrobras Green Aluminum Safety Orange	Safety Red (see note 2)
Flammables and Fuels	Diesel Helicopter Fuel Petroleum Gas Petroleum	Dark Brown Safety Orange White Black	Aluminum (see note 2)
Non-Flammables	Lubricant Dirty Lubricant HP Hydraulic Fluid LP Hydraulic Fluid	Dark Brown Black Safety Red Safety Blue	Petrobras Yellow
Chemical Products	General Sodium Hypochlorite	Safety Orange Petrobras Green	Safety Orange
Fresh Water	Potable Cooling Hot General Service	Safety Blue White Safety Red Dark Brown	White
Bilge or Drainage	General Sanitary Sewage	Black Safety Orange	Petrobras Green
Compressed Air	General Service High Pressure For Bulk System Instrumentation VAC Ducts	Safety Blue Safety Red White Petrobras Yellow White	Safety Blue

Notes

1. All piping, exception for fire fighting, flammable and fuels are painted as surroundings
2. Fire fighting, flammable and fuels piping are painted full length with the 1<sup>st</sup> colour with a single 2<sup>nd</sup> colour strip
3. The use of colour adhesive tapes in lieu of painted strips shall not be allowed.

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### 1.6.8 General Arrangements & Layouts

The following drawings are attached for information:

Plot Plan Starboard Side Elevation	DE-3010.38-1200-200-AMK-001
Plot Plan Aft Elevation	DE-3010.38-1200-200-AMK-002
Plot Plan Above Main Deck	DE-3010.38-1200-200-AMK-004
Plot Plan Main Deck	DE-3010.38-1200-200-AMK-005
Plot Plan Second Deck	DE-3010.38-1200-200-AMK-006
Plot Plan Tank Top	DE-3010.38-1200-200-AMK-007
Plot Plan Columns and Riser Plans	DE-3010.38-1200-200-AMK-008
Plot Plan Columns	DE-3010.38-1200-200-AMK-011
Plot Plan Lower Hull & Columns	DE-3010.38-1200-200-AMK-012
Plant Layout Above Main Deck	DE-3010.38-1200-200-AMK-107
Plant Layout Main Deck Aft Port	DE-3010.38-1200-200-AMK-108
Plant Layout Main Deck Aft Starboard	DE-3010.38-1200-200-AMK-109
Plant Layout Main Deck Fwd Starboard	DE-3010.38-1200-200-AMK-110
Plant Layout Main Deck Fwd Port	DE-3010.38-1200-200-AMK-111
Plant Layout Tank Top Aft Starboard	DE-3010.38-1200-200-AMK-112
Plant Layout Tank Top Aft Port	DE-3010.38-1200-200-AMK-113
Plant Layout Riser Platform Fwd Port	DE-3010.38-1200-200-AMK-114
Plant Layout Riser Platform Fwd Stbd	DE-3010.38-1200-200-AMK-115
Plant Layout Riser Platform Aft Port	DE-3010.38-1200-200-AMK-116
Plant Layout Riser Platform Aft Stbd	DE-3010.38-1200-200-AMK-117
Plant Layout Second Deck Fwd Port/Stbd	DE-3010.38-1200-200-AMK-118
Plant Layout Second Deck Aft Port	DE-3010.38-1200-200-AMK-119
Plant Layout Second Deck Aft Stbd	DE-3010.38-1200-200-AMK-120

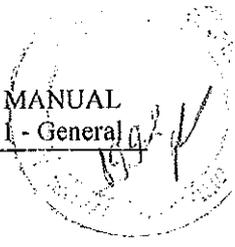
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Plot Plan Starboard Side Elevation, DE-3010.38-1200-200-AMK-001, D

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Plot Plan Aft Elevation, DE-3010.38-1200-200-AMK-002, D

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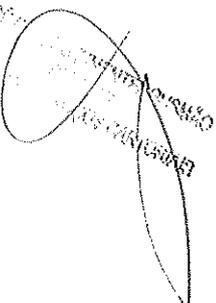
JOSE CARLOS PIMENTEL GUSMÃO  
DIRETOR/  
DIVISÃO DE SERVIÇOS CARTORIAIS

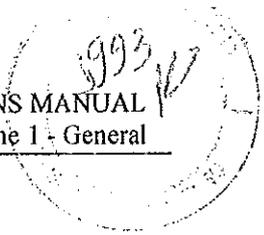
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Plot Plan Above Main Deck, DE-3010.38-1200-200-AMK-004, D

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OPERATIONS MANUAL  
DE-3010.38-1200-200-AMK-004





Plot Plan Main Deck, DE-3010.38-1200-200-AMK-005, D

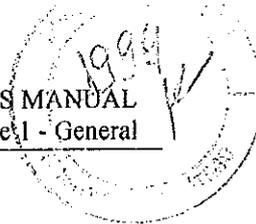
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Plot Plan Second Deck, DE-3010.38-1200-200-AMK-006, D

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Plot Plan Tank Top, DE-3010.38-1200-200-AMK-007, D

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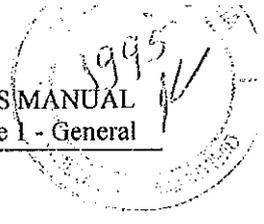
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Plot Plan Columns and Riser Plans, DE-3010.38-1200-200-AMK-008, D

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Plot Plan Columns, DE-3010.38-1200-200-AMK-011, D

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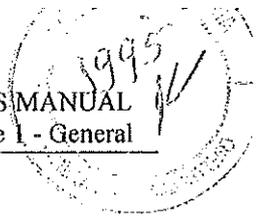
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CARTÓRIO DE REGISTRO DE IMÓVEIS DO MUNICÍPIO DE SÃO PAULO

Plot Plan Lower Hull & Columns, DE-3010.38-1200-200-AMK-012, D

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DEPT. DE RESÍDUOS SÓLIDOS





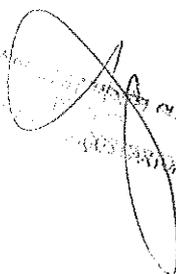
Plot Plan Columns, DE-3010.38-1200-200-AMK-011, D

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DIVISÃO DE PATENTES  
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Plot Plan Lower Hull & Columns, DE-3010.38-1200-200-AMK-012, D

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Plant Layout Above Main Deck, DE-3010.38-1200-200-AMK-107, C

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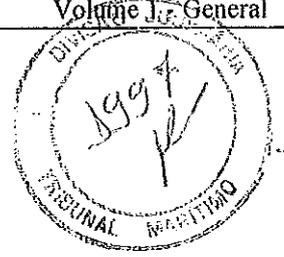
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Plant Layout Main Deck Aft Port, DE-3010.38-1200-200-AMK-108, C

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Plant Layout Main Deck Aft Starboard, DE-3010.38-1200-200-AMK-109, C



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Plant Layout Main Deck Fwd Starboard, DE-3010.38-1200-200-AMK-110, C

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BY: [Signature]  
DIVISION: [Signature]



Plant Layout Main Deck Fwd Port, DE-3010.38-1200-200-AMK-111, C

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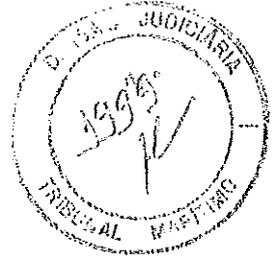
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Plant Layout Tank Top Aft Starboard, DE-3010.38-1200-200-AMK-112, C

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DIVISÃO DE ENGENHARIA

Plant Layout Tank Top Aft Port, DE-3010.38-1200-200-AMK-113, C

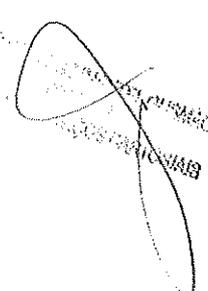


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DIVISÃO DE REGISTRO E ARQUIVAMENTO

Plant Layout Riser Platform Fwd Port, DE-3010.38-1200-200-AMK-114, C

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DIVISION

Plant Layout Riser Platform Fwd Stbd, DE-3010.38-1200-200-AMK-115, C



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Plant Layout Riser Platform Aft Port, DE-3010.38-1200-200-AMK-116, C

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DIVISÃO DE PRODUÇÃO

Plant Layout Riser Platform Aft Stbd, DE-3010.38-1200-200-AMK-117, C



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PROCURADOR GERAL DO QUARZO  
DIVISÃO JUDICIÁRIA  
TRIBUNAL MARÍTIMO



Plant Layout Second Deck Fwd Port/Stbd, DE-3010.38-1200-200-AMK-118

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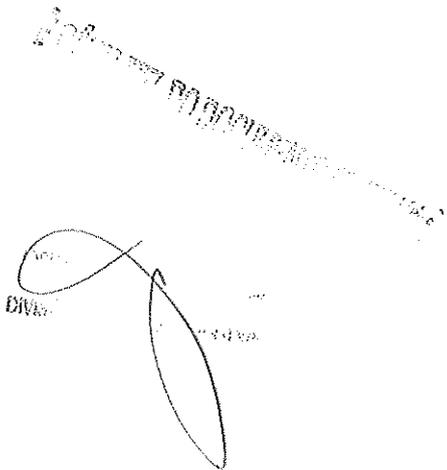
Plant Layout Second Deck Aft Port, DE-3010.38-1200-200-AMK-119, C



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Plant Layout Second Deck Aft Stbd, DE-3010.38-1200-200-AMK-120, C



## 1.7 GLOSSARY

The following general abbreviations are used throughout this Manual. Other abbreviations are included in the relevant Volumes of the Manual.

ABS	American Bureau of Shipping
AMEC Process & Energy Ltd	Process Equipment Designers
Brasoil/Petrobras	Operator/Charterer of the P36
FPU/Unit	Floating Production Unit P36
IMO	International Maritime Organisation
MMM	Ministero Marina Mercantile
Noble Denton Europe Ltd	Naval Architects/Structural Designers
RINA	Registro Italiano Navale
SANA s.P.a	Owners Representative



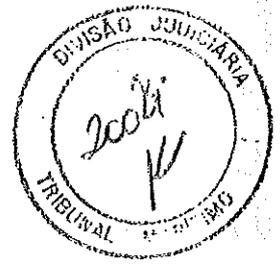
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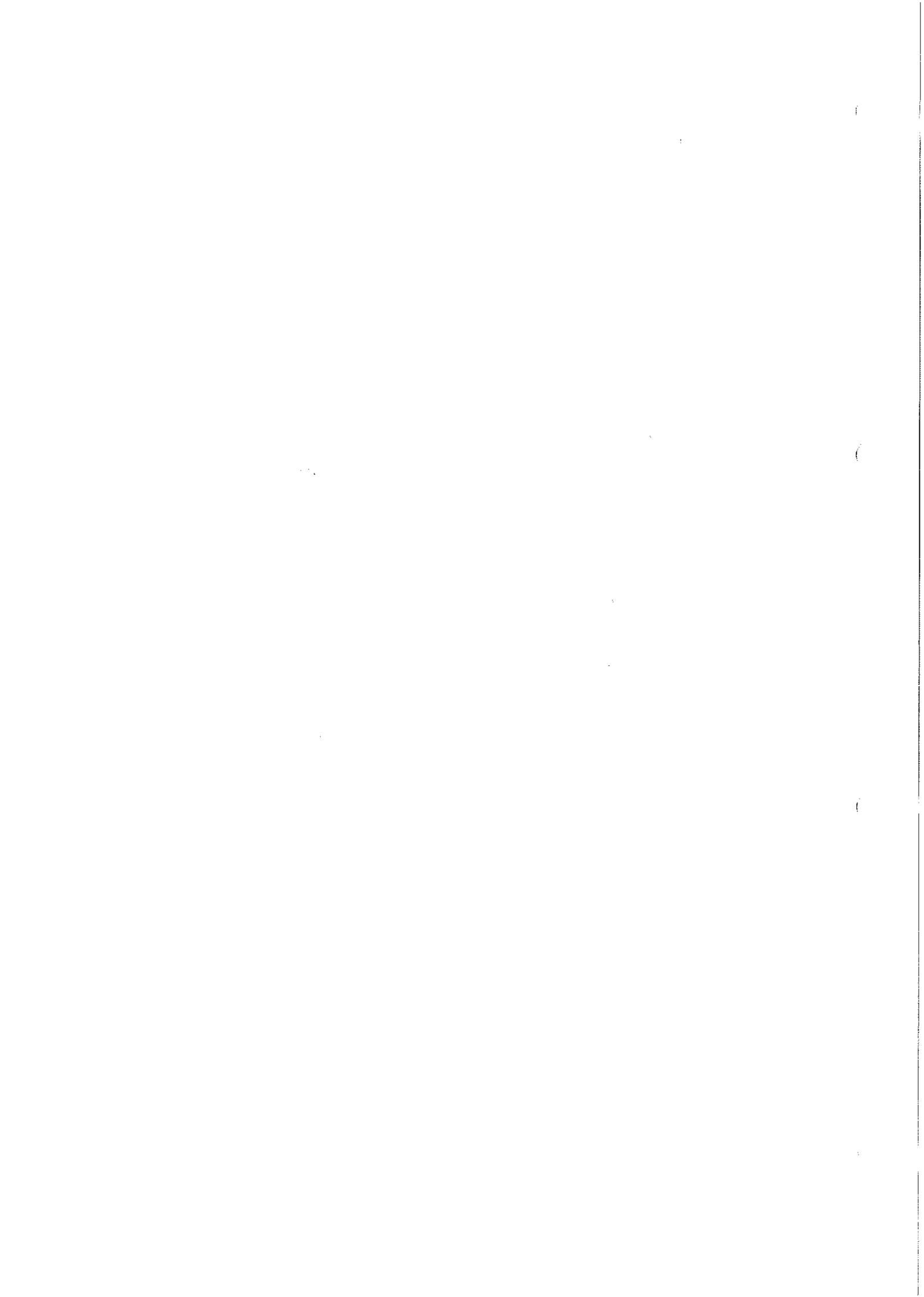


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**REVISION CHANGE NOTICES**

Rev.	Location Changes	Brief Description of Change

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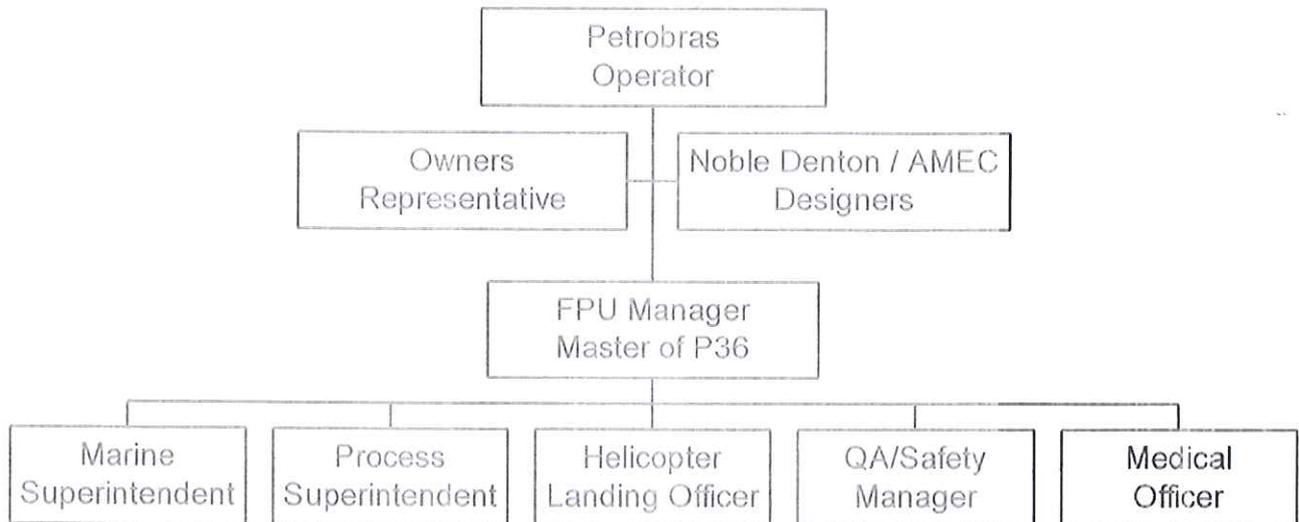
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## 2.1 ORGANISATION

The following organisation is maintained onboard the P36:

Organisation of FPU Petrobras-36



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### 2.1.1 Onshore Base Organisation – Contact Details



#### *Onshore Organisation*

SANA S.p.A

Telephone:

Fax:

SANA's Operations Manager

Telephone:

Mobile Tel:

Private Tel:

Fax:

#### *Base Organisation*

Base .....

Telephone:

Fax:

Base Operations Manager

Telephone:

Mobile Tel:

Private Tel:

Fax:

*The full personnel details that are required to be advised by Petrobras and/or the Owner*

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2.1.2 Onboard Organisation - Names of Superintendents and Telephone Numbers

FPU Manager	Name:
	Telephone:
Marine Superintendent	Name:
	Telephone:
Maintenance Superintendent	Name:
	Telephone:
Production Superintendent	Name:
	Telephone:
Catering Superintendent	Name:
	Telephone:



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### 2.1.3 Duties and Responsibilities in Daily Operations

The following pages give a general description of how the main responsibilities and duties are distributed between the various departments onboard.

#### 2.1.3.1 FPU Manager

##### *GENERAL*

The FPU Manager has the ultimate authority and responsibility for the unit and the personnel onboard. He is the Owner's Representative onboard.

##### *Description*

The following personnel are part of the FPU Manager's staff and will report directly to him:

- Superintendents
- Radio Operator
- Medical Clerk

##### *Authority and Responsibility*

The FPU Manager has the overall responsibility for the safety of the unit. This includes the daily general safety for the unit and well being of all personnel, as well as the general preparedness of the emergency organisation onboard and the immediate handling of emergencies. He has the authority and should be prepared to act on his own initiative in case of emergency situation, after first having consulted with the superintendents and/or any other department head depending on the nature of the emergency.

It is the FPU Manager's duty to actively promote and encourage a good relationship between the different sections onboard, as this is of great importance to the overall performance of the unit.

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### 2.1.3.2 Marine Section

#### *General*

This section, headed by the Marine Superintendent, is in charge of all ballast operations, loading, unloading and the daily external maintenance of safety and marine equipment of the P36. It should always be remembered that the main activity of P36 is the production of hydrocarbons. Therefore maintenance planning and deployment of personnel should as far as practicable not interfere with the above mentioned activities, provided this is not in conflict with the safety of the P36 and its crew.

#### *Description*

The Marine Section consists of the following personnel:

- Marine Superintendent
- Marine Controllers
- Deck Foreman
- Deck Crew

#### *Authority and Responsibility*

The Marine Superintendent is responsible for all the activities carried out within this section, therefore he should ensure that all personnel under his supervision have the necessary qualifications and experience to carry out the work assigned to them, both from a professional and safety point of view. The Marine Superintendent is also the appointed Safety Officer and has responsibility for the safety training onboard. As Safety Officer he should promote safe working practice throughout the unit. He has the sole authority to stop unsafe work and/or bring such practices to the FPU Manager's attention.

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### 2.1.3.3 Maintenance Section

#### *General*

This section, headed by the Maintenance Superintendent, shall maintain all mechanical and electrical equipment on the Unit. The Superintendent shall ensure that all personnel within his section and under his supervision have the necessary qualifications and experience to carryout this section's activities in a safe and professional manner. Being in charge of running the maintenance system it is important that the Maintenance Superintendent communicates closely with other section leaders on the Unit, and keeps himself updated on any maintenance problems that may occur, and their solution.

#### *Description*

The Maintenance Section consists of the following Personnel:

- Maintenance Superintendent
- Senior Electrician
- Senior Mechanic
- Senior Instrumentation
- Various Technicians and Contract of Black Trades

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#### *Authority and Responsibility*

The Maintenance Superintendent has the overall responsibility for all activities within his section and is given the necessary authority to ensure that all activities are carried out in accordance with relevant legislation and safety standards.

### 2.1.3.4 Production Section

#### *General*

This section, headed by the Production Superintendent, is in charge of all production operations and the maintenance of production equipment on the unit. The production Superintendent should ensure that all personnel in his section and under his supervision have the necessary qualification and experience to carryout the production operations in a safe and professional manner.



In the event of a production emergency the Superintendent will ensure that the situation is brought swiftly and effectively under control and shall be certain that the FPU Manager is notified of the situation and kept fully informed as the incident progresses.

#### *Description*

The Production Section consists of the following personnel:

- Production Superintendent
- Shift Supervisors
- Control Room Operators
- Operators of Various Disciplines
- Laboratory Technicians

#### *Authority and Responsibility*

The Production Superintendent is responsible for all activities carried out within his section and has the necessary authority to ensure that the activity is carried out in accordance with the relevant legislation and safety standards.

### 2.1.3.5 Catering Section

#### *General*

This section, headed by the Catering Superintendent, is responsible for the ordering and preparing for the food onboard, for running the laundry and for ensuring that the living quarter are hygienic, clean and tidy.

#### *Description*

The catering section consists of the following personnel:

- Catering Superintendent
- Cooks
- Galley Crew
- Cleaners

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### *Authority and Responsibility*

The Catering Superintendent has the overall responsibility for all activities within his section and shall ensure that all personnel under his supervision have the necessary qualifications for the work assigned to them. He has been given the necessary authority to ensure that all activities within his area of responsibility are carried out in accordance with relevant legislation, safety standards and instructions,

### 2.1.3.6 *Staff Positions*

#### *a) Radio Operator*

##### *General*

The Radio operator is in charge of all radio installations, radio services and maintenance of communication equipment onboard the unit. He shall advise and assist the FPU Manager on all matters concerning radio communications.

##### *Authority and Responsibility*

The Radio Operator has the overall responsibility for radio communication on the unit. While operating he shall ensure that all such activities are in compliance with applicable provisions laid down by the Telecommunications Administration.

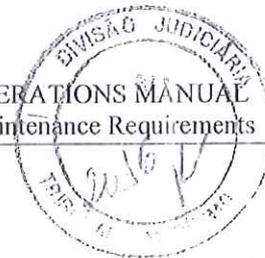
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#### *b) Medical Clerk*

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##### *General*

The Medical Clerk is in charge of the hospital and takes care of medical treatment and medical emergencies onboard the Unit. He will assist the FPU Manager in all matters of hygiene on the Unit. The Medical Clerk shall also execute secretarial tasks for the FPU Manager upon his request provided that this work is not in conflict with his/her medical duties.



### *Authority and Responsibility*

The Medical Clerk is responsible for maintaining the hospital and all related equipment in full operational status at all times. He shall ensure that work carried out complies with current standard for instructions to Medical Wardens in the Roncador Field. He shall ensure that there are always adequate supplies of medicines and medical equipment onboard.

The Medical Clerk reports to the FPU Manager. However, on medical questions he will consult and seek advise from the appointed doctor ashore.

### **2.1.4 Duties and Responsibilities in Emergency Situations**

The emergency organisation onboard the P36 is shown in the following block diagram.

For more details of the emergency organisation onboard, reference is made to Volume 6 of this manual.

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### 2.1.5 Subcontractors/Visitors

The Petrobras onshore office shall advise the FPU Manager of any subcontractors engaged to work on the Unit and any Visitors.

The Petrobras onshore office is responsible for ensuring that the FPU Manager is fully informed of the scope of work/visit for the subcontractors/visitors.

The FPU Manager is responsible for the well being of all subcontractor's personnel onboard the Unit. He also has the authority to take action if he becomes aware of any unsafe practices/operations being carried out onboard the P36 by subcontractors/visitors.

The FPU Manager is responsible for ensuring that all subcontractors/visitors are introduced to the Unit when they arrive onboard for the first time. The Marine Superintendent will take care of this introduction.

The FPU Manager is responsible for ensuring that all subcontractors/visitors are included in the protection arrangements and the working environment onboard.

The FPU Manager should make all possible efforts to resolve any disputes which may arise onboard. If an agreement cannot be reached offshore, it should be reported, in writing, to the Operations Manager at the base. The FPU Manager shall be kept informed of the outcome of the dispute.

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#### *Oil Company's Subcontractors*

Subcontractors engaged by the Oil Company shall report to the Oil Company's Representative onboard.

The FPU Manager shall not interfere with the work performed by the Oil Company's subcontractors, but he has overall responsibility for the safety of the operations. Particular attention should be paid to subcontracted diving services.

### 2.1.6 Authorities Address and Telephone Number

The FPU Manager shall ensure that his is fully conversant with all the local Government Regulations and other Authorities in the Campos Basin, and that the necessary lines of communication have been established with these authorities. Petrobras head office will plan all necessary actions, but the FPU Manager is responsible for the arrangements on board.



The following addresses may be useful:

Registro Italiano Navale (RINA)	Address	Via Corsica 12 16128 Genova Italy
	Telephone:	+3901053851
	Fax:	+39010591877
American Bureau of Shipping (ABS)	Address	ABS House 1 Frying Pan Alley London, E1 7HR, UK
	Telephone:	+44 (0)20 7247 3255
	Fax:	+44 (0)20 7247 3496
Italian Ministero Marina Mercantile (MMM)	Address	Viale Asia Rome 00100 Italy
	Telephone:	
	Fax:	

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## 2.2 SURVEY, MAINTENANCE AND SPARE PARTS SYSTEM REPORTS

### 2.2.1 Survey

The principal Survey Requirements for the Unit from RINA, ABS and Italian Ministero Marina Merchantile (MMM) are reported in the following sections.

All survey requirements are integrated in the computerised *Maintenance and Spare Parts System* as described in paragraph 2.2.2.

#### 2.2.1.1 Registro Italiano Navale (RINA) and American Bureau of Shipping (ABS)

RINA and ABS use a survey item schedule computerised printing system. The system lists all the items introduced in a continuous survey scheme by a number which is referring to a schematic plan. The schematic plan is integrated to the computerised *Maintenance and Spare Parts System* described in paragraph 2.2.2.

The plan incorporates the annual surveys of hull and machinery and the special surveys every four years.

The printing system informs the owners of all the surveys, in which RINA is involved and which will become due.

A special continuous survey scheme may be implemented to inspect the typical welded joints required by RINA as per 'Rules for Construction and Classification of MODU', Chapter 1.11.2.7 – Special Survey of the Hull. For the purpose, a specific plan is required.

#### 2.2.1.2 Italian Ministero Marina Merchantile

In order to operate in Italian waters the Unit has to comply to the rules laid down by the Ministero Marina Merchantile (MMM) and its peripheral organisation consisting in Italy of regional Maritime Directorates. Abroad the function of MMM is delegated to Italian embassies and consulates.

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According to laws in force MMM make general supervisory actions in order to verify that the Unit is always complying to National laws and regulations and to international conventions signed by the Italian Government.

Technical Matters are generally delegated to RINA which has its own survey scheme as outlined in the previous section.

MMM issue directly the following certificates / requirements which are to be fulfilled:

<i>Item:</i>	<i>Expiration:</i>
Manning Requirements	No expiration ✓
Safety Equipment Certificate	Annual and Bi-Annual Survey Required
Ship's Services Certificate	Annual Survey Required
Accommodation Certificate	Six-month Survey Required
RT Safety	Annual Survey Required ✓

In due time the Owner must apply for renewal of the above mentioned certificates.

Any accident and/or event that may alter the class position of the Unit, as well as any accident involving personnel injuries must be notified to Italian Maritime Authority in Italian waters or to Italian embassies or consulates abroad. Entries shall be made in the log book.

### 2.2.1.3 Portomartec

Details to be advised by Petrobras

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### 2.2.2 Maintenance and Spare Part System

The planned maintenance and spare part system is a computerised system – WINPCS.

The system is 'menu orientated' and help texts are available on the screen throughout the system.

The system is available only for dedicated personnel who have been authorised to operate the system. For further details refer to the Maintenance Management Manual and the system user's handbook.

The Maintenance Superintendent is in charge for the functioning of all computerised maintenance and spare part systems onboard.

The system consists of the following modules:

1. Equipment Register
2. Spares Register
3. Maintenance System
4. Technical Specifications
5. Budgeting
6. Statistics
7. Requirements from Authorities and Classifications Institutions.

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## 2.2.3 Reports

### 2.2.3.1 General

The operation of the P36 is a complex one, and as with any other operation, many reports and documentation are required to meet Company and Government Regulations. These reports are of extreme importance to the overall operation and continuous effort must be extended to maintain a high quality of reporting. It is the appropriate supervisor's responsibility to monitor the reports and maintain an acceptable standard.

The reports are separated into three categories: daily, weekly and others. The following paragraphs give a general guideline for main reports which can/must be made (if required from Company and/or Government regulations/specifications).

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### 2.2.3.2 Daily Reports

Dept.	Report	Responsibility
MARINE	Morning Report	Part related to Marine Operations to be filled in by the Marine Superintendent and <u>faxed to shore base</u>
MARINE	Daily Operations	To be filled in by FPU Manager and distributed to shore base, SANA's office and operators
MARINE	Stability Report	To be filled in by Marine Supt. to shore base, SANA's office and operators
OTHER	Personnel Onboard List	Radio Operator to prepare this list and send it to shore base by fax.
OTHER	Working Hours Log	Radio Operator to fill in this list each day and send it to the operators and shore monthly
OTHER	Daily Detailed Log of Issues	To be filled in by the Materials Man and given to each section supt. onboard for follow-up of spare parts in store.



2.2.3.3 Weekly Reports

Dept.	Report	Responsibility
MARINE	Weekly Safety Equipment Checklist	To be completed weekly by the Marine Supt. and filed onboard
OTHER	Hygiene Report	To be completed by Medical Clerk. One copy to be sent to shore base, one copy to Petrobras doctor, if required.

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2.2.3.4 Other Reports

Dept.	Report	Frequency	Fig	Responsibility
MARINE	Mooring Report	Monthly		To be filled in by the FPU Manager. One copy to shore base
MARINE	Oil Spill Report	Incident		To be filled in by FPU Manager. One copy to be sent to shore base. If spill greater than one tonne, the RCC shall be notified immediately
OTHER	Non-conformance Report	Incident		To be completed by Management onboard when informed of or discovering a deviation to regulations, contract or QA requirements
OTHER	Corrective Action Request	Incident		To be completed by Management onboard when informed of or discovering a deviation to regulations, contract or QA requirements
OTHER	Equipment Damage/Failure Report	Incident		To be filled in by relevant section leader. One copy to shore base, one copy to operators rep. if required.
OTHER	Accident Report	Incident		To be completed by Medical Clerk, injured person and accident investigation committee in cooperation.
OTHER	Near Miss accident Report	Incident		To be completed by relevant section supt. when informed of or witnessing a near miss accident within his area of responsibility.
OTHER	Monthly report of working hours	Monthly		To be filled in by Radio Operator based on the working hours log. One copy to be sent to shore base.

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#### 2.2.3.5 Log Books

In addition to the listed reports, also the following logbooks must be kept in accordance with the regulations:

- Ship's Inventory Book
- Captain Log
- Navigation Log
- Engine Room Log
- Oil Record Book
- Radiotelegraphy Log
- Radiotelephony Log
- Radio Battery Log
- Crane Log Book
- Potable Water Log Book

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Petrobras 36 FPU  
Roncador Field

Daily Operations Report  
From 0000 to 2359

Date:

Weather Information	Production Activities
Helicopter Services	Safety & Accident Report
Remarks	

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**Petrobras 36 FPU**  
**Roncador Field**

**Stability Report**

Date:

Item	Weight tonnes	LCG from FP	TCG m from CL	VCG m	FSCT m	FSCL m
Lightship						
Drill Water Tanks						
Potable Water Tanks						
Fuel Oil						
Diesel Oil						
Lub Oils						
Miscellaneous Tanks						
Non Structural Tanks						
Crew & Stores @ Tank Top						
Crew & Stores @ 2nd Deck						
Crew & Stores @ Main Deck						
Helicopter & Laydown Areas						
Process Content						
Vertical Mooring Tensions					-	-
Chain Onboard					-	-
Connected Riser Loads					-	-
SW Ballast						
Displacement						

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**HydroStatic Properties**

**Statical Stability**

MEAN DRAFT (m)
LCB (from FP) (m)
TCB (+ve Stbd) (m)
VCB (USK) (m)
LCF (from FP) (m)
TCF (+ve stbd) (m)
MCHC (m)
MCTC (m)
TPC (m)

Corrected VCG (m)
KMT / KML (m)
GMT / GML (m)

**Stability Margin**

Allowable VCG (m)
Stability Margin (m)





**Petrobras 36 FPU**  
**Roncador Field**

**Working Hours Log**

Date:

Month	1A	2A	3A	4A	1B	2B	3B	4B	Total POB
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
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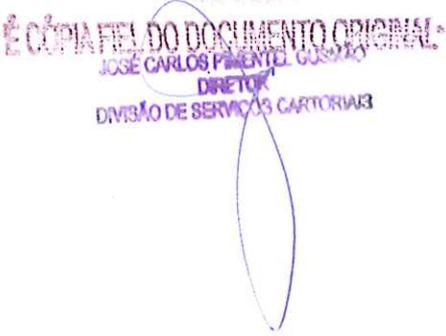
Categories/Distribution  
 of Personnel Onboard

		Crew	SANA Rep	Sub-Contractor
Production Operations	1A			
Catering	2A			
Operations & Maintenance	3A			
Administrative	4A			
Production Operations	1B			
Catering	2B			
Operations & Maintenance	3B			
Administrative	4B			

Petrobras 36 FPU  
 Roncador Field

Detailed Daily Log of Issues

Date:  
 Log No  
 Page of

Item	Company Stock Number	Requisition	Status	Quantity		Description	Name	Dept
				Used	Stock			
								



MA-3010.38-1320-915-NBD-909102



**Petrobras 36 FPU**  
**Roncador Field**

**Weekly Safety Equipment Check List**

Date:

Lifeboats			
Location	Engine Run	Winch Run	Equipment Check
Forward			
Aft			
Port			
Starboard			

Life Rafts, Life buoys & Rope Ladders			
Location	Condition	Location	Condition

Personnel Transfer Net		First Aid Kits	
Paint Storage Locker		Condition of Life Preservers	
No. of Life Preservers v POB		Breathing Apparatus	
Safety Signs		Fire Blanket	
General Alarm		Resuscitator Apparatus	
Gas Indicator		Safety Goggles	
Fire hoses		Oily Rag container	
Conducted Fire Drill		Emergency Lights	
Safety Hats & Shoes		Weekly Safety Meeting	
Helicopter Safety Box		Emergency Radio Equipment	
Helicopter Fuel Control		Fire Extinguishers	
Helideck with Lights			

Remarks:

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Area \_\_\_\_\_ Date \_\_\_\_\_  
 INSPECTED BY \_\_\_\_\_



**Petrobras 36 FPU**  
**Roncador Field**

**Weekly Hygiene Report**

Date:

Catering Company
Catering Section Leader

Last Water Sample Taken
Last Bacteriologic Water Sample Taken

Cleanliness	Acceptable		Remarks
	Yes	No	
Galley			
Mess Room			
Heat Handling Room			
Dry Store			
Refridgerated Store			
Freezer			
Cabins			
Toilets			
Showers			
Changerooms			
Laundry			
Hospital			
Offices			
Gymnasium			
Catering Standard			
Personal Hygiene (Catering Staff)			
Food			
Dishes & Galley			
Utensils			
Temp in Dishwashers			

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Signed (Medical Clerk)	Date:
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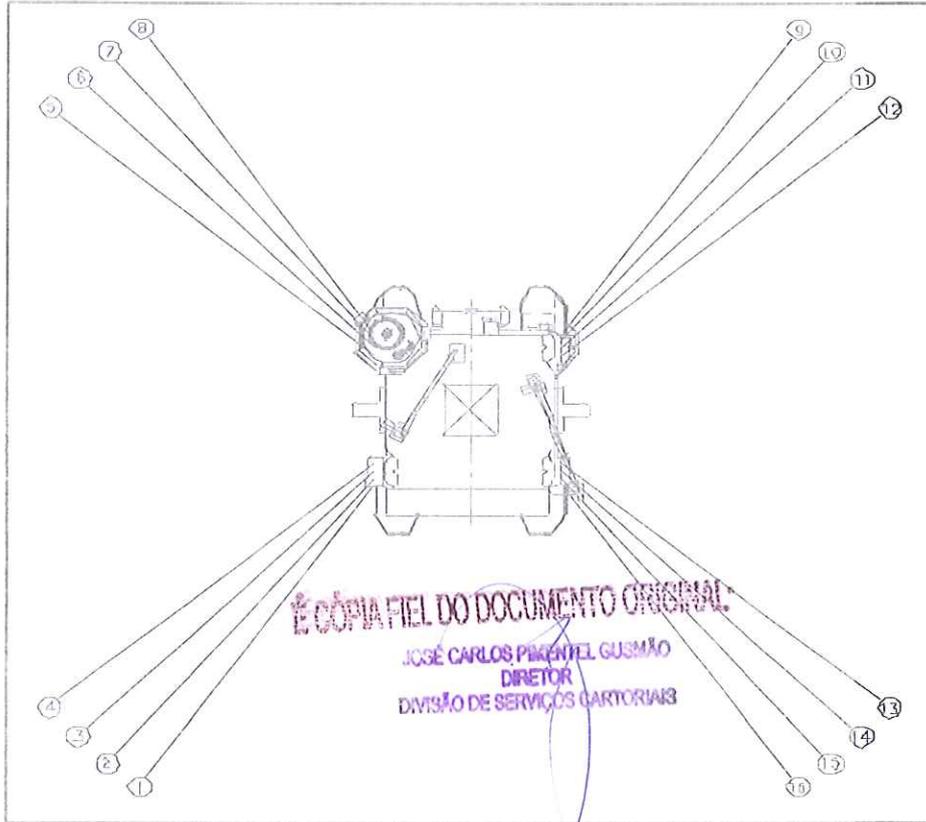
Comments by Rig Management  Date: Platform Manager
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**Petrobras 36 FPU  
 Roncador Field**

**Monthly Mooring Report**

Date:



Line	Max Tension	Average Tension
Port 8		
Port 7		
Port 6		
Port 5		
Port 4		
Port 3		
Port 2		
Port 1		

Line	Max Tension	Average Tension
Stbd 9		
Stbd 10		
Stbd 11		
Stbd 12		
Stbd 13		
Stbd 14		
Stbd 15		
Stbd 16		

Max Offset (Wind Wave )  
 Worst Unit Heading

Remarks



**Petrobras 36 FPU  
Roncador Field**

**Oil Spill Report**

Pollution Occurred	Date
	Time
Pollution Discovered	Date
	Time
Position	
Data Regarding the Pollution	
Reason for Pollution	
Name of Operator	
Signature of FPU Manager	
Note: If amount of Pollution is more than 1 ton, RCC to be notified immediately	
Distribution of this Form: FPU Manager, Base Office	

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



**Petrobras 36 FPU  
 Roncador Field**

**Non-Conformance Report /  
 Corrective Action Report**

Info Copies to  Authorities (Specify)  Operator  Other (Specify)

Subject	Date of Issue	Doc. No.
Identification of Item		
Reference Document/Standard		
Location		
Description of non-Conformance		
Recommended Corrective Action		
Position & Sign. Of Originator	FPU Manager Sign.	Deadline for Reply

Filled in by Responsible Person who is:

Responsible Person Signature of Receipt	Date:	
Corrective Actions to be Performed		
Planned Date for Implementation	Responsible Person Sign.	Date:
Performed Corrective Action	Responsible Person Sign.	Date Completed
Comments / Follow-up		



Petrobras 36 FPU  
 Roncador Field

Report of Equipment

- FAILURE
- DAMAGE
- LOSS

Date Occurrence	Weather Conditions	
	Wind:	
Location	Sea	
	Swell	
	Visibility	
Damage to Unit		
Damage to other Property		
Description of Incident		
Cause of Incident		
<p><b>É CÓPIA FIEL DO DOCUMENTO ORIGINAL</b>                  JOSÉ CARLOS PIMENTEL GUSMÃO                  DIRETOR                  DIVISÃO DE SERVIÇOS CARTORÁRIOS</p>		
Any Personnel Injured?		
Any Person / Equipment at Fault		
Action to Avoid Recurrence		
Any witnesses? (Name, Company, Address & brief statements to be attached)		
Report Prepared By:		



**Petrobras 36 FPU  
 Roncador Field**

**Accident Report  
 Report No.**

Person Involved		
Name	DOB	Employer
Position	Experience in Position	
	<input type="checkbox"/> Less than 1 year	<input type="checkbox"/> Less than 2 year <input type="checkbox"/> More than 2 yea

Information about the Accident	<p><b>É CÓPIA FIEL DO DOCUMENTO ORIGINAL</b>                  JOSÉ CARLOS PARENTE GUIMARÃES                  DIRETOR                  DIVISÃO DE SERVIÇOS CARTÓFIAB</p>	
Description of Injury		
How did the Accident Happen		
Precautions		
Reason for Accident		
Preventative Measures		
Safety Officer's Comments		
Accident Investigation Committee's Sign.		
	FPU Manager	Injured Persons Supervisor
	Safety Officer	Injured Persons VO

Distribution:

Original:	Base Office - Onshore	<input type="checkbox"/> A - Less Serious to Personnel / Environment
Blue Copy:	FPU Manager	<input type="checkbox"/> B - Serious to Personnel / Environment (Cronic Injury)
Yellow Copy:	Injured Persons VO	<input type="checkbox"/> C - Very Serious to Personnel / Environment (Death)
Red Copy:	Operator	



**Petrobras 36 FPU  
 Roncador Field**

**Near Miss Accident Report**

Date of Incident	Time of Incident	Report No.
Name & Position of Persons Involved		Employers
Tasks that the Involved Person(s) performed when incident occurred		
Description of the Incident		
<p><b>É CÓPIA FIEL DO DOCUMENTO ORIGINAL</b>                  JOSÉ CARLOS PIMENTEL GUSMÃO                  DIRETOR                  DIVISÃO DE SERVIÇOS CARTORÁRIOS</p>		
Probable Cause of Incident		
Action to Avoid Recurrence		
Incident Reported By: (Sign/Date)		
Report Prepared By (Sign/Date)		
Approved By (Sign/Date) FPU Manager		



Petrobras 36 FPU  
 Roncador Field

Monthly Report of Working hours  
 Month:

Month	1A	2A	3A	4A	1B	2B	3B	4B	Total POB
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									
26									
27									
28									
29									
30									
31									

É CÓPIA FIEL DO DOCUMENTO ORIGINAL  
 JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORÍARIOS

Categories/Distribution  
 of Personnel Onboard

		Crew	SANA Rep	Sub-Contractor
Production Operations	1A			
Catering	2A			
Operations & Maintenance	3A			
Administrative	4A			
Production Operations	1B			
Catering	2B			
Operations & Maintenance	3B			
Administrative	4B			



### 2.3 CERTIFYING AUTHORITY REQUIREMENTS

No.	Certificate	Date of Expiry	Remarks
1.	Registry		
2.	Classification (Hull)		Subject to Annual Survey
3.	Classification (Machinery)		Subject to continuous machinery survey system operated by RINA
4.	Certificate of Fitness		Subject to Annual Survey
5.	Safety Radiotelegraphy		Subject to Annual Survey
6.	International Load Line		Subject to Annual Survey
7.	Safety Equipment		Subject to Annual Survey
8.	Safety Construction		
9.	International Tonnage Certificate		
10.	Annual Survey of Cargo Gear		
11.	Quadrennial Survey		
12.	Ships Radio Licence		
13.	Coast Guard Inspection		Subject to Annual Survey
14.	Certificate of Examination		

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PINHEIRO GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORÍARIOS

JOB HISTORY FOR PERIOD 29/09/00 --> 14/03/01



3. equi: 501

Projeto...: P36

PETROBRAS 36

3 equi: 5010101

BALEEIRA

Identifi...: YA-777-A

4.....: FPREVM3W

LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 13/03/01

Iniciais...: CAC

Categorias

Homem Horas Custo total Tipo

MECANICA CONTRATADA

1 1.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM.

4.....: FPREVE3T

LTM TRIMESTRAL ELET DE TURCOS, GUINCHOS E BALEEIRA

Done.....: 02/03/01

Iniciais...: awfs

Categorias

Homem Horas Custo total Tipo

MECANICA CONTRATADA

1 2.0 0.0 MAN.PREV.SIST.TERCEI

carregador de baterias inoperante, devido a falha na placa de flutuacao

4.....: FPREVM3W

LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 02/03/01

Iniciais...: CBS

Categorias

Homem Horas Custo total Tipo

MECANICA CONTRATADA

1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

4.....: FPREVM3W

LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 27/02/01

Iniciais...: CBS

Categorias

Homem Horas Custo total Tipo

MECANICA CONTRATADA

1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

É Cópia fiel do documento original

JOSÉ CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAIS



Data.....: 29/03/01

Objeto...: P36

PETROBRAS 36

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 24/02/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

carregador de baterias inoperante, devido a falha na placa de flutuacao

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 22/02/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVM3T LTM TRIMESTRAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 21/02/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 6.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 16/02/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

carregador de baterias inoperante, devido a falha na placa de flutuacao

entifi...: YA/777A

M.....: FPREVM3T LTM TRIMESTRAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 16/02/01 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 6.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSE CARLOS PARENTAL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORARIAS



Data.....: 29/03/01

Objeto...: P36

PETROBRAS 36

4.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 16/02/01 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM.

4.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 13/02/01 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM EM 04/02/01.

4.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 13/02/01 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM EM 04/02/01.

Identifi...: YA-777-A  
 4.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 09/02/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

carregador de baterias inoperante, devido a falha na placa de flutuacao

Identifi...: YA/777A  
 4.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 02/02/01 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL  
 JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 29/03/01

Projeto...: P36

PETROBRAS 36



M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 02/02/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 26/01/01 Iniciais...: AFWW  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 26/01/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 19/01/01 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

conforme ltm em 16/01/01 .

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 16/01/01 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

conforme LTM .EM 06/01/01.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUERÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CATERIAS

Data.....: 29/03/01  
 Objeto...: P36 PETROBRAS 36



M.....: FCORR           Corretiva  
 Done.....: 03/01/01       Iniciais...: CBS  
 Categorias           Homem    Horas   Custo total   Tipo  
 MECANICA CONTRATADA   1       4.0       0.0       MAN.PREV.SIST.TERCEI

REAPERTO NOS ATRACADORES DAS PORTAS DAS BALEEIRAS 5010102 E 5010103  
 5010104

M.....: FPREVM3W       LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 29/12/00       Iniciais...: CBS  
 Categorias           Homem    Horas   Custo total   Tipo  
 MECANICA CONTRATADA   1       1.0       0.0       MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FCORRE           Corretiva  
 Done.....: 23/12/00       Iniciais...: AWFS  
 Categorias           Homem    Horas   Custo total   Tipo  
 ELETRICA CONTRATADA   0       10.0       0.0       MAN.PREV.SIST.TERCEI

EFEITUADA TROCA DA BATERIA DO RADIO VHF.

M.....: FPREVM3W       LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 22/12/00       Iniciais...: GO  
 Categorias           Homem    Horas   Custo total   Tipo  
 MECANICA CONTRATADA   1       1.0       0.0       MAN.PREV.SIST.TERCEI

CONFORME LTM DATA CONCLUSAO 20/12/00.

M.....: FPREVM3M       LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 18/12/00       Iniciais...: WC  
 Categorias           Homem    Horas   Custo total   Tipo  
 MECANICA CONTRATADA   1       3.0       0.0       MAN.PREV.SIST.TERCEI

LTM concluida em: 11/12/00.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL  
 JOSÉ CARLOS PIENDEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORÁRIOS

Data.....: 29/03/01

Objeto...: P36 PETROBRAS 36



M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 18/12/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

-----  
 Servico executado conforme LTM em 17/12/00.  
 -----

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 09/12/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

-----  
 / concluida em 02/12/00.  
 -----

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 30/11/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

-----  
 Conforme ltm .  
 -----

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 24/11/00 Iniciais...:  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

-----  
 Conforme Ltm  
 -----

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 23/11/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

-----  
 Executado conforme LTM, em 22/11/00.  
 -----

**É CÓPIA FIEL DO DOCUMENTO ORIGINAL.**  
 JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



ETROBRAS EP-BC OFFICE

Data.....: 29/03/01

Projeto..: P36 PETROBRAS 36

M.....: FPREVM3S LTM SEMESTRAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 14/11/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 12.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 13/11/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVM3T LTM TRIMESTRAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 13/11/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 6.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVE3S LTM SEMESTRAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 12/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 4.0 0.0 MAN.PREV.SIST.TERCEI

AS MEDICOES FORAM FEITAS COM O MOTOR ACOPLADO, TENDO A DESACOPLAGEM PASSADO PARA A INPECAO ANUAL DO GEINSP.

M.....: FPREVE3T LTM TRIMESTRAL ELET DE TURCOS, GUINCHOS E BALEEIRA  
 Done.....: 12/11/00 Iniciais...:  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 2.0 0.0 MAN.PREV.SIST.TERCEI

Conforme Ltm

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

ASSISTENTE SOCIAL GUSTÃO  
 28/03/01  
 DIVISÃO DE SERVIÇOS CONTÁBILIS



M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 10/11/00 Iniciais...:  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Conforme Ltm

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 10/11/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

RABALHO REALIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 04/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 03/11/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

conforme ltm .data 01/11/00.

M.....: FCORRE Corretiva  
 Done.....: 31/10/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

EFETUADA TROCA DA PONTE RETIFICADORA DO CARREGADOR DE BATERIAS.

É CÓPIA FEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 29/03/01

Projeto...: P36

PETROBRAS 36



M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 31/10/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 26/10/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM, em 21/10/00.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 13/10/00 Iniciais...: cbs  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 12/10/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

M.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 12/10/00 Iniciais...: cbs  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

trabalho realizado conforme ltm

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 08/10/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 04/10/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Conforme ltm.data de conclusao 260900

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 29/09/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

d.equi: 5010102 BALEEIRA

entifi...: YA-777-B

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 13/03/01 Iniciais...: CAC  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL  
 JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 29/03/01

Objeto..: P36

PETROBRAS 36



M.....: FPREVE3T LTM TRIMESTRAL ELET DE TURCOS, GUINCHOS E BALEEIRA  
 Done.....: 02/03/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 2.0 0.0 MAN.PREV.SIST.TERCEI

Equipamento operacional,todas as baterias carregadas,carregadores operacionais e iluminacao funcionado,como tambem o quadro de comando e botoeiras de resgate.

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 02/03/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Equipamento operacional, baterias carregadas,carregador de baterias operacional e iluminacao funcionado,como tambem o quadro de comando e botoeiras de resgate.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 02/03/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 23/02/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

equipamento operacional, baterias carregadas,carregador de baterias operacional e iluminacao funcionado,como tambem o quadro de comando e botoeiras de resgate.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL  
 JOSÉ CARLOS PEREIRA GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 23/02/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 19/02/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVM3T LTM TRIMESTRAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 19/02/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 6.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 16/02/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Equipamento operacional, baterias carregadas, carregador de baterias operacional e iluminacao funcionando, como tambem o quadro de comando e botoeiras de resgate.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORARIOS



entifi...: YA/777B

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 16/02/01 Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

Executado conforme LTM.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 13/02/01 Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

CONFORME LTM EM 04/02/01.

entifi...: YA-777-B

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 09/02/01 Iniciais...: awfs

Categorias	Homem	Horas	Custo total	Tipo
ELETRICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

equipamento operacional, baterias carregadas, carregador de baterias operacional e iluminacao funcionado, como tambem o quadro de comando e botoeiras de resgate.

entifi...: YA/777B

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 02/02/01 Iniciais...: AWFS

Categorias	Homem	Horas	Custo total	Tipo
ELETRICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 02/02/01 Iniciais...: CBS

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUERÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 30/01/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 26/01/01 Iniciais...: AFWW  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 26/01/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 19/01/01 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

conforme ltm em 16/01/01 .

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 16/01/01 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

conforme LTM .EM 06/01/01.

E COPIA FEITA DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 29/12/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FCORRE Corretiva  
 Done.....: 23/12/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 0 10.0 0.0 MAN.PREV.SIST.TERCEI

FEI TUADA TROCA DA BATERIA DO RADIO VHF.

M.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 22/12/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM DATA CONCLUSAO 21/12/00.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 22/12/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM DATA CONCLUSAO 19/12/00.

M.....: FCORRE Corretiva  
 Done.....: 21/12/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 4.0 0.0 MAN.CORR.EXE.TERCEI.

FEITO REPARO NO TUBULAO DA HELICE DA BALEEIRA 2, POIS A MESMA APRESENTAVA REBARBA NA FACE, CAUSANDO ATRITO NA HELICE COM O LEME A BORESTE.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



M.....: FCORRE3      Corretiva  
 Done.....: 21/12/00      Iniciais...: GO  
 Categorias      Homem      Horas      Custo total      Tipo  
 MECANICA CONTRATADA      1      2.0      0.0      MAN.CORR.EXE.TERCEI.

FIXADO CHAPA DE REFORCO NA ESTRUTURA, NO COMPARTIMENTO ABAIXO DOS BANCOS DO TIMONEIRO E COORDENADOR.

M.....: FPREVM3W      LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 09/12/00      Iniciais...: GO  
 Categorias      Homem      Horas      Custo total      Tipo  
 MECANICA CONTRATADA      1      1.0      0.0      MAN.PREV.SIST.TERCEI

... concluida em 02/12/00.

M.....: FPREVM3M      LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 30/11/00      Iniciais...: GO  
 Categorias      Homem      Horas      Custo total      Tipo  
 MECANICA CONTRATADA      1      3.0      0.0      MAN.PREV.SIST.TERCEI

CONFORME LTM DATA;24/11/00.

M.....: FPREVM3S      LTM SEMESTRAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 30/11/00      Iniciais...: GO  
 Categorias      Homem      Horas      Custo total      Tipo  
 MECANICA CONTRATADA      1      12.0      0.0      MAN.PREV.SIST.TERCEI

CONFORME LTM DATA;27/11/00.

M.....: FPREVM3T      LTM TRIMESTRAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 30/11/00      Iniciais...: GO  
 Categorias      Homem      Horas      Custo total      Tipo  
 MECANICA CONTRATADA      1      6.0      0.0      MAN.PREV.SIST.TERCEI

CONFORME LTM DATA;25/11/00.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS FERRELLI CUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 30/11/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Conforme ltm .

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 24/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

M.....: FPREVE3S LTM SEMESTRAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 23/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 4.0 0.0 MAN.PREV.SIST.TERCEI

IDEM EQUIPAMENTO COD.5010102.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 23/11/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM, em 22/11/00.

M.....: FPREVE3T LTM TRIMESTRAL ELET DE TURCOS, GUINCHOS E BALEEIRA  
 Done.....: 19/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 2.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 10/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 10/11/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 05/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 03/11/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Conforme ltm .data 01/11/00.

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 31/10/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

É COPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 29/03/01

Projeto...: P36

PETROBRAS 36



M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 26/10/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM, em 21/10/00.

M.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 19/10/00 Iniciais...: cbs  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 13/10/00 Iniciais...: cbs  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 08/10/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 07/10/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PEREIRA GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORARIAS



M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 04/10/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Conforme ltm.data de conclusao 260900

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 29/09/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

d.equi: 5010103 BALEEIRA  
entifi...: YA-777-C

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 13/03/01 Iniciais...: CAC  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM.

M.....: FPREVE3T LTM TRIMESTRAL ELET DE TURCOS, GUINCHOS E BALEEIRA  
 Done.....: 02/03/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELTRICA CONTRATADA 1 2.0 0.0 MAN.PREV.SIST.TERCEI

equipamento operacional, baterias carregadas, carregador de baterias operacional e iluminacao funcionado, como tambem o quadro de comando e botoeiras de resgate.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS FIBRETEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 29/03/01

Projeto...: P36

PETROBRAS 36



M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 02/03/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Equipamento operacional,baterias carregadas,carregadores operacionais e iluminacao interna funcionado.

M.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 26/02/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVM3T LTM TRIMESTRAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 26/02/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 6.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO RELIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 23/02/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Equipamento operacional,baterias carregadas,carregadores operacionais e iluminacao interna funcionado.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUIMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTÓFIAS



M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 22/02/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO RELIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 16/02/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Equipamento operacional, baterias carregadas, carregadores operacionais e alimentação interna funcionado.

entifi...: YA/777C

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 16/02/01 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 13/02/01 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM EM 04/02/01.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



entifi...: YA-777-C

M.....: FPREVE3T LTM TRIMESTRAL ELET DE TURCOS, GUINCHOS E BALEEIRA

Done.....: 09/02/01 Iniciais...: awfs

Categorias	Homem	Horas	Custo total	Tipo
ELETRICA CONTRATADA	1	2.0	0.0	MAN.PREV.SIST.TERCEI

equipamento operacional, baterias carregadas, carregador de baterias operacional e iluminacao funcionado, como tambem o quadro de comando e botoeiras de resgate.

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 09/02/01 Iniciais...: awfs

Categorias	Homem	Horas	Custo total	Tipo
ELETRICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

Equipamento operacional, baterias carregadas, carregadores operacionais e iluminacao interna funcionado.

entifi...: YA/777C

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 02/02/01 Iniciais...: AWFS

Categorias	Homem	Horas	Custo total	Tipo
ELETRICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

CONFORME LTM.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 02/02/01 Iniciais...: CBS

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS FEMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



M.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 27/01/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 26/01/01 Iniciais...: AFWF  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 19/01/01 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

conforme ltm em 17/01/01 .

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 16/01/01 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

conforme LTM .EM 07/01/01.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 29/12/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

COMITÊ DE PAGAMENTO UNIFORMES

JOSÉ CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



PM.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 27/12/00 Iniciais...: cbs  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

PM.....: FCORRE Corretiva  
 Done.....: 23/12/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 2.0 0.0 MAN.PREV.SIST.TERCEI

TUADA TROCA DA BATERIA DO RADIO VHF.

PM.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 22/12/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM DATA CONCLUSAO 19/12/00.

PM.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 09/12/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

PM concluida em 03/12/00.

PM.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 30/11/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM DATA;24/11/00.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PAIENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



TM.....: FPREVM3S LTM SEMESTRAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 30/11/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 12.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM DATA;27/11/00.

TM.....: FPREVM3T LTM TRIMESTRAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 30/11/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 6.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM DATA;25/11/00.

TM.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 30/11/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Conforme ltm .

TM.....: FPREVE3S LTM SEMESTRAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 25/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 4.0 0.0 MAN.PREV.SIST.TERCEI

EM EQUIPAMENTO COD. 5010101.

TM.....: FPREVE3T LTM TRIMESTRAL ELET DE TURCOS, GUINCHOS E BALEEIRA  
 Done.....: 25/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 2.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

CARLOS PIMENTEL GUSMÃO  
DIRETOR  
SERVIÇOS ADMINISTRATIVOS



M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 24/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 23/11/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM.

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 10/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 10/11/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 06/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GURMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAIS



M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 03/11/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

conforme ltm .data 01/11/00.

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 01/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 26/10/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM, em 22/10/00.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 13/10/00 Iniciais...: cbs  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 08/10/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

**É CÓPIA FIEL DO DOCUMENTO ORIGINAL.**

JOSÉ CARLOS PAIENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 29/03/01

Projeto..: P36

PETROBRAS 36



M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 08/10/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 04/10/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

Conforme ltm.data de conclusao 04/10/00.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 04/10/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Conforme ltm.data de conclusao 03/10/00.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 29/09/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



Id.equi: 5010104 BALEEIRA

Identifi...: YA-777-D

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 13/03/01 Iniciais...: CAC

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

Executado conforme LTM.

M.....: FPREVE3T LTM TRIMESTRAL ELET DE TURCOS, GUINCHOS E BALEEIRA

Done.....: 02/03/01 Iniciais...: awfs

Categorias	Homem	Horas	Custo total	Tipo
ELETRICA CONTRATADA	1	2.0	0.0	MAN.PREV.SIST.TERCEI

Equipamento operacional,baterias carregadas,carregadores operacionais e iluminacao interna funcionado, bem como o quadro de comando e as boteiras de resgate.

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 02/03/01 Iniciais...: awfs

Categorias	Homem	Horas	Custo total	Tipo
ELETRICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

Equipamento operacional,baterias carregadas,carregadores operacionais e iluminacao interna funcionado,resgate.

M.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 02/03/01 Iniciais...: CBS

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	3.0	0.0	MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

É COPIA FIEL DO ORIGINAL

JOSÉ CARLOS PIMENTEL CUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



M.....: FPREVM3T LTM TRIMESTRAL MEC DE TURCOS, GUINCHOS, E BALEEIRAS  
 Done.....: 02/03/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 6.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 23/02/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Equipamento operacional, baterias carregadas, carregadores operacionais e iluminacao interna funcionado, resgate.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 23/02/01 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO RELIZADO CONFORME LTM

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 16/02/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Equipamento operacional, baterias carregadas, carregadores operacionais e iluminacao interna funcionado, resgate.

É COPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



Identifi...: YA/777D

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 16/02/01 Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

Executado conforme LTM.

M.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 13/02/01 Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	3.0	0.0	MAN.PREV.SIST.TERCEI

INFORME LTM EM 04/02/01.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 13/02/01 Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

CONFORME LTM EM 04/02/01.

Identifi...: YA-777-D

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 09/02/01 Iniciais...: awfs

Categorias	Homem	Horas	Custo total	Tipo
ELETRICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

Equipamento operacional, baterias carregadas, carregadores operacionais e iluminação interna funcionando, resgate.

EXIBIR NO DOCUMENTO ORIGINAL

JOSÉ CARLOS FIMENTIL CUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



Identifi...: YA/777D

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 02/02/01 Iniciais...: AWFS

Categorias	Homem	Horas	Custo total	Tipo
ELETRICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

CONFORME LTM.

M.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 26/01/01 Iniciais...: AFWF

Categorias	Homem	Horas	Custo total	Tipo
ELETRICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

CONFORME LTM.

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 19/01/01 Iniciais...: go

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

conforme ltm em 17/01/01 .

M.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 16/01/01 Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

conforme LTM .EM 07/01/01.

M.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS

Done.....: 02/01/01 Iniciais...: cbs

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	3.0	0.0	MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS FERRELL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 29/12/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 29/12/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

.....: FCORRE Corretiva  
 Data.....: 23/12/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 2.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 22/12/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM DATA CONCLUSAO 19/12/00.

.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 09/12/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM concluida em 06/12/00.

**É Cópia do Documento Original**  
 JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORÍAIOS



.....: FPREVM3S LTM SEMESTRAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 09/12/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 12.0 0.0 MAN.PREV.SIST.TERCEI

TEM concluída em 07/12/00.

.....: FPREVM3T LTM TRIMESTRAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 09/12/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 6.0 0.0 MAN.PREV.SIST.TERCEI

TEM concluída em 06/12/00.

.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 09/12/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TEM concluída em 03/12/00.

.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 07/12/00 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM

.....: FPREVE3S LTM SEMESTRAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 03/12/00 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 4.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM

É CÓPIA FIEL DO DOCUMENTO ORIGINAL  
 JOSÉ CARLOS PIMENTEL GUERATO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAIS



Data.....: 29/03/01

Projeto...: P36

PETROBRAS 36

.....: FPREVE3T LTM TRIMESTRAL ELET DE TURCOS, GUINCHOS E BALEEIRA  
 Data.....: 03/12/00 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETTRICA CONTRATADA 1 2.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM

.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 30/11/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM DATA; 24/11/00.

.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 30/11/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

conforme ltm .

.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 24/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETTRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 23/11/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM.

**É Cópia Fiel do Documento Original**  
 JOSÉ CARLOS FIBENTIL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORARIAS



.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 10/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 10/11/00 Iniciais...: CBS  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

BALHO REALIZADO CONFORME LTM

.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 07/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 03/11/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Conforme ltm .data 01/11/00.

.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 Done.....: 01/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

É Cópia fiel do documento original.  
 JOSÉ CARLOS PARANTELLI CUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 one.....: 26/10/00 Iniciais...: GO  
 categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM, em 22/10/00.

.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 one.....: 13/10/00 Iniciais...: cbs  
 categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

.....: FPREVE3W LTM SEMANAL ELET DE TURCOS, GUINCHOS E BALEEIRAS  
 one.....: 08/10/00 Iniciais...: AWFS  
 categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 one.....: 08/10/00 Iniciais...: CBS  
 categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

.....: FPREVM3M LTM MENSAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 one.....: 04/10/00 Iniciais...: go  
 categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

conforme ltm.data de conclusao 04/10/00.

COPIA DO DOCUMENTO  
 JOSÉ CARLOS PIMENTEL CUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORARIAS



.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 04/10/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

conforme ltm.data de conclusao 03/10/00.

.....: FPREVM3W LTM SEMANAL MEC DE TURCOS, GUINCHOS E BALEEIRAS  
 Data.....: 29/09/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PARENTE GUSMÃO  
 OBRATOR  
 DIVISÃO DE SERVIÇOS CARTORIAIS



JOB HISTORY FOR PERIOD 29/09/00 --> 14/03/01

equi: 503  
Projeto..: P36                   PETROBRAS 36

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equi: 5030101           BOTE DE RESGATE  
 tifi...: YA-781-A  
 .....: FPREVM3W       LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 one.....: 13/03/01     Iniciais...: CAC  
 categorias           Homem    Horas   Custo total   Tipo  
 MECANICA CONTRATADA   1       1.0       0.0       MAN.PREV.SIST.TERCEI

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Executado conforme LTM.

.....: FPREVM3Q       LTM QUINZENAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 one.....: 25/02/01     Iniciais...: CBS  
 categorias           Homem    Horas   Custo total   Tipo  
 MECANICA CONTRATADA   1       2.0       0.0       MAN.PREV.SIST.TERCEI

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TRABALHO REALIZADO CONFORME LTM

.....: FPREVM3W       LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 one.....: 25/02/01     Iniciais...: CBS  
 categorias           Homem    Horas   Custo total   Tipo  
 MECANICA CONTRATADA   1       1.0       0.0       MAN.PREV.SIST.TERCEI

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TRABALHO REALIZADO CONFORME LTM

.....: FPREVE3W       LTM SEMANAL ELET DE TURCO, GUINCHO E BOTE RESGATE  
 one.....: 17/02/01     Iniciais...: awfs  
 categorias           Homem    Horas   Custo total   Tipo  
 ELETTRICA CONTRATADA   1       1.0       0.0       MAN.PREV.SIST.TERCEI

-----  
equipamento operacional, baterias carregadas, carregador de bateria  
operacional.

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COPIA DO DOCUMENTO ORIGINAL

JOSE CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORARIAS



Data.....: 29/03/01

Próximo...: P36

PETROBRAS 36

Atividade...: YA/781A

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE

Done.....: 16/02/01 Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

Executado conforme LTM.

.....: FCORR Corretiva

Done.....: 13/02/01 Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	2	6.0	0.0	MAN.CORR.EXE.TERCEI.

.....: PARADO O TAMBUQUE PARA LIMPEZA E SUBSTITUICAO DO OLEO DIESEL ,E SUBSTITUIDO OS FILTROS DE OLEO DIESEL EM 06/02/01.

.....: FPREVM3M LTM MENSAL MEC DE TURCO, GUINCHO E BOTE RESGATE

Done.....: 13/02/01 Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	3.0	0.0	MAN.PREV.SIST.TERCEI

.....: CONFORME LTM EM 09/02/01.

.....: FPREVM3Q LTM QUINZENAL MEC DE TURCO, GUINCHO E BOTE RESGATE

Done.....: 13/02/01 Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	2.0	0.0	MAN.PREV.SIST.TERCEI

.....: CONFORME LTM EM 09/02/01.

.....: FPREVM3T LTM TRIMESTRAL MEC DE TURCO/GUINCHO E BOTE RESGATE

Done.....: 13/02/01 Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	6.0	0.0	MAN.PREV.SIST.TERCEI

.....: CONFORME LTM EM 10/02/01.

É Cópia do Documento Original

JOSÉ CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORARIAS



Data.....: 29/03/01

Projeto...: P36

PETROBRAS 36

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 13/02/01 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM EM 06/02/01.

.....: YA-781-A  
 .....: FPREVE3W LTM SEMANAL ELET DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 10/02/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

equipamento operacional, baterias carregadas, carregador de bateria operacional.

.....: FPREVE3W LTM SEMANAL ELET DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 03/02/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

equipamento operacional, baterias carregadas, carregador de bateria operacional.

.....: FPREVE3W LTM SEMANAL ELET DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 27/01/01 Iniciais...: awfs  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

equipamento operacional, baterias carregadas, carregador de bateria operacional.

É CÓPIA FEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PEREIRA GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORÁRIOS



Atifi...: YA/781A

.....: FPREVM3M LTM MENSAL MEC DE TURCO, GUINCHO E BOTE RESGATE

Done.....: 19/01/01 Iniciais...: go

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	3.0	0.0	MAN.PREV.SIST.TERCEI

conforme ltm .

.....: FPREVM3Q LTM QUINZENAL MEC DE TURCO, GUINCHO E BOTE RESGATE

Done.....: 19/01/01 Iniciais...: go

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	2.0	0.0	MAN.PREV.SIST.TERCEI

conforme ltm .

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE

Done.....: 19/01/01 Iniciais...: go

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

conforme ltm .

.....: FPREVM3Q LTM QUINZENAL MEC DE TURCO, GUINCHO E BOTE RESGATE

Done.....: 16/01/01 Iniciais...:

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	2.0	0.0	MAN.PREV.SIST.TERCEI

conforme LTM .

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE

Done.....: 16/01/01 Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

conforme LTM .EM 09/01/01.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIENDEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



.....: FCORRE           Corretiva  
 Done.....: 23/12/00       Iniciais...: AWFS  
 Categorias           Homem    Horas   Custo total   Tipo  
 ELETRICA CONTRATADA       0       2.0       0.0       MAN.PREV.SIST.TERCEI

EFETUADA TROCA DA BATERIA DO RADIO VHF.

.....: FPREVM3W       LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 22/12/00       Iniciais...: GO  
 Categorias           Homem    Horas   Custo total   Tipo  
 MECANICA CONTRATADA       1       1.0       0.0       MAN.PREV.SIST.TERCEI

CONCLUÍDA LTM DATA CONCLUSAO 20/12/00.

.....: FPREVM3M       LTM MENSAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 18/12/00       Iniciais...: WC  
 Categorias           Homem    Horas   Custo total   Tipo  
 MECANICA CONTRATADA       1       3.0       0.0       MAN.PREV.SIST.TERCEI

LTM concluída em: 11/12/00.

.....: FPREVM3Q       LTM QUINZENAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 18/12/00       Iniciais...: GO  
 Categorias           Homem    Horas   Custo total   Tipo  
 MECANICA CONTRATADA       1       2.0       0.0       MAN.PREV.SIST.TERCEI

Serviço executado conforme LTM em 16/12/00.

.....: FPREVM3Q       LTM QUINZENAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 09/12/00       Iniciais...: GO  
 Categorias           Homem    Horas   Custo total   Tipo  
 MECANICA CONTRATADA       1       2.0       0.0       MAN.PREV.SIST.TERCEI

LTM concluída em 02/12/00.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE

Done.....: 09/12/00

Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

LTM concluida em 04/12/00.

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE

Done.....: 30/11/00

Iniciais...: go

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

Nome ltm .

.....: FPREVM3Q LTM QUINZENAL MEC DE TURCO, GUINCHO E BOTE RESGATE

Done.....: 23/11/00

Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	2.0	0.0	MAN.PREV.SIST.TERCEI

Executado conforme LTM, em 21/11/00.

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE

Done.....: 23/11/00

Iniciais...: GO

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

Executado conforme LTM, em 22/11/00.

Objeto...: YA-781-A

.....: FPREVE3W LTM SEMANAL ELET DE TURCO, GUINCHO E BOTE RESGATE

Done.....: 11/11/00

Iniciais...: awfs

Categorias	Homem	Horas	Custo total	Tipo
ELETRICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

Equipamento operacional, baterias carregadas, carregador de bateria operacional.

  
 JOSÉ CARLOS FRENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 29/03/01

Projeto...: P36

PETROBRAS 36



Identifi...: YA/781A

.....: FPREVM3S LTM SEMESTRAL MEC DE TURCO/GUINCHO E BOTE RESGATE

.....: 09/11/00 Iniciais...: cbs

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	9.0	0.0	MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE

.....: 09/11/00 Iniciais...: cbs

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

Trabalho realizado conforme ltm

.....: FPREVE3W LTM SEMANAL ELET DE TURCO, GUINCHO E BOTE RESGATE

.....: 08/11/00 Iniciais...: AWFS

Categorias	Homem	Horas	Custo total	Tipo
ELETRICA CONTRATADA	1	1.0	0.0	MAN.PREV.SIST.TERCEI

CONFORME LTM

.....: FPREVM3M LTM MENSAL MEC DE TURCO, GUINCHO E BOTE RESGATE

.....: 04/11/00 Iniciais...: cbs

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	3.0	0.0	MAN.PREV.SIST.TERCEI

Trabalho realizado CONFORME LTM

.....: FPREVM3Q LTM QUINZENAL MEC DE TURCO, GUINCHO E BOTE RESGATE

.....: 04/11/00 Iniciais...: cbs

Categorias	Homem	Horas	Custo total	Tipo
MECANICA CONTRATADA	1	2.0	0.0	MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS FIMENEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



.....: FPREVM3T LTM TRIMESTRAL MEC DE TURCO/GUINCHO E BOTE RESGATE  
 Data.....: 04/11/00 Iniciais...: cbs  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 6.0 0.0 MAN.PREV.SIST.TERCEI

trabalho realizado conforme ltm

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 Data.....: 03/11/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Nome ltm .data 31/10/00.

.....: FCORRE Corretiva  
 Data.....: 02/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 10.0 0.0 MAN.PREV.SIST.TERCEI

TROCADA A SOLUÇÃO DE BATERIA DO RADIO.  
 TROCADO OS TERMINAIS DOS INSTRUMENTOS DE MONITORAÇÃO.  
 IDENTIFICADO NÚMERO FUNCIONAMENTO DOS INSTRUMENTOS DE MONITORAÇÃO, AGUARDANDO A  
 COMPRA DE RELES E SENSORES PARA TROCA.

.....: FPREVE3S LTM SEMESTRAL ELET DE TURCO/GUINCHO E BOTE RESGATE  
 Data.....: 02/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

TROCADA A SOLUÇÃO DE BATERIA DO RADIO.  
 TROCADO OS TERMINAIS DOS INSTRUMENTOS DE MONITORAÇÃO.  
 IDENTIFICADO NÚMERO FUNCIONAMENTO DOS INSTRUMENTOS DE MONITORAÇÃO, AGUARDANDO A  
 COMPRA DE RELES E SENSORES PARA TROCA.

ESTAMPADO DO INTERESSE

JOSÉ CARLOS PIRENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORÍARIAS



Data.....: 29/03/01

Próximo...: P36

PETROBRAS 36

.....: FPREVE3T LTM TRIMESTRAL ELET DE TURCO/GUINCHO E BOTE RESGATE  
 Done.....: 02/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 2.0 0.0 MAN.PREV.SIST.TERCEI

PROCADA A SOLUÇÃO DE BATERIA DO RADIO.  
 PROCADO OS TERMINAIS DOS INSTRUMENTOS DE MONITORAÇÃO.  
 IDENTIFICADO N°O FUNCIONAMENTO DOS INSTRUMENTOS DE MONITORAÇÃO, AGUARDANDO A  
 COMPRA DE RELES E SENSORES PARA TROCA.

.....: FPREVE3W LTM SEMANAL ELET DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 02/11/00 Iniciais...: AWFS  
 Categorias Homem Horas Custo total Tipo  
 ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

.....: FPREVM3Q LTM QUINZENAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 26/10/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 2.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM, em 23/10/00.

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 26/10/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

Executado conforme LTM, em 25/10/00.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS PINHEIRO GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



Data.....: 29/03/01  
Projeto...: P36 PETROBRAS 36

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
Done.....: 14/10/00 Iniciais...: CBS  
Categorias Homem Horas Custo total Tipo  
MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

trabalho realizado conforme ltm

.....: FPREVE3W LTM SEMANAL ELET DE TURCO, GUINCHO E BOTE RESGATE  
Done.....: 11/10/00 Iniciais...: AWFS  
Categorias Homem Horas Custo total Tipo  
ELETRICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

CONFORME LTM.

.....: FPREVM3M LTM MENSAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
Done.....: 07/10/00 Iniciais...: CBS  
Categorias Homem Horas Custo total Tipo  
MECANICA CONTRATADA 1 3.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

.....: FPREVM3Q LTM QUINZENAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
Done.....: 07/10/00 Iniciais...: CBS  
Categorias Homem Horas Custo total Tipo  
MECANICA CONTRATADA 1 2.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
Done.....: 07/10/00 Iniciais...: CBS  
Categorias Homem Horas Custo total Tipo  
MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

TRABALHO REALIZADO CONFORME LTM

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS FIMINTEL CUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



Data.....: 29/03/01  
Projeto...: P36 PETROBRAS 36

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 06/10/00 Iniciais...:  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

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 conforme ltm

.....: FPREVM3Q LTM QUINZENAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 04/10/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 2.0 0.0 MAN.PREV.SIST.TERCEI

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 Conforme ltm.data de conclusao 270900

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 04/10/00 Iniciais...: go  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

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 Conforme ltm.data de conclusao 270900

.....: FPREVM3W LTM SEMANAL MEC DE TURCO, GUINCHO E BOTE RESGATE  
 Done.....: 30/09/00 Iniciais...: GO  
 Categorias Homem Horas Custo total Tipo  
 MECANICA CONTRATADA 1 1.0 0.0 MAN.PREV.SIST.TERCEI

-----  
 CONFORME LTM.

É CÓPIA DE UM DOCUMENTO ORIGINAL  
 JOSÉ CARLOS FARIAS GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORÍARIAS



Data.....: 29/03/01  
Projeto...: P36 PETROBRAS 36

.....: FCORRI Corretiva  
Done.....: 29/09/00 Iniciais...: MRA  
Categorias Homem Horas Custo total Tipo  
INSTR. CONTRATADA 2 5.0 0.0 MAN.CORR.EXE.TERCEI.

1) Instalado motor de arranque do bote de resgate e liberado - 17/09/00  
2) Inspeção do motor de arranque do bote de resgate - 20/09/00  
3) Inspeção do motor de arranque do bote de resgate - 27/09/00  
OBS: Serviços executados com acompanhamento do Mestre de Cabotagem, e o ítem 3 acompanhado também pelo técnico do GEINSP.

Equip: 5030301 CHUVEIRO DE EMERGENCIA/LAVA OLHOS N.1  
.....: FPREVS1S MANUTENCAO PREVENTIVA  
Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
Done.....: 05/02/01 Iniciais...: SCM  
Categorias Homem Horas Custo total Tipo  
TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

.....: FPREVS1S MANUTENCAO PREVENTIVA  
Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
Done.....: 16/01/01 Iniciais...: MSM  
Categorias Homem Horas Custo total Tipo  
TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

.....: FPREVS1S MANUTENCAO PREVENTIVA  
Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
Done.....: 02/01/01 Iniciais...: GMG  
Categorias Homem Horas Custo total Tipo  
TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

.....: FPREVS1S MANUTENCAO PREVENTIVA  
Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
Done.....: 05/12/00 Iniciais...: MSM  
Categorias Homem Horas Custo total Tipo  
TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL  
JOSÉ CARLOS FIMINTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



Data.....: 29/03/01

Projeto...: P36 PETROBRAS 36

.....: FPREVS1S MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 21/11/00 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

.....: FPREVS1S MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 25/10/00 Iniciais...: MSM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

.....: FPREVS1S MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 13/10/00 Iniciais...:  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

.....: FPREVS1S MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 01/10/00 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

Requi: 5030302 CHUVEIRO DE EMERGENCIA/LAVA OLHOS N.2  
 .....: FPREVS1S MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 11/02/01 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

.....: FPREVS1S MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 08/01/01 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

É COPIA FEITA DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS FARIAS GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



Data.....: 29/03/01

Projeto...: P36 PETROBRAS 36

.....: FPREVS1S MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 02/01/01 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

.....: FPREVS1S MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 02/12/00 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

.....: FPREVS1S MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 13/10/00 Iniciais...:  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

Requi: 5030303 CHUVEIRO DE EMERGENCIA/LAVA OLHOS N.3  
 .....: FPREVS1S MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 11/02/01 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

.....: FPREVS1S MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 08/01/01 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

.....: FPREVS1S MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 02/01/01 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

COPIA FEITA DO DOCUMENTO ORIGINAL

JOSE CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



Data.....: 29/03/01

Projeto...: P36

PETROBRAS 36

.....: FPREVS1S      MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 12/12/00      Iniciais...: GMG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

.....: FPREVS1S      MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 31/10/00      Iniciais...: GMG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

.....: FPREVS1S      MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 17/10/00      Iniciais...: SCM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

.....: FPREVS1S      MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 13/10/00      Iniciais...: SCM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

Requi: 5030304      CHUVEIRO DE EMERGENCIA/LAVA OLHOS N.4  
 .....: FPREVS1S      MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 03/03/01      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

-Realizado conforme planejado pelo TS.Queiroga em 02/02/2001.  
 -Solicitado a equipe de manutenção da facilidade a interligacao do chuveiro a um tomada de agua potavel nesta data.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSE CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

TROBRAS EP-BC OFFICE

Data.....: 29/03/01

Projeto...: P36

PETROBRAS 36



.....: FPREVS1S      MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 26/01/01      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

-----  
 -Realizado conforme em 20/01/2001 pelo TS. Queiroga.  
 -Solicitado ao Segen o tratamento e pintura do suporte.  
 -----

.....: FPREVS1S      MANUTENCAO PREVENTIVA  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 20/01/01      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

-----  
 - Foi instalado apenas o lava-olhos numero 04.  
 - Solicitado ao Segen/Sergio Azeredo a identificacao de piso conforme NR-23 e o tratamento mecanico e pintura do suporte de sustentacao.  
 -----

Requi: 50304      LANCA RETINIDA  
 .....: FINSPC1A      INSPECAO ANUAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 27/12/00      Iniciais...:  
 Categorias      Homem      Horas      Custo total      Tipo  
 M. DE CABOTAGEM      1      1.0      0.0

-----  
 4 UNIDADES DENTRO VALIDADE.  
 4 U DENTRO VALIDADE  
 -----

Requi: 50305      COLETES SALVA-VIDAS  
 .....: FINSPC2S      INSPECAO QUINZENAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 10/03/01      Iniciais...: MSS  
 Categorias      Homem      Horas      Custo total      Tipo  
 M. DE CABOTAGEM      1      3.0      0.0

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORARIOS



Data.....: 29/03/01

P jeto...: P36

PETROBRAS 36

.....: FINSPC2S      INSPECAO QUINZENAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 09/03/01      Iniciais...: MSS  
 Categorias      Homem      Horas      Custo total      Tipo  
 M. DE CABOTAGEM      1      3.0      0.0

.....: FINSPC2S      INSPECAO QUINZENAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 28/02/01      Iniciais...:  
 Categorias      Homem      Horas      Custo total      Tipo  
 M. DE CABOTAGEM      1      3.0      0.0

.....: FINSPC2S      INSPECAO QUINZENAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 11/02/01      Iniciais...: mss  
 Categorias      Homem      Horas      Custo total      Tipo  
 M. DE CABOTAGEM      1      3.0      0.0

.....: FINSPC2S      INSPECAO QUINZENAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 29/01/01      Iniciais...:  
 Categorias      Homem      Horas      Custo total      Tipo  
 M. DE CABOTAGEM      1      3.0      0.0

Quantidade de coletes atendendo necessidades normativas.  
 Todos identificados e integros.

.....: FINSPC2S      INSPECAO QUINZENAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 14/01/01      Iniciais...: MSS  
 Categorias      Homem      Horas      Custo total      Tipo  
 M. DE CABOTAGEM      2      3.0      0.0

FORAM SUBSTITUIDOS ALGUNS COLETES QUE GERAVAM NAO COFORMIDADES.

.....: FINSPC2S      INSPECAO QUINZENAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 05/01/01      Iniciais...:  
 Categorias      Homem      Horas      Custo total      Tipo  
 M. DE CABOTAGEM      1      3.0      0.0

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSE CARLOS PEREIRA GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAIS



.....: FINSPC2S      INSPECAO QUINZENAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 20/12/00      Iniciais...: MSS  
 Categorias      Homem      Horas      Custo total      Tipo  
 M. DE CABOTAGEM      1      3.0      0.0

INSPECIONADOS: EM PERFEITO ESTADO DE USO.

.....: FINSPC2S      INSPECAO QUINZENAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 06/12/00      Iniciais...: JCFE  
 Categorias      Homem      Horas      Custo total      Tipo  
 M. DE CABOTAGEM      1      3.0      0.0

- 1 - PILHAS FORAM SUBSTITUIDAS EM 15 E 16/11/00.
- 2 - TODOS ESTAO IDENTIFICADOS CORRETAMENTE.
- 3 - QUANTIDADE ATENDE EXIGENCIAS.

.....: FINSPC2S      INSPECAO QUINZENAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 21/11/00      Iniciais...:  
 Categorias      Homem      Horas      Custo total      Tipo  
 M. DE CABOTAGEM      1      3.0      0.0

.....: FINSC2S      Corretiva  
 Done.....: 26/10/00      Iniciais...: MSS  
 Categorias      Homem      Horas      Custo total      Tipo  
 M. DE CABOTAGEM      1      24.0      0.0

1-IDENTIFICADO COM A INSCRICAO PETROBRAS TRENTASEI PORTO NAPOLI POR EXIGENCIA DA CLASSIFICADORA ITALIANA RINA.

.....: FINSPC2S      INSPECAO QUINZENAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 26/10/00      Iniciais...: MSS  
 Categorias      Homem      Horas      Custo total      Tipo  
 M. DE CABOTAGEM      1      24.0      0.0

1-IDENTIFICADO COM A INSCRICAO PETROBRAS TRENTASEI PORTO NAPOLI POR EXIGENCIA DA CLASSIFICADORA ITALIANA RINA.

COPIA FIDEL DO DOCUMENTO ORIGINAL  
 JOSÉ CARLOS FAIENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



TROBRAS EP-BC OFFICE

Data.....: 29/03/01

Projeto...: P36 PETROBRAS 36

.....: FINSPC2S      INSPECAO QUINZENAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 15/10/00      Iniciais...: MSS  
 Categorias      Homem      Horas      Custo total      Tipo  
 1. DE CABOTAGEM      1      3.0      0.0

equi: 50306      BOIAS SALVA-VIDAS  
 .....: FPREVC1T      PRESERVACAO  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 01/03/01      Iniciais...:  
 Categorias      Homem      Horas      Custo total      Tipo  
 1. DE CABOTAGEM      1      4.0      0.0

.....: FPREVC1T      PRESERVACAO  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 06/12/00      Iniciais...: JCFE  
 Categorias      Homem      Horas      Custo total      Tipo  
 1. DE CABOTAGEM      1      4.0      0.0

- BOIAS INSPECIONADAS EM 05/12/00. ESTANDO TODAS PADRONIZADAS. FORAM  
 PEDIDAS 4 FLASH HOLMES PARA ATENDER NECESSIDADE DE COMPLETAR DOTACAO A  
 BORDO.

equi: 50307      SINAIS PIROTECNICOS  
 .....: FINSPC1T      INSPECAO TRIMESTRAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 02/01/01      Iniciais...:  
 Categorias      Homem      Horas      Custo total      Tipo  
 1. DE CABOTAGEM      1      2.0      0.0

TRO VALIDADE  
 INTEGRIDADE PRESERVADA

.....: FINSPC1T      INSPECAO TRIMESTRAL  
 Cent.custo: PREOP      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 15/10/00      Iniciais...: MSS  
 Categorias      Homem      Horas      Custo total      Tipo  
 1. DE CABOTAGEM      1      2.0      0.0

É CÓPIA FEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTOGRAF



.equi: 5031001 MASCARA AUTONOMA PARA FUGA N.1  
 .....: FPREVS1T PRESERVAÇÃO PERIODICA  
 Done.....: 27/12/00 Iniciais...: QRG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

- Realizado conforme programado.

.equi: 5031002 MASCARA AUTONOMA PARA FUGA N.2  
 .....: FPREVS1T PRESERVAÇÃO PERIODICA  
 Done.....: 27/12/00 Iniciais...: QRG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

- Realizado conforme programado.

.equi: 5031003 MASCARA AUTONOMA PARA FUGA N.3  
 .....: FPREVS1T PRESERVAÇÃO PERIODICA  
 Done.....: 10/12/00 Iniciais...: JRAS  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

.equi: 5031004 MASCARA AUTONOMA PARA FUGA N.4  
 .....: FPREVS1T PRESERVAÇÃO PERIODICA  
 Done.....: 12/12/00 Iniciais...: JRAS  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

EXECUÇÃO DO SERVIÇO:10/12/00.

.equi: 5031005 MASCARA AUTONOMA PARA FUGA N.5  
 .....: FPREVS1T PRESERVAÇÃO PERIODICA  
 Done.....: 27/12/00 Iniciais...: QRG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

- Realizado conforme programado.

**É CÓPIA FIEL DO DOCUMENTO ORIGINAL.**  
 JOSÉ CARLOS PIMENTEL CUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAIS



Data.....: 29/03/01

Projeto...: P36 PETROBRAS 36

1.equi: 5031006 MASCARA AUTONOMA PARA FUGA N.6  
 1.....: FPREVS1T PRESERVAÇÃO PERIODICA  
 Done.....: 12/12/00 Iniciais...: JRAS  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0  
 -----  
 EXECUÇÃO DO SERVIÇO:10/12/00.  
 -----

1.equi: 5031007 MASCARA AUTONOMA PARA FUGA N.7  
 1.....: FPREVS1T PRESERVAÇÃO PERIODICA  
 Done.....: 27/12/00 Iniciais...: QRG  
 Categorias Homem Horas Custo total Tipo  
 TI DE SEGURANCA 1 1.0 0.0  
 -----  
 - Realizado conforme programado.  
 -----

1.equi: 5031008 MASCARA AUTONOMA PARA FUGA N.8  
 1.....: FPREVS1T PRESERVAÇÃO PERIODICA  
 Done.....: 10/12/00 Iniciais...: JRAS  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0  
 -----

1.equi: 50311 COMPRESSOR DE AR  
 1.....: FPREVC2T PRESERVACAO  
 Done.....: 11/02/01 Iniciais...: MSS  
 Categorias Homem Horas Custo total Tipo  
 M. E CABOTAGEM 1 8.0 0.0 MAN.PREV.SIST.TERCEI  
 -----

1.equi: 50312 ESCADA DE CORDAS PARA FUGA QUEBRA PEITO  
 1.....: FPREVC2M INSPECAO PERIODICA  
 Done.....: 14/02/01 Iniciais...: MSS  
 Categorias Homem Horas Custo total Tipo  
 M. DE CABOTAGEM 1 2.0 0.0  
 -----

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS FERRETEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORARIOS

Data.....: 20/03/01

JOB HISTORY FOR PERIOD 20/09/00 --> 20/03/01



Cod.equi: 505  
Projeto...: P36 PETROBRAS 36

Cod.equi: 50501 EXTINTOR INCENDIO MAIN DECK, GUINDASTE, HELIDECK E M  
 LTM.....: FPREVS1M PRESERVACAO  
 Done.....: 17/02/01 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 2.0 0.0  
 -----  
 INICIADO EM 13-02-01  
 -----

LTM.....: FPREVS1M PRESERVACAO  
 Done.....: 08/01/01 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 2.0 0.0

LTM.....: FPREVS1M PRESERVACAO  
 Done.....: 04/12/00 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 2.0 0.0

LTM.....: FPREVS1M PRESERVACAO  
 Done.....: 30/10/00 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 2.0 0.0

LTM.....: FPREVS1M PRESERVACAO  
 Done.....: 25/09/00 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 2.0 0.0  
 -----

ALGUNS EXTINTORES ESTÃO TEMPORARIAMENTE EM SUBSTITUIÇÃO AOS DA UNIDADE QUE FORAM PARA MANUTENÇÃO

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PINHEIRO GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



Cod.equi: 50502 EXT.INCENDIO RISER DECK, SECOND DECK, EXT.POPA INE

LTM.....: FPREVS1M PRESERVACAO

Done.....: 13/03/01 Iniciais...: SCM

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	2.0	0.0	

1 - PESADOS OS EXTINTORES DE CO2 5 KG. FORAM ENVIADOS 6 EXTINTORES PARA RECARGA POIS ESTAVAM COM PERDA SUPERIOR A 10% DA CARGA.  
 2 - SOLICITADO 10 EXTINTORES AP-10 LITROS EM SUBSTITUICAO DOS QUE VENCERAO NO MES DE ABRIL 2001.

LTM.....: FPREVS1M PRESERVACAO

Done.....: 11/03/01 Iniciais...: SCM

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	2.0	0.0	

Realizado pesagem dos extintores de CO2-5kg, e retirado 09 (nove) devido a carga com perda superior a 10%.  
 Os extintores serao usados em treinamento e posteriormente desembarcados para recarga-reteste.

LTM.....: FPREVS1M PRESERVACAO

Done.....: 06/02/01 Iniciais...: SCM

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	2.0	0.0	

LTM.....: FPREVS1M PRESERVACAO

Done.....: 03/02/01 Iniciais...: SCM

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	2.0	0.0	

LTM.....: FPREVS1M PRESERVACAO

Done.....: 27/01/01 Iniciais...: SCM

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	2.0	0.0	

Foram substituidos os extintores de po-quimico originais da lataforma, sendo retirados os P-12 que deverao ser enviados para a oficina.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



LTM.....: FPREVS1M      PRESERVACAO  
 Done.....: 10/01/01      Iniciais...: MSM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      2.0      0.0

LTM.....: FPREVS1M      PRESERVACAO  
 Done.....: 01/12/00      Iniciais...: MSM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      2.0      0.0

LTM.....: FPREVS1M      PRESERVACAO  
 Done.....: 01/11/00      Iniciais...: MSMM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      2.0      0.0

LTM.....: FPREVS1M      PRESERVACAO  
 Done.....: 27/09/00      Iniciais...: MSM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      2.0      0.0

- 1-OS EXTINTORES DE PO QUIMICO PERTENCEM A GESEG, OS DE P-36 ESTAO EM RECONDICIONAMENTO.
- 2-OS EXTINTORES DE CO2 FORAM PESADOS NO MES DE SETEMBRO.
- 3-FEITO A INSPECAO NOS EXTINTORES DE ESPUMA.
- 4-FEITO PRESERVACAO NAS CARRETAS DO TG 3.
- 5-NAO FORAM ENCONTRADOS OS EXTINTORES DE ESPUMA 4007 DO TG-1 DE 9 LITROS, BEM COMO, O 4020 DO TG-1 DE 60 LITROS.

Cod. equi: 5050401      EQUIPAMENTO AUTONOMO DE RESPIRACAO N.1  
 LTM.....: FPREVS1T      PRESERVACAO PERIODICA  
 Done.....: 01/12/00      Iniciais...: MSM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

Cod. equi: 5050402      EQUIPAMENTO AUTONOMO DE RESPIRACAO N.2  
 LTM.....: FPREVS1T      PRESERVACAO PERIODICA  
 Done.....: 01/12/00      Iniciais...: MSM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

É copia fiel do documento original.

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

PETROBRAS EPBC OFFICE

Data.....: 20/03/01  
Projeto...: P36

PETROBRAS 36



Cod.equi: 5050403  
LTM.....: FPREVST  
Done.....: 07/12/00  
Categorias  
TEC. DE SEGURANCA

EQUIPAMENTO AUTONOMO DE RESPIRACAO N.3  
PRESERVACAO PERIODICA  
Iniciais...: GMG  
Homem Horas Custo total Tipo  
1 1.0 0.0

Cod.equi: 5050404  
LTM.....: FPREVST  
Done.....: 12/03/01  
Categorias  
TEC. DE SEGURANCA

EQUIPAMENTO AUTONOMO DE RESPIRACAO N.4  
PRESERVACAO PERIODICA  
Iniciais...: SCM  
Homem Horas Custo total Tipo  
1 1.0 0.0

Esta sendo usado para treinamento com os operadores.

LTM.....: FPREVST  
Done.....: 07/12/00  
Categorias  
TEC. DE SEGURANCA

PRESERVACAO PERIODICA  
Iniciais...: GMG  
Homem Horas Custo total Tipo  
1 1.0 0.0

Cod.equi: 5050407  
LTM.....: FPREVST  
Done.....: 12/03/01  
Categorias  
TEC. DE SEGURANCA

EQUIPAMENTO AUTONOMO DE RESPIRACAO N.7  
INSPECAO PERIODICA  
Iniciais...: SCM  
Homem Horas Custo total Tipo  
1 1.0 0.0 MAN.PREV.PRED.PETR.

Cod.equi: 5050408  
LTM.....: FPREVST  
Done.....: 12/03/01  
Categorias  
TEC. DE SEGURANCA

EQUIPAMENTO AUTONOMO DE RESPIRACAO N.8  
INSPECAO PERIODICA  
Iniciais...: SCM  
Homem Horas Custo total Tipo  
1 1.0 0.0 MAN.PREV.PRED.PETR.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS PARENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORARIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Cod.equi: 5050501            ARMARIO COM EQUIPAMENTOS DE APOIO N.1  
 LTM.....: FPREVST            PRESERVACAO  
 Done.....: 31/01/01            Iniciais...: SCM  
 Categorias            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA            1        1.0        0.0  
 -----  
 FALTA LANTERNA PORTATIL  
 -----

LTM.....: FPREVST            PRESERVACAO  
 Done.....: 13/10/00            Iniciais...: SCM  
 Categorias            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA            1        1.0        0.0

Cod.equi: 5050502            ARMARIO COM EQUIPAMENTOS DE APOIO N.2  
 LTM.....: FPREVST            PRESERVACAO  
 Done.....: 03/02/01            Iniciais...: SCM  
 Categorias            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA            1        1.0        0.0

LTM.....: FPREVST            PRESERVACAO  
 Done.....: 13/10/00            Iniciais...: SCM  
 Categorias            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA            1        1.0        0.0

Cod.equi: 5050503            ARMARIO COM EQUIPAMENTOS DE APOIO N.3  
 LTM.....: FPREVST            PRESERVACAO  
 Done.....: 03/02/01            Iniciais...: SCM  
 Categorias            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA            1        1.0        0.0

LTM.....: FPREVST            PRESERVACAO  
 Done.....: 13/10/00            Iniciais...: SCM  
 Categorias            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA            1        1.0        0.0

JOSÉ CARLOS PIENDEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Cod.equi: 5050504      ARMARIO COM EQUIPAMENTOS DE APOIO N.4  
 LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 01/01/01      Iniciais...: GMG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

Cod.equi: 5050505      ARMARIO COM EQUIPAMENTOS DE APOIO N.5  
 LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 31/12/00      Iniciais...: GMG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

Cod.equi: 5050506      ARMARIO COM EQUIPAMENTOS DE APOIO N.6  
 LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 07/03/01      Iniciais...: SCM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 21/11/00      Iniciais...: SCM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 17/10/00      Iniciais...: SCM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

Cod.equi: 5050507      ARMARIO COM EQUIPAMENTOS DE APOIO N.7  
 LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 07/03/01      Iniciais...: SCM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 21/11/00      Iniciais...: SCM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

**E C O P I A F I E L D O D O C U M E N T O O R I G I N A L**

JOSE CARLOS PINHEIRO GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 17/10/00      Iniciais...: SCM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

Cod.equi: 5050508      ARMARIO COM EQUIPAMENTOS DE APOIO N.8  
 LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 08/02/01      Iniciais...: MSM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 06/02/01      Iniciais...: MSM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

ESTA FALTANDO RETINIDA E FILTRO QUIMICO

LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 01/11/00      Iniciais...: MSM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

Cod.equi: 5050509      ARMARIO COM EQUIPAMENTOS DE APOIO N.9  
 LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 08/02/01      Iniciais...: MSM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 06/02/01      Iniciais...: MSM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

ESTA FALTANDO RETINIDA E FILTRO QUIMICO

LTM.....: FPREVS1T      PRESERVACAO  
 Done.....: 30/10/00      Iniciais...: MSM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

É Cópia FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PINHEIRO GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Cod.equi: 5050510 ARMARIO COM EQUIPAMENTOS DE APOIO N.10  
 LTM.....: FPREVS1T PRESERVACAO  
 Done.....: 05/02/01 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

LTM.....: FPREVS1T PRESERVACAO  
 Done.....: 30/09/00 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN.PREV.PRED.PETR.

Cod.equi: 5050601 CANHAO PORTATIL AGUA/ESPUMA N.1  
 LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 05/02/01 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 30/01/01 Iniciais...: QRG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

- Realizado conforme programado pelo TS. Queiroga em 20/01/2001.

LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 26/01/01 Iniciais...: QRG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

-Realizado conforme em 20/01/2001 pelo TS. Queiroga.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL:

COORDENADOR GERAL  
 DIRETOR  
 SERVIÇO DE SERVIÇOS CARTORIAS



LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 20/01/01                    Iniciais...: QRG  
 Categorias                            Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0

- Solicitado ao Segen/Sergio Azeredo a identificacao de piso conforme NR-23

Cod.equi: 5050602                    CANHAO PORTATIL AGUA/ESPUMA N.2  
 LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 05/02/01                    Iniciais...: SCM  
 Categorias                            Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0

Cod.equi: 5050603                    CANHAO PORTATIL AGUA/ESPUMA N.3  
 LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 15/02/01                    Iniciais...: GMG  
 Categorias                            Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0

Cod.equi: 5050701                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.1  
 LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 26/01/01                    Iniciais...: QRG  
 Categorias                            Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0

-Realizado conforme em 20/01/2001 pelo TS. Queiroga.

LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 20/01/01                    Iniciais...: QRG  
 Categorias                            Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0

- Solicitado ao Segen/Sergio Azeredo a identificacao de piso conforme NR-23

É CÓPIA DO DOCUMENTO ORIGINAL  
 DIRETOR  
 UNIDADE DE SERVIÇOS CARTORIAIS



Cod.equi: 5050702 ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.2  
 LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 26/01/01 Iniciais...: ORG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

-Realizado conforme em 20/01/2001 pelo TS. Queiroga.

LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 20/01/01 Iniciais...: ORG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

- Solicitado ao Segen/Sergio Azeredo a identificacao de piso conforme NR-23

Cod.equi: 5050703 ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.3  
 LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 16/02/01 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 24/09/00 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

Cod.equi: 5050704 ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.4  
 LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 15/02/01 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

**É CÔPIA DO DOCUMENTO ORIGINAL:**

JOSE CARLOS FUMENEL BUSTÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAIS



LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 24/09/00                    Iniciais...: GMG  
 Categorias                            Homem       Horas       Custo total       Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0

Cod.equi: 5050705                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.5  
 LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 16/02/01                    Iniciais...: GMG  
 Categorias                            Homem       Horas       Custo total       Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0

L' .....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 24/09/00                    Iniciais...: GMG  
 Categorias                            Homem       Horas       Custo total       Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0

EQUIPAMENTOS SENDO SUBSTITUIDOS

Cod.equi: 5050706                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.6  
 LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 29/10/00                    Iniciais...: GMG  
 Categorias                            Homem       Horas       Custo total       Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0

Cod.equi: 5050707                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.7  
 LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 29/10/00                    Iniciais...: GMG  
 Categorias                            Homem       Horas       Custo total       Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0

É Cópia do Documento Original.

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



Cod.equi: 5050708                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.8  
 LTM.....: FPREVS1T                PRESERVACAO  
 Cent.custo: PREOP                CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 30/10/00                Iniciais...: GMG  
 Categorias                        Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA                1            1.0            0.0

Cod.equi: 5050709                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.9  
 LTM.....: FPREVS1T                PRESERVACAO  
 Cent.custo: PREOP                CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 02/11/00                Iniciais...: GMG  
 Categorias                        Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA                1            1.0            0.0

Cod.equi: 5050710                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.10  
 LTM.....: FPREVS1T                PRESERVACAO  
 Cent.custo: PREOP                CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 06/11/00                Iniciais...:  
 Categorias                        Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA                1            1.0            0.0

Cod.equi: 5050711                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.11  
 LTM.....: FPREVS1T                PRESERVACAO  
 Cent.custo: PREOP                CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 27/12/00                Iniciais...: QRG  
 Categorias                        Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA                1            1.0            0.0

- Realizado conforme programado.

Cod.equi: 5050712                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.12  
 LTM.....: FPREVS1T                PRESERVACAO  
 Cent.custo: PREOP                CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 03/02/01                Iniciais...: SCM  
 Categorias                        Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA                1            1.0            0.0

É Cópia do Documento Original

JOSÉ CARLOS FINEI TEL GUSMÃO  
 DIRETOR  
 ENVIÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Cod.equi: 5050713 ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.13  
 LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 03/02/01 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 22/09/00 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

EQUIPAMENTOS SENDO SUBSTITUIDOS

Cod.equi: 5050714 ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.14  
 LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 05/02/01 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 22/09/00 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

EQUIPAMENTOS SENDO SUBSTITUIDOS

Cod.equi: 5050715 ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.15  
 LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 05/02/01 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

É CÓPIA DE DOCUMENTO ORIGINAL

JOSÉ CARLOS FIMINTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36

JTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 03/02/01                    Iniciais...: SCM  
 Categorias                    Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1           1.0           0.0

JTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 27/09/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1           1.0           0.0

1-NAO FOI REALIZADA A PRESERVACAO PORQUE O ARMARIO ESTA SENDO SUBSTITUIDO.

Mod.equi: 5050716                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.16

JTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 11/03/01                    Iniciais...: SCM  
 Categorias                    Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1           1.0           0.0

ATENDIDO O PADRAO-37-2972

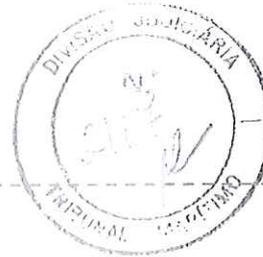
JTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 22/10/00                    Iniciais...: SCM  
 Categorias                    Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1           1.0           0.0

Mod.equi: 5050717                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.17

JTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 11/03/01                    Iniciais...: SCM  
 Categorias                    Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1           1.0           0.0

ATENDIDO O PADRAO PE-37-2972

É CÓPIA DE UM DOCUMENTO ORIGINAL  
 JOSÉ CARLOS FIMMEL OLIVEIRA  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36

LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 22/10/00                    Iniciais...: SCM  
 Categorias                            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0

Cod.equi: 5050718                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.18  
 LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 11/03/01                    Iniciais...: SCM  
 Categorias                            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0

TENDIDO O PADRAO PE-37-2972

LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 22/10/00                    Iniciais...: SCM  
 Categorias                            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0

Cod.equi: 5050719                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.19  
 LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 11/03/01                    Iniciais...: SCM  
 Categorias                            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0

TENDIDO O PADRAO PE-37-2972

Cod.equi: 5050720                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.20  
 LTM.....: FPREVS1T                    PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 01/12/00                    Iniciais...: MSM  
 Categorias                            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0

É CÓPIA DELO DOCUMENTO ORIGINAL

JOSÉ CARLOS FIAENTEL GUARÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTOGRAFAS



Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36

Mod.equi: 5050721                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.21  
 M.TM.....: FPREVS1T                PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 01/12/00                   Iniciais...: MSM  
 Categorias                            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0

Mod.equi: 5050722                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.22  
 M.TM.....: FPREVS1T                PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 01/12/00                   Iniciais...: MSM  
 Categorias                            Homem    Horas    Custo total    Tipo  
 C. DE SEGURANCA                    1        1.0        0.0

M.TM.....: FPREVS1T                PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 27/09/00                   Iniciais...: MSM  
 Categorias                            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0

1-PRESERVACAO NAO FOI REALIZADA PORQUE O ARMARIO ESTA SENDO SUBSTITUIDO.

Mod.equi: 5050723                    ARMARIOS COM EQUIPAMENTOS COMB.INCENDIO N.23  
 M.TM.....: FPREVS1T                PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 01/12/00                   Iniciais...: MSM  
 Categorias                            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0

M.TM.....: FPREVS1T                PRESERVACAO  
 Cent.custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 22/09/00                   Iniciais...: GMG  
 Categorias                            Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSE CARLOS FERREIRA GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36

Mod. equi: 5050724                    ARMARIOS COM EQUIPAMENTOS COMB. INCENDIO N.24  
 ATM.....: FPREVS1T                    PRESERVACAO  
 Cent. custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 11/03/01                    Iniciais...: SCM  
 Categorias                    Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0  
 -----  
 ATENDIDO O PADRAO PE-37-2972  
 -----

ATM.....: FPREVS1T                    PRESERVACAO  
 Cent. custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 22/10/00                    Iniciais...: SCM  
 Categorias                    Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0

Mod. equi: 5050801                    ARMARIOS DE COMB. INCENDIO COM ESPUMA N.1  
 ATM.....: FPREVS1T                    PRESERVACAO  
 Cent. custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 03/03/01                    Iniciais...: QRG  
 Categorias                    Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0  
 -----  
 -Realizado conforme planejado pelo TS. Queiroga em 02/02/2001.  
 -----

ATM.....: FPREVS1T                    PRESERVACAO  
 Cent. custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 11/10/00                    Iniciais...: QRG  
 Categorias                    Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0  
 -----  
 -REALIZADO CONFORME PLANEJADO.  
 -OS EQUIPAMENTOS ATUAIS SÚO PADRÚO CANADENSE.  
 -SERÚO SUBSTITUIDOS PELO PADRÚO PETROBRÇS.  
 -----

Mod. equi: 5050802                    ARMARIOS DE COMB. INCENDIO COM ESPUMA N.2  
 ATM.....: FPREVS1T                    PRESERVACAO  
 Cent. custo: PREOP                    CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 19/02/01                    Iniciais...: GMG  
 Categorias                    Homem    Horas    Custo total    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0

É Cópia do Documento Original

JOSÉ CARLOS FERRETE GUEZÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Mod. equi: 5050806 ARMARIOS DE COMB. INCENDIO COM ESPUMA N.6  
 JTM.....: FPREVS1T PRESERVACAO  
 Cent. custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 02/11/00 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

Mod. equi: 5050807 ARMARIOS DE COMB. INCENDIO COM ESPUMA N.7  
 JTM.....: FPREVS1T PRESERVACAO  
 Cent. custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 27/01/01 Iniciais...: QRG  
 Categorias Homem Horas Custo total Tipo  
 C. DE SEGURANCA 1 1.0 0.0

- Realizado conforme programado.

JTM.....: FPREVS1T PRESERVACAO  
 Cent. custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 23/10/00 Iniciais...: jras  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

Mod. equi: 5050808 ARMARIOS DE COMB. INCENDIO COM ESPUMA N.8  
 JTM.....: FPREVS1T PRESERVACAO  
 Cent. custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 27/01/01 Iniciais...: QRG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

- Realizado conforme programado.

JTM.....: FPREVS1T PRESERVACAO  
 Cent. custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 23/10/00 Iniciais...: jras  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS PEREIRA GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Mod. equi: 5050809 ARMARIOS DE COMB. INCENDIO COM ESPUMA N.9  
 TM.....: FPREVS1T PRESERVACAO  
 Cent. custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 27/01/01 Iniciais...:  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0  
 - Realizado conforme programado.

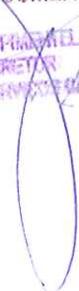
TM.....: FPREVS1T PRESERVACAO  
 Cent. custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 15/01/01 Iniciais...: JRAS  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

Mod. equi: 5050810 ARMARIOS DE COMB. INCENDIO COM ESPUMA N.10  
 TM.....: FPREVS1T PRESERVACAO  
 Cent. custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 26/01/01 Iniciais...: QRG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0  
 - Realizado conforme em 20/01/2001 pelo TS. Queiroga.

TM.....: FPREVS1T PRESERVACAO  
 Cent. custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 20/01/01 Iniciais...: QRG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0  
 - Realizado conforme programacao.  
 - Solicitado ao Segen/Sergio Azeredo a identificacao de piso conforme NR-23

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSE CARLOS FARIAS TEL. GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS DE SANITARIAS





Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36

Mod.equi: 5050811 ARMARIOS DE COMB.INCENDIO COM ESPUMA N.11  
 LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 11/03/01 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0  
 ATENDIDO O PADRAO PE-37-2972

LTM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 22/10/00 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

Mod.equi: 50509 EXT.INC.PONTOON/COLUNA BB PROA/POPA E PLANTA GAS  
 LTM.....: FPREVS1M  
 Done.....: 20/02/01 Iniciais...: JRAS  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0  
 PRESERVACAO NA PLANTA DE GAS EM 19/02/01.  
 PRESERVACAO NO POONTOON EM 20/02/01.

LTM.....: FPREVS1M  
 Done.....: 16/01/01 Iniciais...: JRAS  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

LTM.....: FPREVS1M  
 Done.....: 12/12/00 Iniciais...: JRAS  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0  
 EXECUÇÃO DO SERVIO:  
 PLANTA DE GçS: 09 E 10/12/00.  
 POONTOON; 10/12/00.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS FERREZ GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



LTM.....: FPREVS1M

Done.....: 10/11/00

Iniciais...: JRAS

Categorias Homem Horas Custo total Tipo

TEC. DE SEGURANCA 1 1.0 0.0

REALIZADO CONFORME PLANEJADO.

LTM.....: FPREVS1M

Done.....: 11/10/00

Iniciais...: JRAS

Categorias Homem Horas Custo total Tipo

TEC. DE SEGURANCA 1 1.0 0.0

-REALIZADO CONFORME PLANEJADO

Mod. equi: 50510

EXT. INC. PONTOON/COLUNA BE PR/PP PLANTA OLEO DRILL

LTM.....: FPREVS1M

Done.....: 03/03/01

Iniciais...: QRG

Categorias Homem Horas Custo total Tipo

TEC. DE SEGURANCA 1 1.0 0.0

-Realizado conforme planejado em 02/03/2001.

-Realizada a pesagem de todos os extintores de CO2 e atualizada a planilha de controle dos equipamentos pelo TS. Queiroga.

LTM.....: FPREVS1M

Done.....: 26/01/01

Iniciais...: QRG

Categorias Homem Horas Custo total Tipo

TEC. DE SEGURANCA 1 1.0 0.0

-Realizado conforme planejado.

-Solicitado ao Segen a identificação de piso conforme norma, para os equipamentos de combate a incendio portateis e fixos desta area.

LTM.....: FPREVS1M

Done.....: 27/12/00

Iniciais...: QRG

Categorias Homem Horas Custo total Tipo

TEC. DE SEGURANCA 1 1.0 0.0

- Os extintores das colunas e pontoons popa e proa boreste estão necessitando pintura para demarcação de piso.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS FARIAS CUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



LTM.....: FPREVS1M

Done.....: 20/11/00

Iniciais...: QRG

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	

-Realizado conforme programado.

LTM.....: FPREVS1M

Done.....: 09/10/00

Iniciais...: QRG

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	

-Realizado conforme programaco em 05/10/2000

Cod.equi: 50511

EXTINTORES DAS BALEEIRAS E BOTE DE RESGATE

LTM.....: FPREVS1M

Done.....: 13/03/01

Iniciais...: MSS

Categorias	Homem	Horas	Custo total	Tipo
M. DE CABOTAGEM	1	1.0	0.0	

TRATADOS E PINTADOS OS SUPORTES DOS EXTINTORES.

LTM.....: FPREVS1M

Done.....: 08/03/01

Iniciais...: MSS

Categorias	Homem	Horas	Custo total	Tipo
M. DE CABOTAGEM	1	1.0	0.0	

LTM.....: FPREVS1M

Done.....: 10/02/01

Iniciais...: MSS

Categorias	Homem	Horas	Custo total	Tipo
M. DE CABOTAGEM	1	1.0	0.0	

LTM.....: FPREVS1M

Done.....: 31/12/00

Iniciais...:

Categorias	Homem	Horas	Custo total	Tipo
M. DE CABOTAGEM	1	1.0	0.0	

EXTINTORES BALEEIRAS OK.EXTINTOR BOTE DE RESGATE AGUARDANDO SUBSTITUICAO.

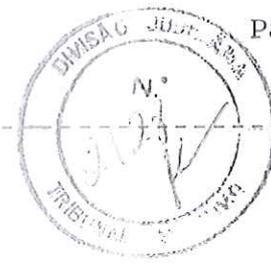
É CPIA FEL DO DOCUMENTO ORIGINAL.

JOS CARLOS PIMENTEL GUSMO  
DIRETOR  
DIVISO DE SERVIOS PARTICIPAIS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Cod.equi: 5051204                    HIDRANTE INTERNO N.4  
 LTM.....: FPREVS1T                PRESERVACAO  
 Done.....: 07/03/01                Iniciais...: SCM  
 Categorias                            Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1        1.0       0.0       MAN.PREV.PRED.PETR.

LTM.....: FPREVS1T                PRESERVACAO  
 Done.....: 21/11/00                Iniciais...: SCM  
 Categorias                            Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1        1.0       0.0       MAN.PREV.PRED.PETR.

Cod.equi: 5051205                    HIDRANTE INTERNO N.5  
 LTM.....: FPREVS1T                PRESERVACAO  
 Done.....: 07/03/01                Iniciais...: SCM  
 Categorias                            Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1        1.0       0.0       MAN.PREV.PRED.PETR.

LTM.....: FPREVS1T                PRESERVACAO  
 Done.....: 21/11/00                Iniciais...: SCM  
 Categorias                            Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1        1.0       0.0       MAN.PREV.PRED.PETR.

LTM.....: FPREVS1T                PRESERVACAO  
 Done.....: 23/10/00                Iniciais...: SCAM  
 Categorias                            Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1        1.0       0.0       MAN.PREV.PRED.PETR.

Cod.equi: 5051206                    HIDRANTE INTERNO N.6  
 LTM.....: FPREVS1T                PRESERVACAO  
 Done.....: 05/02/01                Iniciais...: SCM  
 Categorias                            Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1        1.0       0.0       MAN.PREV.PRED.PETR.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36

LTM.....: FPREVS1T

PRESERVACAO

Done.....: 22/10/00

Iniciais...: SCM

Categorias

Homem Horas Custo total

Tipo

TEC. DE SEGURANCA

1 1.0

0.0

MAN.PREV.PRED.PETR.

Cod.equi: 5051207

HIDRANTE INTERNO N.7

LTM.....: FPREVS1T

PRESERVACAO

Done.....: 03/02/01

Iniciais...: SCM

Categorias

Homem Horas Custo total

Tipo

TEC. DE SEGURANCA

1 1.0

0.0

MAN.PREV.PRED.PETR.

LTM.....: FPREVS1T

PRESERVACAO

Done.....: 22/10/00

Iniciais...: SCM

Categorias

Homem Horas Custo total

Tipo

TEC. DE SEGURANCA

1 1.0

0.0

MAN.PREV.PRED.PETR.

Cod.equi: 5051208

HIDRANTE INTERNO N.8

LTM.....: FPREVS1T

PRESERVACAO

Done.....: 03/02/01

Iniciais...: SCM

Categorias

Homem Horas Custo total

Tipo

TEC. DE SEGURANCA

1 1.0

0.0

MAN.PREV.PRED.PETR.

LTM.....: FPREVS1T

PRESERVACAO

Done.....: 22/10/00

Iniciais...: SCM

Categorias

Homem Horas Custo total

Tipo

TEC. DE SEGURANCA

1 1.0

0.0

MAN.PREV.PRED.PETR.

Cod.equi: 5051209

HIDRANTE INTERNO N.9

LTM.....: FPREVS1T

PRESERVACAO

Done.....: 31/01/01

Iniciais...: SCM

Categorias

Homem Horas Custo total

Tipo

TEC. DE SEGURANCA

1 1.0

0.0

MAN.PREV.PRED.PETR.

É Cópia Fiel do Documento Original

JOSÉ CARLOS FIMENTELXUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAIS

Data.....: 20/03/01

rojeto...: P36

PETROBRAS 36



LTM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 22/10/00                    Iniciais...: SCM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0                    MAN.PREV.PRED.PETR.

Cod.equi: 5051210                    HIDRANTE INTERNO N.10  
 LTM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 31/01/01                    Iniciais...: SCM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0                    MAN.PREV.PRED.PETR.

LTM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 23/10/00                    Iniciais...: SCAM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0                    MAN.PREV.PRED.PETR.

Cod.equi: 5051211                    HIDRANTE INTERNO N.11  
 LTM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/12/00                    Iniciais...: GMG  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0                    MAN.PREV.PRED.PETR.

LTM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 27/09/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0                    MAN.PREV.PRED.PETR.

1-MANGUEIRA MUITO SUJA DEVE SER SUBSTITUIDA.

Cod.equi: 5051212                    HIDRANTE INTERNO N.12  
 LTM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/12/00                    Iniciais...: GMG  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0                    MAN.PREV.PRED.PETR.

É CÔPIA DE DOCUMENTO ORIGINAL  
 JOSE CARLOS PINHEIRO GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS PARTICIPAIS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



ATM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 27/09/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

Cod.equi: 5051213                    HIDRANTE INTERNO N.13  
 ATM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/12/00                    Iniciais...: GMG  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

A.....: FPREVS1T                    PRESERVACAO  
 Done.....: 27/09/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

1-FALTA MANGUEIRA.NAO TEMOS A BORDO. FARA DE PADRAO 2 1/4.

Cod.equi: 5051214                    HIDRANTE INTERNO N.14  
 ATM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/12/00                    Iniciais...: GMG  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

A.....: FPREVS1T                    PRESERVACAO  
 Done.....: 27/09/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

1-MANGUEIRA MUITO SUJA.DEVE SER SUBSTITUIDA.NAO TEMOS A BORDO.FORA DO PADRAO 2 1/4.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL  
 JOSÉ CARLOS FIMENDEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Mod. equi: 5051215                    HIDRANTE INTERNO N.15  
 ATM.....: FPREVS1T                PRESERVACAO  
 Done.....: 29/12/00                Iniciais...: GMG  
 Categorias                            Homem    Horas    Custo total            Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0                    MAN.PREV.PRED.PETR.

ATM.....: FPREVS1T                PRESERVACAO  
 Done.....: 27/09/00                Iniciais...: MSM  
 Categorias                            Homem    Horas    Custo total            Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0                    MAN.PREV.PRED.PETR.

Mod. equi: 5051216                    HIDRANTE INTERNO N.16  
 ATM.....: FPREVS1T                PRESERVACAO  
 Done.....: 29/12/00                Iniciais...:  
 Categorias                            Homem    Horas    Custo total            Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0                    MAN.PREV.PRED.PETR.

ATM.....: FPREVS1T                PRESERVACAO  
 Done.....: 27/09/00                Iniciais...: MSM  
 Categorias                            Homem    Horas    Custo total            Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0                    MAN.PREV.PRED.PETR.

1-MANGUEIRA MUITO SUJA.DEVE SER SUBSTITUIDA.NAO TEMOS A BORDO.FORA DO PADRAO 2 1/4.

Mod. equi: 5051217                    HIDRANTE INTERNO N.17  
 ATM.....: FPREVS1T                PRESERVACAO  
 Done.....: 30/12/00                Iniciais...:  
 Categorias                            Homem    Horas    Custo total            Tipo  
 TEC. DE SEGURANCA                    1        1.0        0.0                    MAN.PREV.PRED.PETR.

É CÔPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAIS



Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36

ITM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 27/09/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

1-MANGUEIRA INSTALADA MUITO ELAVADA DO PISO. QUANDO FOR INSTALADO O ARMARIO SERA INSTALADO MAIS BAIXO.

Mod.equi: 5051218                    HIDRANTE INTERNO N.18  
 ITM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/12/00                    Iniciais...: GMG  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

ITM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 27/09/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

Mod.equi: 5051219                    HIDRANTE INTERNO N.19  
 ITM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/12/00                    Iniciais...: GMG  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

ITM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 27/09/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

Mod.equi: 5051220                    HIDRANTE INTERNO N.20  
 ITM.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/12/00                    Iniciais...: GMG  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Mod. equi: 5051221  
 ATM.....: FPREVS1T PRESERVACAO  
 Done.....: 27/09/00 Iniciais...: MSM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN. PREV. PRED. PETR.

Mod. equi: 5051221  
 ATM.....: FPREVS1T PRESERVACAO  
 Done.....: 06/02/01 Iniciais...: MSM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN. PREV. PRED. PETR.

Mod. equi: 5051222  
 ATM.....: FPREVS1T PRESERVACAO  
 Done.....: 30/10/00 Iniciais...: MSM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN. PREV. PRED. PETR.

Mod. equi: 5051222  
 ATM.....: FPREVS1T PRESERVACAO  
 Done.....: 06/02/01 Iniciais...: MSM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN. PREV. PRED. PETR.

Mod. equi: 5051223  
 ATM.....: FPREVS1T PRESERVACAO  
 Done.....: 30/10/00 Iniciais...: MSM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN. PREV. PRED. PETR.

Mod. equi: 5051223  
 ATM.....: FPREVS1T PRESERVACAO  
 Done.....: 06/02/01 Iniciais...: MSM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0 MAN. PREV. PRED. PETR.

É Cópia Fiel do Documento Original.

JOSÉ CARLOS FIMENDEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTOGRAFICOS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/10/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN. PREV. PRED. PETR.

Mod. equi: 5051224                    HIDRANTE INTERNO N.24  
 Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 06/02/01                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN. PREV. PRED. PETR.

Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/10/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN. PREV. PRED. PETR.

Mod. equi: 5051225                    HIDRANTE INTERNO N.25  
 Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 06/02/01                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN. PREV. PRED. PETR.

Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/10/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN. PREV. PRED. PETR.

Mod. equi: 5051226                    HIDRANTE INTERNO N.26  
 Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 06/02/01                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN. PREV. PRED. PETR.

É CÓPIA FEITA DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL OLIVEIRA  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORARIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/10/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

Mod. equi: 5051227                    HIDRANTE INTERNO N.27  
 Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 06/02/01                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/10/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

Mod. equi: 5051228                    HIDRANTE INTERNO N.28  
 Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 06/02/01                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/10/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

Mod. equi: 5051229                    HIDRANTE INTERNO N.29  
 Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 06/02/01                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo total                    Tipo  
 TEC. DE SEGURANCA                    1            1.0            0.0                    MAN.PREV.PRED.PETR.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS FARIAS GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTÓRIAS



Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/10/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1           1.0           0.0           MAN. PREV. PRED. PETR.

Mod. equi: 5051230                    HIDRANTE INTERNO N.30  
 Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 06/02/01                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1           1.0           0.0           MAN. PREV. PRED. PETR.

Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 30/10/00                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1           1.0           0.0           MAN. PREV. PRED. PETR.

Mod. equi: 5051231                    HIDRANTE INTERNO N.31  
 Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 06/02/01                    Iniciais...: MSM  
 Categorias                    Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1           1.0           0.0           MAN. PREV. PRED. PETR.

Mod. equi: 5051232                    HIDRANTE INTERNO N.32  
 Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 20/02/01                    Iniciais...: JRAS  
 Categorias                    Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1           1.0           0.0           MAN. PREV. PRED. PETR.

Item.....: FPREVS1T                    PRESERVACAO  
 Done.....: 05/11/00                    Iniciais...: JRAS  
 Categorias                    Homem    Horas    Custo    total    Tipo  
 TEC. DE SEGURANCA                    1           1.0           0.0           MAN. PREV. PRED. PETR.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS FIMMTEL GASMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAIS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Mod. equi: 5051233      HIDRANTE INTERNO N.33  
 ATM.....: FPREVS1T      PRESERVACAO  
 Done.....: 18/02/01      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

ATM.....: FPREVS1T      PRESERVACAO  
 Done.....: 05/11/00      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

Mod. equi: 5051234      HIDRANTE INTERNO N.34  
 ATM.....: FPREVS1T      PRESERVACAO  
 Done.....: 18/02/01      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

ATM.....: FPREVS1T      PRESERVACAO  
 Done.....: 05/11/00      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

ATM.....: FPREVS1T      PRESERVACAO  
 Done.....: 29/09/00      Iniciais...: GMG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

Mod. equi: 5051235      HIDRANTE INTERNO N.35  
 ATM.....: FPREVS1T      PRESERVACAO  
 Done.....: 18/02/01      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

**É CÓPIA FIEL DO DOCUMENTO ORIGINAL**

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTÓRIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



ATM.....: FPREVS1T      PRESERVACAO  
 Done.....: 05/11/00      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

ATM.....: FPREVS1T      PRESERVACAO  
 Done.....: 30/09/00      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

OS HIDRANTES ESTÃO SENDO SUBSTITUIDOS JUNTAMENTE COM OS ACESSÁRIOS DAS CAIXAS; MUDANDO DO PADRÃO CANADENSE PARA O PETROBRAS.

Mod. equi: 5051236      HIDRANTE INTERNO N.36  
 ATM.....: FPREVS1T      PRESERVACAO  
 Done.....: 21/02/01      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

ATM.....: FPREVS1T      PRESERVACAO  
 Done.....: 05/11/00      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

ATM.....: FPREVS1T      PRESERVACAO  
 Done.....: 30/09/00      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

OS HIDRANTES E OS EQUIPAMENTOS DAS CAIXAS ESTÃO SENDO SUBSTITUÍDOS; MUDANDO DO PADRÃO CANADENSE PARA O PADRÃO PETROBRAS.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PINHEIRO GUSMÃO  
 DIRETOR  
 DEPARTAMENTO DE SERVIÇOS CARBONÍFICOS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Mod. equi: 5051237 HIDRANTE INTERNO N.37

MTM.....: FPREVS1T PRESERVACAO

Done.....: 12/12/00 Iniciais...: JRAS

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	MAN. PREV. PRED. PETR.

EXECUÇÃO DO SERVIÇO: 10/12/00.

MTM.....: FPREVS1T PRESERVACAO

Done.....: 03/10/00 Iniciais...: JRAS

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	MAN. PREV. PRED. PETR.

ESQUIPAMENTOS NO PADRÃO CANADENSE, ESTÃO SENDO SUBSTITUÍDOS PARA O PADRÃO PETROBRAS.

Mod. equi: 5051238 HIDRANTE INTERNO N.38

MTM.....: FPREVS1T PRESERVACAO

Done.....: 12/12/00 Iniciais...: JRAS

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	MAN. PREV. PRED. PETR.

EXECUÇÃO DO SERVIÇO: 10/12/00.

SUBSTITUIMOS AS CHAVES DE MANGUEIRAS ANTIGAS POR NOVAS E COLOCAMOS O INVENTÁRIO ADESIVO NAS CAIXAS.

MTM.....: FPREVS1T PRESERVACAO

Done.....: 04/10/00 Iniciais...: JRAS

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	MAN. PREV. PRED. PETR.

ESQUIPAMENTOS NO PADRÃO CANADENSE, ESTÃO SENDO SUBSTITUÍDOS PARA O PADRÃO PETROBRAS.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS PRINTELLI GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTÓGRAFOS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Mod. equi: 5051239 HIDRANTE INTERNO N.39

ATM.....: FPREVS1T PRESERVACAO

Done.....: 12/12/00 Iniciais...: JRAS

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	MAN.PREV.PRED.PETR.

EXECUÇÃO DO SERVIÇO: 10/12/00.

SUBSTITUIMOS AS CHAVES DE MANGUEIRAS ANTIGAS POR NOVAS E COLOCAMOS O INVENTÁRIO ADESIVO NAS CAIXAS.

ATM.....: FPREVS1T PRESERVACAO

Done.....: 03/10/00 Iniciais...: JRAS

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	MAN.PREV.PRED.PETR.

ESQUIPAMENTOS NO PADRÃO CANADENSE, ESTÃO SENDO SUBSTITUÍDOS PARA O PADRÃO PETROBRAS.

Mod. equi: 5051240 HIDRANTE INTERNO N.40

ATM.....: FPREVS1T PRESERVACAO

Done.....: 12/12/00 Iniciais...: JRAS

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	MAN.PREV.PRED.PETR.

EXECUÇÃO DO SERVIÇO: 10/12/00.

SUBSTITUIMOS AS CHAVES DE MANGUEIRAS ANTIGAS POR NOVAS E COLOCAMOS O INVENTÁRIO ADESIVO NAS CAIXAS.

ATM.....: FPREVS1T PRESERVACAO

Done.....: 03/10/00 Iniciais...: JRAS

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	MAN.PREV.PRED.PETR.

ESQUIPAMENTOS NO PADRÃO CANADENSE, ESTÃO SENDO SUBSTITUÍDOS PARA O PADRÃO PETROBRAS.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS FIMINTEL GUIMÃO  
DIRETOR  
UNIDADE DE SERVIÇOS CARTÓFIAS



Mod. equi: 5051241 HIDRANTE INTERNO N.41

ATM.....: FPREVS1T PRESERVACAO

Done.....: 12/12/00 Iniciais...: JRAS

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	MAN. PREV. PRED. PETR.

EXECUÇÃO DO SERVIÇO: 10/12/00.

SUBSTITUIMOS AS CHAVES DE MANGUEIRAS ANTIGAS POR NOVAS E COLOCAMOS O INVENTÁRIO ADESIVO NAS CAIXAS.

ATM.....: FPREVS1T PRESERVACAO

Done.....: 03/10/00 Iniciais...: JRAS

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	MAN. PREV. PRED. PETR.

ESQUIPAMENTOS NO PADRÃO CANADENSE, ESTÃO SENDO SUBSTITUÍDOS PARA O PADRÃO PETROBRAS.

Mod. equi: 5051242 HIDRANTE INTERNO N.42

ATM.....: FPREVS1T PRESERVACAO

Done.....: 12/12/00 Iniciais...: JRAS

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	MAN. PREV. PRED. PETR.

EXECUÇÃO DO SERVIÇO: 10/12/00.

SUBSTITUIMOS AS CHAVES DE MANGUEIRAS ANTIGAS POR NOVAS E COLOCAMOS O INVENTÁRIO ADESIVO NAS CAIXAS.

ATM.....: FPREVS1T PRESERVACAO

Done.....: 03/10/00 Iniciais...: JRAS

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	MAN. PREV. PRED. PETR.

ESQUIPAMENTOS NO PADRÃO CANADENSE, ESTÃO SENDO SUBSTITUÍDOS PARA O PADRÃO PETROBRAS.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS FERREZ GOMES  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTÓRIAS



Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36

Mod. equi: 5051243      HIDRANTE INTERNO N.43  
 FM.....: FPREVST      PRESERVACAO  
 Done.....: 10/12/00      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN. PREV. PRED. PETR.

FM.....: FPREVST      PRESERVACAO  
 Done.....: 30/09/00      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN. PREV. PRED. PETR.

-/ HIDRANTES E OS ACESSÁRIOS ESTÃO SENDO SUBSTITUIDOS, MUDANDO DO PADRÃO CANADENSE PARA O PETROBRAS.

Mod. equi: 5051244      HIDRANTE INTERNO N.44  
 FM.....: FPREVST      PRESERVACAO  
 Done.....: 03/03/01      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN. PREV. PRED. PETR.

-Realizado conforme planejado em 02/03/01 pelos TS's Queiroga.

FM.....: FPREVST      PRESERVACAO  
 Done.....: 20/11/00      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN. PREV. PRED. PETR.

-Realizado conforme programado.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS FERRETELLI GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



PETROBRAS EP-BC OFFICE

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36

ITEM.....: FPREVSIT      PRESERVACAO  
 Done.....: 30/09/00      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

OS HIDRANTES E SEUS ACESSÁRIOS ESTÃO SENDO SUBSTITUÍDOS, MUDANDO DO PADRÃO CANADENSE PARA O PADRÃO PETROBRAS.

Mod.equi: 5051245      HIDRANTE INTERNO N.45  
 ITEM.....: FPREVSIT      PRESERVACAO  
 Done.....: 03/03/01      Iniciais...: ORG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

-Realizado conforme planejado em 02/03/01 pelos TS's Queiroga.

ITEM.....: FPREVSIT      PRESERVACAO  
 Done.....: 20/11/00      Iniciais...: ORG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

-Realizado conforme programado.

ITEM.....: FPREVSIT      PRESERVACAO  
 Done.....: 30/09/00      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

OS HIDRANTES E SEUS ACESSÓRIOS ESTÃO SENDO SUBSTITUÍDOS, MUDANDO DO PADRÃO CANADENSE PARA O PADRÃO PETROBRAS.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS FARIAS GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORARIAS



PETROBRAS EPBC OFFICE  
Data.....: 20/03/01  
Projeto...: P36 PETROBRAS 36

Mod. equi: 5051246 HIDRANTE INTERNO N.46  
ITEM.....: FPREVS1T PRESERVACAO  
Done.....: 03/03/01 Iniciais...: QRG  
Categorias Homem Horas Custo total Tipo  
TEC. DE SEGURANCA 1 1.0 0.0 MAN. PREV. PRED. PETR.

-Realizado conforme planejado em 02/03/01 pelos TS's Queiroga.

ITEM.....: FPREVS1T PRESERVACAO  
Done.....: 20/11/00 Iniciais...: QRG  
Categorias Homem Horas Custo total Tipo  
C. DE SEGURANCA 1 1.0 0.0 MAN. PREV. PRED. PETR.

-Realizado conforme programado.

ITEM.....: FPREVS1T PRESERVACAO  
Done.....: 30/09/00 Iniciais...: JRAS  
Categorias Homem Horas Custo total Tipo  
TEC. DE SEGURANCA 1 1.0 0.0 MAN. PREV. PRED. PETR.

OS HIDRANTES E SEUS ACESSÁRIOS ESTÃO SENDO SUBSTITUIDOS, MUDANDO DO PADRÃO CANADENSE PARA O PADRÃO PETROBRAS.

Mod. equi: 5051247 HIDRANTE INTERNO N.47  
ITEM.....: FPREVS1T PRESERVACAO  
Done.....: 03/03/01 Iniciais...: QRG  
Categorias Homem Horas Custo total Tipo  
TEC. DE SEGURANCA 1 1.0 0.0 MAN. PREV. PRED. PETR.

-Realizado conforme planejado em 02/03/01 pelos TS's Queiroga.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS FINEGHEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORÁRIOS



PETROBRAS EP-BC OFFICE

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36

ITEM.....: FPREVS1T      PRESERVACAO  
 Done.....: 20/11/00      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN. PREV. PRED. PETR.

-Realizado conforme programado.

ITEM.....: FPREVS1T      PRESERVACAO  
 Done.....: 30/09/00      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN. PREV. PRED. PETR.

OS HIDRANTES E SEUS ACESSÁRIOS ESTÃO SENDO SUBSTITUIDOS, MUDANDO DO PADRÃO CANADENSE PARA O PADRÃO PETROBRAS

Mod. equi: 5051248      HIDRANTE INTERNO N.48  
 ITEM.....: FPREVS1T      PRESERVACAO  
 Done.....: 03/03/01      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN. PREV. PRED. PETR.

-Realizado conforme planejado em 02/03/01 pelos TS's Queiroga.

ITEM.....: FPREVS1T      PRESERVACAO  
 Done.....: 20/11/00      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN. PREV. PRED. PETR.

-Realizado conforme programado.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS JURÍDICOS

Data.....: 20/03/01

Objeto...: P36

PETROBRAS 36



TM.....: FPREVS1T      PRESERVACAO  
 Done.....: 30/09/00      Iniciais...: JFAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

OS HIDRANTES E SEUS ACESSÁRIOS ESTÃO SENDO SUBSTITUIDOS, MUDANDO DO PADRÃO CANADENSE PARA O PADRÃO PETROBRAS.

od.equi: 5051249      HIDRANTE INTERNO N.49  
 TM.....: FPREVS1T      PRESERVACAO  
 Done.....: 03/03/01      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

-Realizado conforme planejado em 02/03/01 pelos TS's Queiroga.

TM.....: FPREVS1T      PRESERVACAO  
 Done.....: 20/11/00      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

-Realizado conforme programado.

od.equi: 5051250      HIDRANTE INTERNO N.50  
 TM.....: FPREVS1T      PRESERVACAO  
 Done.....: 27/12/00      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

- Realizado conforme programado.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL  
 JOSÉ CARLOS FIMINTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



Mod.equi: 5051251      HIDRANTE INTERNO N.51  
 ATM.....: FPREVST      PRESERVACAO  
 Done.....: 27/12/00      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

- Realizado conforme programado.

Mod.equi: 5051252      HIDRANTE INTERNO N.52  
 ATM.....: FPREVST      PRESERVACAO  
 Done.....: 27/12/00      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

- Realizado conforme programado.

Mod.equi: 5051253      HIDRANTE INTERNO N.53  
 ATM.....: FPREVST      PRESERVACAO  
 Done.....: 27/12/00      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

- Realizado conforme programado.

Mod.equi: 5051254      HIDRANTE INTERNO N.54  
 ATM.....: FPREVST      PRESERVACAO  
 Done.....: 27/12/00      Iniciais...: QRG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0      MAN.PREV.PRED.PETR.

- Realizado conforme programado.

É Cópia fiel do documento original

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Mod. equi: 5051255

HIDRANTE INTERNO N.55

ATM.....: FPREVSI1

PRESERVACAO

Done.....: 27/12/00

Iniciais...: QRG

Categorias

Homem

Horas

Custo total

Tipo

TEC. DE SEGURANCA

1

1.0

0.0

MAN. PREV. PRED. PETR.

- Realizado conforme programado.

É Cópia do Documento Original  
JOSE CARLOS FIMINTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

JOB HISTORY FOR PERIOD 20/09/00 --> 20/03/01



od.equi: 811  
Projeto...: P36                      PETROBRAS 36

od.equi: 81101                      PAINEL DE FOGO E GAS (AUGUST)  
 TM.....: FINS3M                      INSPECAO TRIMESTRAL  
 Cent.custo: PREOP                      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 12/01/01                      Iniciais...: MSM  
 Categorias                      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA                      1              1.0              0.0

REALIZADO INSPECAO NO PAINEL AUTRONICA E AS IRREGULARIDADES FORAM INFORMADA AO SUFAC ATRAVES DO LIVRO DE REGISTROS DE NAO CONFORMIDADES NO SISTEMA DE FOGO E GAS.

TM.....: FINS3M                      INSPECAO TRIMESTRAL  
 Cent.custo: PREOP                      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 02/10/00                      Iniciais...: JRAS  
 Categorias                      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA                      1              1.0              0.0

O TS MAGELA FOI TREINADO NA OPORTUNIDADE.

TM.....: FINS3M                      INSPECAO TRIMESTRAL  
 Cent.custo: PREOP                      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 01/10/00                      Iniciais...: JRAS  
 Categorias                      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA                      1              1.0              0.0

OPORTUNIDADE PASSAMOS INFORMAÍES PARA O TS MAGELA, SOBRE O SISTEMA

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS FIMENDEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

JOB HISTORY FOR PERIOD 20/09/00 --> 20/03/01



Mod. equi: 813  
Projeto...: P36 PETROBRAS 36

Mod. equi: 813 SISTEMA AGUA INCENDIO/DILUVIO/SPRINKLERS/WATER SPR  
 TM.....: FPREVST1T TESTE NO SISTEMA DE SPRINKLERS  
 Done.....: 16/01/01 Iniciais...: MSM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

Mod. equi: 81301 BOMBA DE INCENDIO GARBARINO MOD. MU250/400  
 TM.....: FINSPTS3M INSPECAO TRIMESTRAL  
 Mt. custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 02/10/00 Iniciais...: JRAS  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0  
 TESTADA A BOMBA "C", PARTIU NO AUTOMATICO.

Mod. equi: 8130101 BBA DE INCEND.  
 Identifi...: XA-401A  
 TM.....: FPREVM2T LTM TRIMESTRAL P/ BOMBA INCENDIO XA/401A  
 Done.....: 26/09/00 Iniciais...: MVS  
 Categorias Homem Horas Custo total Tipo  
 OP. DE PETROL. FAC. MEC 1 1.0 0.0 MAN. PREV. EXE. PETROB.

DURANTE A COLETA DE DADOS DA PREDITIVA O EQUIPAMENTO FUNCIONOU DURANTE  
 PROXIMADAMENTE 15 MIN, AS TEMPERATURAS DO MOTOR E BOMBA NAO ULTRAPASSARAM  
 40 GRAUS CELSIUS.  
 NENHUM VAZAMENTO FOI DETECTADO.  
 NENHUM RUÍDO ANORMAL FOI OBSERVADO.  
 MANOMETROS INDICANDO AS PRESSOES NORMAIS DE OPERACAO.  
 NIVEL DE OLEO NORMAL.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



TM.....: FPREVM2T LTM TRIMESTRAL P/ BOMBA INCENDIO XA/401A  
 Done.....: 26/09/00 Iniciais...: MVS  
 Categorias Homem Horas Custo total Tipo  
 OP.DE PETROL.FAC.MEC 1 1.0 0.0 MAN.PREV.EXE.PETROB.

DURANTE A COLETA DE DADOS DA PREDITIVA O EQUIPAMENTO FUNCIONOU DURANTE APROXIMADAMENTE 15 MIN, AS TEMPERATURAS DO MOTOR E BOMBA NAO ULTRAPASSARAM 40 GRAUS CELSIUS.  
 NENHUM VAZAMENTO FOI DETECTADO.  
 NENHUM RUÍDO ANORMAL FOI OBSERVADO.  
 MANOMETROS INDICANDO AS PRESSOES NORMAIS DE OPERACAO.  
 NIVEL DE OLEO NORMAL.

.....: FPREVM2T LTM TRIMESTRAL P/ BOMBA INCENDIO XA/401A  
 Done.....: 26/09/00 Iniciais...: MVS  
 Categorias Homem Horas Custo total Tipo  
 OP.DE PETROL.FAC.MEC 1 1.0 0.0 MAN.PREV.EXE.PETROB.

DURANTE A COLETA DE DADOS DA PREDITIVA O EQUIPAMENTO FUNCIONOU DURANTE APROXIMADAMENTE 15 MIN, AS TEMPERATURAS DO MOTOR E BOMBA NAO ULTRAPASSARAM 40 GRAUS CELSIUS.  
 NENHUM VAZAMENTO FOI DETECTADO.  
 NENHUM RUÍDO ANORMAL FOI OBSERVADO.  
 MANOMETROS INDICANDO AS PRESSOES NORMAIS DE OPERACAO.  
 NIVEL DE OLEO NORMAL.  
 A BOBINA DE PARADA DO MOTOR ESTA QUEIMADA.

TM.....: FCOORE2 Corretiva  
 Done.....: 20/09/00 Iniciais...: AESM  
 Categorias Homem Horas Custo total Tipo  
 OP.DE PETROL.FAC.ELE 1 2.0 2.0 MAN.CORR.EXE.PETROB..

FEITO INTERVENCAO NO CIRCUITO ELETRICO DO MOTOR DA BOMBA DE INCENDIO A DEVIDO A MESMA NAO ESTA DESLIGANDO QUANDO ACIONAVA AS BOTOEIRAS STOP.FOI CONSTATADO QUE A BOBINA DE ABERTURA ESTAVA QUEIMADA.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS FERNANDES GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORARIAS



Mod. equi: 8130102 BBA DE INCEND.

Identifi...: XA-401B

TM.....: FPREVM2T LTM TRIMESTRAL P/ BOMBA INCENDIO XA/401B

Done.....: 26/09/00 Iniciais...: MVS

Categorias	Homem	Horas	Custo total	Tipo
OP.DE PETROL.FAC.MEC	1	1.0	0.0	MAN.PREV.EXE.PETROB.

DURANTE A COLETA DE DADOS DA PREDITIVA O EQUIPAMENTO FUNCIONOU DURANTE APROXIMADAMENTE 15 MIN, AS TEMPERATURAS DO MOTOR E BOMBA NAO ULTRAPASSARAM 40 GRAUS CELSIUS.

NENHUM VAZAMENTO FOI DETECTADO.

NENHUM RUÍDO ANORMAL FOI OBSERVADO.

MANOMETROS INDICANDO AS PRESSOES NORMAIS DE OPERACAO.

NIVEL DE OLEO NORMAL.

TM.....: FPREVM2T LTM TRIMESTRAL P/ BOMBA INCENDIO XA/401B

Done.....: 26/09/00 Iniciais...: MVS

Categorias	Homem	Horas	Custo total	Tipo
OP.DE PETROL.FAC.MEC	1	1.0	0.0	MAN.PREV.EXE.PETROB.

DURANTE A COLETA DE DADOS DA PREDITIVA O EQUIPAMENTO FUNCIONOU DURANTE APROXIMADAMENTE 15 MIN, AS TEMPERATURAS DO MOTOR E BOMBA NAO ULTRAPASSARAM 40 GRAUS CELSIUS.

NENHUM VAZAMENTO FOI DETECTADO.

NENHUM RUÍDO ANORMAL FOI OBSERVADO.

MANOMETROS INDICANDO AS PRESSOES NORMAIS DE OPERACAO.

NIVEL DE OLEO NORMAL.

É CÓPIA FEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS PINHEIRO GUMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



od.equi: 8130103 BBA DE INCEND.  
 dentifi...: XA-401C  
 TM.....: FPREVM2T LTM TRIMESTRAL P/ BOMBA INCENDIO XA/401C  
 Done.....: 26/09/00 Iniciais...: MVS  
 Categorias Homem Horas Custo total Tipo  
 OP.DE PETROL.FAC.MEC 1 1.0 0.0 MAN.PREV.EXE.PETROB..

-----  
 DURANTE A COLETA DE DADOS DA PREDITIVA, FOI MEDIDO AS TEMTERATUARAS DO MOTO  
 E BOMBA, E AS MESMAS NAO ULTRAPASSARAM A 40 GRAUS CELSIUS.  
 NENHUM VAZAMENTO FOI DETECTADO.  
 NENHUM RUIDO ANORMAL FOI OBSERVADO.  
 OS MANOMETROS ESTAO INDICANDO AS PRESSOES NORMAIS.  
 O NINEL DE OLEO ESTA NORMAL.  
 -----

od.equi: 8130104 BBA DE INCEND.  
 dentifi...: XA-401E  
 TM.....: FPREVM2T LTM TRIMESTRAL P/ BOMBA INCENDIO XA/401E  
 Done.....: 26/09/00 Iniciais...: MVS  
 Categorias Homem Horas Custo total Tipo  
 OP.DE PETROL.FAC.MEC 1 1.0 0.0 MAN.PREV.EXE.PETROB..

-----  
 DURANTE A COLETA DE DADOS DA PREDITIVA, FOI MEDIDO AS TEMPERATURAS (15 MIN D  
 OPERAÇÃO), AS TEMPERATURAS TANTO DO MOTOR QUANTO DA BOMBA NAO ULTRAPASSARAM  
 A 40 GRAUS CELSIUS.  
 NENHUM VAZAMENTO FOI DETECTADO.  
 NENHUM RUIDO ANORMAL FOI OBSERVADO.  
 OS MANOMETROS ESTAO OK.  
 O NIVEL DE OLEO ESTA NORMAL.  
 -----

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



Data.....: 20/03/01  
 Projeto...: P36 PETROBRAS 36

Mod. equi: 8130201 BBA DE INCEND. JOCKEY  
 Identifi...: XA-401-D  
 TM.....: FPREVM2T MANUT. TRIMESTRAL DA BOMBA JOCKEY  
 Done.....: 11/03/01 Iniciais...: MVS  
 Categorias Homem Horas Custo total Tipo  
 OP.DE PETROL.FAC.MEC 1 1.0 0.0 MAN.PREV.EXE.PETROB.

-----  
 TEMPERATURAS DA BOMBA - LA = 32oC , LOA = 33oC  
 TEMPERATURAS DO MOTOR ELETRICO - LA = 32oC , LOA = 32oC  
 NAO FOI CONSTATADO NENHUM VAZAMENTO E O RUIDO ESTA NORMAL.  
 OS MANOMETROS ESTAO OK, SUCCAO = 3,5 BAR , DESCARGA = 10 DAR  
 HIDROFOBO, PARTIDA DA BOMBA COM 7 BAR E PARADA COM 10 BAR  
 LUBRIFICADO O MANCAL LOA DA BOMBA (GRAXA GMA-2-EP)  
 -----

Identifi...: XA-401D  
 TM.....: FPREVM2T MANUT. TRIMESTRAL DA BOMBA JOCKEY  
 Done.....: 11/02/01 Iniciais...: MVS  
 Categorias Homem Horas Custo total Tipo  
 OP.DE PETROL.FAC.MEC 1 1.0 0.0 MAN.PREV.EXE.PETROB.

-----  
 TEMPERATURAS MOTOR E BOMBA OK.  
 VERIFICADO QUANTO A VAZAMENTOS E RUIDO ANORMAL, ESTANDO TUDO OK.  
 MANOMETRO DE SUCCAO E DESCARGA OPERANDO NORMALMENTE.  
 LUBRIFICADO OS MANCAIS DA BOMBA.  
 -----

Mod. equi: 8130401 VALV. DE DILUVIO - A  
 Identifi...: ADV-486A  
 TM.....: FPREVS2S  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 01/11/00 Iniciais...: MSM  
 Categorias Homem Horas Custo total Tipo  
 OP.DE PETROL.FAC.INS 1 1.0 0.0  
 TEC. DE SEGURANCA 1 1.0 0.0

TM.....: FPREVS2S  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 02/10/00 Iniciais...: JRAS  
 Categorias Homem Horas Custo total Tipo  
 OP.DE PETROL.FAC.INS 1 1.0 0.0  
 TEC. DE SEGURANCA 1 1.0 0.0

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS



Mod. equi: 8130402 VALV. DE DILUVIO - B

Identifi...: ADV-486B

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 01/11/00 Iniciais...: MSM

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 02/10/00 Iniciais...:

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

Mod. equi: 8130403 VALV. DE DILUVIO - C

Identifi...: ADV-486C

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 10/01/01 Iniciais...: MSM

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 02/10/00 Iniciais...:

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

Handwritten signature and stamp of José Carlos Fementel Gushão, Diretor, Divisão de Serviços Cartoriais.



Mod. equi: 8130404 VALV. DE DILUVIO - D

Identifi...: ADV-486D

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 10/01/01 Iniciais...: MSM

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

VALVULA DE BLOQUEIO A MONTANTE DA ADV DANDO PASSAGEM. NAO CONSEGUI REARMAR ADV.

.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 02/10/00 Iniciais...: JRAS

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

Mod. equi: 8130405 VALV. DE DILUVIO - E

Identifi...: ADV-486E

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 10/01/01 Iniciais...: MSM

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 01/10/00 Iniciais...: GMG

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

FALTA INSERIR O PROCEDIMENTO, POREM FOI VERIFICADO A ATUAÇÃO DA REFERIDA ADV

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS FERRETEL GUSHÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORÁRIOS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Mod. equi: 8130406 VALV. DE DILUVIO - F

Identifi...: ADV-486F

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 10/01/01 Iniciais...: MSM

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 01/10/00 Iniciais...: GMG

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

FALTA INSERIR O PROCEDIMENTO POREM FOI VERIFICADO A ADV

Mod. equi: 8130407 VALV. DE DILUVIO - G

Identifi...: ADV-486G

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 01/10/00 Iniciais...: GMG

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

FALTA INSERIR O PROCEDIMENTO

Mod. equi: 8130408 VALV. DE DILUVIO - H

Identifi...: ADV-486H

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 01/11/00 Iniciais...: MSM

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS FERRETEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 01/10/00 Iniciais...: JRAS

Categorias	Homem	Horas	Custo	total	Tipo
OP.DE PETROL.FAC.INS	1	1.0	0.0		
TEC. DE SEGURANCA	1	1.0	0.0		

Mod. equi: 8130501 VALV. DE DILUVIO - J

Identifi...: ADV-524301J

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 09/02/01 Iniciais...: MSM

Categorias	Homem	Horas	Custo	total	Tipo
OP.DE PETROL.FAC.INS	1	1.0	0.0		
TEC. DE SEGURANCA	1	1.0	0.0		

Mod. equi: 8130502 VALV. DE DILUVIO - K

Identifi...: ADV-524302K

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 26/12/00 Iniciais...: srsf

Categorias	Homem	Horas	Custo	total	Tipo
OP.DE PETROL.FAC.INS	2	1.0	0.0		MAN.PREV.EXE.PETROB."
TEC. DE SEGURANCA	1	1.0	0.0		

necessita lubrificacao nas valvulas de bloqueio

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 17/12/00 Iniciais...: QRG

Categorias	Homem	Horas	Custo	total	Tipo
OP.DE PETROL.FAC.INS	1	1.0	0.0		
TEC. DE SEGURANCA	1	1.0	0.0		

-Nóo foi possível cumprir o item 2 por nóo encontrar o livro de registros n sala de contrle.

-Necess rio a lubrificacóo na aste e v lvulas do sistema.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS PIRES TEL. GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS



Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36

Mod. equi: 8130503 VALV. DE DILUVIO - L

Identifi...: ADV-524303-L

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 03/03/01 Iniciais...: QRG

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

-Realizado conforme planejado em 20/02/01 pelos TS's Queiroga e Raimundo.

Identifi...: ADV-524303L

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 16/01/01 Iniciais...: MSM

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 01/12/00 Iniciais...: MSM

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

Mod. equi: 8130504 VALV. DE DILUVIO - M

Identifi...: ADV-524304M

TM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 01/12/00 Iniciais...: MSM

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS PEREIRA GUEDES  
MESTRE  
DIVISÃO DE SEGURANÇA PETROBRAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Mod. equi: 8130505 VALV. DE DILUVIO - N

Identifi...: ADV-524305N

FM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 01/12/00 Iniciais...: MSM

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

Mod. equi: 8130506 VALV. DE DILUVIO - O

Identifi...: ADV-524306O

FM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 26/12/00 Iniciais...: srsf

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

- necessita lubrificacao nas valvulas de bloqueio

FM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 17/12/00 Iniciais...: QRG

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

- Não foi possível cumprir o item 2 por não encontrar o livro de registros na sala de controle.

- necessário a lubrificação na haste e válvulas do sistema.

Mod. equi: 8130507 VALV. DE DILUVIO - P

Identifi...: ADV-524307P

FM.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 09/02/01 Iniciais...: MSM

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
DIRETOR  
DEPARTAMENTO DE SERVIÇOS GERAIS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Mod. equi: 8130511 VALV. DE DILUVIO - T

Identifi...: ADV-524311T

Item.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 09/02/01 Iniciais...: MSM

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

Mod. equi: 8130512 VALV. DE DILUVIO - U

Identifi...:

Item.....: FPREVS2S

Done.....: 26/12/00 Iniciais...:

valvulas de bloqueio precisam ser lubrificadas

Identifi...: ADV-524312U

Item.....: FPREVS2S

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 17/12/00 Iniciais...: QRG

Categorias Homem Horas Custo total Tipo

OP.DE PETROL.FAC.INS 1 1.0 0.0

TEC. DE SEGURANCA 1 1.0 0.0

-Nóo foi possível cumprir o item 2 por nóo encontrar o livro de registros na sala de contrle.

-Necess rio a lubrificacóo na aste e v lvulas do sistema.

Mod. equi: 8130801 CANHAO FIXO DE AGUA/ESPUMA N.1

Identifi...:

Item.....: FPREVS1T

PRESERVACAO

Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124

Done.....: 27/09/00 Iniciais...: SCM

Categorias Homem Horas Custo total Tipo

TEC. DE SEGURANCA 1 1.0 0.0

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS PAZINTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Mod. equi: 8130802 CANHAO FIXO DE AGUA/ESPUMA N.2  
 ATM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 27/09/00 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

Mod. equi: 8130803 CANHAO FIXO DE AGUA/ESPUMA N.3  
 ATM.....: FPREVS1T PRESERVACAO  
 Cent.custo: PREOP CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 27/09/00 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

Mod. equi: 8131001 DISPARO REMOTO DILUVIO DO RISER DECK/EXTENSAO POPA  
 ATM.....: FPREVS1M PRESERVACAO  
 Done.....: 13/03/01 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

ATM.....: FPREVS1M PRESERVACAO  
 Done.....: 31/01/01 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

ATM.....: FPREVS1M PRESERVACAO  
 Done.....: 01/01/01 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

Mod. equi: 8131003 DISPARO REMOTO DILUVIO DO MAIN DECK  
 ATM.....: FPREVS1M PRESERVACAO  
 Done.....: 13/02/01 Iniciais...: GMG  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

ATM.....: FPREVS1M PRESERVACAO  
 Done.....: 03/02/01 Iniciais...: SCM  
 Categorias Homem Horas Custo total Tipo  
 TEC. DE SEGURANCA 1 1.0 0.0

**É CÓPIA FIEL DO DOCUMENTO ORIGINAL**  
 JOSÉ CARLOS PINHEIRO GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



IM.....: FPREVS1M      PRESERVACAO  
 Done.....: 27/01/01      Iniciais...: SCM  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

IM.....: FPREVS1M      PRESERVACAO  
 Done.....: 03/12/00      Iniciais...: GMG  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

Mod.equi: 8131004      DISPARO REMOTO DILUVIO DA PLANTA DE GAS

IM.....: FPREVS1M      PRESERVACAO  
 Done.....: 19/02/01      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

-----  
 PRESERVACAO REALIZADA EM 19/02/01, ALGUMAS CAIXAS JA ESTAVAM EMPOEIRADAS NO DIA SEGUINTE EM VIRTUDE DOS RESIDUOS GERADOS PELO TRATAMENTO MECANICO NOS T A, B, C.  
 -----

IM.....: FPREVS1M      PRESERVACAO  
 Done.....: 14/01/01      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

-----  
 NA OPORTUNIDADE COLOCAMOS AS PLACAS DE IDENTIFICAÇÃO DOS LOCAIS E RESPECTIVAS ADV.  
 -----

IM.....: FPREVS1M      PRESERVACAO  
 Done.....: 12/12/00      Iniciais...: JRAS  
 Categorias      Homem      Horas      Custo total      Tipo  
 TEC. DE SEGURANCA      1      1.0      0.0

-----  
 EXECUÇÃO DO SERVIO:09/12/00.  
 -----

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS FIMENDEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

Projeto...: P36

PETROBRAS 36



Mod. equi: 8131005 DISPARO REMOTO DILUVIO PLANTA OLEO/DRILL FLOOR

ITEM.....: FPREVS1M PRESERVACAO

Done.....: 03/03/01 Iniciais...: QRG

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	

-Realizado conforme planejado em 02/03/2001 pelo TS. Queiroga.

ITEM.....: FPREVS1M PRESERVACAO

Done.....: 26/01/01 Iniciais...: QRG

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	

-Realizado conforme planejado.

ITEM.....: FPREVS1M PRESERVACAO

Done.....: 27/12/00 Iniciais...: QRG

Categorias	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	

- Realizado conforme programado.

É Cópia Fiel do Documento Original

JOSE CARLOS FIMMEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

Data.....: 20/03/01

JOB HISTORY FOR PERIOD 20/09/00 --> 20/03/01

od.equi: 815

Projeto...: P36

PETROBRAS 36



od.equi: 81502

CO2 DA COZINHA

TM.....: FPREVS1T

INSPECAO PROGRAMADA

Done.....: 12/03/01

Iniciais...: SCM

Categorias

	Homem	Horas	Custo total	Tipo
TEC. DE SEGURANCA	1	1.0	0.0	

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS FREITAS GUSMÃO  
DEPTEC  
UNIDADE DE SERVIÇOS CENTRAIS

Data.....: 20/03/01

JOB HISTORY FOR PERIOD 20/09/00 --> 20/03/01



cd.equi: 816  
Projeto...: P36                      PETROBRAS 36

cd.equi: 8160101                      TANQUE DE LGE N.1  
 IM.....: FPREVS1S                      PRESERVACAO  
 Cent.custo: PREOP                      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 03/11/00                      Iniciais...: GMG  
 Categorias                      Homem      Horas      Custo      total      Tipo  
 TEC. DE SEGURANCA                      1              2.0              0.0

cd.equi: 8160102                      TANQUE DE LGE N.2  
 IM.....: FPREVS1S                      PRESERVACAO  
 Cent.custo: PREOP                      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 04/11/00                      Iniciais...: GMG  
 Categorias                      Homem      Horas      Custo      total      Tipo  
 TEC. DE SEGURANCA                      1              2.0              0.0

cd.equi: 8160103                      TANQUE DE LGE N.3  
 IM.....: FPREVS1S                      PRESERVACAO  
 Cent.custo: PREOP                      CAD-D9115 CAC-D6642 OTD-D0557 OTC-D0557 UI-P12124  
 Done.....: 03/11/00                      Iniciais...: GMG  
 Categorias                      Homem      Horas      Custo      total      Tipo  
 TEC. DE SEGURANCA                      1              2.0              0.0

É Cópia do Documento Original

JOSÉ CARLOS PIMENTEL CUSIMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAIS



*AÇÕES NECESSÁRIAS PARA  
MANUTENÇÃO DA SEGURANÇA NA  
SITUAÇÃO ATUAL*

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS FERRETEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS ADMINISTRATIVOS

INVENTÁRIO DO MATERIAL DE SALVATAGEM  
EXISTENTE A BORDO DA P-36

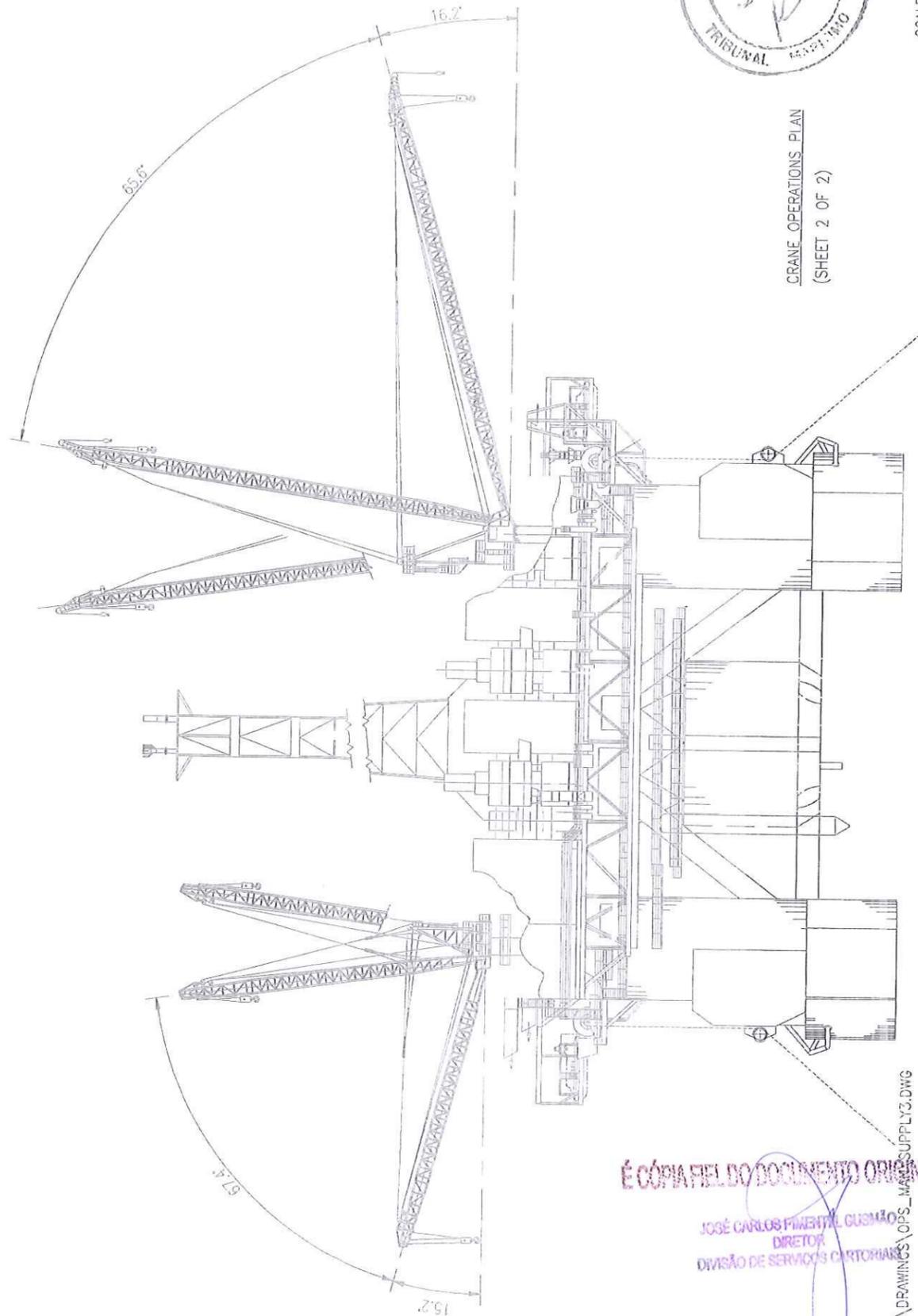


- 4 (quatro) baleeiras com capacidade para 65 (sessenta e cinco) pessoas cada, contendo suas palamentas completas.
- 1 (um) bote de resgate com capacidade para 6 (seis) pessoas, contendo suas palamentas completas.
- 8 (oito) balsas salva-vidas com capacidade para 25 (vinte e cinco) pessoas cada, contendo suas palamentas completas.
- 400 (quatrocentos) coletes salva-vidas, sendo 180 nos camarotes e 220 nas caixas dos postos de abandono, além de 52 (cinquenta e dois) coletes de serviço.
- 6 (seis) transponders, sendo um em cada baleeira, um na sala de controle e um na sala de rádio.
- 40 (quarenta) bóias circulares instaladas, sendo 20 (vinte) com sinalização luminosa, além de 5 (cinco) bóias em reserva.
- 4 (quatro) lança-retinidas.
- 1 (um) EPIRB instalado.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS PINHEIRO GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS





CRANE OPERATIONS PLAN  
(SHEET 2 OF 2)

SCALE 1:750 (A4)

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

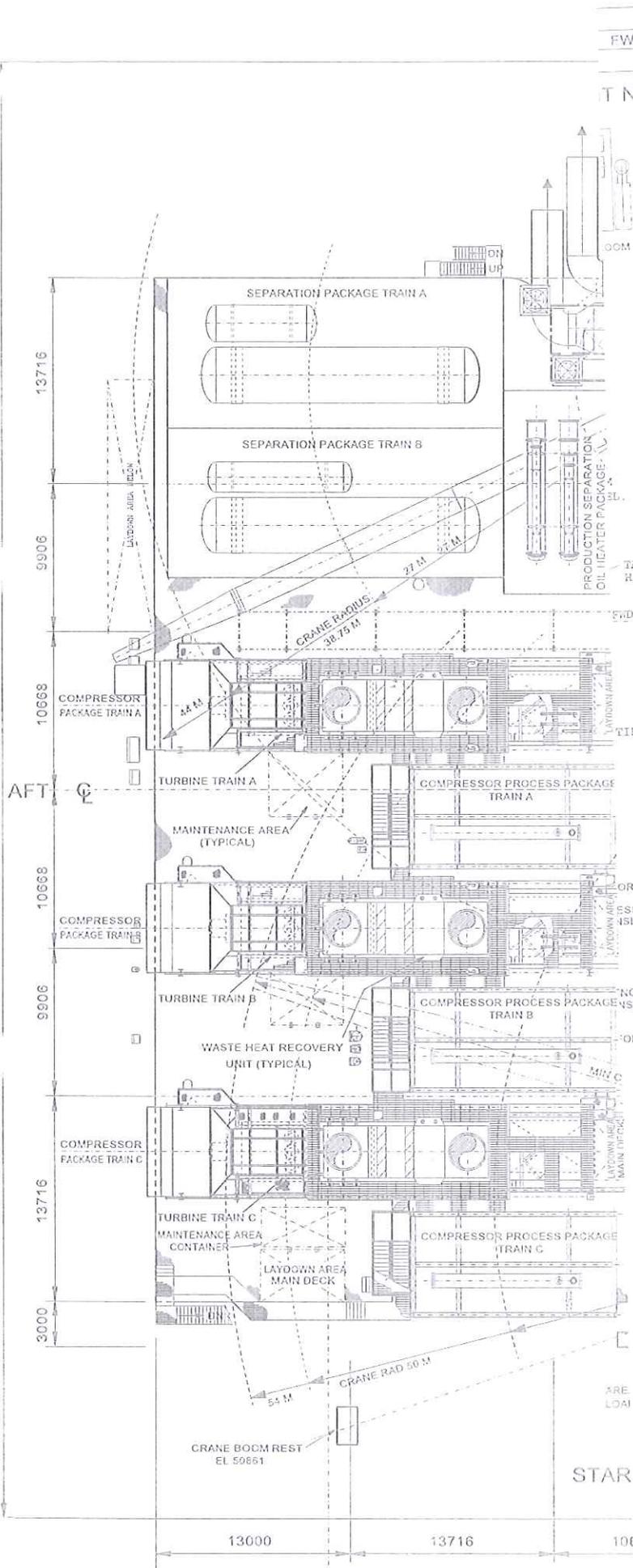
JOSÉ CARLOS FIMENTEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORARIOS

I:\ROMFADOR\CAD\DRAWINGS\OIP3\_MAR\SUPPLY3.DWG





97580°



**LIST OF EXISTING EQUIPMENT**

EQUIP No	DESCRIPTION
A75001	PORT DECK CRANE
A75004	STARBOARD DECK CRANE
E41011	WASTE HEAT RECOVERY UNIT
E41013	WASTE HEAT RECOVERY UNIT
GE-514001	AUXILIARY GENERATOR
T-55101	FW PLANT CHEMICAL TANK
T-55102	FW EXPANSION TANK
A-58002	HELICOPTER DISPENSING SKID

**LIST OF NEW EQUIPMENT INCORPORATED**

EQUIP No	DESCRIPTION
PN-TA-541201	FLARE PANEL
TA-541201	HP FLARE TIP
TA-541202	LP FLARE TIP
UQ-121001-02A/B	FLOWLINE LAUNCHER PACKAGE
UQ-121001-03	FLOWLINE RECEIVERS PACKAGE
UQ-122314-01	GAS EXPORT PIG LAUNCHERS PACKAGE
UQ-122314-02	FUELGAS EXPORT PIG LAUNCHERS PACKAGE
UQ-512501-02	EXPANSION VESSELS PACKAGE
UQ-541203	VENT SNUFFING PACKAGE
Z-TA-541201	PILOT GAS SKID

**NOTES**

1. \* DENOTES OVERALL MOULDED DIMENSIONS



**É CÓPIA FIEL DO DOCUMENTO ORIGINAL**  
 JOSE CARLOS FERNANDES DE SA  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTÓRIOS

DE-3010.38-1200-200-AMK-005 PLOT PLAN MAIN DECK  
 DRAWING NUMBER DRAWING TITLE

REFERENCE DRAWINGS						
REV	ISSUE DATE	DESCRIPTION OF REVISION	DRN BY	CHK BY	APP'D BY	APP'D CONC'T
F		GENERALLY REVISED	PC			
E		REVISED AFC	GH	PS	PJS	
D		GENERALLY REVISED AFC	LK	PS	LK	
C		APPROVED FOR CONSTRUCTION	MS	AJH	LK	
B		APPROVED FOR DESIGN MS		NJE	LK	
A		RE-ISSUED I.D.C.	NJB			
O		PROJECT REV I.D.C.	GH			

**BR BRASOIL** P36-RONCADOR FIELD DEVELOPMENT  
 CONTRACT: L0277

**NOBLE DENTON** **Petromec** **AMEC**

TITLE: UNIT P36 PLOT PLAN ABOVE MAIN DECK EL:6024 & ABOVE

DRAWN/LATE: N.J.B.  
 CHECKED/DATE: N.J.B. 11/8/97  
 APPROVED/DATE: L.K. 12/8/97  
 SCALE: 1:200

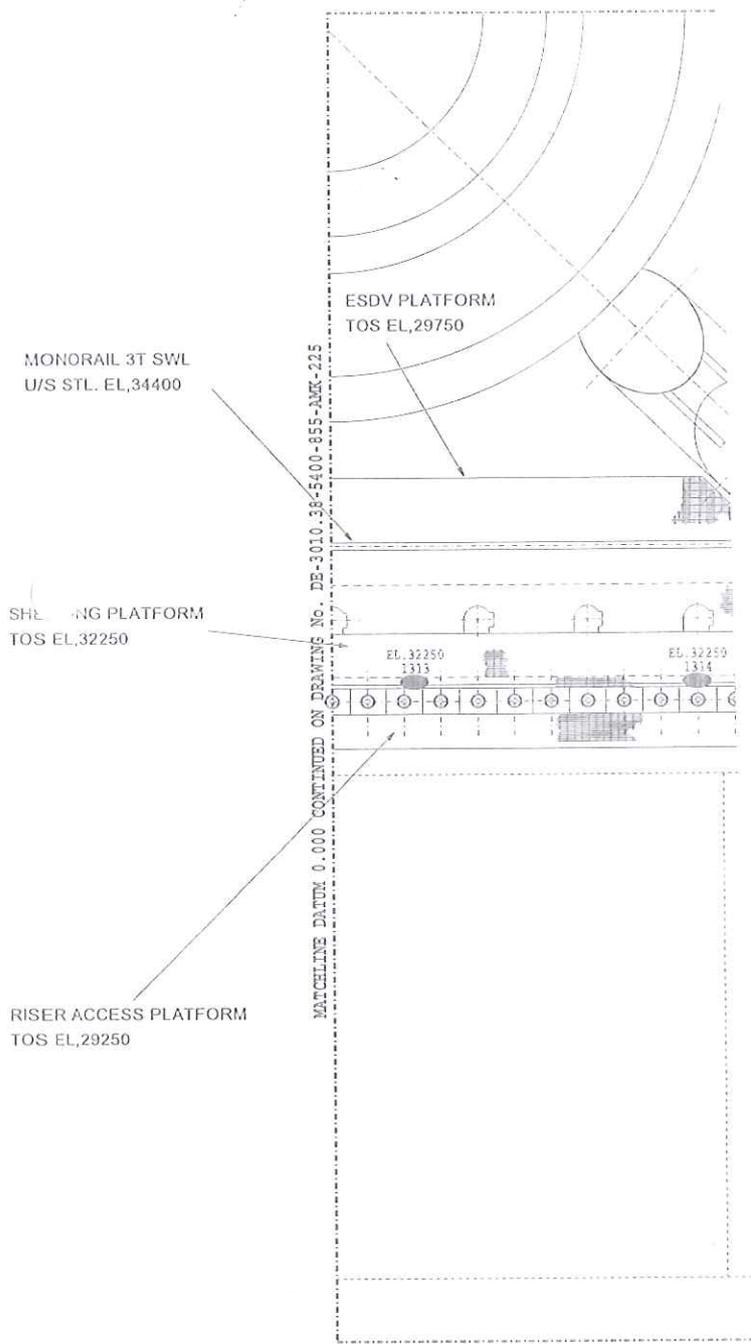
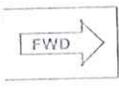
DRAWING NUMBER: DE-3010.38-1200-200-AMK-004 REV: F





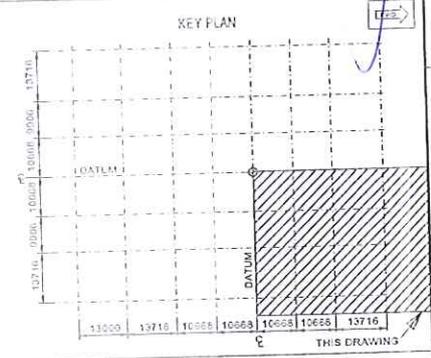






É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PINHEIRO GUARÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTOGRAFIAIS



DRAWING NUMBER		DRAWING TITLE	
REFERENCES DRAWINGS			
A	DATE	AS CONSTRUCTED - QUANT	TH RV BF
REV	ISSUE DATE	DESCRIPTION OF REVISION	DES BY CHK BY APPD BY APPD CLIENT
		<b>P36-RONCADOR FIELD DEVELOPMENT</b> <b>CONTRACT : L0277</b>	
<b>TITLE</b> <b>FIRE &amp; GAS RISER DECK</b> <b>FWD/STBD</b> <b>EL. 28956-EL. 35000</b>			<b>DRAWN/DATE</b> TH/07.07.99
			<b>CHECKED/DATE</b> RV
			<b>APPROVED/DATE</b> BF
			<b>SCALE</b> 1:100
<b>DRAWING NUMBER</b> DE-3010.36-5400-855-AMK-227			<b>REV</b> A

TYPE	QTY
	1
	5

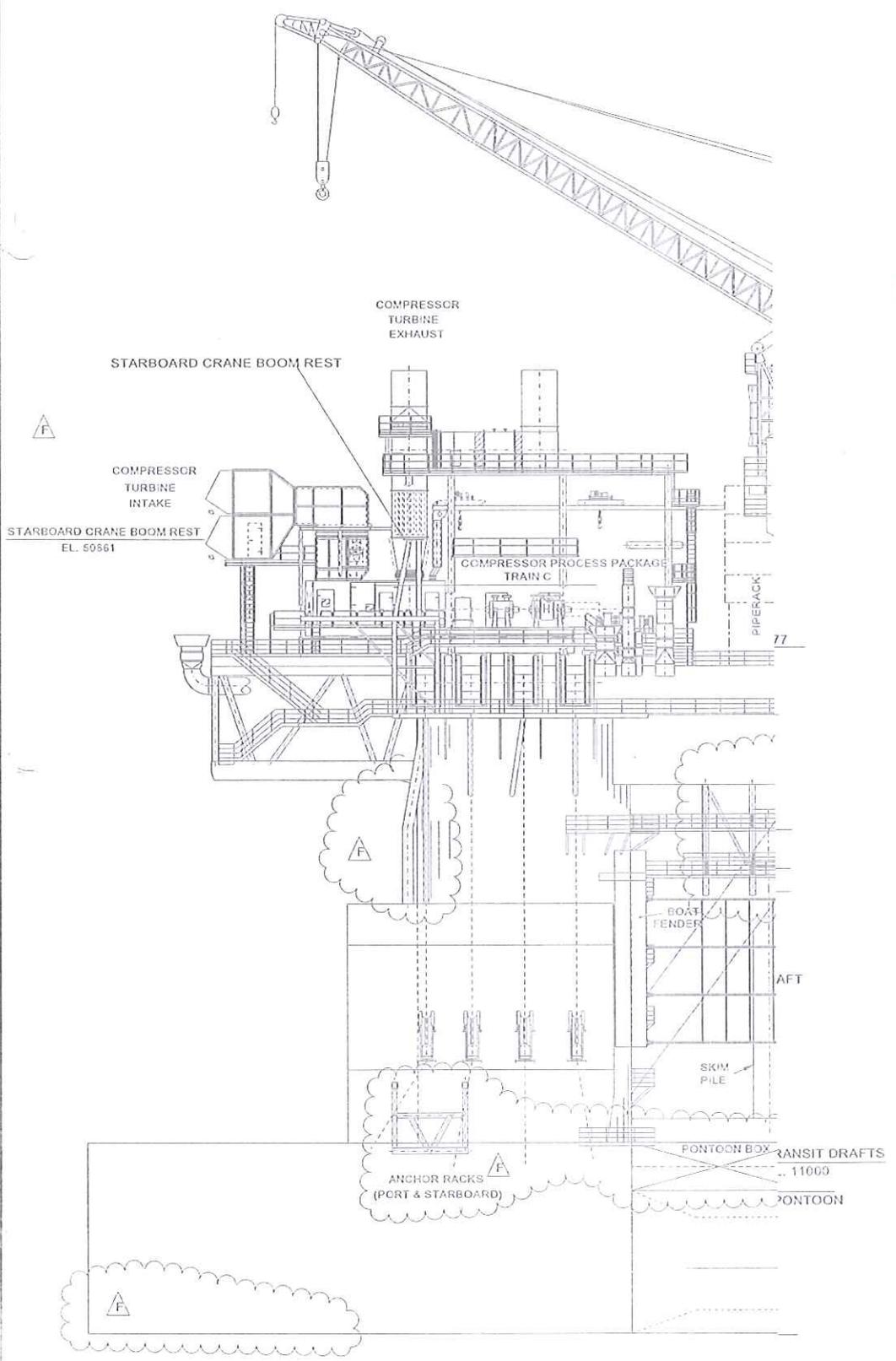


3



É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS PIMENTEL GUSMÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTÓGRAFOS



DRAWING NUMBER		DRAWING TITLE	
REFERENCE DRAWINGS			

REV	ISSUE DATE	DESCRIPTION OF REVISION	DESIGNED BY	CHECKED BY	APPROVED BY
F		GENERALLY REVISED	AE		
E	3/6/99	REVISED AFC	LK	PS	PJS
D	10/9/98	GENERALLY REVISED AFC	LK	PS	LK
C	5/1/98	APPROVED FOR CONSTRUCTION	MS	AJH	LK
B	12/8/97	APPROVED FOR DESIGN	DGB	NJB	LK
A	4/8/97	RE-ISSUED FOR IDC	DGB		
O	2/6/97	PROJECT REV I.D.C.	GH		

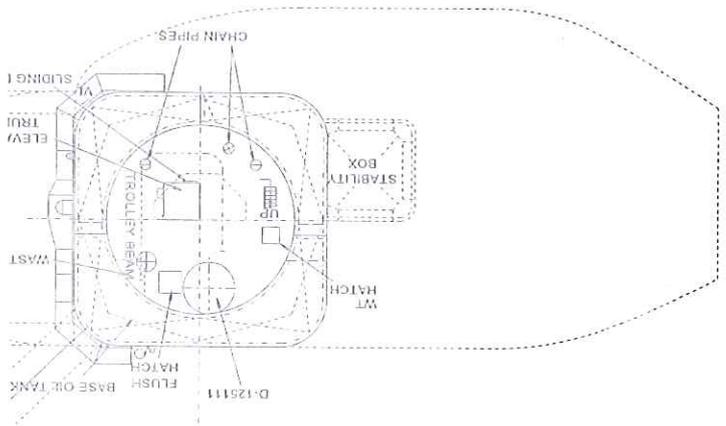
**BR BRASOIL** P36-RONCADOR FIELD DEVELOPMENT  
 CONTRACT: L0277

**NOBLE DENTON** **Petromec** **AM**

TITLE: UNIT P36 PLOT PLAN  
 STARBOARD SIDE  
 ELEVATION

DRAWN/DAT: N.J.B.  
 CHECKED/DATE: N.J.B. 11/8/97  
 APPROVED/DATE: L.K. 12/8/97  
 SCALE: 1:200

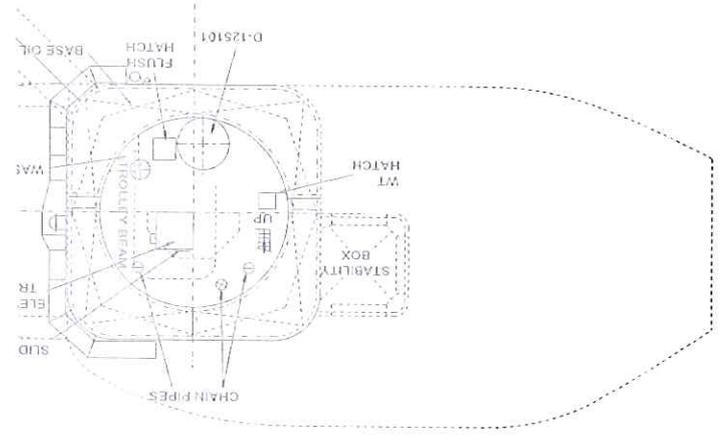
DRAWING NUMBER: DE-3010.38-1200-200-AMK-001



É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSÉ CARLOS FERREIRA GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTÓFIAS

AFT



DE-3010, 38-1200-200-AMK-009	BRASOL	NOBLE DENON	Petromec	AMK
DE-3010, 38-1200-200-AMK-009	UNIT P36 PLOT PLAN	COLUMNS & RISER PLATFORM	FL28956-FL31955 A.B.T.	SCALE 1:200
11/08/97	11/08/97	12/08/97	L.K.	12/08/97
N.J.B.	N.J.B.	N.J.B.	N.J.B.	N.J.B.

P36-RONCADOR FIELD DEVELOPMENT		CONTRACT: 10277	
REV	DATE	DESCRIPTION OF REVISION	BY

0		PROJECT REV I.D.C.	GH
A		RE-ISSUE I.D.C.	GH
B		APPROVED FOR DESIGN	NB NJB LK
C		ISSUED FOR CANCELLATION	MS

DE-3010, 38-1200-200-AMK-009	UNIT P36 PLOT PLAN	COLUMNS & RISER PLATFORM	FL28956-FL31955 A.B.T.
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DE-3010, 38-1200-200-AMK-009	UNIT P36 PLOT PLAN	COLUMNS & RISER PLATFORM	FL28956-FL31955 A.B.T.
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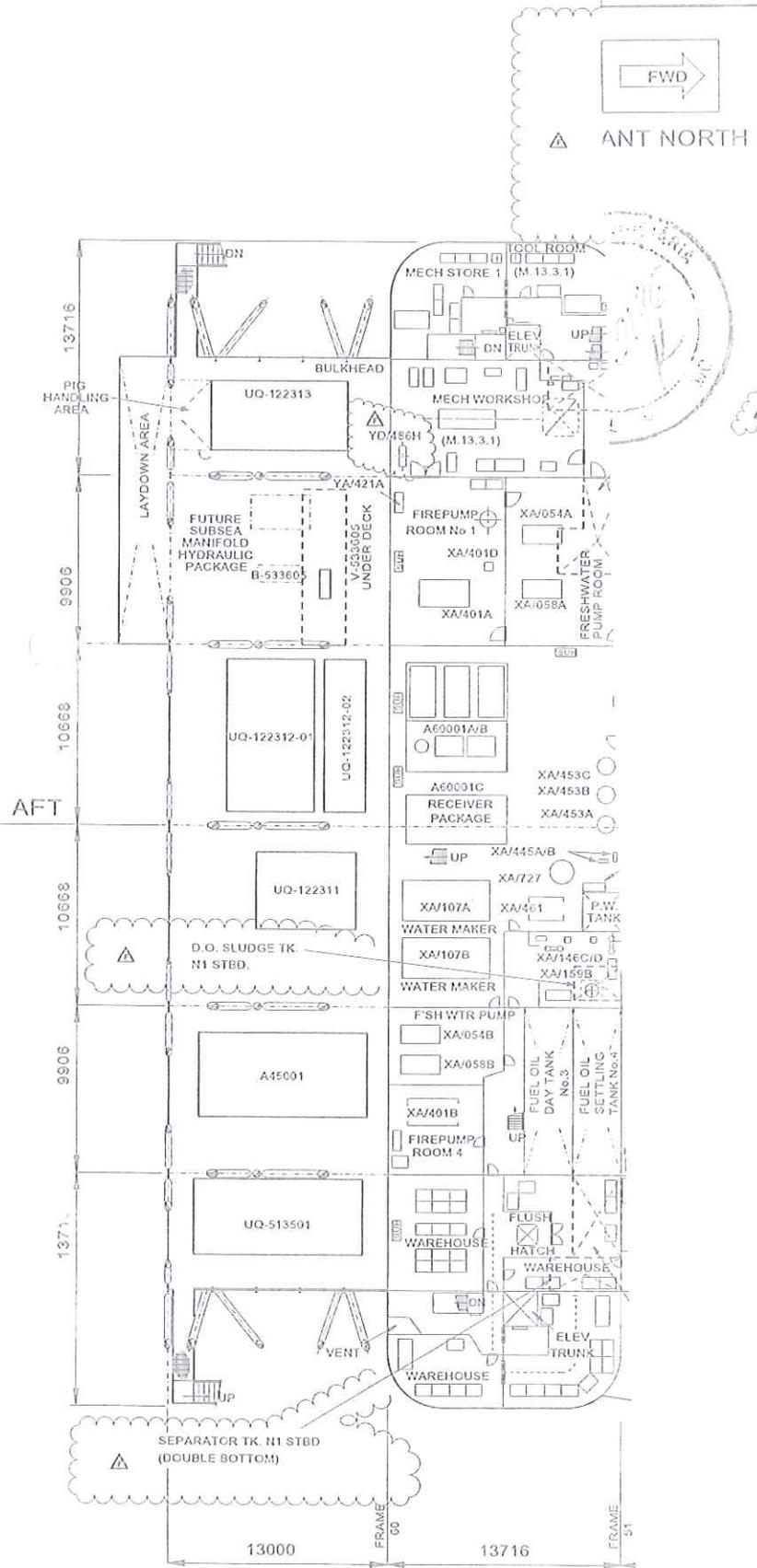
LIST OF EXISTING EQUIPMENT	EQUIP No	DESCRIPTION
	D-125101	DEAERATOR TOWER
	D-125111	DEAERATOR TOWER
	T05001A-D	P. TANKS (NOT USED)
	HOLD 4	SEA WATER LIFT PUMPS



10 9 8 7 6 5 4 3 2 1







LIST OF EXISTING EQUIPMENT

EQUIP No	DESCRIPTION
A60001A/C	AIR COMPRESSOR SKID
XA/054A/B	FWC CIRC PUMPS
XA/058A/B	FWC HEAT EXCHANGERS
XA/107A/B	WATER MAKERS (REV OSMOSIS)
XA/144A/B	EM GEN DIESEL OIL FEED PUMP
XA/146A/B	GEN SET DIESEL OIL FEED PUMP
XA/146C/D	GEN SET DIESEL OIL FEED PUMP
XA/159A/B	DIESEL OIL PURIFIER SKID
XA/275A-C	TURBINE GENERATING SETS
XA/401A/B	FIRE PUMPS
XA/401D	FIRE JOCKEY PUMP
XA/445A/B	HOT WATER CIRCULATING PUMPS
XA/453A-C	FRESH WATER HEATERS
XA/461	FRESH WATER PRESSURE TANK
XA/464	U.V. STERILIZER UNIT
XA/727	P.W. CHORINATING UNIT
YA/421A	BILGE EJECTORS FOR BOTTOM
YD/486H	DELUGE SKID

LIST OF EXISTING EQUIPMENT TO BE UPGRADED & RELOCATED

A45001	DRAINS TREATMENT PACKAGE
A42001	CHEMICAL INJECTION (W.1) SKID
A42002	CHEMICAL INJECTION (OIL) SKID
YA/688A/B	REFRIGERANT CONDITIONING UNIT

LIST OF NEW EQUIPMENT INCORPORATED

B-123302	GLYCOL SUMP TANK PUMP
B-511102A/B/C	SEAWATER SUPPLY CAISSON PUMPS A,B,C
B-533605	DRAINS SUMP TANK PUMP
PN-514001	EXPORT POWER SWITCH PANEL
TD-511101A/B/C	SEAWATER SUPPLY CAISSONS
TF-514001	EXPORT POWER TRANSFORMER
TQ-123301	GLYCOL SUMP TANK
UQ-121003	HYDRAULIC POWER PACK UNIT
UQ-122311	CRUDE OIL BOOSTER PUMPS PKG
UQ-122312-01	CRUDE OIL EXPORT PUMPS PKG
UQ-122312-02	CRUDE OIL EXPORT PUMPS VALVES PKG
UQ-122313	OIL EXPORT PIG LAUNCHERS
UQ-125101	WATER INJECTION MANIFOLD
UQ-513501	FUEL GAS TREATMENT PACKAGE
UQ-682501-01	CHEMICAL INJ. PACKAGE(OIL PROD.)
UQ-682501-02	CHEMICAL INJ. PACKAGE(OIL PROD.)
UQ-682502	CHEMICAL INJ. PACKAGE(WATER INJ.)
V-533605	DRAINS SUMP TANK
Z-542301/5	DELUGE SKIDS 'J' TO 'N'
Z-542307/12	DELUGE SKIDS 'P' TO 'U'
PN-533601	PROD CAISSON LOCAL PANEL
ATI-5336	MONITOR OIL/WATER UQ-533602
Z-610016	PULL IN SHEAVE
Z-610017	PULL IN SHEAVE

DE-3010.38-1200-200-AMK-007 PLOT PLAN SECOND DECK  
 DE-3010.38-1200-200-AMK-008 PLOT PLAN COL & RISER PLATFORMS

DRAWING NUMBER	DRAWING TITLE

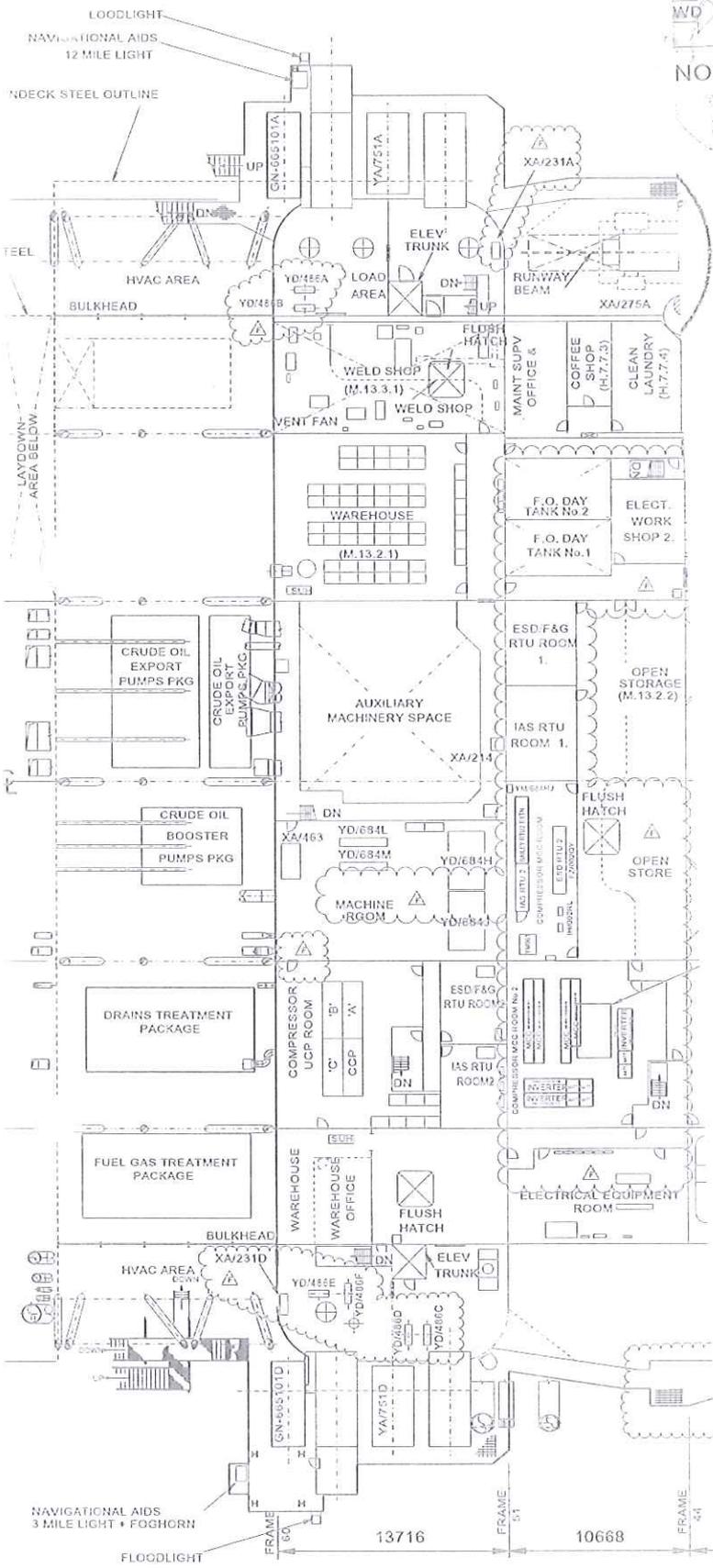
REFERENCE DRAWINGS						
REV	ISSUE DATE	DESCRIPTION OF REVISION	DESIGNED BY	CHECKED BY	APPROVED BY	APPROVED CLIENT
F		GENERALLY REVISED	RH			
E		GENERALLY REVISED AFC	GH	ES	ES	
D		GENERALLY REVISED AFC	MS	PS	LK	
C		APPROVED FOR CONSTRUCTION	MS	A/H	LK	
B		APPROVED FOR DESIGN	MS	HJB	LK	
A		RE-ISSUED I.D.C.	LK			
0		PROJECT REVIEW I.D.C.	GH			

BRASOIL P36-RONCADOR FIELD DEVELOPMENT CONTRACT : L0277

NOBLE DENTON Petromec AMEC

TITLE	DRAWN/DATE
UNIT P36 PLOT PLAN TANK TOP EL 36576 A.B.L.	N.J.B.
	CHECKED/DATE
	N.J.B. 11/8/97
	APPROVED/DATE
	L.K. 12/8/97
	SCALE
	1:200

DRAWING NUMBER DE-3010.38-1200-200-AMK-007 REV F



**LIST OF EXISTING EQUIPMENT**

EQUIP No	DESCRIPTION
M06003A/B	TOWING BRIDLE WINCH
XA/214	AIR COMPRESSORS LUBE OIL TANK
XA/275A/B	TURBINE GENERATING SET
XA/275C	TURBINE GENERATING SET
XA/401C	FIRE PUMP
XA/463	SEA WATER PRESSURE SET
XA/777A/B	LIFEBOAT
XA/231C/D	MOORING WINDLASS LUBE OIL TANK
XA/231A/B	MOORING WINDLASS LUBE OIL TANK
YA751A/B	MOORING WINCH
YA751C/D	MOORING WINCH
YD/486A	DELUGE SKID
YD/486B	DELUGE SKID
YD/486C	DELUGE SKID
YD/486D	DELUGE SKID
YD/486E	DELUGE SKID
YD/486F	DELUGE SKID
YD/684H	AIR HANDLING UNIT
YD/684J	AIR HANDLING UNIT
YD/684L	AIR CONDITIONING UNIT
YD/684M	AIR CONDITIONING UNIT

**LIST OF NEW EQUIPMENT**

GN-665101A	MOORING WINCHES
GN-665101B	MOORING WINCHES
GN-665101C	MOORING WINCHES
GN-665101D	MOORING WINCHES
UQ-542501	CENTRALISED CO <sub>2</sub> SYSTEM

**NOTES**

1. REFER TO E&I ROOM LAYOUT DRAWINGS FOR FINAL LAYOUT DETAILS.

*É COPIA FEITA DO DOCUMENTO ORIGINAL*

*JOSÉ CARLOS PIMENTEL ROSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS OPERACIONAIS*

DE-3010.38-1200-200-AMK-007	PLOT PLAN TANK TOP
DE-3010.38-1200-200-AMK-005	PLOT PLAN MAIN DECK
DRAWING NUMBER	DRAWING TITLE

REFERENCE DRAWINGS						
REV	ISSUE DATE	DESCRIPTION OF REVISION	DRN BY	CHK BY	APP'D BY	AFF'D CLIENT
F		GENERALLY REVISED	AE			
E		REVISED AFC	M.S.	P.S.	P.J.S.	
D		GENERALLY REVISED AFC	M.S.	PS	IK	
C		APPROVED FOR CONSTRUCTION	M.S.	A.H.	LK	
B		APPROVED FOR DESIGN	NJB	N.B.	LK	
A		RE-ISSUED I.D.C.	NJB			
9		PROJECT REVIEW I.D.C.	GH			

**BR BRASOIL** P36-RONCADOR FIELD DEVELOPMENT CONTRACT: L0277

**Noble Denton** **Petromec** **AMEC**

TITLE: UNIT P36 PLOT PLAN SECOND DECK EL 39624 A.B.L.

SCALE: 1:200

DATE: N.J.B. 11/8/97

CHECKED: N.J.B. 11/8/97

APPROVED: L.K. 12/8/97

DRAWING NUMBER: DE-3010.38-1200-200-AMK-006

REV: F



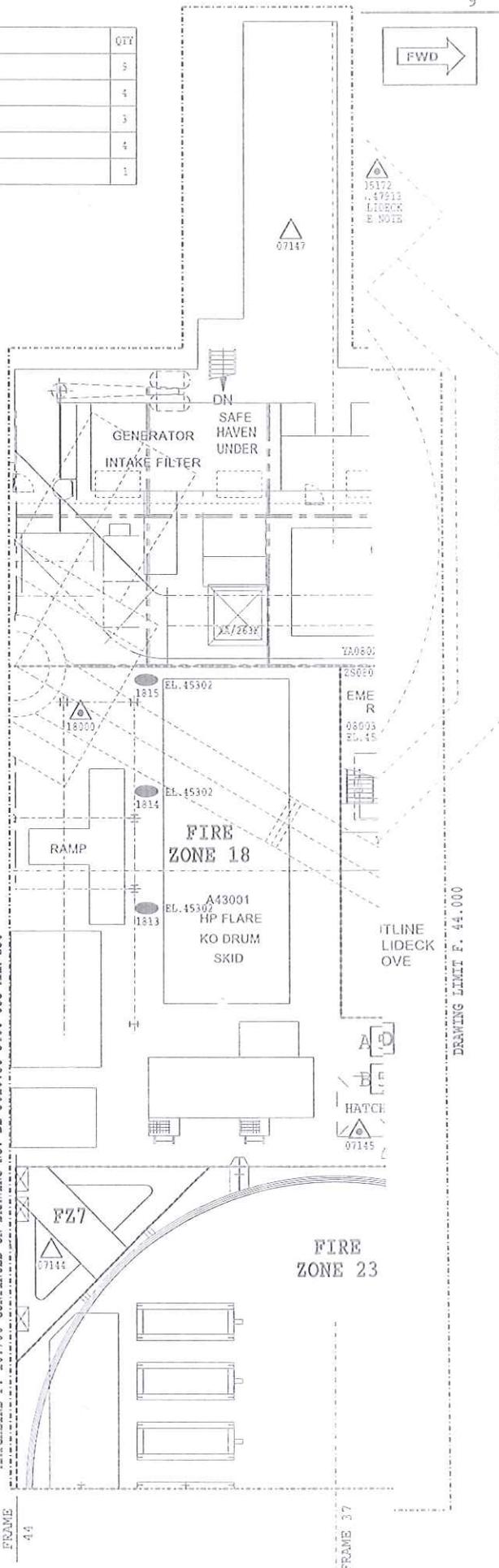




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DOOR SIGN	4
LADDER	3
ISHEUTTON	4
EMPER	1

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K/IN126	08-05-15	08-05-15	15
K/IN127	08-05-15	08-05-15	15
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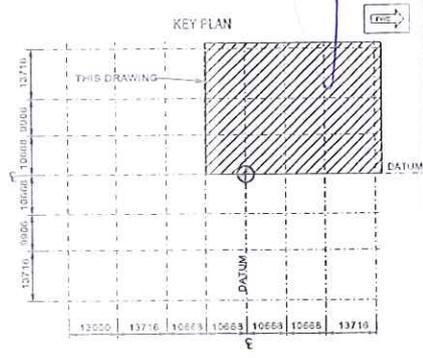


NOTES:  
1. MANUAL ALARM CALL POINTS LOCATED ON HELIDECK STAIRS.



É CÓPIA FIEL DO DOCUMENTO ORIGINAL

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DIRETOR  
DIVISÃO DE SERVIÇOS CARTÓGRAFOS



DRAWING NUMBER		DRAWING TITLE	
REFERENCE DRAWINGS			
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REV	ISSUE DATE	DESCRIPTION OF REVISION	ERN BY
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		APPD BY	APPD CLIENT
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NOBLE DENTON		PETROMEC	
AMC			
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		CHECKED/DATE	
		RV	
		APPROVED/DATE	
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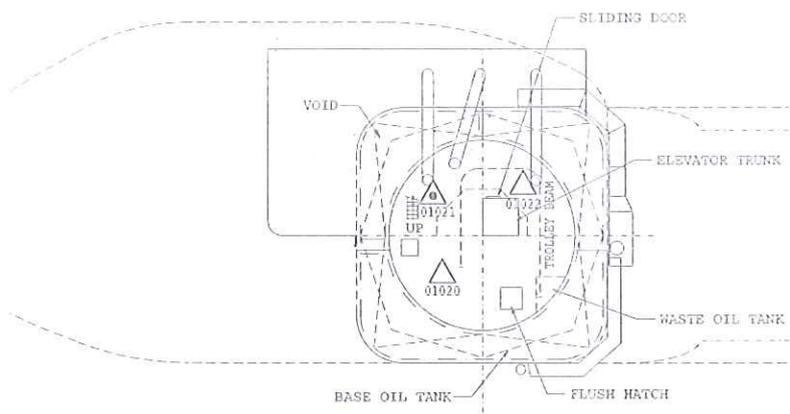








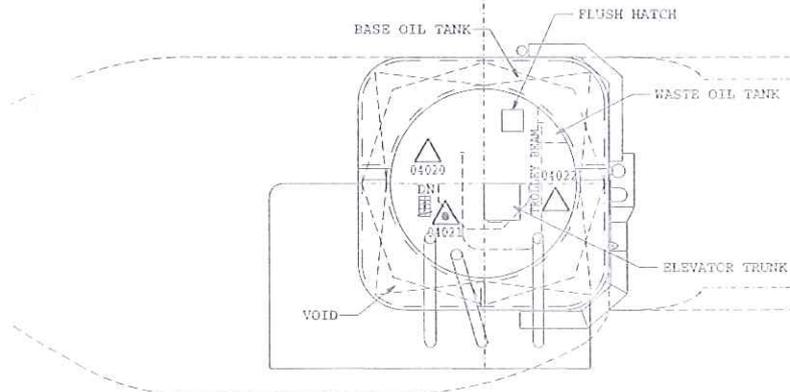




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ZONE 4



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É CÓPIA FIEL DO DOCUMENTO ORIGINAL

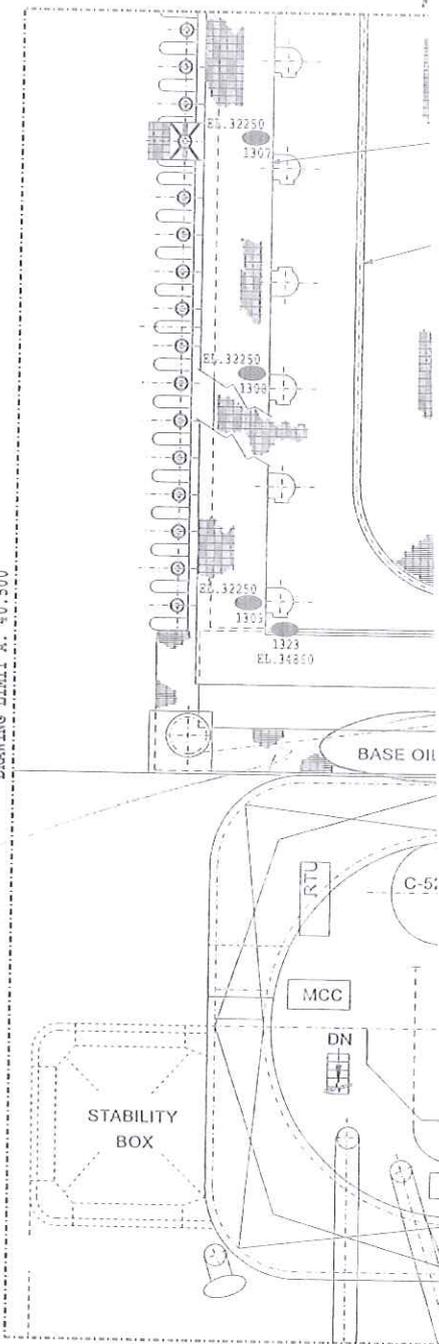
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DIVISÃO DE SERVIÇOS CATORZAS

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NOBLE DENTON		Petromec	AMEC
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FRAME 60

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DIVISÃO DE SERVIÇOS CARTOGRAFICOS



DRAWING NUMBER	DRAWING TITLE

REFERENCE DRAWINGS	

REV	ISSUE DATE	DESCRIPTION OF REVISION	DEN BY	CHK BY	APPD BY	APPD CLIENT
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BR BRASOIL P33-RONCADOR FIELD DEVELOPMENT CONTRACT: L0277

NOBLE DENTON Petromec AMEC

TITLE  
**FIRE & GAS RISER DECK AFT/STBD EL. 28956-EL. 35000**

SCALE  
1:100

DRAWING NUMBER: DE-3010.38-5400-8°5-AMK-225

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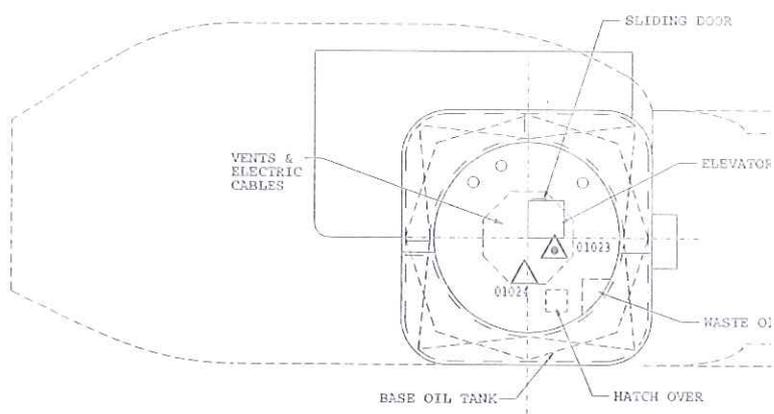
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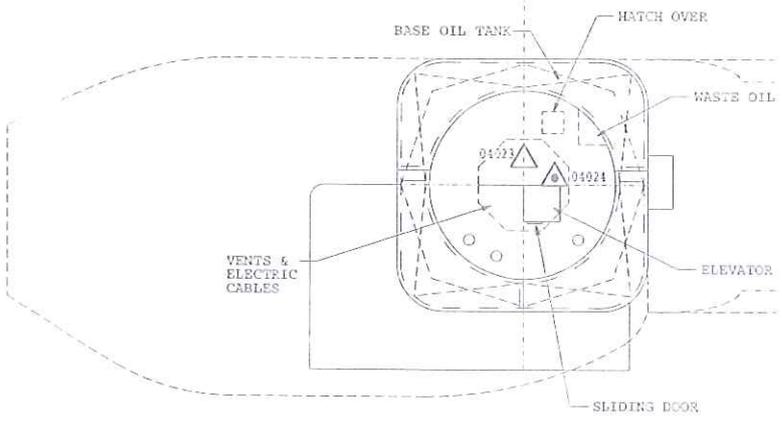
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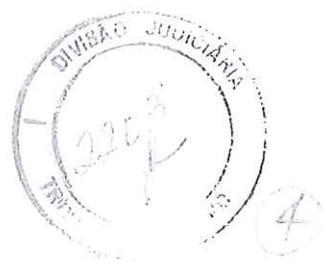


FII ZON

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DRAWING NUMBER		DRAWING TITLE				
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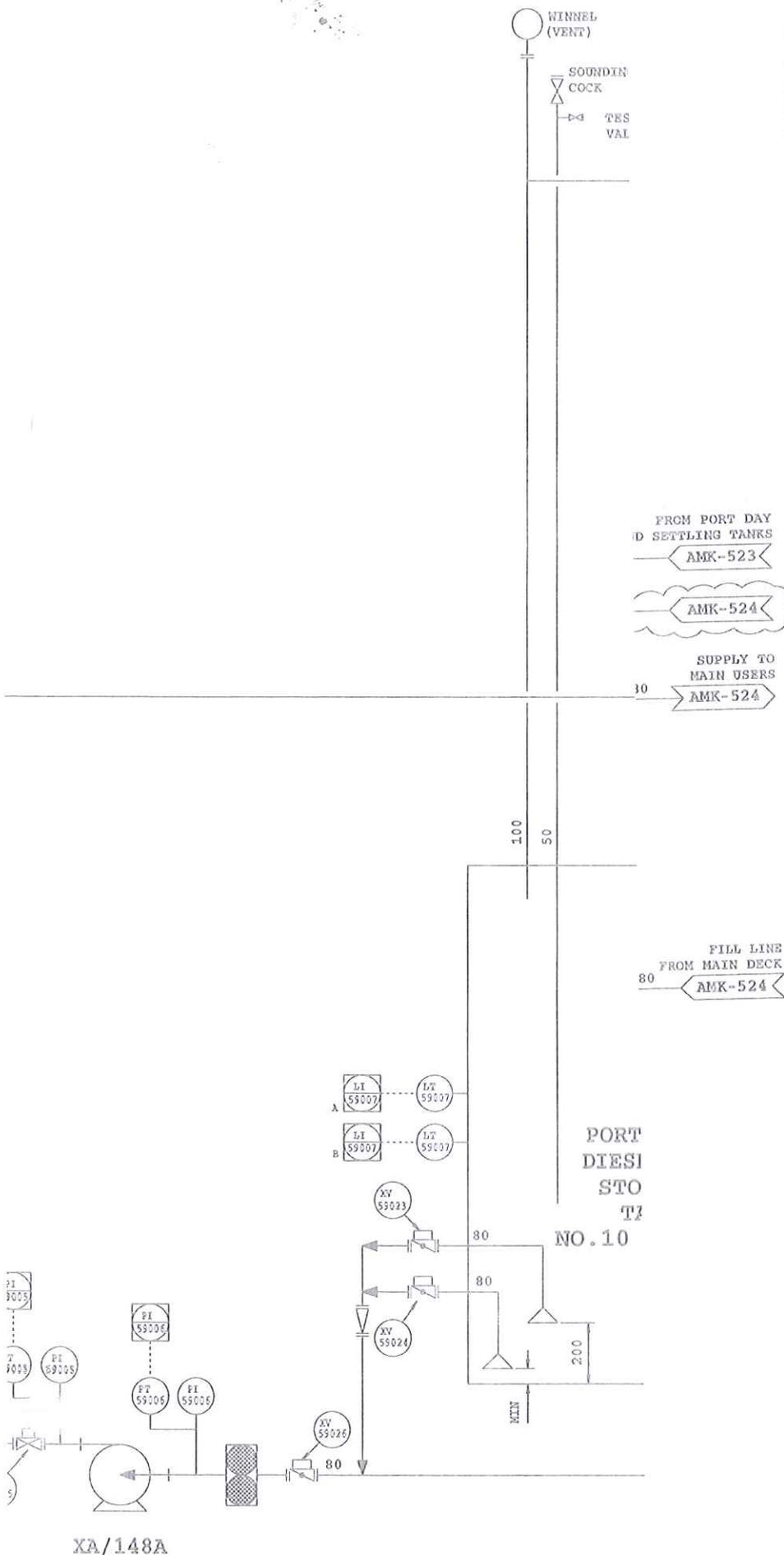
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DIESEL OIL TRANSFER PUMP  
XA/148A  
38 M<sup>3</sup>/hr  
50 MWC

PORT DIESEL  
NO  
611



NOTES

1. SITE VERIFICATION REQUIRED FOR AS BUILT'S



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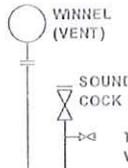
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B	23/03/93	REVISED AFC	DGS
A	25/11/85	FOR CONSTRUCTION	SJS GC
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SCALE		NONE	
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LAST UPDATED

XA/148A

XAI 148 C  
38 M<sup>3</sup> / hr  
50 MWC

TANK



OVERFLOW  
TO DIESEL FUEL  
SETTLING TANK  
AMK-524

SUPPLY TO  
MAIN USERS  
AMK-524

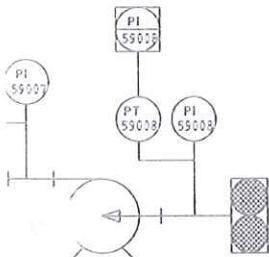
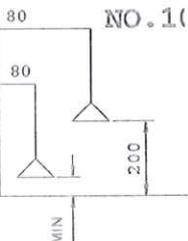
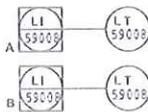
FROM STB DAY  
SETTLING TANKS  
AMK-524

FILL LINE  
FROM MAIN DECK  
AMK-524

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NOTES

1. SITE VERIFICATION REQUIRED FOR AS BUILTS



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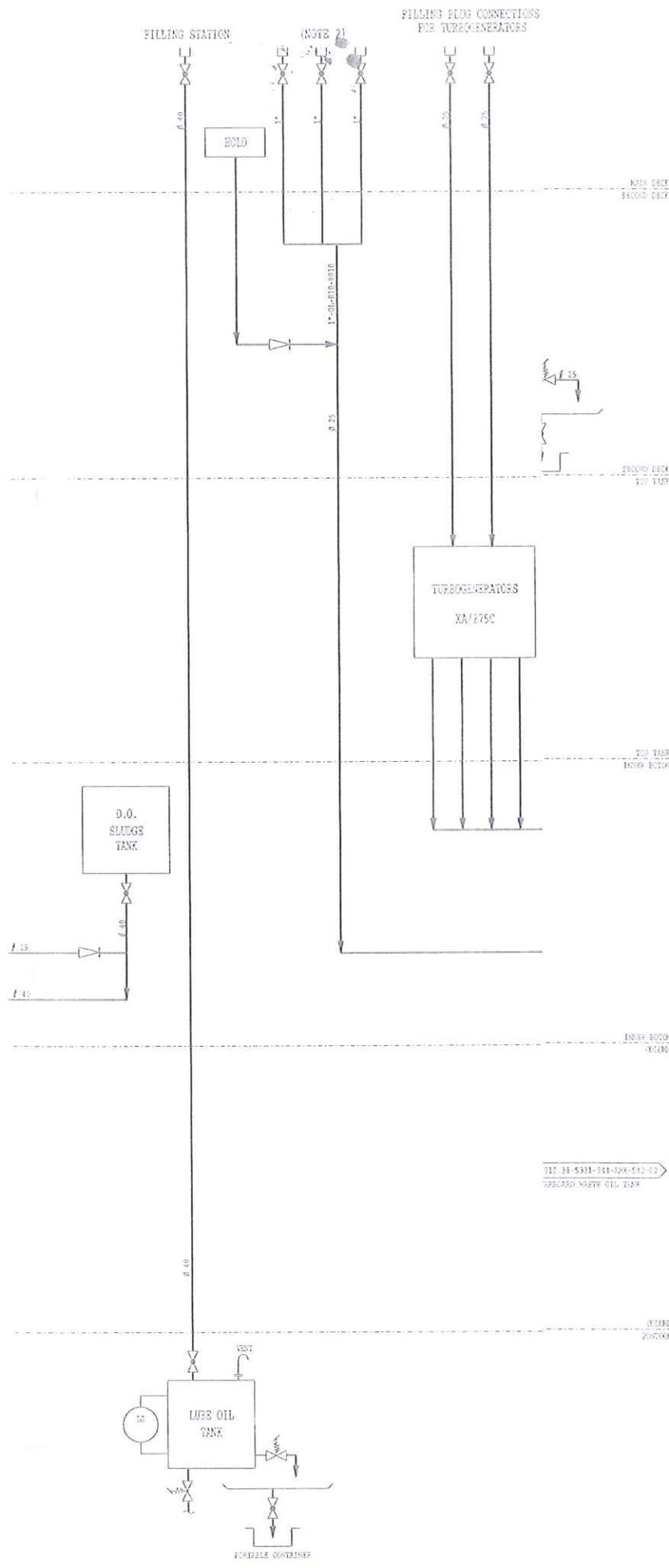
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DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

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NOBLE DENTON		PETROBRAS		AMK AMK		
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**SPECIFIC NOTES**

- 1 - SITE VERIFICATION REQUIRED FOR AS BUILT
- 2 - NEW LUBE OIL DRAIN HOSE CONNECTIONS FOR COMPRESSOR TURBINES.



**SIMBOLOGY**

SELF-CLOSING VALVE

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THIS DRAWING WAS REDRAWN BY UTC AND INCORPORATES THE INFORMATION OF DWG'S: DE-3010.38-5250-944-AMK-532-03 / 532-04/532-05/532-06


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A	18-1-95	FOR CONSTRUCTION	SJS	GC		

**BRASOIL** P36-RONCADOR FIELD DEVELOPMENT  
CONTRACT No :- 7/15/2150

**NOBLE DENTON** **Petromec** **AMEC**

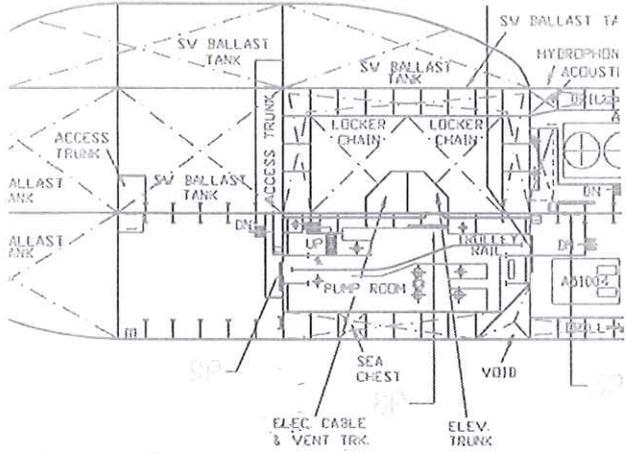
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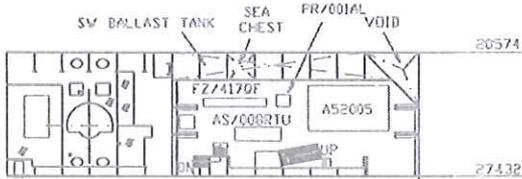
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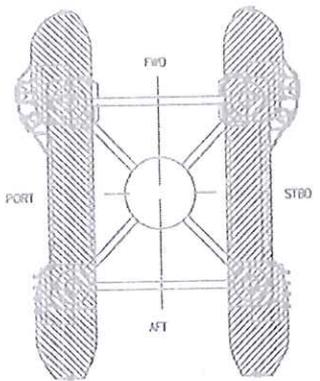
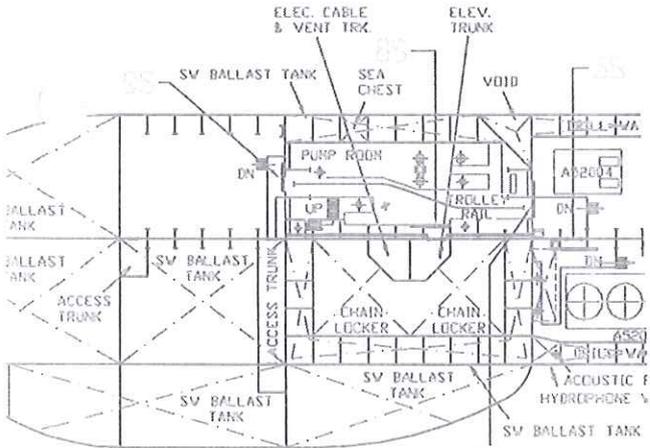




LEVEL ABOVE PUMP & THRUSTER ROOM  
EL. 5514 A.B.L. (PORT SIDE)



LEVEL ABOVE PUMP & THRUSTER ROOM  
EL. 5514 A.B.L. (ST'B'D SIDE)



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DIVISÃO DE SERVIÇOS JURÍDICOS

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NOBLE DEVON		Pertronomic	AMEC
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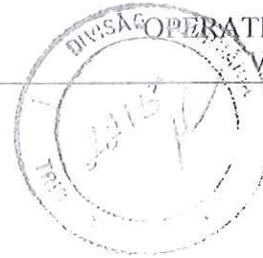
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**REVISION CHANGE NOTICES**

Rev.	Location Changes	Brief Description of Change

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DIRETOR  
DIVISÃO DE SERVIÇOS CARTÓGRAFOS



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E CONFEITO DO DOCUMENTO ORIGINAL

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 DIRECTOR  
 DIVISÃO DE SERVIÇOS OPERACIONAIS

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DIVISÃO DE SERVIÇOS CARTORIAIS

### 3.1 GENERAL SAFETY



#### 3.1.1 Safety Introductions to New Arrivals

First time visitors will be given instructions regarding the Unit itself, alarm signals, how to behave in case of alarms, what lifesaving equipment is available, smoking regulations onboard etc. Afterwards they will be given a tour of the Unit and special attention will be given to the lifesaving equipment, escape routes and hazardous areas. The general form in Fig. 3.1.1 is to be filled in when the safety introduction is given.

#### 3.1.2 Safety Pamphlet

The Safety Pamphlet is given to each new arrival as his/her personal copy, as part of the safety introduction onboard. The purpose of this pamphlet is to give a short description of safety related rules, procedures and guidelines which shall be complied with onboard. The safety pamphlet also contains some general information, as follows:

1. Introduction
2. General
  - Safety
  - Smoking
  - Doors
  - Alcohol
  - Drugs and medicines
  - Horseplay
  - Fishing
  - Personal, portable, battery powered equipment
  - Camera
  - General housekeeping rules
3. Arrival/Departure
4. Alarm signals
5. Station Bill

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DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAIS

6. Gas alarm
7. Lifeboat stations/lifeboat muster
8. Man overboard
9. Fire
10. Visitors- third party – others
11. "Hot-work" permit
12. Permission to enter tanks and other confined spaces
13. Barrings and warning signs
14. Hoisting operations
15. Operation of watertight doors
16. Escape routes
17. Handling of chemicals
18. Accidents
19. Inspections and drills
20. Safety Meetings
21. Reporting of non-conformances
22. Quality assurance system

In addition it contains drawings of the unit with location of lifesaving equipment, fire fighting equipment and escape ways.

É CÓPIA FEITA DO DOCUMENTO ORIGINAL.

### 3.1.3 Station Bill

The purpose of the Station Bill is to ensure that each person onboard know their duties in the event of an emergency. Station Bills are posted at strategic locations onboard the vessel.

Everyone onboard shall read and understand the Station Bill.

The safety plans, signs and posters are displayed for everybody's benefit and safety purposes.



### 3.1.4 Safety Equipment

For the crewmember's personal safety, the FPU P-36 is equipped with comprehensive and modern lifesaving appliances for use in emergency situations.

The Safety Supt. is responsible for the safety equipment and the proper location and maintenance of these.

### 3.1.5 Safety Drills and Musters

Lifeboat drills and musters are arranged once a week. In order to make the drill realistic, the time for the drill will normally not be announced beforehand. When the lifeboat alarm sounds, each person onboard not part of an emergency team, shall immediately go to their lifeboat, put on their lifebelt/survival suit, (found in the cabins and the containers close to the lifeboat) and follow the instructions given.

It is compulsory for everyone onboard to participate in the drills being arranged onboard.

NOTE: See also Volume 4, paragraph 4.2 of this Manual.

### 3.1.6 Accidents

The prevention of accidents is of great importance and nobody should allow a condition hazardous to life or limb to exist without remedying the defect or reporting it to his Supt. immediately.

### 3.1.7 Deficiencies

Anyone discovering deficiencies with the lifesaving equipment while they are onboard should notify the Marine Supt. immediately.

### 3.1.8 Hazards

Hazards shall be reported to the Section Supt. immediately and/or brought under control as soon as possible. If the hazard cannot be controlled, the Section Supt. is responsible for informing the FPU Manager about the situation and for taking the necessary actions and precautions.

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JOSÉ CARLOS FIMENEL GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORÁRIOS

It is the responsibility of everyone onboard to report any hazardous conditions.

### 3.1.9 Alcohol and Drugs

Alcoholic beverages, drugs or other intoxicating materials are not permitted onboard. Intoxicated persons will have no admittance to the unit.

### 3.1.10 Relief Personnel

Relief personnel coming on duty shall be informed of any changes that have taken place during their time off that might cause any hazards.

The Section Supt. and foremen are responsible to ensure that all personnel clearly understand the safety precautions and conditions of the job that they shall undertake.

### 3.1.11 Safety Meetings

The crew and other personnel onboard shall participate in the weekly safety meeting.

### 3.1.12 Safety Supt.

The Marine Supt. is appointed Safety Supt. onboard.

As Safety Supt. he shall keep the lifesaving, fire-fighting and other safety/emergency equipment in good working condition. He or other competent person appointed by him, shall pay special attention to new employees or visitors coming to the platform. They shall be given thorough instructions as described in paragraph 3.1.1.

The Safety Supt., in co-operation with the FPU Manager, is responsible for planning and executing safety drills onboard in order to learn the procedures to be followed in case of an emergency situation.

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### 3.1.13 Training of Personnel

JOSE CARLOS FIMBRES DE SA  
DIRETOR  
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It is the FPU Manager's overall responsibility to ensure the systematic training of all personnel.



It is the responsibility of each Section Supt. to implement and check physically that the individual has reached a satisfactory level of competence in their position. Once the individual has been checked out and their knowledge and competence is verified, the Section Supt. shall sign on the form the level and systems/machinery the individuals have been verified to have an acceptable knowledge of.

Each individual shall have one set of the systematic training program pertaining to his/her position onboard. This set shall be filled in with the individual's name and shall be kept on file onboard for systematic follow-up. Once the form is completed a copy shall be given to the individual and one copy sent ashore to the Personnel Co-ordinator. The original shall be kept onboard until the individual terminates his position with the company, then it may be discarded.

The on-the-job training is divided in several levels with checklists for each position onboard.

### 3.1.14 Personal Safety Rules

1. Employees are encouraged to take an active part in all phases of the safety program.
2. Makeshifts of any kind should be avoided, and any makeshifts necessary as a temporary measure should be corrected as quickly as possible.
3. Care should be exercised in walking and moving about the work area to avoid sliding, tripping and falling. Employees should not run during normal operations.

Do not perform unnecessary operations.

Do not take unnecessary risks.

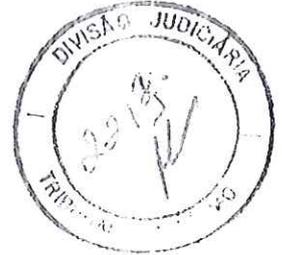
4. Do not attempt to do a job alone when assistance is needed. Help should be called.
5. Employees should avoid strains when lifting by keeping their backs as nearly upright as possible and using the leg muscles instead of the back or stomach muscles. They should not attempt to lift more than can be safely handled. They should be sure there are enough men to handle the load.
6. Avoid carrying loads that extend above eye level when walking on level surfaces or down stairways.
7. Everyone should position himself in a safe location when unusual strains are placed on equipment materials.

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8. Falling objects have caused many serious injuries. Keep feet in the clear and handle material with care. Do not leave tools or other material on scaffolds or other elevations, where they may become dislodged and fall.
9. Avoid walking and working under suspended loads. When necessary to work under a load raised on jacks or suspended by hoisting equipment, the load should be blocked.
10. Employees should never attempt to grease moving machinery that is not equipped with properly guarded grease fittings. Always pull the main disconnect switch if possible.
11. No major repair work should be done over moving machinery. When working close to moving machinery a temporary guard should be provided between the machine and the men at work.
12. Drive belts must not be tightened while they are in motion.
13. All pressure must be removed from vessels, lines, regulators, meters, fittings, and connections before disconnecting, moving or working on them.
14. Employees should not hammer or pound on lines or fittings under pressure.
15. Water and steam lines should never be converged into one discharge.
16. All openings must be adequately guarded or covered with planks of adequate strength and length to prevent anyone from falling or stepping into them.
17. For work requiring that several men use shovels, pick axes, machetes, brush hooks, etc., a safe distance between individuals should be maintained.
18. Nails or sharp edges around tops of kegs, barrels and boxes should always be removed. Boards should never be thrown down or allowed to lie around with nail points sticking up. The nails should be bent down, or preferably removed, where their presence creates a hazard.
19. The working condition of safety shutdown equipment should be checked at least quarterly. Periodic inspections of relief or other emergency valves should be established.
20. All operators of equipment should be informed of the capacities of their equipment and not exceed the capacity ratings.
21. All belts should be properly guarded against the possibility of inflicting injury to personnel in the work area.

- 22. Standard handrails should be provided when four or more steps are required.
- 23. All belts, chains and sprockets should be adequately guarded.
- 24. All guards should be immediately replaced when repairs are completed on equipment.



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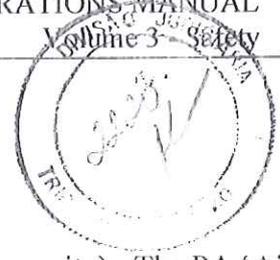
3.1.14.1 Safety Introduction Form

Company:		
Name:	Position:	
<b>1.</b>	Safety Pamphlet:	CHECK
<b>2.</b>	Unit Layout:	
	2.1 Living Quarters (Cabin, mess room, recreational area, laundry, hospital)	<input type="checkbox"/>
	2.2 Hazardous Areas (Zone 1, Zone 2, Unclassified area)	<input type="checkbox"/>
	2.3 Work Area (hazards, safety equipment, escape routes)	<input type="checkbox"/>
<b>3.</b>	Organisation and Administrative Systems:	
	3.1 Organisation Chart	<input type="checkbox"/>
	3.2 Emergency Organisation	<input type="checkbox"/>
	3.3 Applicable Manuals and Procedures (ref. per. Training Manual)	<input type="checkbox"/>
	3.4 Household Rules	<input type="checkbox"/>
<b>4.</b>	Safety System & Equipment:	
	4.1 Station Bill and Safety Plan	<input type="checkbox"/>
	4.2 Alarm Signals (fire, gas, abandon ship)	<input type="checkbox"/>
	4.3 Firefighting systems (stationary and portable)	<input type="checkbox"/>
	4.4 Lifeboats, Rafts, Vests and Survival Suits	<input type="checkbox"/>
	4.5 Personal Safety Equipment	<input type="checkbox"/>
	4.6 Escape Routes	<input type="checkbox"/>
	4.7 Reporting of Accidents/Hazardous Situation	<input type="checkbox"/>
	4.8 Work Permit	<input type="checkbox"/>
	4.9 Emergency Drills	<input type="checkbox"/>
<b>5.</b>	Instruction / Demonstration	
	5.1 Portable Fire Extinguishers	<input type="checkbox"/>
<b>The Safety Introduction has been completed</b>		
Date:	Sign. Safety Supt.	Sign. Participant

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 DIRETOR PORTÁVEL FIRE EXTINGUISHERS  
 DIVISÃO DE SERVIÇOS CARTÓGRAFOS

Figure 3.1.1 Safety Introduction Form



### 3.2 ALARM SYSTEM

The Alarm System consists of a dual PA/Alarm system (redundant for security). The PA 'A' and 'B' systems are provided with the means by which verbal announcements and alarm tones are broadcast throughout the vessel.

Each system provides broadcast cover to all areas where personnel normally have access and it is capable of completely independent operation. Each area is covered by loudspeakers and visual alarms fed from two completely independent, and separately located, PA central equipment. Both systems are accessed, simultaneously, from common control panels (on bridge). The systems allow initiation of alarm tones to loudspeakers and the energising of visual alarms from control panels in the central control-room (CCR), radio room, and at each central equipment rack. Speech announcements are possible from all control panels.

Each PA system comprises central equipment racks and termination racks, each located in a non-hazardous area. In areas where the noise level may exceed 87dBA the PA speakers are supplementary by A & B system visual alarms.

NOTE: For further details see 'PA System Instrumentation Manual' and Volume 4; paragraph 4.6 of this Manual.

#### 3.2.1 Alarm Signals

Prepare Evacuation	Steady horn on general alarm system and P.A. announcement
Fire/Gas Alarm	Rapid intermittent horn on general alarm system
Man Overboard	P.A. announcement

Upon hearing an alarm proceed immediately to assigned emergency station or muster at lifeboat station in accordance with the Station Bill.

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#### 3.2.2 Prepare Evacuation Alarm

Orders to abandon the rig are given by the FPU Manager via the P.A. system or directly to the lifeboat leaders.

### 3.2.3 Fire/Gas Alarm

The fire/gas alarm is activated by the fire alarm push buttons. The fire alarm is also automatically activated by detectors, initially indicated in the bridge and engine control rooms, and after a time delay the fire alarm will be activated throughout the FPU.

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### 3.3 PERSONAL PROTECTIVE EQUIPMENT



#### 3.3.1 Clothing

1. Personnel getting their clothing saturated with oil, gasoline or chemicals shall change clothes immediately to prevent skin irritations. They should avoid all sources of fire prior to changing of clothes and wash the part of their body affected with soap and water. The Medic Clerk shall be consulted if skin rash develops.
2. Safety hard hats must be worn everywhere on the rig when outside living quarters. Superintendents shall enforce compliance with this requirement.
3. Personnel working near moving or rotating machinery shall not wear baggy, loose or ragged clothing. Do not tie or otherwise attach a rag to your body in such a manner that it cannot be removed quickly. Safety shoes/boots are required when working outside living quarters. Superintendents shall enforce employees to wear safety shoes/boots. Wearing of hobnailed shoes or shoes with protruding nails is prohibited onboard.
4. Gloves of appropriate type should be worn when handling pipes, timber, or other rough materials. Gloves must be worn while engaged in welding work. Gloves with long gauntlets should not be worn where they may be caught in moving or rotating machinery. Rubber or plastic coated gloves must be used to handle chemicals or other materials considered being skin irritants.

#### 3.3.2 Ear Protection

Personnel are required to use ear protection when working in noisy areas.

For "Restricted Areas" see fig. 3.3.2.

#### 3.3.3 Eye Protection

1. Approved type goggles and/or face protection shall be worn when handling classes of materials or performing work causing possible injury to the eyes. If in doubt when eye protection is required or what type to use, consult your Supt.

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2. Eye protection shall be worn by employees engaged in the following jobs:
  - Drilling overhead
  - Buffing and grinding
  - Chipping, caulking and chiselling
  - Riveting, sledging and scaling
  - Some woodworking operations
  - Pouring of lead joints and babbitting
  - Replacing or tightening gauge glasses
  - Breaking concrete
  - When using a hammer on a striking tool
  - Handling lime or other fine and dusty material
  - Working inside boilers and furnaces where the eyes are exposed to excessive foreign matter
  - Handling irritating caustics, acids or other chemicals
  - Cutting wire with grinding machine
3. Anyone near other persons who are doing work that requires the use of safety goggles must also wear goggles.
4. When welding or cutting material with acetylene gas, workers should use No. 5 or 6 shade lenses.
5. Helpers for acetylene welders or cutters should use No. 4 shade lenses or equivalent.
6. For electric arc welding, workers should use welding helmets or hand shields with No. 10 or 12 shade lenses.
7. Helpers for electric welders or cutters must use No. 6 shade lenses.
8. Flammable eye shields or visors must not be worn. A spark or intense heat may set them on fire and cause serious injury.
9. Complete eye protection should be worn when dust hazards *exist* and when using a type of pneumatic tool.

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10. Splash-proof chemical goggles and proper long gloves should be used when:
- handling hazardous chemical liquids, powders or vapours
  - cleaning material with chemical solutions
  - handling creosote material
  - working with molten metal, coal tar products, asphalt or bitumen compounds, or
  - in any other operation where the employee's eyes may be exposed to hazardous chemicals.
11. Personnel who wear contact lenses and are exposed to chemical and dust hazards, should always be aware of the problems caused by getting a foreign material into the eyes. Such personnel must immediately see the Medic Clerk for treatment.
12. To ensure maximum eye protection and comfort, any type of eye protection used should be adjusted properly to fit the individual's face.
13. When excessive fogging of lenses occurs, various types of "anti-fogging" compounds are available for application to the lenses to limit fogging conditions.
14. An approved cover-glass, impact type safety goggle (for use over personal glasses) may be furnished to employees who are only occasionally exposed to eye hazards.



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### 3.3.4 Safety Belts and Lines

Personnel are required to wear safety belt and tail line when working over the side of the Unit, painting under deck and working under the decks in general. Also when working on crane booms fore mast and at heights of 2m or more above deck, unless other means have been provided to prevent falls. Supt.'s shall enforce use of safety belts and tail lines.

A safety belt/harness is to be provided to personnel when climbing the derrick.

The use of safety belts and tail lines should be discussed and demonstrated frequently in safety meetings.

Safety belts are to be used when entering the tanks in the pontoons and when entering voids.

### 3.3.5 Respirators

1. Personnel using paint sprays must always wear protective masks or respirators intended for such use.
2. Personnel with a punctured eardrum should never use a supplied air mask unless they use ear-plugs with the mask and never in H<sub>2</sub>S environment.
3. Upon completion of each job, all parts of the face mask piece and hose including harness and necessary lines of the supplied air mask, should be properly washed and dried and made ready for re-use. Equipment must be protected against exposure to excess heat. Any repairs or replacements shall be made as soon as they are discovered.
4. Connections on the fresh air supply hose must be inspected frequently and tightened whenever they become loose.
5. User of the mask should remove his hat or cap in order to secure a tight fit to his face. All articles such as tobacco and chewing gum must be removed from the mouth before donning the mask. After the mask has been adjusted and tightened, it must be tested for leaks by closing the air-line valve and inhaling. If the mask is tight against the face, the fit is satisfactory. If it is not, the leak must be located and eliminated or the mask must be changed with a proper one.
6. Personnel with beard should try to avoid work that requires respirators as it might be difficult to keep it tightly fit to the face if the mask is not in direct contact with bare skin. If they have to do such work special care must be taken.

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*Insert Restricted Areas (Ear Defenders/Safety Glasses) Drawings here when commissioning procedures have identified appropriate areas.*



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### 3.4 GENERAL WORKING PRECAUTIONS

#### 3.4.1 Crew Meetings

Superintendents should hold crew meetings periodically and on occasions when new or hazardous work arises to discuss safety and encourage the crew to make suggestions. It shall be the duty of all personnel to plan the job to which he is assigned. Job planning gives the worker knowledge of the hazards to be encountered, thereby enabling him to avoid injury to himself and his team.

The Supt. shall outline safe methods and the proper way of carrying out the work, and shall make sure that his instructions are followed.

The Supt. shall conduct a short briefing session before starting on a new job.

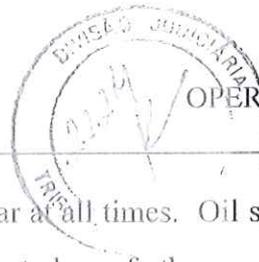
The way of doing the work, the hazards of the job, and the way to control the hazards shall be explained to each crewmember.

#### 3.4.2 Housekeeping, General

1. Good "housekeeping" is required due to the restricted area and the types of material and equipment utilised and to be stored, much of which must be immediately accessible. Paints and flammable materials shall be isolated and stored in designated areas. Care should be taken in storing chemicals.
2. All permanent or temporary openings or holes in or on structure decks, gangways and lifeboat platforms shall have guarding facilities around them at all times when they are in use.
3. All such openings shall be properly closed when not in use. Removed or missing guard rails shall be immediately replaced upon completion of an operation.
4. All tools and equipment not in immediate use shall be kept stored in their proper storage area.

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5. Passageways and escape routes shall be kept clear at all times. Oil spills shall be cleaned up immediately. The basket landings shall be kept clear of other equipment, material and slippery substances. Boat bumpers shall be maintained in good condition. Oily rags and other substances that present a fire hazard shall be disposed in such a manner so as not to violate any of the pollution regulations.
6. First aid kits, fully equipped, shall be available at all times and the material therein kept up to date.
7. All personnel shall co-operate with the Government Regulatory Bodies and comply with their instructions and regulations.

### 3.4.3 Entering Tanks and Enclosed Spaces

To enter empty voids tanks or confined rooms can be very dangerous.

Danger when entering empty voids is related to:

1. Lack of oxygen
2. Poisonous gases (CO<sub>2</sub> etc.)
3. Explosive gases

The only way to find out if any of these circumstances are present, is to measure the atmosphere in the voids with relevant instruments.

The only way to remove the dangerous atmosphere is by cleaning and purging the tank with air.

#### 1. Lack of Oxygen

Measure the oxygen content in the atmosphere with an oxygen measure instrument. Never enter any void with oxygen content below 21% without a breathing apparatus.

#### 2. Poisonous Gas

All closed voids have to be checked with different gas measure instruments. CO<sub>2</sub> and other gases from oil and crude can be extremely dangerous to life. If gas is present, ventilate the voids and take new measurements until the atmosphere is clean.

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### 3. Explosive Gas

Explosive gas can be measured by an explosive meter. This instrument measures if the atmosphere is explosive, but does not detect if oxygen or inert gas is present.

Notwithstanding the above, empty tanks, voids or confined rooms shall not be entered unless permission to do so has been given by the Marine Supt. – see Paragraph 3.5.2 for procedures.

NOTE: When using respirators, see above Paragraph 3.3.5.

#### 3.4.4 Hand Tools

1. Tools should be kept neatly on the tool bench so they may be easily found when needed.
2. All tools and equipment must be inspected regularly. Defective and unsafe tools or equipment must be reported to the Supt. as soon as they are found to be in poor condition and be repaired or replaced at once.
3. Tools, equipment and material must not be thrown up or down from one working level to another. They should be carried or sent up or down by the use of a handling or other safe, suitable method.
4. Hand tools should be used in the manner and on work, for which they are designed.
5. Wrenches should not be used directly overhead. A position to one side is recommended.
6. When using a wrench, be sure the wrench fits the nut, and in applying force, use care. Where possible, pull and do not push the wrench.
7. Never use a wrench to secure leverage by placing the jaw of it into the jaw of another.
8. Adjustable pipe and crescent wrenches should be adjusted to take a full but snug grip on the pipe or nut, and the pull should be made towards the jaw of the wrench. This tends to tighten the grip and does not put undue strain upon the wrench.

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9. One should never step or jump on wrenches and tongs when additional force is needed.

10. Jack handles should be removed when the jacks are not being used.

11. The handles of all sledges, hammers and mauls should be properly wedged into the heads.

12. Spout-type oil cans should have flexible or bent spouts.

13. Safety washers must be used on all emery wheels. Employees should stand to one side of the plan of rotation if possible and should wear proper goggles.
14. Before making repairs to any type of power tool, the power source must be disconnected.



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### 3.5 INSTRUCTIONS AND DUTIES FOR POTENTIAL HAZARDOUS OPERATIONS

#### 3.5.1 Working Oversight

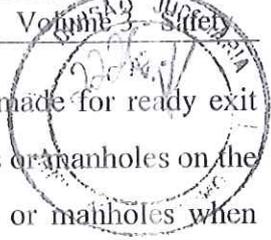
1. The Marine Supt. is responsible that the persons appointed to do the job are qualified for working oversight.
2. A working permit to be issued for working oversight.
3. The Marine Supt. check that the persons working oversight are wearing working type life vest, safety belt or safety harness with lifeline and VHF/UHF radio. He also shall check that the working light is sufficient.
4. The stand-by vessel (if such is available) to be called close to the working area.
5. Where stand-by vessel is not available, the "man over board boat" to be mobilised ready for launching and rescue operation.

#### 3.5.2 Working in Enclosed Areas

1. Personnel shall not open an enclosed area, voids or tanks before the Marine Supt. has given his permission to do so. Before entering such confined areas a working permit must be issued. The Control Room Operator on duty shall be notified of which compartments will be opened, the sequence that will be followed and the number that will be opened at any one time.
2. Personnel shall not enter an enclosed area, voids or tanks likely to contain accumulation of hazardous vapours or gases, unless wearing suitable and approved respiratory equipment. A test or chemical analysis shall be made of the atmosphere inside the confined area to determine whether it is gas free, and safe to enter and work in.
3. All tanks, vessels, or other enclosed areas must be opened and thoroughly ventilated before personnel are allowed to enter. Fresh air blowers or air hoses should be used for venting such spaces and also to provide continuous fresh air while any work is being performed inside. Blowers must be placed in such a manner that the fresh air intake will not pick up exhaust vapours, fumes or gases.

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4. Before work is performed in an enclosed area, provisions shall be made for ready exit and entrance. Tanks, vessels or other enclosed areas having openings or manholes on the side as well as in the top shall be entered from the side openings or manholes when practicable.
5. An approved harness safety belt with a life line attached shall be used by all personnel entering tanks, vessels or other confined spaces that are tested gas free but are in danger of becoming gassy. At least one person shall stand by on the outside ready to give assistance or go for help in case of emergency.
6. When conditions in an enclosed area are such to require a person within the space to wear respiratory equipment there shall be at least one additional man on the job equipped with approved respiratory equipment. If one man so equipped is outside, he shall be within sight and call of the man inside.
7. While work is being performed inside a confined space where respiratory equipment is required, at least one qualified person shall be readily available to administer artificial respiration or use the respirator.
8. No source of ignition shall be introduced into a confined space where flammable vapours or gases are, or may be, present.
9. Prior to personnel entering a confined space all lines entering the space shall be either blinded or all valves controlling such lines must be closed, locked and tagged.
10. When work is being performed in two or more tanks or vessels which are blinded off as a unit, the atmosphere in each tank or vessel of such a unit shall be tested and the highest concentration of gases or vapours so found shall govern the procedures to be followed for all work inside each tank or vessel of such a unit.
11. Tank top must be kept free of all loose objects or materials. Manholes on tanks must be kept closed except during gauging and cleaning operations.
12. Before any hot work is done on a tank regardless of its service, it shall be thoroughly cleaned and made safe for the particular work to be done.

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### 3.5.3 Electrical Work

1. Avoid contact with electrical power lines (contact even with low voltage lines such as 110-volt circuits can result in death).
2. Employees should avoid stepping on or handling live wiring, lighting units or handlamps found laying on the floor or ground, especially in damp areas. Such a condition should be remedied by opening the circuit and restoring the items to the proper place.
3. In operating electrical equipment, employees should proceed according to instructions. They should not experiment. If equipment does not operate properly, they should call an Electrician.
4. Unauthorised persons must not attempt to make repairs to electrical equipment. All unsafe appliances, lines and electrical apparatus should be reported to the Electrician or your Supt.
5. Only an Electrician or other authorised person shall repair defective electrical equipment.
6. Defective or frayed electric cords of equipment and appliances must be repaired or replaced.
7. Electrical outlets should not be overloaded.
8. Substitutes for fuses such as coins, slugs, or any other make shift connections must never be used.
9. Only authorised personnel should attend to replace primary fuses such transform disconnect and line fuses.
10. Hand, shoes and clothing should be dry when any electrical equipment is handled.
11. All portable electric tools shall be circuit grounded through the third wire of a three-conductor cord.
12. Water or steam should not be used to wash the area near electric motors or other electric apparatus, unless the power has been cut off.
13. When changing a broken light bulb, make sure that the circuit is de-energised.
14. Keep the glassware on all industrial fixtures clean so that illumination will be at a safe level. Never remove protective gloves from vapour-proof or explosion-proof fixtur longer than necessary to clean or replace.

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15. Employees should avoid handling broken fragments or fluorescent lamp tubes and should not breathe dust or vapours from a broken lamp. Sufficient time should be allowed for the atmosphere to clear before cleaning up the broken pieces. Should any wounds be received, employees should wash thoroughly and seek immediate medical attention. Burned out tubes should always be disposed of so a hazard to other people will not be created.
16. Safety lamps and extension cords must be kept in good order. They must be checked for bad insulation and cracked or broken protection gloves. The cord shall not be used if it is defective. Care should be taken to avoid wrapping the cord around the arms, or any part of the body. Avoid standing in water when using the cord.
17. All portable handlights used in hazardous locations must be of explosion-proof type.
18. No portable handlight should be used unless the outside glove and metal guard are in place.
19. Only flashlights and hand lantern approved shall be used in hazardous locations.
20. Doors and covers of electric apparatus enclosures shall be kept closed except while making repairs.
21. When the enclosure or frame of any electrical apparatus is discovered to be charged, notify an electrician immediately to make necessary repairs.
22. Switches that are opened to permit work on electrical circuit or equipment should be locked in the open position or tagged to warn against closing them.
23. All non-current carrying enclosures or structure used in electric apparatus of circuits shall be grounded. In a grouping of electric apparatus the ground shall be interconnected. Before opening or working on such enclosures or structures determine that the ground is effective. Always call the electrician.

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### 3.5.4 Hot Work, Welding and Burning

#### 3.5.4.1 Authorisation

Burning and welding are among the most critical of offshore activities; these activities can be performed safely if proper precautions are taken before such work begins and while it is in progress.

No work involving burning, welding or other ignition creating activity will begin on any unit until authorised by the Technical Supt. as overall responsible Supt. for welding and burning when working along a hot platform.

This authorisation is to be granted only after

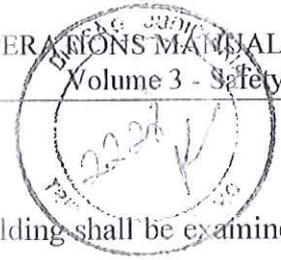
1. The Supt. has checked that subject area is not considered as a strength member on the unit.
2. A Class approved work schedule is obtained if the subject area is considered a strength member.
3. The Supt. or responsible person delegated by him has personally inspected the area in which the work is to be done, and determined that it is safe to proceed and after he is assured there is a thorough understanding of the work to be accomplished and the operation conditions under which it is to be conducted, by all Company and contract Supt's and responsible personnel involved.
4. Control Room Operator is informed.

After issuing the authorisation by means of a Hot Work Permit, and while the work is in progress the Supt. or a responsible person delegated by him, should remain in the immediate area to maintain co-ordination until the work is completed.

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30/01/2012  
DIRETORIA DE SERVIÇOS  
CARTORARIAS

- Preparation
1. An inspection of the area surrounding each location where any burning, welding or other ignition creating activity is expected to be conducted shall be made, and a work Permit shall be completed before any work begins.
  2. The inspection shall be made by the Supt. or a responsible person delegated by him.



### 3.5.4.3 Inspection of Location

1. The area surrounding the location of any proposed burning or welding shall be examined by the Supt. to assure that no sparks, flame or hot slag will be blown into or fall upon any combustible material or equipment likely to be set on fire or damaged by such sparks, flame or hot slag. Protective non-flammable covering may be required.
2. In either open or confined areas where there is a possibility of combustible vapours being present, the Supt. shall make a gas test before giving his approval to begin work, and shall periodically retest for vapours during the time the work is in progress.
3. If either gas or oil is present, the area should be thoroughly cleaned to remove any ignitable substance. The Supt. shall retest after cleaning to assure that no combustible vapours are present.
4. If burning or welding must be done around timber decks the Supt. shall, where possible, require the timbers to be wetted with water and arrange for a flowing stream of water to be ready for immediate use if ignition should occur. If a flowing stream of water is not readily available the Supt. shall, where possible, arrange for a protective covering over the timber. A blanket may be used for this purpose.
5. The Supt. must be assured that adequate ventilation will be provided while the work is in progress. Good ventilation is particularly essential when cutting or welding on brass, galvanised iron, cadmium plating or other alloys, or paints, which might produce harmful fumes.
6. If burning or welding must be done on containers, tanks or other vessels which have contained a flammable substance the Supt. must be assured that these objects have been thoroughly cleaned and are gas free before the work begins.
7. Used empty barrels must never be cut into by burning torch.
8. If burning or welding must be done on in-service or connected up piping, the Supt. must be assured that the following is fulfilled for the actual pipe:
  - It has been bled to atmospheric pressure
  - It has been thoroughly purged and cleaned
  - There is no possibility of pressure building up in the pipe
  - All connecting valves are tightly closed

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- Blind or skillett flanges, if used, are properly installed

#### 3.5.4.4 Enclosed Areas

1. It shall be the duty of the Supt. to see that every confined space in which work is to be done is opened up, free of gas and cleaned if necessary, tested and thoroughly ventilated before personnel are allowed to enter. Air blowers may be used for venting and to provide a continuous source of fresh air while work is in progress. The Supt. shall see that all blowers are located in such a position that the fresh air intake will not pick up exhausted fumes of vapours.
2. If any burning or welding is done on bulkheads, decks or overheads the Supt. shall give particular attention to it before burning or welding work is allowed to begin.
3. If burning or welding is confined to piping entering a confined space, the Supt. shall give particular attention to the requirements for in-service or connected up piping previously mentioned. It is further recommended, where possible, that positive closures such as blind flanges, bull plugs or locked valves, be employed on pipe lines entering confined spaces, while work is under way in those spaces.
4. The Supt. shall arrange for ready entrance and exit to confined spaces.

#### 3.5.4.5 Fire Watch

1. A person working alone shall not perform burning or welding. The Supt. shall delegate one or more persons as necessary as a 'fire watch' with specific instruction to observe flying sparks and falling slag in order to recognise and prevent possible fire hazards. Personnel assigned to 'fire watch' shall have no other duties while so employed.
2. The Supt. shall be particularly alert to the assignment of an additional 'fire watch' on the opposite side of any bulkhead, deck or overhead subject to burning or welding. The 'fire watch' shall be equipped with a fire extinguisher. He may also be equipped with a running water hose when practicable. The Supt. should establish a prearranged means of signalling whereby burning or welding shall cease immediately should a hazardous situation arise.

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### 3.5.4.6 Oxygen and Acetylene

It is assumed for the purpose of this Sub-Section of the Manual that burning and welding will be done by experienced and qualified persons well versed in the particular safe practices pertaining to their occupations. Therefore, the recommendations which follow are primarily for these persons without that background who may be required to move or transport burning and welding equipment, or who may be assigned the duty of assisting a burner or welder.

1. Cylinders are to be handled with care. They must not be handled roughly, dropped or knocked together.
2. Cylinders should be secured in an upright position, in a designated safe place, with caps in place at all times, except when a particular cylinder is being used. Caps should always be in place on both full and empty cylinders, while they are being moved or transported.
3. Never store oxygen cylinders where they may be exposed to oil, grease or high temperatures.
4. Keep sparks, flame and heat away from cylinders. Where possible, cylinders should be stored under cover out of the direct rays of the sun.
5. Cylinders are designated solely for the purpose of containing particular gases. They are not designed for rollers or supports and should never be used for these purposes even though they are believed to be empty.
6. Always attach the proper regulator to the cylinder for which it is designed before using gas from the cylinder. For instance, never attach an oxygen pressure reducing regulator to a cylinder containing a combustible gas.
7. Never force connections that do not fit.
8. Never use oxygen for compressed air.
9. Cylinders, valves, regulators and hoses are to be inspected before starting each job.
10. Always keep all threads on oxygen cylinders, regulators and hoses free of oil and grease.
11. Never test for leaks by using flame or an oily liquid. Use soapy water.
12. Never use any leaking equipment. Notify the appropriate Supt. of any leaks detected.
13. Never tamper with, nor attempt to repair, oxygen and acetylene equipment. Repairs must be made only by qualified personnel.

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14. Always close main oxygen and acetylene valves on cylinders burning and/or welding have been completed.

#### 3.5.4.7 *Electric Welding*

It is also assumed for this Sub-Section of the Manual that experienced and qualified personnel, well versed in the safe practices pertaining to their occupation, will perform welding. It is further assumed (and essential) that the welding machines, leads and electrode holders to be used are of good design and are maintained in first class operating condition.

1. All welding cables shall be completely insulated. Cables with worn or damaged spots shall not be used until repaired or replaced.
2. All ground connections shall be securely made to eliminate sparks. Ground connection shall be connected as close as possible to the working space.
3. Connection of the ground return to a common conductor is permissible, provided returns are not made through conductors such as a pipe containing flammable gases or liquids, other cables or conduits, chains, wire rope, etc.
4. All persons assisting burners or welders should wear sufficient clothing to protect all parts of their body from sparks, hot slag and the rays of the welding arc. Sleeves must not be rolled up.
5. Never look directly or indirectly at a welding arc without protective goggles.
6. Always keep the work area clean, particularly stub ends of welding rods that can fall under the feet and cause a nasty fall.

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#### 3.5.5 Handling of Dangerous Material Hazardous to the Health

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1. Personnel exposed to acids, ammonia, caustic soda, litharge, tetraethyl lead, hydrogen sulphide, aluminium chloride and other toxic substances and gases should consult their Supt. for definite instructions and necessary protective equipment. Clean, fresh water shall always be available.
2. Avoid as far as possible breathing vapours or fumes as they may be harmful. Keep on the windward side to avoid fumes.



3. Rapid evaporation of highly volatile products will cause severe burns. If such product does come into contact with the skin, wash at once and obtain medical attention if necessary.
4. All chemical containers should be kept well sealed and should be clearly marked. Empty containers should be disposed in a way that will avoid hazards.
5. Acid storage containers should have suitable means of extracting the fluid from the containers.
6. Concentrated acids must be used only in open or well ventilated rooms.
7. Any area where toxic chemicals are being used shall be marked with warning signs identifying the chemicals and their use.
8. The action of acids and caustics on the eyes is very rapid and may cause blindness unless washing with water is done immediately. Effective methods are to plunge the head into clean water and blink the eyes rapidly, or to flush the eyes in an eyewash station until the Medic Clerk arrives to bring the person to the hospital.
9. The Medic Clerk shall take care of the treatment of chemical injuries and illnesses. Survival may, however, depend upon the immediate administration of relief, therefore, first aid remedies with instruction for their use should always be readily available.
10. Paint should be removed by paint remover or be scraped off. Suitable eye protection should be worn.
11. Proper respirators must be worn while using paint spray guns. They should also be worn when handling chemicals of such a nature that a fume or vapour hazard is present.
12. Gasoline, kerosene, naphtha, or any other flammable liquid must not be siphoned by mouth suction from tanks or containers.

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### 3.5.6 Crane Operations

#### 3.5.6.1 General

Only qualified, certified and authorised personnel shall operate the cranes. No one, except the Crane Operator shall be permitted on the crane while it is in operation. The only exception to this rule is when a new Crane Operator is being trained or the crane including its machinery is being tested.

The Crane Operators shall have an Offshore Crane Operator Certificate and shall otherwise be fit and qualified for offshore crane operations.

#### 3.5.6.2 Instruction and Precaution

1. The maximum lift established for each crane shall not be exceeded. Attention shall always be paid to the derating tables under the different sea state conditions.
2. The Crane Operator shall never start the crane until a signalman is within eye sight, or alternatively until radio contact is established. When there are several hook-on men, obey the signals of the lead man only. Obey emergency stop signal given by anyone.
3. If and when extensions are added to the boom, the capacity plate and instrumentation shall be changed and shall clearly indicate the safe load for the new boom length and radius being used.
4. There shall be at least two wraps of cable on the drum at all times during the operation.
5. While the crane is in operation, the Crane Operator shall not perform any other work nor shall he leave the position at the controls until the load is safely landed.
6. Tag lines for controlling loads shall always be used.
7. A standard signal system shall be used on all crane operations.
8. No one shall ride on loads, buckets, or hooks suspended from crane or boom.
9. Permit no one to stand underneath any load. Sound warning if necessary.
10. Do not allow other personnel on the deck. Sound warning when necessary.

11. The crane shall not be used to "snake" or side pull loads.

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12. The crane shall not be operated while helicopters are landing, taking off, or while on the heliport with motor running.
13. When using the single line, it is recommended that a sling forerunner be attached to the hook to keep the ball at a safe distance from the worker.
14. The crane shall not be operated with an empty chain sling attached unless both ends of the sling are hooked to the block.
15. The Crane Operator, while transferring persons from a supply boat to the FPU, shall raise personnel basket only high enough off the supply boat deck to clear all obstructions, swing the basket over the water, raise to the landing deck level, swing the basket over the landing area, and gently lower it to the deck. When departing from the FPU, reverse process.
16. Always designate one man to give signals to the Crane Operator: hand signals are important because through their use, commands are communicated to operators of machinery.
17. When the crane is shut down, all controls should be left in the neutral position and the brakes locked. The rotation lock shall be used at all times when unattended. The boom shall be stowed in the crane cradle
18. British regulations require that lifting over living quarter area only can be done when the area is alarmed and evacuated.

### 3.5.6.3 Crane Log Book

The Crane Operator shall duly complete the Crane Log Book on a regular basis so as to keep it up to date at all times.

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## 3.5.7 Equipment for Lifting and Transportation of Materials, etc

### 3.5.7.1 Chains

Careful attention must be paid to the selection of chains. They must be certified for the designated work. A chain must not be used when knotted, kinked or twisted. A chain gives no warning prior to breaking; therefore, the recommended safety factor shall not be exceeded.

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Each chain shall be marked with its safe lifting capacity. Cold locks must not be used on heavy-duty chains. Chains must not be shortened by knotting or spliced by wiring or placing bolts between links. If hooks or links become distorted, they must be replaced. New chains should be purchased with hooks already attached.

Chains must be inspected periodically as recommended by the authorities.

#### 3.5.7.2 *Fork Lifts*

When lifting materials with a powered fork lift, carry the load at a low level in order to get a forward view. If the load obstructs the view, the truck must be reversed. Head guards shall be provided above the Operator's seat. Fork lifts shall be operated on even level surfaces only and by certified personnel only. Procedures pertaining to the safe operation of vehicles are applicable to fork lifts.

#### 3.5.7.3 *Hoists*

Secure the chain hoists to prevent their falling. The chain hoists shall not be used for loads larger than their rated capacity. The chain hoists must be overhauled or repaired at first signs of slippage or hard operation.

#### 3.5.7.4 *Lines in Tension*

Wire lines, chains or ropes being subjected to heavy strains may break. Keep a safe distance from lines under tension.

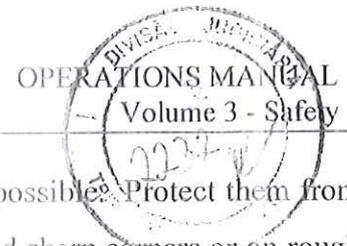
#### 3.5.7.5 *Overhead Loads*

Never pass underneath or work under a suspended load. Use tag lines or guide poles to guide suspended material or equipment

#### 3.5.7.6 *Fibre Ropes or Synthetic Ropes*

Ropes shall not be used as the main lifting line (above the hook). Rope slings that have been subjected to acids or excessive heat shall be destroyed. Rope slings must be protected from abrasion by padding when fastened or drawn across square corners or sharp or rough surfaces.

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Take good care of the ropes. Keep the ropes indoors whenever possible. Protect them from acids, caustics and other chemicals. Do not let them chafe around sharp corners or on rough objects. Keep them dry and clean. Keep blocks and pulleys in good condition, and securely anchored, when in use.

### 3.5.7.7 Wire Ropes

Wire ropes or cables shall be inspected by a competent person at the time of installation and during operations and removed from load carrying service when detrimental wear and corrosion is present. Wire ropes removed from service due to defects shall be sufficiently marked or identified as being unfit for further use and sent ashore.

Appropriate eye protection must be used when cutting wire ropes. Wire ropes must be maintained in accordance with the recommendations of the manufacturer. Grease in order to avoid wear. Kinking and untwisting of wire ropes must be avoided; at no time shall a load be applied to a kinked rope.

The wire ropes must not be overloaded, i.e. the safety factors according to the regulations and manufacturers recommendations shall not be exceeded. The crane wires shall be securely fastened to the drum according to specifications from regulatory bodies.

The Crane Operator will operate the crane according to instructions and according to regulations.

### 3.5.7.8 Slings

Only certified slings, shackles and hooks shall be used. Slings, their fittings and fastenings, when in use, shall be inspected daily for evidence of overloading, excessive wear or damage. Slings found to be defective shall be immediately removed from service and sent ashore. Suitable protection must be provided between the sling and sharp unyielding surfaces of the load to be lifted. Proper storage must be provided for slings while not in use. Sharp bends or knots shall not be permitted in wire rope.

Slings shall never be choked in the splice. All hook-on men shall utilise accepted technique for rigging.

Slings shall be given a colour code for the year they were certified.

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### 3.5.7.9 *Wire Rope Connectors*

Connections, fittings, fastenings, parts, etc. used in connection with cables and ropes shall be of good quality and of proper size and strength. Socketing, splicing and sizing of wire ropes shall be performed by a qualified person.

All eye splices must contain the proper size rope thimble.

When a wedge socket fastening is used, the dead or shortened end of the rope must be made secure against loosening.

Handle the wire ropes hand-over-hand. Never slide through the hands. Wear gloves when handling wire ropes.

A wire top cutter or cutting torch must be used to cut wire rope and the rope must be tied or taped on each side of the intended cut. Use goggles.

### 3.5.8 **Bunkering**

When transferring oil from a supply ship to the FPU, the applied hoses shall be fitted with a non-return valve at the end that is coupled to the supply ship, to prevent oil pollution during uncoupling. Any oil spill shall be reported to the Operator's representative and, if more than 1 tonne, to the Rescue Control Centre (RCC). The FPU Manager is responsible for oil spill prevention from the FPU.

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- Area around filling and emptying positions.
- Area around flexible pipelines and hoses.
- Area around sample taking (valves, etc.)
- Area around seals of pumps, compressors, and similar rotating equipment.
- Area around places where there is regular cleaning, inspection, etc.

### 3.6.2 Operations in Hazardous Areas

In hazardous areas (see enclosed drawings) any spark-producing operations must not take place. That is mainly work on:

- Hot electric circuits
- Connecting of electric circuits
- Welding or cutting
- Open fire

Before working on hot circuits or cutting, grinding, burning or welding in a potentially gas hazardous area, the worker must have obtained a written 'Work Permit' signed by his Supt.

#### 3.6.2.1 Increased Safety Equipment

Increased safety equipment is equipment designed to prevent sparking and arcing except for parts housed in a flameproof enclosure, and to avoid that dangerous temperature rises are reached by any part in contact with explosive gas mixture, both by normal working conditions and by certain abnormal conditions. This kind of equipment is compulsory in hazardous zone areas.

#### 3.6.2.2 Pressurised Equipment and Areas

Pressurised equipment is equipment housed in an enclosure that has been made safe by being purged with safe atmosphere. Make sure that the overpressure is correct and the ventilation is working properly.

Pressurised areas are areas that have been made safe by being purged with safe atmosphere.

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Under-pressurised areas are areas that have been under-pressurised by extracting air from the room to avoid gas coming out.

There is an alarm in the wheelhouse if the overpressure is lost in a room that leads to a hazardous area or the under-pressure is lost in a room of hazardous area.

ATTENTION: All doors and hatches have to be closed.

### 3.6.2.3 Procedures at Loss of Overpressure

The action to be taken on pressure failure is not specified in the standard, but can be found in the appropriate National Code of Practice. Generally, if the over-pressure is lost, the following is to be done with equipment in that room:

- a) Shut down of ventilation system
- b) Shut down of electrical equipment
- c) Shut down or disconnection of emergency equipment except battery supplied lighting and radio
- d) Shut down of explosion motors.

NOTE: For further details see LTV Manual

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*Insert Hazardous Area Drawings*

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*Insert Hazardous Area Drawings*

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### 3.7 HANDLING AND LOCATION OF DANGEROUS MATERIAL

NOTE: No specific area has been foreseen for the storage of dangerous materials (radioactive, corrosive, toxic or explosive substances) on the Unit.

All the pressurised rooms at more than 1 bar are located externally, on or above the Main Deck.

1. Employees exposed to acids, ammonia, caustic soda, tetraethyl lead, hydrogen sulphide, aluminium chloride and other toxic substances and gases should consult their foremen for definite instructions and necessary protective equipment.
2. Avoid as far as possible breathing vapours or fumes, as they may be harmful. Keep to the windward side of escaping fumes, as far as possible.
3. Rapid evaporation of highly volatile products will cause severe burns. If such products come in contact with the skin, wash at once and obtain medical attention if necessary.
4. All chemical containers should be kept well sealed and should be plainly marked. Empty containers should be disposed of in a manner that will avoid creating hazards.
5. Acid storage containers should have suitable means of extracting the fluid from the container.
6. Concentrated acids must be used only in open or well-ventilated rooms.
7. Any area where toxic chemicals are being used shall be posted with warning signs identifying the chemicals and their use.
8. The action of acids and caustics on the eyes is very rapid and may cause blindness unless washing with water is done immediately. Effective methods are to plunge the head into vessel of clean water and wink the eyes rapidly, or to allow the water from a bubbler drinking fountain to flow into the flush out the eyes.
9. The treatment of chemical injuries and illness should be left wholly to a physician. A worker's life, however, may depend upon the immediate administration of relief, therefore, first aid remedies with instructions for their use should always be readily available.

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10. Paint should be removed by paint remover or be scraped off. Suitable eye protection should be worn.
11. Proper respirators must be worn while using paint spray guns. They should also be worn when handling chemicals of such a nature that a fume or vapour hazard is present.
12. Gasoline, kerosene, naphtha, varsol or any other flammable liquid must not be siphoned by mouth suction from tanks or containers.
13. Radioactive sources and explosives shall only be handled by authorised personnel. The area where these personnel work, shall be avoided by others and their instructions must be followed carefully.
14. Mercury shall only be handled by authorised personnel. When mercury is used other people shall avoid these areas.

NOTE: For more details, reference should be made to the "Emergency Procedures (EMS)" and "Medical First Aid Guide (MFAG)" of IMDG Code.

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### 3.8 HEALTH SERVICES

#### 3.8.1 Medicines and First Aid Instructions

It is the responsibility of the Medic Clerk to perform all duties related to any level of nursing matter. The Medic Clerk functions are directly organised under the FPU Manager.

##### NOTES:

- a) For reference to the duties and responsibilities of the Medic Clerk, see Job Description for Medic Clerk (can be found in "Statutory Operations Manual").
- b) For reference to the duties in emergency situations, see Volume 6 of this Manual.
- c) The Official Narcotics Book is to be kept by the FPU Manager in accordance with the law.

#### 3.8.2 Medicines and Medical Equipment

It is the responsibility of the Medic Clerk to keep the required amount of medicines and to check the expiration dates of time limited medicines.

The Medic Clerk is also responsible to keep the medical equipment in good order and regularly carry out function tests.

The amount and types of medicines and medical equipment are according to Petrobras standard.

A copy of the latest edition of the Petrobras list of medicine and medical equipment shall be available in the Hospital.

As mentioned above, the Medic Clerk must make sure that the medicines and medical equipment onboard also is in accordance with the local regulations, when the FPU is operating in foreign waters.

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### 3.8.3 Medical Services Onshore

The Medic Clerk is responsible for the co-ordination of medical assistance between the unit and shore, and it is the Medic Warden who will consider the need for medical treatment and advise when medical assistance from shore or other units will be necessary. If such assistance is required, the FPU Manager shall be informed, and the actions that are taken shall be according to the planned procedures for such medical assistance. It is the responsibility of the Medic Clerk to make and maintain the plan for the shore based medical services, and this plan shall be easily available in the Bridge, Radio Room and Hospital.

When contact is established to parties outside the Unit the following information is to be given:

- Type of injury
- Number of patients and name, age, address
- Treatment given, medicines, type and amount

In cases when the Medic Clerk needs to have assistance from shore, he shall be given first priority on communication with shore.

### 3.8.4 Transportation

After a serious injury it may be necessary to arrange for separate transportation of injured people from the unit to shore. It is the responsibility of the Medic Clerk, together with the shore based doctor, to decide whether such transport should be arranged. If such transport is required, it is the responsibility of the FPU Manager in co-operation with the Operator's representative, who can order a helicopter for the transportation onshore, to make the necessary arrangements. Together with the doctor the following arrangement must be agreed:

- Transportation arrangement (who does what)
- Alerting the hospital
- Transportation from heliport on shore to hospital.
- Medical escort

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The FPU Manager is further responsible to advise the base office and to inform on what has been decided upon between the Unit and the doctor/hospital. He shall also request the Operator's representative to arrange for helicopter transportation.

When requesting helicopter transportation for injured/sick personnel the shore base to be given following details:

- Name and position of FPU
- Number of patients
- Number of patients in stretchers
- Advice medical escort if necessary
- Landing arrangement (type of heli-deck)
- Weather conditions.

The Medic Clerk shall prepare the patient(s) for transportation and escort the patient(s) shore if necessary.

Information about the patient(s) is to be attached to the patient(s) in such a way that it may not be torn off or removed.

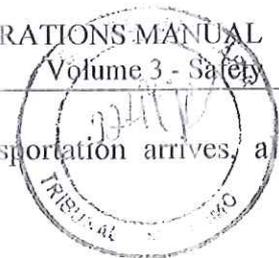
### 3.8.5 Death

In case of fatal accidents the FPU Manager must be informed immediately and he is responsible for further action to be taken.

The police with jurisdiction for the area to be informed about the incident. The police to be given all pertaining information, and the police together with the base office to clarify action to be taken on such matters as investigation, autopsy and other possible measures to be initiated, such as informing next of kin.

The victim(s) of a fatal accident must not be removed before the police arrive or permission has been received.

The body/bodies of the victims must be covered up. If the victim must be removed it is the responsibility of the FPU Manager to arrange for pictures to be taken of the site and of the victim from several positions before the moving is carried out.



If an injured person dies before the requested assistance and transportation arrives, all initiated actions shall be called off.

Transportation of the deceased persons to shore shall be arranged from the FPU and the local helicopter base.

If the incident has been of such a nature that it is necessary to hold a maritime inquiry, the Marine Investigator in charge of the area where the unit is operating is to be informed.

NOTE: Reference is also made to Volume 6 of this "Operating Manual" and to the "Emergency Procedures (EMS)" and "Medical First Aid Guide (MFAG)" of IMDG Code.

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EM BRANCO

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DIRETOR  
DIVISÃO DE SERVIÇOS CAPTIVOS





Hatches characteristic summary table

Hatch No.	Qty	Description	Clear Opening	
1	1	Column Access	914x914 H=600	◆
2	1	Column Access	914x914 H=600	◆
3	1	Column Access	914x914 H=600	◆
4	1	Column Access	914x914 H=600	◆
5	1	Column Access	1200x1200	◆
6	1	Column Access	1200x1200	◆
7	1	Hatch Escape Column	600x600 H=600	◆
8	1	Hatch Escape Column	600x600 H=600	◆
9	1	Void Tank 43 Port	2147x2147	◆
10	1	Void Tank 43 Port	1220x1220	◆
11	1	Lift Escape (aft/stbd)	1931x1931	○
12	1	Lift Escape (aft/port)	1931x1931	○
13	1	Production Warehouse (Stbd Aft)	2150x2146	◆
14	1	HPU room	2040x1965	○
15	1	Welding Shop	2150x2146	◆
16	1	Dry Store	1380x1380	○
17	1	2nd Deck Passage (Port)	1550x1550 H=600	○
18	1	Sack Storage	3036x3017	◆
19	2	Rotor Withdrawal Fwd	2100x2450	○
20	2	Rotor Withdrawal Aft	2100x2100	○
21	1	Service Hatch	6387x5462	○
22	1	Tank Top Central Caisson	2500x2000	○
23	1	Shale Shaker Room Service - DELETED	2600x2800	○
24	1	Drill floor access	6500x6500	○
25	1	Drill floor access	5100x5700	○
26	2	Caissons Access	580x580 H=600	○
27	1	Lift Escape (fwd/port)	1931x1931	○
28	1	Lift Escape (fwd/stbd)	1931x1931	○

- ◆ Watertight
- Weathertight

FIGURE 4.1.4.3 - SHEET 1

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COMMERCIAL



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DIVISÃO DE SERVIÇOS CARTORIAIS

ELIZABETHANCO



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**REVISION CHANGE NOTICES**

Rev.	Location Changes	Brief Description of Change

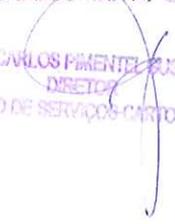
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## 4.1 HULL AND STRUCTURE

### 4.1.1 Construction and Materials

In general, the main hull structure is made from high strength steel except where indicated otherwise on the main structural plans and in the Construction Booklet.

Brief description of steel grades used in the platform construction and relative Figures are detailed in the following.

**NOTE:** EH36-Z plates are used in way of the special connections between the following:

1. columns and lower hulls
2. main braces to columns and lower hulls
3. centre caisson to upper hull
4. fairlead support structures; shell plates in way of fairlead attachments.
5. spider decks to bottom shell
6. connections where plate thickness is equal to or greater than 30mm.

STEEL GRADE	L.R.S.	RINA
<b>Lower Hulls and Riser Supports</b>		
Plates:	EH36	S36 (ERE36)
Built-up sections:	EH36	S36 (ERE36)
Rolled profiles:	AH36	S36 (ERS36)
<b>Columns</b>		
Plates:	EH36	S36 (ERE36)
Built-up sections:	EH36	S36 (ERE36)
Rolled profiles, web <200 mm:	AH36	S36 (ERS36)
Rolled profiles, web >200 mm:	DH36	SS36 (ERSS36)
<b>Fairlead Box Extensions &amp; Stability Boxes</b>		
Plates:	EH36	S36 (ERE36)
Built-up sections:	EH36	S36 (ERE36)
Rolled profiles:	AH36	S36 (ERS36)

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STEEL GRADE	L.R.S.	RINA
<b>Lower Aft/Fwd Sections of F/lead Box Extensions</b>		
Plates:	AH36	S36 (ERS36)
Built-up sections:	A, B, AH36	A, S, ERS36
Rolled profiles:	A	A
<b>Centre Caisson</b>		
Plates:	EH36	S36 (ERE36)
Built-up sections:	EH36	S36 (ERE36)
Rolled profiles, web <200 mm:	AH36	S36 (ERS36)
Rolled profiles, web > 200 mm:	DH36	SS36 (ERSS36)
<b>Bracings</b>		
Plates:	EH36	S36 (ERE36)
Built-up sections:	EH36	S36 (ERE36)
<b>Upper Hull, Equipment Supports and Spider Decks</b>		
Plates: t<30mm	EH36	S36 (ERE36)
t≥30mm	EH36Z	SS36
Built-up sections:	EH36	S36 (ERE36)
Rolled profiles, web <200 mm:	AH36	S36 (ERS36)
Rolled profiles, web > 200 mm:	DH36	ERSS36
<b>Mooring Winches Support Structures</b>		
Plates:	EH36	S36 (ERE36)
Built-up sections:	EH36	S36 (ERE36)
Pillars:	EH36	S36 (ERE36)
Rolled profiles:	AH36	S36 (ERS36)
<b>Helideck</b>		
Deck:	AlMgSil (aluminium alloy)	
Trusses	D	SS
<b>Pipe Rack and Crane Boom Rests</b>		
Trusses	AH36	S27

RONCADOR FIELD DEVELOPMENT

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## 4.1.2 Cathodic Protection System

Ref. Fig. 4.1.2.1



### 4.1.2.1 General

The Electrochemical "CAPAC" impressed current cathodic protection system has been provided to protect the submerged hull and appendages against corrosion. Control and power supply components is the solid-state, static type of sufficient Capacity to provide no less than eighty-six milliamperes per square meter of wetted area. The number and dissolution rate of the anodes is maintained for at least 20 years without replacement of anodes.

The system is arranged for both manual and automatic operations. In automatic operation, the controllers shall continuously monitor the degree of protection and provide at all times the proper anode current to maintain the optimum level of protection as indicated by the voltage between the suitable reference electrodes and the hull. Two reference electrodes are provided for each controller/power unit to monitor the hull potential and permit the port and starboard hulls to be run separately to meet their respective demands; reference electrodes have a life expectancy of no less than 20 years.

External components, including anodes is designed for minimum drag and is <38 mm thick; protection of all appendages are on an uniform basis with the hull.

The system is certified by RINA and Lloyd's Register.

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### 4.1.2.2 System Components

The system components (see also paragraph 1.2.8 of this Manual) are:

- PR\*001 AL: Self Controlled Automatic Saturable Reactor Power Supply drip proof - IP44 enclosure operating from power supply of 440 V, 3-phase, 60 Hz.
- PR\*001 AN: Anode Assembly, driver serviceable type, replaceable without the FPU in dry-dock.
- PR\*001 CW: Reference Electrode (Cell), replaceable from inside the vessel.
- PRIOO 1 P1: Central Monitor Panel complete with LED indicators for "Normal" and "Alarm" conditions. Complete with analog meters to display total current and hull potentials from reference electrodes.

#### 4.1.2.3 Specifications

- Wetted surface area to be protected: 20,900 m<sup>2</sup> (excluding SCR's)
- Current density: 86 mA/m<sup>2</sup>
- Required current: 1,759 A
- Power supply: 440 Vac, 60 Hz, 3-phase
- Weight of hardware: approx. 1,728 kg
- Self Controlled Automatic Saturable Reactor Power Supply:
  - Input: Voltage 440 Vac, 3 phase, 60 Hz
  - Power 0.14-15.5 kVA at 28 V
  - Input breaker 25 A
  - Unit operates with ±10% voltage variation  
±5% frequency variation
- Output: 450A dc, 28 Vdc at ambient temperature
- Power 12.6 kW (Average dc) for 28 V
- Sensitivity: A difference of 50 millivolts between automatic control setting and the reference electrode voltage will cause the anode output to change from 2% to 100% of rated value
- Control range: A 12 Vdc control voltage input produces full output (450 Vdc)

**NOTE:** For further details and information, see "Cathodic Protection System Manual".

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Legend of Fig. 4.1.2.1

Equipment Number	Symbol	Description	Std. Drg.
PR*001	AN	Anode	E66881001
PR*001	CW	Reference Electrode	E66881001
PR*001	PW	Cofferdam for Anode	E66881010
PR*003	DV	Electric Cable Passage	NE884651A
PR*001	AL	Controlled Power	F66881001
PR*001	PI	Remote Hull Potential Indicator and Ammeter	E66881001
PR*002	PW	Cofferdam for reference cell	E66881010
PR*001	DV	Pipe galvanised	NI300000J
PR*002	DV	Sleeve to be welded	

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### 4.1.3 Protective Coatings

The protective coatings are related to:

- structure exterior treatment
- structure interior treatment
- structure insulation

#### 4.1.3.1 Structure Exterior Treatment

a. Lower Hull (up to 12,192 m above base line), including Sea Chests and Interior of Piping to First Valve

- 1st Coat INTERTUF JXAS49/JXA550, 250 My D.F.T.
- 2nd Coat INTERTUF JXA548/JXA550, 250 My D.F.T.
- 3rd Coat INTERTUF JXA464/JXA465, 100 My D.F.T.
- 4th Coat Anti-fouling INTERSMOOTH BFA956 150 My D.F.T.
- 5th Coat Anti-fouling INTERSMOOTH BFA9S4 150 My D.F.T.

b. Columns, Caisson, Bracings, Undersides of Upper Hull and Cellar Deck and Helicopter, including Structures below Main Deck

- 1st Coat INTERZINC EPA072/EPA073, 60 My D.F.T.
- 2nd Coat INTERGARD EGA088/EGA089, 40 My D.F.T.
- 3rd Coat INTERGARD EM EBA744, 150 My D.F.T.
- 4th Coat INTERGARD EM EBA744, 150 My D.F.T.

NOTE: All gratings below main deck shall be hot dip galvanised.

c. Upper Surface of Helicopter Deck (Light alloy)

- 1st Coat MARINE FF420 PRIMER, 100 My D.F.T.
- 2nd Coat BASE COAT PR1539U, 2500 My D.F.T.
- 3rd Coat NON-SKID FINISH PR1136, 1000 My D.F.T.

NOTE: The painting systems conform to regulation and antistatic.

FPU name, marks etc. are coated with one of Colour Topping paint PR1141.

d. Upper Surface of Drill Floor Walkways Areas

- 1st Coat INTERSHIELD ENA300/ENA303. 150 My D.F.T.



- 2nd Coat INTERSHIELD ENA301/ENA303, 150 My D.F.T.
- 3rd Coat INTERGARD EM EBA744, 75 My D.F.T.
- 4th Coat INTERGARD EM EBA744, 75 My D.F.T.

**NOTE:** Anti-skid additive to be added to 3rd coat.

*e. Pipe Rack Area, Cellar Deck, Exposed Main Deck, Roof Areas, Crane Tubs, Exposed Foundations*

- 1st Coat INTERSHIELD ENA300/ENA303, 150 My D.F.T.
- 2nd Coat INTERSHIELD ENA301/ENA303, 150 My D.F.T.
- 3rd Coat INTERGARD EM EBA744, 75 My D.F.T.
- 4th Coat INTERGARD EM EBA744, 75 My D.F.T.

**NOTE:** Anti-skid additive to be added to 3rd coat.

*f. Upper Hull Slides, all Superstructure Sides, Emergency Generator House, Windbreaks around Derrick Floor and Substructure*

- 1st Coat INTERZINC EPA072/EPA073, 60 My D.F.T.
- 2nd Coat INTERGARD EGA088/EGA089, 40 My D.F.T.
- 3rd Coat INTERGARD EM EBA744, 75 My D.F.T.
- 4th Coat INTERGARD EM EBA744, 75 My D.F.T.

**NOTE:** On decks only apply the following anti-abrasion Epoxy system:

- 1st Coat INTERSHIELD ENA300/ENA303, 150 My D.F.T.
- 2nd Coat INTERSHIELD ENA301/ENA303, 150 My D.F.T.
- 3rd Coat INTERGARD EM EBA744, 75 My D.F.T.
- 4th Coat INTERGARD EM EBA744, 75 My D.F.T.

**NOTE:** Anti-skid additive to be added to 3rd coat.

*g. Miscellaneous*

1. Handrails (galvanised steel/aluminium)

- Degrease with solvent
- 1st Coat INTERGARD EGA088/EGA089, 40 My D.F.T.
- 2nd Coat INTERLAC CL, 40 My D.F.T.
- 3rd Coat INTERLAC CL, 40 My D.F.T.

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2. Exposed deck piping and deck fitting
  - 1st Coat INTERZINC EPA072/EPA073, 60 My D.F.T.
  - 2nd Coat INTERGARD EGA088/EGA089, 40 My D.F.T.
  - 3rd Coat INTERGARD EM EBA744, 150 My D.F.T.
3. Exposed ladders (galvanised steel/aluminium)
  - Degrease with solvent
  - 1st Coat INTERGARD EGA088/EGA089, 40 My D.F.T.
  - 2nd Coat INTERGARD EM EBA744, 150 My D.F.T.
4. Cranes, mooring machinery, derrick
  - 1st Coat INTERZINC EPA072/EPA073, 60 My D.F.T.
  - 2nd Coat INTERGARD EGA088/EGA089, 40 My D.F.T.
  - 3rd Coat INTERGARD EM EBA744, 150 My D.F.T.
  - 4th Coat INTERGARD EM EBA744, 50 My D.F.T. (only for signal marking).

#### 4.1.3.2 Structure Interior Treatment

a. All Ballast Tanks, Chain Lockers, Drill Water Tanks and Contaminated Drain Tanks (including pipes, support and any other fittings) - Foundations in internal areas

- 1st Coat INTERTUF JCA225/JCA227, 150 My D.F.T.
- 2nd Coat INTERTUF JCA223/JCA227, 150 My D.F.T.

**NOTE:** The ballast tanks are protected with anodes in addition to aforesaid coating. Anodes are of the aluminium type to adequately control electrolytic corrosion for a minimum period of five years. All anodes are bolted to clips that are in turn welded to internal structure.

b. Potable Water Tanks and Distilled Water Tanks (including pipes, valves, supports and any other fittings)

- 1st Coat PLASTIGEL ATOSSICO 3220, 150 My D.F.T.
- 2nd Coat PLASTIGEL ATOSSICO 3220, 150 My D.F.T.

c. Fuel Oil Tanks, Lube Oil Tanks (interior)

- Coated with a light coat of special preservative oil.

d. Interiors of Bracings, Cofferdam and Voids (including column and caisson voids up to 28.96m levels) (including pipes, valves, supports and any other fittings)

- 1st Coat INTERTUF JCA225/JCA227, 100 My D.F.T.
- 2nd Coat INTERTUF JCA223/JCA227, 100 My D.F.T.



e. Interior of Central Caisson, Tank Top and Bulkheads (1.5m under only)

- 1st Coat INTERTUF JXA548/JXA550, 150 My D.F.T.

**NOTE:** All other surfaces are coated with a coat of anticorrosive preservative oil.

f. Interiors of Pump Rooms, Water Injection Rooms, and Thruster Rooms in Lower Hulls and Auxiliary Machinery Spaces in Columns and Caissons (Bilge included)

- 1st Coat INTERZINC EPA072/EPA073, 60 My D.F.T.
- 2nd Coat INTERGARD EGA088/EGA089, 40 My D.F.T.
- 3rd Coat INTERGARD EM EBA744, 150 My D.F.T.

**NOTE:** On decks only the following system is applied:

- 1st Coat INTERZINC EPA072/EPA073, 60 My D.F.T.
- 2nd Coat INTERGARD EGA088/EGA089, 40 My D.F.T.
- 3rd Coat INTERGARD EM EBA744, 50 My D.F.T.

**NOTE:** Add anti-skid product.

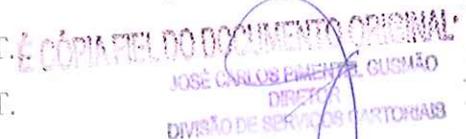
- 4th Coat INTERGARD EM EBA744, 150 My D.F.T.

g. Exterior of Built-in Tanks, Independent Tanks, Builder Furnished Machinery Components, Foundations, Etc.

Same as space in which located.

h. Interiors of Columns and Caissons above 28.96 m Flat and Interior of Access Trunks

- 1st Coat INTERPRIME CPA224, 80 My D.F.T.
- 2nd Coat INTERPRIME CPA226, 80 My D.F.T.
- 3rd Coat INTERLAC CL 40 My D.F.T.



i. Living Quarters, Control Rooms, etc. (Unexposed steel surfaces behind joiner or insulation)

- 1st Coat INTERPRIME CPA224, 80 My D.F.T.

j. *Living Quarters, Control Rooms, Machinery Spaces (including, but not limited to Engine Room, Emergency Generator House, Laboratories, Sack Storage Rooms, etc., and Piping, Cable Raceways, therein) - Exposed Steel Surfaces*

- 1st Coat INTERPRIME CPA224, 80 My D.F.T.
- 2nd Coat INTERPRIME CPA226, 80 My D.F.T.
- 3rd Coat INTERLAC CL 30 My D.F.T.

**NOTE:** Only for decks, add anti-skid additive.

k. *Chequered Plating, Grating*

Chequered plating and gratings in main engine room, thruster rooms, water injection rooms, and pump rooms in lower hulls, are galvanised steel.

Grating on spider decks is FIBREGRATE XFR-92.

l. *Glycol Sump Tank*

1. Interior surfaces, including bulkheads and overhead, mud pit and processing tank exteriors, mud mixers, exposed wiring raceways, ducts work, exposed mud piping, tops of tank partitions, walkway gratings and supports, are blasted to SSPC-SPI0 (SA 2.5) finishing degree and coated with:

- 1st Coat INTERGARD THB000/TFHA044, 125 My D.F.T.
- 2nd Coat INTERGARD THE138/THA044, 125 My D.F.T.
- 3rd Coat INTERGARD THB000/THAO44, 125 My D.F.T.

2. All surfaces of glycol sump tank and processing tanks interiors are blasted to SSPC-SPI0 (SA 2.5) finishing degree and coated with:

- 1st Coat INTERGARD THB000/THA044, 125 My D.F.T. 5.0
- 2nd Coat INTERGARD THE138/THA044, 125 My D.F.T. 5.0
- 3rd Coat INTERGARD THB000/THA044, 125 My D.F.T. 5.0

4.1.3.3 *Structure Insulation*

É CÓPIA FIEI See Fig 4.1.3.3 (sheets 1 to 5) for insulation areas

**NOTE:** For simulation type, refer to Fincantieri Dwg. A30224025.

#### 4.1.4 Watertight Doors and Hatches



##### 4.1.4.1 Watertight Door System

Ref: Fig. 4.1.4.1 and 4.1.4.2

The system is of "Electro-Hydraulic" type; the doors are manufactured with welded steel and the motion to the doors is given by hydraulic cylinders, double-acting (Fig. 4.1.4.2).

The connection of the ram cylinder to the frame and on the door incorporates a spherical joint to accommodate any misalignment due to door wedges or installation inaccuracies. When closed, the doors are locked against respective frames by wedges, in order to achieve a close-tight fitting between door and frame itself.

The water-tightness is implemented by special profile brass packing in which a special gasket in graphite is inserted and fixed to the door by screws.

Suitable guides, fitted on upper and lower sides of the frame, guarantee the sliding/translation of the doors under whatever operational condition.

For each door, a Power Unit built in compact version arranged near the door supplies the hydraulic power.

The electro-hydraulic modular-unit is fitted with oleo-pneumatic accumulator and starter.

On each door frame are fitted:

- local manoeuvre module for the local control of the door operating by both the sides of bulkhead
- hand pumps for the local emergency manoeuvre.

With this system it is possible:

- a) From the REMOTE MAIN BOARD
- to CLOSE all the doors simultaneously, with selective control switch
  - to pre-set all the doors in "LOCAL CONTROL" by means of selective control switch
  - to signal the OPENED-CLOSED position: the opened door L.E.D. lit with door in action
  - to light and sound ALARM for FAILURE of power-units
  - to light indications for electric - motor RUNNING

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b) From the surrounding of each door:

- control-handles, workable from both sides of the bulkhead
- manual pumps, for emergency local operation, workable from both sides of the bulkhead
- lights and sound alarm, activated about 7 seconds in advance before starting closure, and signalling also during the motion of the door

**WARNING:**        **The watertight doors must be normally closed**

*A. PARTS DESCRIPTION*

The system consists of the following appliances:

- No. 44 watertight doors controlled by means of D.A. hydraulic cylinders
- No.88 D.A. hydraulic cylinder fitted on the frame of the door
- No.88 limit switches fitted on the upper guide of the door
- No.88 flashing light indicators, for "Door in Motion" optical local alarms, positioned on both sides of the bulkhead
- No.44 sound alarm, for local indication of "Door in Motion" fitted on the local control unit
- No.44 control-units, local type with tight bulkhead crossing for control levers workable from both sides of bulkhead
- No.88 manual pumps with levers fitted on both sides of bulkhead
- No.44 electro-hydraulic modular power units including starters and hydraulic accumulators
- No.1 control panel, fitted on the main board, with all control-check indication equipment.

*B. ELECTRO-HYDRAULIC POWER UNIT*

Each door is equipped with a separate power-unit installed in adequate position near the door.

No. 1 hydraulic accumulator, charged by a gear-pump, driven by a 3-phase, asynchronous electric motor supplies the pressure power.

The accumulator capacity permits, if no electric power is available, the door operation at least three times, i.e., CLOSED-OPEN-CLOSED.

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The accumulator charge is monitored by a differential pressure switch, whose cutting-out, at a pressure of about 95 bar, will cause the switching-off of the electric motor and consequently of the pump.

When the pressure in the circuit drops at about 70 bar, the cutting-in of the pressure switch will cause the switching-on of the electric motor and the pump will restart to push the fluid towards the accumulators and associated circuit.

The cutting-in of electric motor, of the Power Unit, and the faulty signal, are reported in the mimic panel on the Main Board.

In case of power failure the door can be closed by means of the hand-pumps fitted on the frame of each door.

### C. LOCAL MODULAR HYDRAULIC UNIT

A local modular control unit has been fitted on the Watertight Door frame.

The unit is composed by all hydraulic appliances necessary for the local movement for opening and closing the door with the pressure supplied by the Power Unit or, in case of its failure, by the pressure supplied by manual local pumps, mounted on the door frame too.

The hydraulic appliances of the modular unit are pre-mounted at workshop on suitable supporting plate, which can be fitted to the door frame.

Local control CLOSE/OPEN levers are provided to allow the operations from each side of the bulkhead.

The system allows also the movement control of the door independently from the Central Operating Panel.

If door has been closed remotely from the Central mimic panel the door can be opened locally by means of this lever.

After releasing the lever, the door will close again automatically, the temporary opening will allow to pass through the doorway.

An opened door can be closed also locally by means of this lever.

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If the remote control on the Central mimic panel is switched to the "Local Control" position, the door can be locally opened by means of the levers and, when the lever is released, the door will not automatically close.

#### *D. CONTROL PANEL BOARD IN CENTRAL CONTROL ROOM*

The control panel in the Central Control Room (C.C.R.) in Bridge is equipped with all controls necessary to operate the doors and with all indications/warnings for doors monitoring.

The mimic control panel is assembled in front of the board.

The control panel is composed by:

- No. 1 natural anodized aluminium panel
- No. 1 two-position switch: "DOOR CLOSED" "LOCAL CONTROL"
- No. 44 signalling LED indicating "DOOR OPENED" (red)
- No. 44 signalling LED indicating "DOOR CLOSED" (green)
- No. 44 signalling LED indicating power unit failure (yellow)
- No. 44 signalling LED indicating electric motor run (red)
- No. 6 signalling LED indicating "MANUAL HATCH COVER OPENED" (red)
- No. 6 signalling LED indicating "MANUAL HATCH COVER CLOSED" (green)
- No. 1 LED signalling power failure 220 Vdc
- No. 1 LED signalling power failure 24 Vdc
- No. 1 LED signalling W.T.D. cards failure
- No. 1 warning by sound for Watertight Doors System alarms
- No. 1 warning by sound for Manual Hatches Cover System alarm
- No. 1 push-button, for sound alarm acknowledge
- No. 1 test lamp push-button.

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#### *E. LIMIT SWITCHES AND LOCAL ALARM DEVICES*

##### *I. Limit Switches*

The indications of OPEN/CLOSED position of each door are controlled by two limit switches, rigidly connected to sliding guides of the door frame.



## 2. Local Alarm Devices

The door is equipped with two flashing light-indicators, one on each side of the bulkhead, and with one sound alarm.

### A. TECHNICAL DATA

#### *Electro-Hydraulic Power Unit*

- Electric motor power	2.5 kW
- Hydraulic pump displacement	9.5 l/min approx.
- Maximum Service pressure	95 bar
- Hydraulic accumulators capacity	32/52 l
- Pre-charge pressure	36 bar
- Motor nominal electric current	4.5 A
- Minimum pressure cutting-in	70 bar approx.
- Low pressure alarm cutting-in	55 bar approx.
- Oil low level alarm	170 mm from bottom approx.
- Oil very low level cut-off	100 mm from bottom approx.
- Pressure relief valve, adjusted at	100 bar
- Tank capacity	75 litres approx.

#### *Emergency Pumps*

- Doors dim.	762x1676 mm
- Type	INO 1/35 approved M.M.M.
- Displacement/cycle	53.8 cm <sup>3</sup>
- Filtering gauge	25 micron
- Maximum pressure	250 bar
- Viscosity range	101380 (cSt) mm <sup>2</sup> /s
- Viscosity range	10/400 (cSt) mm <sup>2</sup> /s

Doors dim. 1066x1676 mm

- Type	INO 2/45 approved M.M.M.
- Displacement/cycle	111.3 cm <sup>3</sup>
- Filtering gauge	25 micron

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- Maximum pressure 250 bar
- Viscosity range 101380 (cSt) mm<sup>2</sup>/s
- Viscosity range 101400 (cSt) mm<sup>2</sup>/s

*Control Panel*

- Power supply 220 Vac /24 Vdc

**NOTE:** For further details refer to the relevant Vendor's Manual.

**4.1.4.2 Hatches System**

*Ref. Fig. 4.1.4.3 and 4.1.4.4*

The system is of "MANUAL" Type. The hatches are manufactured with welded steel and may be operated only locally by hand. It is possible to open and close the hatches by a hand wheel operating on both sides of the hatches (see Fig. 4.1.4.4).

When closed, the hatches are locked against respective frames by lock wedges, in order to achieve a close-tight fitting between hatches and frame itself; the lock-wedges are moved by the hand-wheels mechanism.

Water-tightness is implemented by a special profile brass packing in which a special gasket in graphite is inserted and fixed to the hatches by screws.

With this system is possible:

a. In the local position:

to open and to close the hatches only by hand, operating with the hand wheels and moving the hatch.

b. From the Watertight Doors System Control Panel in C.C.R.:

to check the hatches status by the indicating LED's on the W.T.D. mimic panel:

RED light: hatches opened

GREEN light: hatches closed

When the hatch stays opened for more than about 30 minutes, the acoustic alarm sounds.

**WARNING:** The hatches must be normally closed

### PARTS DESCRIPTIONS

The system consists of the following appliances

- No. 6 watertight and fireproof hatches hand operated;
- No. 12 limit switches (two for each hatch) fitted on the hatch and on the hatch frame;
- No. 1 mimic panel, fitted on the main board in C.C.R. with:
  - No. 6 LED's indicating the closing position (GREEN)
  - No. 6 LED's indicating the opening position (RED)
- No. 1 alarm sound.



- NOTES:
1. The mimic Panel is the same as for the Watertight Doors System.
  2. For further details, refer to the relevant Vendor's Manual.

#### 4.1.5 Watertight Manholes

The watertight manholes general arrangement plan is shown in Fig. 4.1.5.1.

Manholes added as a result of the upgrade of the FPU for Roncador are shown on Drgs:

*DE-3010.38-1200-200-NBD-502-01 to -04: New Manholes General Arrangement*

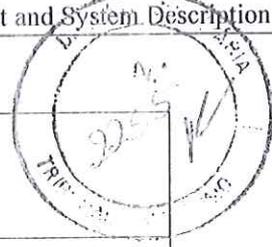
The watertight manholes must be normally locked.

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MANHOLES PLAN (Ref. Fig. 4.1.5.1)		
ITEM	EQUIPMENT NUMBER	DESCRIPTION
1	AE*001PU	R.W.T. W/COAMING
2	AE*002PU	R.W.T.
3	AE*002PU	R.W.T.
4	AE*001PU	R.W.T. W/COAMING
5	AE*003PU	R.W.T.
6	AE*004PU	R.W.T.
7	AE*005PU	R.W.T. W/COAMING
8	AE*038PU	R.W.T.
9	AE*006PU	R.W.T.
10	AE*007PU	F.W.T.
11	AE*008PU	R.W.T.
12	AE*009PU	R.W.T.
13	AE*009PU	R.W.T.
14	AE*009PU	R.W.T.
15	AE*009PU	R.W.T.
16	AE*009PU	R.W.T.
17	AE*010PU	R.W.T.
18	AE*011PU	R.W.T. W/COAMING
19	AE*012PU	R.W.T.
20	AE*013PU	F.W.T.
21	AE*014PU	R.W.T. W/COAMING
22	AE*014PU	R.W.T. W/COAMING
23	AE*015PU	R.W.T.
24	AE*013PU	F.W.T.
25	AE*015PU	R.W.T.
26	AE*042PU	R.W.T. W/COAMING
27	AE*016PU	R.W.T.
28	AE*036PU	R.W.T.
29	AE*042PU	R.W.T. W/COAMING
30	AE*042PU	R.W.T. W/COAMING
31	AE*016PU	R.W.T.
32	AE*036PU	R.W.T.
33	AE*042PU	R.W.T. W/COAMING
34	AE*011PU	R.W.T.
35	AE*01SPU	F.W.T.
36	AE*037PU	R.W.T. W/COAMING
37	AE*037PU	R.W.T. W/COAMING
38	AE*018PU	F.W.T.
39	AE*019PU	R.W.T.
40	AE*019PU	R.W.T.

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MANHOLES PLAN  
 (Ref. Fig. 4.1.5.1)

ITEM	EQUIPMENT NUMBER	DESCRIPTION
41	AE*020PU	F.W.T.
42	AE*021PU	R.W.T.
43	AE*020PU	F.W.T.
44	AE*022PU	R.W.T.
45	AE*023PU	R.W.T.
46	AE*023PU	R.W.T.
47	AE*023PU	R.W.T.
48	AE*023PU	R.W.T.
49	AE*023PU	R.W.T.
50	AE*024PU	R.W.T. W/COAMING
51	AE*025PU	R.W.T.
52	AE*026PU	R.W.T.
53	AE*027PU	R.W.T.
54	AE*039PU	R.W.T.
55	AE*028PU	R.W.T. W/COAMING
56	AE*029PU	R.W.T. W/COAMING
57	AE*030PU	R.W.T.
58	AE*030PU	R.W.T.
59	AE*029PU	R.W.T. W/COAMING
60	AE*031PU	F.W.T.
63	AE*001PU	R.W.T. W/COAMJNG
64	AE*02PU	R.W.T.
65	AE*002PU	R.W.T.
66	AE*001PU	R.W.T. W/COAMING
67	AE*003PU	R.W.T.
68	AE*004PU	R.W.T.
69	AE*005PU	R.W.T. W/COAMING
70	AE*038PU	R.W.T.
71	AE*006PU	R.W.T.
72	AE*007PU	F.W.T.
73	AE*008PU	R.W.T.
74	AE*009PU	R.W.T.
75	AE*009PU	R.W.T.
76	AE*009PU	R.W.T.
77	AE*009PU	R.W.T.
78	AE*009PU	R.W.T.
79	AE*010PU	R.W.T.
80	AE*011PU	R.W.T. WICOAMJNG
81	AE*012PU	R.W.T.

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MANHOLES PLAN (Ref. Fig. 4.1.5.1)		
ITEM	EQUIPMENT NUMBER	DESCRIPTION
82	AE*013PU	F.W.T.
83	AE*014PU	R.W.T. W/COAMING
84	AE*014PU	R.W.T. W/COAMING
85	AE*015PU	R.W.T.
86	AE*013PU	F.W.T.
87	AE*015PU	R.W.T.
88	AE*042PU	R.W.T. W/COAMING
89	AE*016PU	R.W.T.
90	AE*036PU	R.W.T.
91	AE*042PU	R.W.T. W/COAMING
92	AE*042PU	R.W.T. W/COAMING
93	AE*016PU	R.W.T.
94	AE*036PU	R.W.T.
95	AE*042PU	R.W.T. W/COAMING
96	AE*017PU	R.W.T.
97	AE*018PU	F.W.T.
98	AE*037PU	R.W.T. W/COAMING
99	AE*03~PU	R.W.T. W/COAMING
100	AE*018PU	F.W.T.
101	AE*019PU	R.W.T.
102	AE*019PU	R.W.T.
103	AE*020PU	F.W.T.
104	AE*021PU	R.W.T.
105	AE*020PU	F.W.T.
106	AE*022PU	R.W.T.
107	AE*023PU	R.W.T.
108	AE*023PU	R.W.T.
109	AE*023PU	R.W.T.
110	AE*023PU	R.W.T.
111	AE*023PU	R.W.T.
112	AE*024PU	R.W.T.
113	AE*025PU	R.W.T. W/COAMING
114	AE*02CPU	R.W.T.
115	AE*02;PU	R.W.T.
116	AE*039PU	R.W.T.
117	AE*02SPU	R.W.T. W/COAMING
118	AE*029PU	R.W.T. W/COAMING
119	AE*030PU	R.W.T.
120	AE*030PU	R.W.T.
121	AE*029PU	R.W.T. W/COAMING
136	AE*055PU	R.W.T. W/COAMING
137	AE*055PU	R.W.T. W/COAMJNG

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MANHOLES PLAN

(Ref. Fig. 4.1.5.1)

ITEM	EQUIPMENT NUMBER	DESCRIPTION
138	AE*009PU	R.W.T.
139	AE*009PU	R.W.T.
140	AE*009PU	R.W.T.
141	AE*009PU	R.W.T.
142	AE*044PU	R.W.T.
143	AE*044PU	R.W.T.
144	AE*044PU	R.W.T.
145	AE*044PU	R.W.T.
146	AE*044PU	R.W.T.
147	AE*044PU	R.W.T.
148	AE*044PU	R.W.T.
149	AE*044PU	R.W.T.
150	AE*032PU	R.W.T.
151	AE*032PU	R.W.T.
152	AE*033PU	R.W.T.
153	AE*033PU	R.W.T.
154	AE*045PU	R.W.T.
155	AE*045PU	R.W.T.
156	AE*045PU	R.W.T.
157	AE*04SPU	R.W.T.
158	AE*034PU	R.W.T.
159	AE*034PU	R.W.T.
160	AE*034PU	R.W.T.
161	AE*034PU	R.W.T.
162	AE*047PU	R.W.T. W/COAMING
163	AE*047PU	R.W.T. W/COAMING
164	AE*047PU	R.W.T. W/COAMING
165	AE*047PU	R.W.T. W/COAMING
166	AE*047PU	R.W.T. W/COAMING
167	AE*047PU	R.W.T. W/COAMING
168	AE*047PU	R.W.T. W/COAMING
169	AE*047PU	R.W.T. W/COAMING
170	AE*047PU	R.W.T. W/COAMING
171	AE*047PU	R.W.T. W/COAMING
172	AE*047PU	R.W.T. W/COAMING
173	AE*047PU	R.W.T. W/COAMING
174	AE*047PU	R.W.T. W/COAMING
175	AE*047PU	R.W.T. W/COAMING
176	AE*047PU	R.W.T. W/COAMING
177	AE*047PU	R.W.T. W/COAMING
178	AE*048PU	R.W.T. W/COAMING

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 DIVISÃO DE SERVIÇOS CARTORIAS

MANHOLES PLAN (Ref. Fig. 4.1.5.1)		
ITEM	EQUIPMENT NUMBER	DESCRIPTION
179	AE*048PU	R.W.T. W/COAMING
180	AE*048PU	R.W.T. W/COAMING
181	AE*048PU	R.W.T. W/COAMING
182	AE*035PU	R.W.T.
183	AE*035PU	R.W.T.
184	AE*035PU	R.W.T.
185	AE*035PU	R.W.T.
186	AE*045PU	R.W.T.
187	AE*045PU	R.W.T.
188	AE*049PU	R.W.T.
189	AE*049PU	R.W.T.
190	AE*040PU	F.W.T.
191	AE*040PU	F.W.T.
192	AE*056PU	R.W.T. W/COAMING
193	AE*056PU	R.W.T. W/COAMING
194	AE*056PU	R.W.T. W/COAMING
195	AE*056PU	R.W.T. W/COAMING
196	AE*046PU	R.W.T.
197	AE*046PU	R.W.T.
198	AE*046PU	R.W.T.
199	AE*046PU	R.W.T.
200	AE*050PU	F.W.T.
201	AE*050PU	F.W.T.
202	AE*044PU	R.W.T.
203	AE*044PU	R.W.T.
204	AE*044PU	R.W.T.
205	AE*044PU	R.W.T.
206	AE*044PU	R.W.T.
207	AE*044PU	R.W.T.
208	AE*044PU	R.W.T.
209	AE*044PU	R.W.T.
210	AE*044PU	R.W.T.
211	AE*044PU	R.W.T.
212	AE*051PU	R.W.T.
213	AE*051PU	R.W.T.
214	AE*052PU	R.W.T.
215	AE*051PU	R.W.T.
216	AE*051PU	R.W.T.
217	AE*052PU	R.W.T.
218	AE*053PU	F.W.T.

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**MANHOLES PLAN**

(Ref. Fig. 4.1.5.1)

ITEM	EQUIPMENT NUMBER	DESCRIPTION
219	AE*053PU	F.W.T.
220	AE*041PU	F.W.T.
221	AE*041PU	F.W.T.
222	AE*054PU	R.W.T. W/COAMING
223	AE*054PU	R.W.T. W/COAMING
224	AE*054PU	R.W.T. W/COAMING
225	AE*054PU	R.W.T. W/COAMING
226	AE*054PU	R.W.T. W/COAMING
227	AE*054PU	R.W.T. W/COAMING
228	AE*054PU	R.W.T. W/COAMING
229	AE*054PU	R.W.T. W/COAMING
230	AE*054PU	R.W.T. W/COAMING
231	AE*054PU	R.W.T. W/COAMING
232	AE*054PU	R.W.T. W/COAMING
233	AE*054PU	R.W.T. W/COAMING
234	AE*047PU	R.W.T. W/COAMING
235	AE*047PU	R.W.T. W/COAMING
236	AE*047PU	R.W.T. W/COAMING
237	AE*047PU	R.W.T. W/COAMING
238	AE*057PU	R.W.T. W/COAMING
239	AE*057PU	R.W.T. W/COAMING
240	AE*057PU	R.W.T. W/COAMING
241	AE*057PU	R.W.T. W/COAMING
242	AE*057PU	R.W.T. W/COAMING
243	AE*057PU	R.W.T. W/COAMING
244	AE*057PU	R.W.T. W/COAMING
245	AE*057PU	R.W.T. W/COAMING
246	AE*058PU	F.W.T.
247	AE*058PU	F.W.T.
248	AE*058PU	F.W.T.
249	AE*058PU	F.W.T.
250	AE*057PU	R.W.T. W/COAMING
251	AE*057PU	R.W.T. W/COAMING
252	AE*057PU	R.W.T. W/COAMING
253	AE*057PU	R.W.T. W/COAMING
254	AE*057PU	R.W.T. W/COAMING
255	AE*057PU	R.W.T. W/COAMING
256	AE*058PU	F.W.T.
257	AE*057PU	R.W.T. W/COAMING
258	AE*057PU	R.W.T. W/COAMING
259	AE*057PU	R.W.T. W/COAMING
260	AE*057PU	R.W.T. W/COAMING

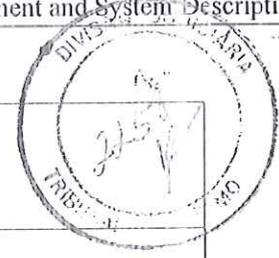
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 DIVISÃO DE MANUTENÇÃO  
 CATORZE

MANHOLES PLAN (Ref. Fig. 4.1.5.1)		
ITEM	EQUIPMENT NUMBER	DESCRIPTION
261	AE*057PU	R.W.T. W/COAMING
262	AE*043PU	R.W.T.
263	AE*043PU	R.W.T.
264	AE*058PU	F.W.T.
265	AE*058PU	F.W.T.
266	AE*058PU	F.W.T.
267	AE*058PU	F.W.T.
268	AE*058PU	F.W.T.
269	AE*058PU	F.W.T.
270	AE*058PU	F.W.T.
271	AE*057PU	R.W.T. W/COAMING
272	AE*057PU	R.W.T. W/COAMING
273	AE*051PU	R.W.T.
274	AE*051PU	R.W.T.
275	AE*051PU	R.W.T.
276	AE*057PU	R.W.T. W/COAMING
277	AE*057PU	R.W.T. W/COAMING
278	AE*057PU	R.W.T. W/COAMING
279	AE*051PU	R.W.T.
280	AE*051PU	R.W.T.
281	AE*051PU	R.W.T.
282	AE*051PU	R.W.T.
283	AE*043PU	R.W.T.
284	AE*043PU	R.W.T.
285	AE*051PU	R.W.T.
286	AE*051PU	R.W.T.
287	AE*051PU	R.W.T.
288	AE*051PU	R.W.T.
289	AE*043PU	R.W.T.
290	AE*043PU	R.W.T.
291	AE*051PU	R.W.T.
292	AE*057PU	R.W.T. W/COAMING
293	AE*057PU	R.W.T. W/COAMING
294	AE*057PU	R.W.T. W/COAMING
295	AE*057PU	R.W.T. W/COAMING
296	AE*054PU	R.W.T. W/COAMING
297	AE*054PU	R.W.T. W/COAMING
298	AE*054PU	R.W.T. W/COAMING
299	AE*054PU	R.W.T. W/COAMING
300	AE*052PU	R.W.T.

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MANHOLES PLAN

(Ref. Fig. 4.1.5.1)

ITEM	EQUIPMENT NUMBER	DESCRIPTION
301	AE*052PU	R.W.T.
302	AE*052PU	R.W.T.
303	AE*052PU	R.W.T.
304	AE*057PU	R.W.T. W/COAMING
305	AE*057PU	R.W.T. W/COAMING
306	AE*057PU	R.W.T. W/COAMING
307	AE*051PU	R.W.T.
308	AE*051PU	R.W.T.
309	AE*058PU	F.W.T.
310	AE*058PU	F.W.T.
311	AE*058PU	F.W.T.
312	AE*058PU	F.W.T.
313	AE*058PU	F.W.T.
314	AE*058PU	F.W.T.
315	AE*058PU	F.W.T.
316	AE*058PU	F.W.T.
317	AE*058PU	F.W.T.
318	AE*058PU	F.W.T.
319	AE*058PU	F.W.T.
320	AE*058PU	F.W.T.
321	AE*058PU	F.W.T.
322	AE*058PU	F.W.T.
323	AE*058PU	F.W.T.
324	AE*059PU	F.W.T.
325	AE*059PU	F.W.T.
326	AE*059PU	F.W.T.
327	AE*059PU	F.W.T.
328	AE*059PU	F.W.T.
329	AE*057PU	R.W.T. W/COAMING
330	AE*060PU	OVAL MANHOLES PAD TYPE NOT SUBJECTED TO HYDROSTATIC HEAD
331	AE*060PU	OVAL MANHOLES PAD TYPE NOT SUBJECTED TO HYDROSTATIC HEAD
332	AE*060PU	OVAL MANHOLES PAD TYPE NOT SUBJECTED TO HYDROSTATIC HEAD
333	AE*060PU	OVAL MANHOLES PAD TYPE NOT SUBJECTED TO HYDROSTATIC HEAD
334	VS 32S-3	F.W.T. (TYPE D)
335	VS 32P-3	F.W.T. (TYPE D)
336	VS 45AS	F.W.T. (TYPE D)

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MANHOLES PLAN (Ref. Fig. 4.1.5.1)		
ITEM	EQUIPMENT NUMBER	DESCRIPTION
337	VS 45AP	F.W.T. (TYPE D)
338	VS 46AS	F.W.T. (TYPE D)
339	VS 46AP	F.W.T. (TYPE D)
340	VS 61S	F.W.T. (TYPE D)
341	VS 61P	F.W.T. (TYPE D)
342	VS 64S	F.W.T. (TYPE D)
343	VS 64P	F.W.T. (TYPE D)
344	VS 65S	F.W.T. (TYPE D)
345	VS 65P	F.W.T. (TYPE D)
346	DRILL FLOOR	F.W.T. (TYPE B)
347	GLYCOL STOWAGE TK (FR:50-51)	SPECIAL 600DIA
348	GLYCOL SUMP TK AFT DCK EXTN	SPECIAL 600DIA
349	BALLAST SW CIRC PORT (101)	F.W.T. (TYPE D)
350	BALLAST SW CIRC PORT (104)	F.W.T. (TYPE D)
351	BALLAST SW CIRC STBD (106)	F.W.T. (TYPE D)
352	BALLAST SW CIRC STBD (109)	F.W.T. (TYPE D)
353	BILGE BALLAST SW CIRC PORT (102)	F.W.T. (TYPE D)
354	BILGE BALLAST SW CIRC PORT (105)	F.W.T. (TYPE D)
355	BILGE BALLAST SW CIRC STBD (107)	F.W.T. (TYPE D)
356	BILGE BALLAST SW CIRC STBD (110)	F.W.T. (TYPE D)
357	SW INJ. PORT (103)	F.W.T. (TYPE D)
358	SW INJ. STBD (108)	F.W.T. (TYPE D)
359	CHAIN LOCKER 9 PORT (FR: 11-15)	F.W.T. (TYPE D)
360	CHAIN LCKR 10 PORT (FR: 59-63)	F.W.T. (TYPE D)
361	CHAIN LCKR 11 STBD (FR:11-15)	F.W.T. (TYPE D)
362	CHAIN LCKR 12 STBD (FR:59-63)	F.W.T. (TYPE D)

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MANHOLES PLAN

(Ref. Fig. 4.1.5.1)

ITEM	EQUIPMENT NUMBER	DESCRIPTION
363	SW BLST TK 16P	F.W.T. (TYPE D)
364	SW BLST TK 16S	F.W.T. (TYPE D)
365	DRILL WTR TK 8P	F.W.T. (TYPE D)
366	DRILL WTR TK 8S	F.W.T. (TYPE D)
367	SW BLST TK 5P	F.W.T. (TYPE D)
368	SW BLST TK 5S	F.W.T. (TYPE D)
369	VS 29S	F.W.T. (TYPE D)
370	VS 29P	F.W.T. (TYPE D)
371	VS 30S	F.W.T. (TYPE D)
372	VS 30P	F.W.T. (TYPE D)
386	VS 60	R.W.T. WITH COAMING

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#### 4.1.6 Weathertight/Gastight Doors

Ref: Fig 4.1.6.12

In the aforesaid Figure also the doors which must be normally closed have been highlighted.

#### 4.1.7 Watertight and Weathertight Openings - General Plan

Ref: Fig 4.1.7.1 and 4.1.7.2

All the shell openings (excluding doors, hatches and manholes) are shown on Fig. 4.1.7.2 so that stability of the platform may be evaluated on the basis of the regulations in force.

On Fig 4.1.7.1 the different types of openings used on board are shown.

- Type "A" openings are generally equipped with a structural vertical duct, minimum thickness 5 mm, suitably reinforced and supported to guarantee its strength.

In line on this duct an axial fan, one or two silencers, a gas and weathertight fitted horizontally have been installed. A weather cap shaped in two different forms protects the duct end; the largest ducts have a four-side head, the smallest ones have a single side head.

- Type "B" openings consist of a platform side shell or superstructure side shell opening protected by a louver and a gas and weathertight fire damper fitted vertically.
- Type "C" openings are only four, each for one centrifugal fan surmounted by a vertical duct similar to type "A". Connection between fans and ducts is realised by a rubberised heavy canvas flexible joint in turn protected by a steel plate.
- Type "D" openings consist of an air inlet/outlet without damper (small diameter) fitted with a steel shutter (external) and a remote controlled internal valve.

Eight out of nine openings serve the columns, therefore in case of inclination due to loss of column no further flooding can occur.

- Type "E" openings are valved overboard discharge/suction through seal chests realised in accordance with the Rules

Type "F" openings consist of a tank air vent fitted with self closing winel head.

NOTE: For further details refer to Fincantieri dwg no G50000185

#### 4.1.8 Watertight boundaries

Refer to Capacity Plans (DE-3010.38-1320-962-NBD-367-01 to -13) in Volume 7.



## 4.2 SAFETY SYSTEMS

### 4.2.1 Fire Fighting Systems

The fire fighting and fire detection installations are made according to all latest international rules for Offshore Mobile Units.

Active and passive fire protection is fitted on board.

The passive fire protection refers to the primary structures of the Unit, in order to control and restrict the spread of fire.

All active fire equipment is shown in Fig. 4.2.5 (Safety Plan).

#### 4.2.1.1 Regulations, Codes and Standards

The primary regulations, codes and standards relating to offshore firefighting are listed below:

##### *Acts of Parliament*

- The Merchant Shipping Act 1979

##### *Statutory Instruments*

- SI 1974 No.289 Offshore Installations (Construction and Survey) Regulations -
- SI 1976 No.1019 Offshore Installations (Operational Safety, Health and Welfare) Regulations
- SI 1977 No.1232 Health and Safety at Work Act 1974 (Applications outside Great Britain) Order 1977.
- SI 1978 No. 611 Offshore Installations (Firefighting equipment) Regulations -
- SI 1982 No.360 Offshore Installations (Life Saving Appliances and Firefighting Equipment - Amendments) Regulations.

##### *Rules and Regulations*

- RINA Rules of Mobile Offshore Drilling Units.
- MARPOL 1973 Amendments.
- SOLAS Convention 1974 and 1978-1981-1983 Amendments

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- IMO-MODU Code 1980 & Amendments
- ILO Convention 92-133-143

#### 4.2.1.2 Codes and Standards

- DPC Portomartec 20T8604 Fire Protection Requirements For Materials And Appliances Used On Board Brazilian Ships
- DPC Portomarinst 22.14 Life Saving Appliances Allotment
- DPC Portomartec 20T8602 Lifebuoys
- DPC Portomartec 20T8603 Life Jackets

#### Cullen Report

- The Cullen Report 1990 recommendations have been taken into account as applicable to this type of vessel.

#### 4.2.1.3 Fire & Gas Detection System

Ref: Doc Title: Fire & Gas Detection System  
Doc. No: DE-3010.38-5400-855-AMK-220 to -241 inclusive (Fincantieri Drgs)

#### A. GENERAL

The fire and gas detection system continuously monitors all vessel areas, and in response to a fire condition or release of hydrocarbon/toxic gas, initiates the appropriate fire fighting and level of shutdown.

It also alerts personnel, by audio and visual alarms on the panel, of the existence and location of such condition.

#### B. FUNCTIONAL COMPONENTS

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#### Equipment

- a) The basic components of the fire & gas detection system are:
  1. Central Control Room (CCR) Fire & Gas Panel with printers.
  2. Fire detectors.
  3. Manual fire-call push/buttons.

4. Field gas sensors.
5. Portable measuring equipment (meters) for all gases.
6. Fire panels for cranes.



b) CCR Fire & Gas Detection Panel (IH/001QI)

The CCR Fire & Gas panel is an independent unit capable of monitoring field sensors, effecting certain logic decisions, and controlling outputs to the front of panel mimic, to the ESD system, to the Public Address/ General Alarm, to the fire fighting control systems, and to the repeater panels.

The fire control panel concerns:

- firewater pumps control
- fixed CO<sub>2</sub> system for gas turbines enclosures
- water-sprays
- sprinklers
- deluge.

The system is interfaced to the ESD (Emergency Shutdown System).

c) Fire Detectors

The fire detector system comprises the following types:

1. Flame fire detectors.
2. Heat fire detectors.
3. Smoke fire detectors.
4. Manual fire call push/buttons.

d) Gas Sensors

The gas sensors comprise the following types:

1. HC gas detectors.
2. H<sub>2</sub> gas detectors.

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The sensors are for operation in Zone type 1 hazardous conditions, gas group IIB, temperature class T3, with H<sub>2</sub> detectors suitable for gas group IIC temperature class T6.

e) Fire & Gas Panels for Cranes

Each of the two cranes on board is provided with a dedicated fire & gas panel.

The fire & gas detectors relevant to the cranes are connected directly to their own dedicated fire & gas panels, which give to the C.C.R. panel the following cumulative signals:

- - 20% L.E.L. gas signal;
- - 60% L.E.L. gas signal;
- - fire detected signal.

The C.C.R. panel repeats the fire & gas alarm signal to the crane panels.

The Manual fire call push button fitted in each crane cabin is connected, through the crane terminal board, directly to the C.C.R. panel.

f) Location

Components of fire & gas detection system are located according to drawing:

*DE-3010.38-5400-855-AMK-220 to -241 inclusive (Fincantieri Drg.)*

C. FIRE ZONING & LOGIC

1) Fire zones (Fig. 4.2.1)

The platform is divided into physically distinct fire zones.

The split is into the following major areas:

1. Port pontoon and column aft
2. Port pontoon and column forward
3. Starboard pontoon and column forward
4. Starboard pontoon and column aft
5. Accommodation, Office Areas & Radio Room
6. Port Machinery Spaces

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7. Starboard Machinery Spaces
8. Emergency Generator Room and Laboratory
9. Not Used
10. Incinerator
11. Port forward Fire Pump Room
12. Starboard forward Fire Pump Room
13. Riser Deck Area
14. Aft process areas – port tank top
15. Aft process areas – stbd tank top
16. Chemical Injection Area
17. Separators and Compressor A
18. Port Piperack
19. Process & Compressor Train A
20. Compressor train B & Process Package
21. Compressor train C & Process Package
22. Starboard Piperack
23. Manifold Area
24. Main Deck Starboard Process
25. Compressor Turbine Enclosure Train A
26. Compressor Turbine Enclosure Train B
27. Compressor Turbine Enclosure Train C
28. Main Deck Forward Utilities Area
29. Main Deck Aft Process Area

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The divisions 6 & 7 allow for a splitting of the FPU's essential services into two distinct halves so that one half may still function with a fire in the other.

The above divisions are sub-divided into smaller areas based upon the extent of passive and fixed active fire fighting facilities.

D. DETECTORS

1) Fire Detectors

The following types of detectors are fitted:

- a) Thermal
- b) Smoke (optical type)
- c) Smoke (ionisation type)
- d) Flame
- e) Frangible bulb

2) Fire Call Points

In addition to the fire detectors, manual devices (call points) are fitted.

The push-buttons have the same function of the fire detectors.

The audible and visual alarm is activated by operation of local manual devices (call points) located at readily accessible strategic locations throughout the Unit.

Manual call points once activated continue to register automatically at the CCR panel.

3) HC gas detector

Each gas detector is connected to the CCR gas detection panel.

Gas detection generates alarms and trigger actions per Cause and Effect diagram.

4) H<sub>2</sub> portable gas detectors

Two portable devices capable of measuring accurately an accumulation of flammable gas are provided.

The meters incorporate features that allow the operator to ascertain the percentage concentration of gas or vapours sampled based on the Lower Explosive Limit for which the meter is calibrated.

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#### 4.2.1.4 Fire Protection System

##### A. SYSTEM PHILOSOPHY

According to Fig. 4.2.2, a two stage system installed with four seawater circulating pumps (XA039 A-B-C-D) drawing water directly from the sea and feeding to pressurised seawater ring main at the upper deck level. Fire pumps (XA401 A-B-C-E) located at this upper level shall draw from the seawater ring main and discharge into a firewater ring main.

Firewater protection services are connected to this firewater ring main and to seawater ring main.

Both the seawater and firewater ring mains are installed within the upper hull away from the main fire risk in production areas and fitted with valves to enable isolation of any part of each ring main in case of damage by fire or explosion.

Performance data of the pumps installed in firefighting plants are according to the National Fire Protection Association Codes.

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##### B. SEAWATER RING

Four pump rooms are located in the FPU pontoons, one room at each end of the pontoons. An electrically driven seawater circulating pump is located in each room capable of drawing water directly from the sea via both high and low seawater inlet boxes. The control of all four pumps and the relevant control valves will for normal operation be from the Integrated Automation System or locally in emergency.

Each seawater circulating pump discharges water up each of the four columns where they are joined together to form the seawater ring.

This ring pipework is totally enclosed in the sealed lower structural box section of the upper hull.

Manually operated isolation valves are installed in this ring to ensure that isolation of any part of the seawater ring main can be achieved without diminishing the performance of the ring main in supplying suction water for the fire pumps. The ring also provides the cooling water for all the marine and process equipment requirements.

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Table 4.2.1.2 - Seawater Pumps Main Characteristics

Equipment No	XA039 A-D	
Manufacturer	Garbarino	
Model	QVK 18/320	
Capacity	1550-590	m <sup>3</sup> /h
T.M.H.	75-34	m
Speed	1750-1150	rpm
Electric motor power	520-130	kW

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B. FIREWATER RING

Ref: Doc. Title: "Diagram Firewater Piping System"

Doc. No: P&ID DE-3010.38-5423-947-AMK-146.01-02

Doc. No: DE-3010.38-5420-944-AMK-552.01 to 08 (Fincantieri Drg)

Fig. 4.2.2.

A pressurised fire main water extinguishing system is provided

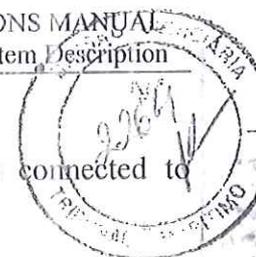
Five fire pumps are located as follows:

- Two pumps (one auxiliary) in pump room at tank top level, port side (XA/401A, XA/401D)
- One pump in pump room at tank top level, starboard side (XA/401B)
- One pump in pump room at second deck level, forward (XA/401C)
- One pump in pump room at main deck level, forward, port side (XA/401E).

The fire main seawater line is arranged as a ring line on the tank top deck, with branches to valves through hose connection.

Boxes with fire extinguishing hoses are located as per above drawing and figure.

The pumps are connected to seawater ring main system.



The system is pressurised by a pressure tank (capacity 1000 litre) connected to compressed air network; the pressure tank operates as an accumulator.

**Table 4.2.1.3 - Firewater Pumps Main Characteristics**

	Main Pumps	Jockey Pump	
Equipment No.	XA401A-B-C-E	XA401D	
Manufacturer	Garbarino	Garbarino	
Model	MU 200/500	MU 80-400 L3	
Capacity	1300	90	m <sup>3</sup> /hr
T.M.H.	65	65	m
Speed	1750	1750	rpm
Electric Motor Power	290	34,8	kW

Manually operated isolation valves, locked open, are fitted throughout the firewater ring main to allow for damage isolation or maintenance work to proceed without affecting the integrity and operation of the main. The isolation valves status is monitored in the central/production control room. The duplicate supplies from the firewater ring main for the process plant are taken from different isolated parts of the main. Connections are also provided for fixed water spraying system and hydrants.

**C. WATER DELUGE SYSTEM**

- Ref: *Doc Title: Deluge Piping System Diagram*  
*Doc. No: DE-3010.38-5423-947-AMK-140-01 to -02*  
*DE-3010.38-5423-947-AMK-140-141-01 to -02*  
*DE-3010.38-5420-944-AMK-553-01 to -07 (Fincantieri Drg)*

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The automatic system concerns the following areas (see Fig. 4.2.3):

- Main deck                                      Zones, 17 to 24
- Tank top deck                                Zone 14 to 16

- Riser (spider) deck Zone 13

An automatic detection system for fire extinguishing and exposure protection is provided for each deluge area.

The deluge system works on the principle of automatic deluge in the area where fire is detected with remote manual actuation (or ultimately automatic actuation) from all deluge areas adjacent to the area with fire detected.

#### D. *FIXED WATER SPRAYING PIPING SYSTEM*

Ref: *Doc Title: Fixed Water Spraying Piping System*

*Doc. No: DE-3010.38-5420-944-AMK-554-01 to 09 (Fincantieri Drg)*

Individual fixed water spraying piping system has been installed within the upper hull and takes its supply from the pressurised firewater ring main via a remote operated control valve. The individual areas protected are: gas turbine generator rooms, fuel oil purifier rooms, auxiliary machinery spaces, emergency generator room and marine supplies store room. The system can be activated either by local manual operation of the supply valve, or by remote operation from the firefighting control panel in the central/production control room.

The system is connected to the firewater ring.

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#### E. *AUTOMATIC SPRINKLER SYSTEM*

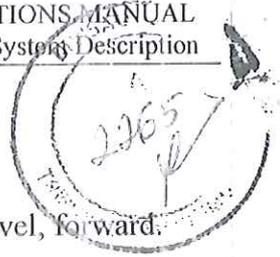
Ref: *Doc Title: Sprinkler Piping System*

*Doc. No: DE-3010.38-5420-944-AMK-555-01 to -04 (Fincantieri Drg)*

A pressurised automatic sprinkler system is provided according to the above Fincantieri drawing.

The system concerns the accommodation areas (tank top deck and second deck) and comprises (see Fig. 4.2.4):

- One seawater pump, electrically driven (YD/485A)
- One air compressor, electrically driven; max. pressure 12 bar, capacity 130 litres/min, complete with electric motor 2.2 kW, 1,750 rpm (YD/485B)
- One pressure tank; capacity 3,500 lt, 8 bar working pressure (YL/485A)



- One control station.

All above components are fitted in the fire pump room at Second Deck level, forward.

The system is pressurised by a tank connected to the compressed air network and to the compressor (as spare) which operates as accumulator.

**Table 4.2.1.4 - Seawater Pump Main Characteristics**

Equipment No	YD/485A	
Manufacturer	Garbarino	
Capacity	90	m <sup>3</sup> /h
T.M.H.	10	mH <sub>2</sub> O
Speed	1750	rpm
Electric Motor Power	22	kW

**4.2.1.5 Fixed CO<sub>2</sub> Protection System for Gas Turbine Enclosures**

Ref: Doc. No: E6150266 (Fincantieri Drg)

Each gas turbine generator set with its associated equipment is housed in a completely self-contained enclosure.

The enclosure includes a CO<sub>2</sub> fire fighting system, fire and heat, flammable and toxic gas detection detectors, in accordance with Fincantieri drawing E6150266.

**4.2.1.6 Fixed CO<sub>2</sub> Protection System for Galley Hood**

Ref: Doc Title: CO<sub>2</sub> Fire Fighting System for Galley Protection  
Doc. No: DE-3010.38-5420-944-AMK-558(Fincantieri Drg)

A CO<sub>2</sub> protection system for galley ducts at second deck is provided.

The system (ZD/536) comprises:

- a CO<sub>2</sub> cylinder, capacity 13.4 lt

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- an actuation station, w/manual control
- an audible signal
- valves & discharge nozzles.

The system components are located at Mess Room, Second Deck level.

#### 4.2.1.7 Dry Powder Fire Extinguishing System

Ref: Doc Title: Dry Powder Fire Fighting System  
Doc. No: DE-3010.38-5420-944-AMK-557 (Fincantieri Drg)

A dry powder system is fitted to protect the helideck.

The system comprises the following main components, located in the Fire Pump Room at Main Deck level port side, forward:

- nitrogen bottles for tank pressurisation charged at 150 bar (YD/544B)
- dry powder tank capacity 300 lt (250 kg of dry powder) (YD/544A).

A pneumatic control box (YD/544C) and a hose reel with 30 m hose and dry power pistol (delivers 3.7 kg/s) are fitted on the helideck platform No.3.

#### 4.2.1.8 Foam Extinguishing System for Helideck

Ref: Doc Title: Diagram Foam Piping System  
Doc. No: DE-3010.38-5420-944-AMK-556-01 to 02 (Fincantieri Drg)

A foam extinguishing system is provided according to above drawing.

The system concerns the helideck and comprises the following main components, located in the Fire Pump Room at main deck level, port side, forward:

- three foam compound tanks, capacity 1000 lt each (YAI545A-B-C);
- one seawater electric pump (YA/477);
- one hydraulic power pack, for the monitors control (YD1545D);
- three foam monitors, hydraulic type, activated by means of remote control unit (console), or by local control panel are fitted on the helideck.

The system is connected to the main seawater fire system.

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#### 4.2.1.9 *Portable Fire Extinguishers*

Portable fire extinguishers are provided onboard. Portable extinguishers are located as per Figures 4.2.5 and 4.2.6.

The extinguishers are of the following types and capacities:

- CO<sub>2</sub>                    5 & 10 kg;
- powder                6 & 12 kg;
- powder                50 kg;
- foam                    6 & 12 lt;
- foam                    50 lt;
- foam                    150 lt.

#### 4.2.1.10 *Fireman's Equipment*

Fireman's equipment are provided on board and stored in locations shown on Figure 4.2.6. Equipment, fire outfits and helicopter rescue outfits are listed on the following tables.

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Table 4.2.1.5 - Fireman's Equipment

Locker Type 1:		
Qty	Material For No.8 Equipment	Item
8	Portable safety lamp with spare bulb	DI*039EV
8	Pair of electr. insulated material boots	DI *049EV
8	Pair of electr. insulated material gloves	DI *050EV
8	Rigid helmet with neck protection	DI*05 1EV
8	Mask with multi purpose filter	DI*052EV DI*053EV
8	Fire axe	DI*029EV
8	Protective clothing thermo-reflecting and watertight of approved type	DI*054EV
8	Self breathing apparatus predisposed for the insertion of portable radio	Owner supply
8	Safety belt with suspenders	DI*047EV
8	Incombustible safety rope (L = 40m)	DI*043EV
Locker Type 2		
1	Portable safety lamp with spare bulb	
1	Single piece fireman's suit	
1	Pair of fireman's gloves	
1	Fireman's helmet	DI*051EV
1	Self contained breathing apparatus set	
1	Safety harness and rescue line	DI*053EV
1	Fire axe	DI*029EV
1	Crowbar	DI*031EV

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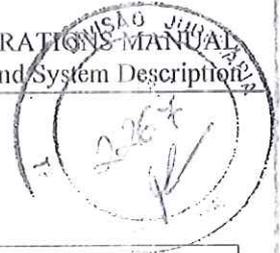


Table 4.2.1.6 - Additional Fireman's Equipment

Fire Station No. 1		
Qty	Material For No.1 Equipment	Item
1	Incombustible safety rope (L =40 m)	DI*043EV
1	High pressure compressor for breathing bottles charge	Owner supply
11	UHF portable radio of approved type suitable for IIC class gas presence areas. Complete with cables for connection with smoke-working equipment	TC/ELE
4	Crowbar	DI*031EV
1	Self breathing apparatus for radio station	Owner supply
4	Jemmybar	DI*032EV
4	Portable oxygen-acetylene cutting sets	
51	Spare batteries for safety lamps	
Fire Station No. 2		
Pieces	Material For No.1 Equipment	Item
4	Crowbar	DI*031EV
4	Jemmybar	DI*032EV

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Table 4.2.1.7 - Fire Outfits

Fire Station No. 3		
Pieces	Material For No.1 Outfits	Item
1	High pressure compressor for breathing air bottles charge	
28	Single air bottle self-breathing apparatus	
2	Portable devices for measuring accumulation of flammable gas	
1	Jemmybar	DI*032EV
4	Buckets with proper length rope (L = 40 m)	DI*035EV
2	Antifire cover	DI*036EV
1	Fireman belt with bag containing proper tools (chisel, hammer, monkey wrench, lever, screwdriver etc.)	DI*037EV
1	Electrician's bag (containing proper tools and one pair of insulated gloves)	O.M.C.
1	Self breathing apparatus	
1	Portable safety lamp with spare bulb	DI*039EV
4	International shore connections	DI*040RA
1	A complete recharge kit comprising sufficient spare parts, tools and other necessary equipment to enable recharging at sea	DI*041DV
2	Nitrogen cylinders with regulator and hose complete with suitable fitting to enable recharging of stored pressure fire extinguishers at sea	DI*042DV

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Table 4.2.1.8 - Helicopter Rescue Outfits

Fire Station No. 3		
Pieces	Material For No.1 Outfits	Item
1	Light ladder	DI*02VEV
2	Fireman's axe	DI*029EV
1	Heavy duty hacksaw with blade (+ 5 spare blades)	O.M.C.
1	Metal hook with a 3 m long handle	DI*030EV
1	Crowbar	DI*03 1EV
1	Bolt cutter	O.M.C.
1	Jemmybar	DI*032EV
1	Steel plate scissors	O.M.C.
1	Jack, minimum 1/2 ton.	O.M.C.
1	Set of extension hoses for CO <sub>2</sub> fire extinguisher (helideck)	
1	Adjustable wrench	
1	Pair of pliers (side cutting)	
1	Set of screw drivers	
5	Harness knife c/w sheath	
1	Anti-fire cover	
1	Portable foam applicator	

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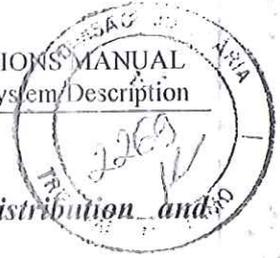
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Table 4.2.1.9 – Spares

Fire Station No. 4		
Pieces	Material For No.1 Spares	Item
123	5 kg portable CO <sub>2</sub> spare fire extinguisher	DI*O15DV
34	Spare charges for 9 lt portable foam extinguisher	DI*O18DV
124	Spare charges for 6 kg portable dry powder extinguisher	DI*O16DV
51	Spare batteries for safety lamp (Alkaline type)	
13	Spare charges for 45 lt foam extinguisher	DI*O20DV
2	Spare charge for 135 lt foam extinguisher	DJ*023DV
9	Spare charges for 25 kg dry powder extinguisher	DI*022DV
28	Single air bottle self-breathing apparatus	
2	Extension for CO <sub>2</sub> fire extinguishers helideck bridge	DI*06 1DV

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*4.2.1.11 Seawater and Firewater Pumps. Electrical Power Arrangement, Distribution and Operation*

*A. POWER ARRANGEMENT*

According to Fig. 4.2.7, three 6.6 kV gas turbine generators, two located port and one starboard, power the electrical system, through two interconnected H.V. switchboards MSB 1 and MSB 2. Dual 6.6 kV/450V transformers are installed on each of the two H.V. switchboards and feed the two separated 440 V switchboards.

A diesel driven emergency generator feeds the two 440 V emergency switchboards ESB 'A' and ESB 'B' which are separated by a breaker.

A seawater circulating pump and a fire pump are directly connected to each of the 440 V switchboards MSB 1 and MSB 2.

Each side of the emergency switchboard feeds one seawater circulating pump and one fire pump.

*B. ELECTRICAL DISTRIBUTION*

The distribution of the principal parts of the firewater system is shown on the Figure 4.2.8 "Electrical distribution plan of facility".

The four seawater circulating pumps are located in the pumps rooms at the forward and aft sections of each pontoon.

The fire pumps are located either in or above the main upper steel structure two located aft and two forward.

The 440 V switchboards MSB 1, MSB 2, and ESB distribute the power supplies as shown in sketch 3 and as described above. Using the back feed from the ESB to the MSB 1 and MSB 2, the above distribution of power will provide the most flexible arrangement in the case of fire or explosion to allow the minimum of two seawater circulating and two firewater pumps to be available at all times.

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C. *OPERATION*

Under normal conditions with two gas turbine generators operating power is supplied to two seawater circulating and two fire pumps on the 440 V switchboards and to the remaining two seawater circulating pumps and two fire pumps on the emergency switchboards. All eight pumps are available at all times.

In an emergency situation, with the main gas turbine generators inoperable the emergency generator switchboard feeds two seawater circulating pumps and two fire pumps.

The manually operated breaker in each emergency switchboard allows a back feed supply to power the 440 V switchboard to run the remaining two seawater circulating and two fire pumps if required. This arrangement will allow total flexibility to utilise any of the two seawater circulating and two fire pumps.

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4.2.1.12 *Control System*

A. *FIREWATER RING MAIN*

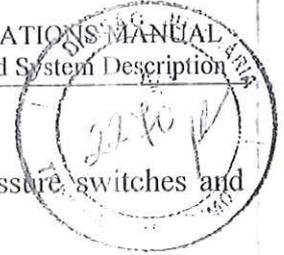
The firewater ring main is pressurised to 10 bar by a connection to the pressure tank linked to the compressed air system.

The pressure tank has pressure switches connected to the jockey pump and one for each of the four fire pumps. The electric driven jockey pump capacity is sized to cover the flow of firewater for up to three hydrants utilised for firefighting/washdown purposes.

Should the pressure continue to fall even with the jockey pump operational, the main electric driven firewater pumps will start in sequence until the designed requirement for full firefighting capacity of two pumps is achieved.

B. *FIRE CONTROL PANEL*

Control of seawater circulating pumps and their associated remote control valves are activated from ECOS. A firefighting control panel is located in the Central/Production Control Room and it is an integral part of the overall control operation of the FPU.



The panel is interconnected to the fire and gas panel, ECOS, pressure switches and remote controlled firewater valves.

The panel is designed to indicate on a deck by deck basis a mimic covering the firewater ring main, deluge, sprinkler and hydrant connections from the ring. Remotely operated valve actuation and status from a position on the mimic relative to its actual position. The status of firewater ring main manual isolation valves is shown by means of lights indicating their position.

The four electrically driven fire pumps controls are mounted on the control panel, covering pump auto and manual start and instrumentation. The pump start/stop operation is interlocked with the remote controlled suction and discharge valves.

*C. FIRE PUMP LOCAL CONTROL PANELS*

A local control panel is located near each fire pump unit.

The panel allows for local stop and start facilities, status instrumentation and control.

*D. SEAWATER SYSTEM CONTROL*

In the event of a fire, all non-essential users of seawater are shut off, so that sufficient water is available within the seawater ring main for the fire.

*4.2.1.13 Passive Systems*

*A. ENCLOSURES, STRUCTURAL FIRE PROTECTION*

Complete structural fire protection of the FPU is shown in Fincantieri drawing G30000020 (structural fire protection) and in Figure 4.2.9.

The doors marked with O symbol are provided with limit switch (signal lamps located in CCR).

**WARNING: THESE DOORS MUST BE NORMALLY CLOSED.**

*B. DUCTS & PIPES PASSING THROUGH*

Ducts or pipes passing through decks or bulkheads are fitted with fireproof insulation and other devices in order to cut the flame passage.

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In Figure 4.2.10 some typical applications are shown.

### C. FIRE DAMPERS

Ventilation plant is provided with remote-controlled fire dampers, "fail safe" closed and designed for rapid closure.

A typical remote-controlled fire damper configuration is shown in Figure 4.2.11.

## 4.2.2 Life Saving Equipment

### 4.2.2.1 General

*Supplementary documentation: Fincantieri Drg. A20314055 "Life Saving Appliances"; and Equipment Suppliers Operation, Maintenance and Parts List Manuals.*

Life saving appliances are provided and located according to MMM, SOLAS 1974, IMO 1983 and Amendments, DOT and NMD, and are based on a total of 126 persons.

See also Volume 3 of this Manual.

### 4.2.2.2 Lifeboats with Equipment

There are three lifeboat stations:

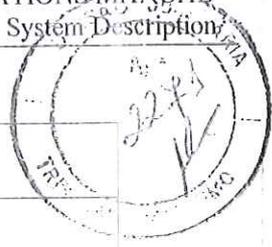
- One forward with two lifeboats
- One at port side with one lifeboat
- One at starboard side with one lifeboat.

At the starboard station, one high-speed man overboard/rescue boat is installed.

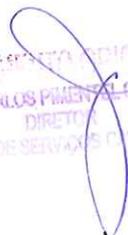
The equipment includes a spraying system and an internal compressed air system for fire and smoke protection. Each lifeboat has its own launching system, with necessary platforms and winches.

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<b>Main Particulars of Lifeboats</b>	
Equipment No	YA/777A - D
No off	Four (4)
Type	Totally enclosed, fire retardant GRP, with engine
Make/Model	Mulder & Rijke TELB 95/65 tanker
Dimensions [m]	9.50 x 3.00 x 1.28
Capacity	65 persons
Hook distance [m]	8.5
<b>Loads</b>	
Weight (incl. Equipment)	5,000 kg
Davit Load	9,875 kg
<b>Engine</b>	
Make/Model	Perkins-Prima M 80T
Type	Four stroke, diesel, water-cooled
Output	45 kW at 3,000 rpm
Water-cooled	
Speed	at least 6 knots
Fuel capacity	for 24 hours running in calm sea
<b>Certificates/Letter of Compliance</b>	
RINA, MMM	
The lifeboats are the MMM approved type.	

  
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<b>Main Particulars of Cranes for Lifeboats</b>	
Equipment No	YA/779A -C
No off	Four (4)
Type	Fixed gravity type winch
Make/Model	Tecnimpianti/Schat Davit Company B.V. FDA 104/22
Winch	Electric motor driven
Launching operation	It is possible to control the lowering directly from the lifeboat with 65 persons, or from the winch platform. The winch is capable of hoisting a lifeboat with 65 persons
Location	
2 sets	Fwd lifeboat station second deck level
1 set	Port lifeboat station main deck level
1 set	Starboard lifeboat station main deck level
Winch	Electric motor driven
<b>Certificates/Letter of Compliance</b>	
RINA, MMM	
The cranes are of the MMM approved type.	

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4.2.2.3 Rescue Boat

Main Particulars of Rescue Boat	
Equipment No	YA/781A
Type	Semi-rigid inflated fast Diesel-jet rescue boat with hull and deck of hand laminated G.R.P. and inflatable all around tube of Hypalon/Neoprene coated nylon material with heavy-duty rubber fender strip
Make/Model	Mulder & Rijke, Ribsea 700 DJ
Dimensions	Overall 7x2.60x 1.05 m
Capacity	18 persons max./ Rescue service: 6 persons
Speed	28 knots with 3 persons
Suspension	Single point
<b>Loads</b>	
Weight (incl. Equipment)	2,100 kg
Davit Load (6 persons)	2,550 kg
<b>Engine</b>	
Make/Model	Perkins - TG.35544
Type	6-cylinder, 4-stroke direct-injected turbocharged marine diesel
Output	136 kW at 2,400 rpm
Waterjet	R.G. Parker (Eng.) Ltd. P.P. Jet, model PP90G
<b>Certificates/Letter of Compliance</b>	
RINA, MMM	
The rescue boat is the MMM approved type.	

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<b>Main Particulars of Rescue Boat Davit</b>	
Equipment No	YA/782A
No off	Four (4)
Type	Fixed gravity type with one-point suspension
Make/Model	Tecnimpianti/Schat Davit Company B .V. /F.D.A.R. 27.5/16
Winch	Electric boatwinch Crank handle for emergency hoist
Launching operation	Remote control gear allows operation from within the rescue boat
<b>Certificates/Letter of Compliance</b>  RINA, MMM  The equipment is the MMM approved type.	

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4.2.2.4 Life Rafts with Equipment

<b>Main Particulars of Life Rafts</b>	
Equipment No	YA/774A
No. off	Six (6) sets
Type	Davit launched inflatable type contained in GRP container
Make/Model	Viking, 25 DKF
Capacity	25 persons
Location:	
3 sets	Port side lifeboat station on main deck level
3 sets	Starboard side lifeboat station on main deck level
<b>Loads</b>	
Weight (incl. Equipment)	2,100 kg
Davit Load (6 persons)	2,550 kg
<b>Engine</b>	
Make/Model	Perkins - TG.35544
Type	6-cylinder, 4-stroke direct-injected turbocharged marine diesel
Output	136 kW at 2,400 rpm
Waterjet	R.G. Parker (Eng.) Ltd. P.P. Jet, model PP90G
<b>Certificates/Letter of Compliance</b>	
RINA, MMM	
The life rafts are the MMM approved type.	

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Main Particulars of Life Rafts Davits	
Equipment No	YA/778A -B
No off	Two (2)
Type	Revolving gravity type with winch
Make/Model	Tecnimpianti/Schat Davit Company B.V./S.R.R. M.O.B./3.65/2100
Winch	Hand operated (lowering, hoisting)
Capacities:	
$W_e$ = raft with equipment	225 kg
$W_p$ = weight of 25 persons	1,875 kg
$W_f$ = total weight w/25 persons	2,100 kg
<b>Certificates/Letter of Compliance</b>	
RINA, MMM	
The equipment is the MMM approved type.	

For complete instructions, see "Instruction & Maintenance Manual" for boats, liferafts and davits.

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4.2.2.5 Other Life Saving Appliances

The following life saving appliances are provided supplementary to the above.

Item	Qty.	Location
Lifebuoys	11	-
Life jackets	190	Cabins/Muster station
Immersion suit	258	Cabins/Muster station
Line throwing appliance	1	In wheel house
Red hand flare	9	In wheel house
Rocket parachute flare	12	In wheel house
Hand red stars signals	6	In wheel house
First aid kit	10	One in each lifeboat, one in each liferaft
Lifeboat radio Transmitter/Receiver	1	In wheel house
Transmitter/Receiver Radio equipment for internal and ship-to-ship communication (U.H.F. Walkie-talkie)	4	In each lifeboat
	1	In rescue boat
VHF emergency radio beacon, aeromobile frequencies, water-proof floating type	4	In each lifeboat
	1	In rescue boat
	1	Radio room

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### 4.2.3 Emergency Shutdown System (ESD)

#### 4.2.3.1 Purpose

The objective of the ESD system is to ensure the safety of personnel and/or protection of the Unit.

The ESD system will continuously monitors process and utility conditions and will take appropriate automatic actions should these deviate from normal. These actions shall include raising alarms, and shutdown of production, process and/or marine equipment.

#### 4.2.3.2 Shutdown Hierarchy & Logic

The logic of the ESD System will use a four level hierarchy of shutdown, with Level 4 being the most severe:

- Level 1: Partial shutdown of process or utilities
- Level 2: Total shutdown of process without affecting utilities
- Level 3: Total shutdown of process and "non-essential" utilities
- Level 4: Automatic depressurisation and preparation to abandon

The emergency shutdown system for levels 1, 2 and 3 may be operated by hand or automatically. The level 4 operation shall only be hand-operated.

Activities initiated by an ESD hierarchically higher than others will cover the remaining levels as well.

a. **Level 1 Emergency Shutdown (ESD-1) :** Partial process or utilities shutdown

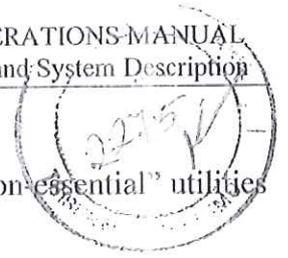
Consists of individual shutdown of equipment or partial shutdown system, process or utilities, caused by a breakdown in the system itself or by the action of other systems.

b. **Level 2 Emergency Shutdown (ESD-2) :** Total process shutdown

Consists of the total shutdown of the process with the automatic shutoff of all the surface SDVs, without any effect on utilities.

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- c. **Level 3 Emergency Shutdown (ESD-3)** : Total process and “non-essential” utilities shutdown.

Consists of the total shutdown of the process and “non-essential” utilities with the automatic shutoff of SDVs, Wing and Master valves.

This ESD level is divided into 2 sub-levels:

- ESD Partial: Power generation and distribution maintained
- ESD Total: Power generation or main power distribution shut off.

- d. **Level 4 Emergency Shutdown (ESD-4)** : Depressurisation and preparation to abandon.

Consists of the total shutdown of the process with automatic closure of SDVs, Wing, Master and SSS valves, automatic depressurisation and shutdown of utilities, except those required for the supply of “essential” AC and DC power. This shutdown can only be initiated by manual operation via ECOS or by the ESD-4 push-button.

ESD-4 can be initiated without activating the acoustic alarm for “Prepare to Abandon”, which is activated by a specific push-button located adjacent to the ESD-4 push-button or through ECOS keyboard.

ESD-4 has the same effect as ESD-3 with the following additions:

- Public Address system overrides all other communications.
- Emergency generator is shutdown.
- Downhole subsea safety valves are closed.
- All non certified safe battery fed systems to be shut down.

The CCR & Radio rooms have been designed as ECC's (Emergency Control Centres). These contain non-certified equipment required to operate after an ESD Level 4 shutdown (Fire & Gas Detection, Radios, PA system). These rooms (and their associated Battery/UPS rooms) are covered by their own independent gas detection system. Gas detection in these rooms will shutdown the affected equipment.

#### 4.2.3.3 Functional Components

The ESD and support systems comprise the following functional components:

- a) ESD Central Control Panel (Remote terminal unit 4), located in CCR.

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- b) ESD Remote Terminal Units (RTU 1, 2, 3, 5 and 6).
- c) Field Instrumentation.
- d) Electrical Power Supplies.
- e) Instrument Air System.
- f) Instrument Hydraulic Oil System.
- g) Redundant Communications Network.
- h) Manual Shutdown Stations (pushbuttons), located as indicated in following table:

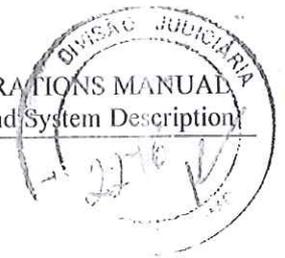
Location	Qty.	Function
Embarkation Room Fwd	1	Level 4
Helideck	1	Level 4
CCR	1	Level 4
	1	Level 3
Radio Room	1	Level 4
	1	Level 3

The ESD push-buttons are connected into three loops as follows:

- a) CCR level 4 and Radio Room Level 4
- b) CCR level 4 and Radio Room Level 4
- c) CCR level 4 and Radio Room Level 4

All field located manual shutdown stations are Ex'd' or Ex'i' and protected from accidental operations by a flap cover. The buttons are stay-put latched type.

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4.2.3.4 Shutdown Levels Summary

Causes	Effects
<b>Post ESD Level 4</b>	
(A) Gas in ECC 1 (CCR) or ECC 1 UPS Room	(A) Shutdown non-Zone 1 rated equipment for ECC 1
(B) Gas in ECC2 (Radio) or ECC2 Room	(B) Shutdown non-Zone 1 rated equipment for ECC2.
<b>ESD Level 4</b>	
(A) Manual PB at: Radio Room CCR	As ESD Level 3 plus: Shutdown Emergency Generator Isolate non-Zone 1 batteries
(B) Manual PB at: Helideck Embarkation Room forward	As above plus: Abandon Unit audible alarm
(C) Manual PB at: FPU Manager Office CCR Helideck Lifeboats	As ESD Level 3 plus: PA override for broadcast Abandon vessel audible alarm Shutdown emergency generator Isolate non Zone 1 batteries
<b>ESD Level 3</b>	
(A) Any ESD Level 4	As ESD Level 2 plus: Shutdown turbo-generators Start emergency generator & isolate emergency switchboard
(B) Fire in Process Area	Isolate process & utilities
(C) Gas in > 1 vent inlet	Blowdown process & utilities
(D) Loss of Instrument Air	Trip & isolate non-essential electrical equipment
(E) Manual PB at: CCR Production Area	Trip & isolate non-essential electrical equipment in production area

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Causes	Effects
<b>ESD Level 2</b>	
(A) Any ESD Level 4 or 3  (B) Oil separators: LoLo pressure HiHi pressure LoLo oil level HiHi oil level  (C) Crude export pipeline: LoLo pressure HiHi pressure	Shutdown & isolate all process & utility equipment to contain hydrocarbons, and limit loss of hazardous fluids, including:  <b>Crude System</b> Test manifold / heater / separator Prod. manifold /prod. separator Oil dehydr / atmos. separator Crude booster pump Crude export pumps/pipeline  <b>Gas Systems</b> Gas Booster comp. train. HP gas comp. trains TEG contactors Gas metering & export Fuel gas  <b>Utilities</b> Heating medium Cooling medium Chemical injection Flare & vent Produced water Drains Seawater injection Glycol regeneration
<b>ESD Level 1</b>	
(A) Local equipment fault	(A) Trip & isolate process or utilities on unit basis
(B) Gas/smoke detection in ventilation	(B) Stop ventilation for area affected
(C) Main zone manual PB's	(C) Stop all ventilation, trip fuel & oil systems as appropriate.

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#### 4.2.3.5 Operation Details

##### A. VENTILATION

The trip is as follows:

The ESD system energises an MCC 24 VDC relay which opens a contact to trip the fan motor and de-energise the 110 VAC solenoid valve of the dampers. A contact from the dampers closed limit switch opens to feed back confirmation to the ESD system.

The reset procedure is as follows:

1. Clear cause of shutdown on ESD system.
2. Operate reset at ESD system. This energises the damper solenoid valve. The damper remains closed at this point.
3. Manually reset dampers pneumatic supply local to the damper. The fan will not automatically re-start.
4. The fan is now enabled for manual start at the CCR HVAC panel (or MCC if MCC selected to local).

##### B. SHUTDOWN PHILOSOPHY FOR VENTILATION IN CASE OF GAS DETECTION

###### CASE 1- NON HAZARDOUS ROOM. EXHAUST IN NON HAZARDOUS AREA

In case of detection of SMOKE or TOXIC gas or COMBUSTIBLE gas, the ventilation fan is stopped, the ventilation exhaust is stopped and the relevant dampers are closed.

###### CASE 2- NON HAZARDOUS ROOM EXHAUST IN HAZARDOUS AREA

The logic of shutdown is as per case I with the following addition. If the ventilation is running or the exhauster is running or both are running (normal case), there is an airflow through the exhaust outlet, therefore any external gas accumulation around the outlet will not cause any backflow. Should both the ventilation and exhaust fans be stopped, then gas might enter through the outlet. To prevent this, an electrical interlock is provided between the ventilation fan starter and the exhauster fan starter such that:

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- if both the a.m. machines are stopped then the exhauster damper will be closed (to prevent backflow)
- after shutdown/stop of both machines, the ventilation fan is started first, then the damper may be re-opened and the exhauster re-started

### *CASE 3- HAZARDOUS ROOM*

Detection of smoke or gas in the ventilation inlet stops the ventilation fan and closes the relevant damper. The exhaust will continue running to keep the hazardous room depressurised.

Detection of gas inside the room or in the exhaust outlet gives alarm only.

### *C. AIR CONDITIONING*

The principle is similar to the ventilation. Each air conditioning group is served by one fan, one or more exhauster, one or more heaters, all powered by a "multiple" starter. The group is stopped energising one relay with NC contact, like the ventilation starters. Furthermore, as the compressors are serving more than one air conditioning group, there is an electrical interlock that trips the compressor if all the air conditioning groups served by it are stopped.

### *D. FUEL AND OIL PUMPS*

Fuel and oil pumps can be stopped and the fuel shut-off valves can be closed on a major zone basis (see Level 1).

The pump is tripped energising a relay in the relevant starter.

"Pump stopped" feed back (contact in the starter) is given to the ESD. The valve is closed energising a relay; the "Valve closed" feed back is given to the ESD by means of an auxiliary contact. The a.m. valves and pumps are normally controlled by the vessel automation system. The ESD overrides it.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL.

### *E. VARIOUS MARINE SYSTEMS*

- Oily water separator.
- Incinerator.
- D.O. purifiers.

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The shutdown of the a.m. equipment is to be achieved by opening a loop in a circuit in the relevant control panels.

*F. TURBO-GENERATORS*

The shutdown is performed by the Turbine control panel.

*G. BATTERY CHARGERS AND UPS*

The feeder to the charger is powered by the main or the emergency power net on board. It will be de-energised at Level 3 (if from main) or 4 (if from emergency).

The battery will be disconnected energising the shut-trip coil of the relevant breaker. For batteries to be disconnected at Level 4, the a.m. circuit breaker will be enclosed in an Exd box. Status (open) of the breaker will be given to the ESD.

*H. EMERGENCY DIESEL GENERATOR*

To shutdown the EDG the following sequence will be done:

- 1) open the main circuit breaker
- 2) issue an ESD command to the cabinet
- 3) after 1,5-2 minutes, disconnect the battery supplying the EDG control cabinet to prevent EDG restart.

*I. PRODUCTION EQUIPMENT*

1) Electrical

Motors, heaters, etc. are tripped at the relevant MCC/switchgear by removing a 24 V DC signal applied to a dedicated ESD relay during normal, healthy operation. These ESD relays are located in the MCC switchgear.

2) Process Valves

ESDV block valves and BDV blowdown valves will be in normal operating position by 24 V DC signals powering the associated solenoid valve (50 V). Removing the 24 V DC signal (trip or failure) will cause a valve to go to its fail-safe position.

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### 3) Local Control Panels (LCP's)

Some production systems have on or off-skid local control panels. Control logic within these panels will be tripped by the ESD system either by opening a volt-free contact or removing 24 V DC from an LCP located relay. In all causes removal of power causes equipment to go to its "fail-safe" state.

#### 4.2.3.6 System Diagnostics

Diagnostic routines are provided; they can be separated into off-line / start-up diagnostics and on-line continuous diagnostics.

##### A. INTERNAL FAULTS

The correct function of the system is continually monitored and any faults annunciated on the system printers.

Main internal faults monitored are:

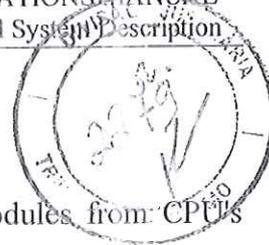
- - Internal power supplies healthy
- - Fusefail
- - MCB tripped
- - Cabinet high temperature
- - Main processors healthy
- - Watchdog healthy
- - Modbus link healthy
- - Autotest Fault
- - LAN healthy

##### B. EXTERNAL FAULTS

An additional volt-free contact is provided from each system representing external faults. This contact is normally closed and opens if any line-monitored input or output is in fault. A common alarm signal is given on a dedicated page for each system and the Tag No. of the input/output in fault will appear on the system printer.

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#### 4.2.3.7 System Repair

The system has been designed to allow the on line changing of all modules, from CPUs input/output cards and power supplies. These repairs can be accomplished with ease whilst on-line and without powering down the system.

##### A. CONTROL COMPUTER BOARD (ICCB) REPAIR

- Remove faulty ICCB.
- Plug in replacement ICCB.
- Allow internal off-line diagnostics to complete (traffic light sequence).
- Warm start ICCB.
- New ICCB is now operational.

##### B. INPUT/OUTPUT (I/O) CARDS

- Have to hand replacement I/O card.
- Operate maintenance switch of card to be replaced.
- Remove old card.
- Plug in replacement card.
- Operate replacement card maintenance switch.

##### C. CPU POWER SUPPLY MODULE

- Turn off isolator switch on faulty module.
- Unplug power supply modules.
- Plug in replacement module.
- Turn on isolator switch on replacement module.
- Warm start ICCB.

##### D. INPUT/OUTPUT RELAYS

- Unplug faulty relay.
- Plug in replacement relay.

For further details, refer to ESD system technical manual.

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#### 4.2.4 Escape System

*Ref: Doc No.: DE-3010.38-5400-947-AMK-110 to -114; Escape Routes*

The design of escape routes is according to applicable rules and regulations and is also shown on plans onboard. Escape routes are shown leading to temporary safe refuge in the accommodation area.

#### 4.2.5 Medical Equipment

##### 4.2.5.1 Hospital

The hospital is situated on the second deck port side. The hospital contains two single berths and two double berths, and it is further equipped with refrigerator, lockers for medicine etc.

An alarm button signalling in the Control Room is provided over each bed.

##### 4.2.5.2 Medical and Dental Equipment

The FPU is equipped with medical and dental equipment according to MMM regulations and Petrobras standards. Instruction books for all the equipment shall be filed in the hospital and shall be readily available for the Medic Clerk.

Medical supplies consist of medicines, disinfectants, chemical reagents, dressings and nursing requisites and a small number of instruments, for examination and limited surgery.

First-aid equipment is also distributed in other places on the FPU, according to the rules.

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### 4.3 PLATFORM SERVICE SYSTEMS

All systems described in this section are designed to operate under the following conditions.

1. Roll 22,50
2. Pitch 22,50
3. Period 12 sec
4. List 15°
5. Trim 15°
6. Ambient temperature   inside           0° to +50°C  
                                  outside       -20° to +50°C

#### 4.3.1 Ballast System

*Ref: DE-3010.38-5334-944-AMK-543 to 546: P&ID Ballast System, and  
Fig. 4.3.1: Ballast System Diagram.*

40 ballast tanks, inside the pontoons and columns, ensure a proper ballast service for the FPU.

In the fore and aft end of each pontoon two pump rooms are provided connected to each other by a crossover pipeline.

Another crossover pipeline ensures the connection between the aft pump rooms of each pontoon (this line runs through the aft horizontal bracing).

One ballast pump (XA/414 A-D) is arranged in each pump room complete with remote control and monitoring both from ECOS and BMP (Ballast Mimic Panel). Four ECM's (Emergency Control Mimic) ensure the possibility of emergency operations. Double level transmitters arranged on board give remote level indication of each ballast tank.

In order to prevent water hammer damages, an automatic valves sequence is used by ECOS.

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Table 4.3.1.1 - Ballast Pumps Main Characteristics

Equipment No.		XA414 A-D
Manufacturer		Garbarino
Model		MU 200/500
Capacity	m <sup>3</sup> /hr	590
T.M.H.	m	30
Speed	rpm	1750
Electric Motor Power	kW	90

#### 4.3.1.1 Ballast Plant Start

- 1) The operator chooses and opens the relevant sea chest on duty valves.
- 2) The operator starts the pump which does not run until pump suction side valve is opened.
- 3) About 8-10 sec. after starting the pump, the throttling type delivery valve slowly opens.

#### 4.3.1.2 Ballast Plant Stop

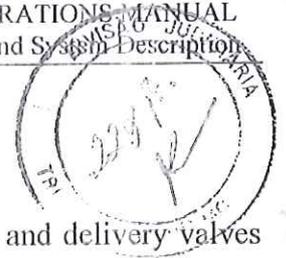
- 1) The operator stops the pump and at the same time, the suction line valve closes.
- 2) About 8-10 sec. after stopping the pump, the throttling type delivery valve slowly closes.

In each pump room suction and delivery pipes are connected to seawater circulating pipes and relevant seawater pumps (XA/039 A-D) in order to ensure emergency ballast operations by sea water system.

#### 4.3.1.3 Control Mode Philosophy

- 1) Keyboard

From this position it is possible to operate the valves individually putting the auto-manual software selector in manual position, without any interlock.



2) BMP

From this position the pump starting is interlocked with the suction and delivery valves only. No individual control of the above valves is possible.

3) ECM

No automatic sequence is provided for operations from this PNL.

#### 4.3.1.4 Electrical Supply

Electrical power supply to ballast pumps and to seawater/ballast pumps is shown on diagram of Fig. 4.3.2.

Note that the electrical power supply system is designed to ensure ballast system operation at the following inclinations:

- 22.5° for the main power supply
- 35° for the emergency power supply

#### 4.3.2 Bilge System

Ref: Doc Title: *Bilge Piping System*

Doc. No: *DE-3010.38-5331-944-AMK-540-01 to 07*

The bilge system is shown in Fig. 4.3.3: Bilge System Diagram.

Two bilge systems are provided:

- Automatic bilge (automatic operation).
- Rule bilge (manual operation).

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Table 4.3.2.1 - Bilge Pumps Main Characteristics

Equipment No.		XA414 A-H	XA412 A-D	XAJ49A-B
Manufacturer		Garbarino	Garbarino	Garbarino
Model		MU40/250LMP	MU80/315	
Capacity	m <sup>3</sup> /hr	27,6	90	4,97
T.M.H.	m	30	35	40
Speed	rpm	1750	1750	1750
Electric Motor Power	kW	6,7	18,5	3,5

**4.3.2.1 Automatic Bilge**

An automatic bilge system is provided for each thruster room and each pump room.

Each space has a high capacity bilge well which collects the bilge water.

From each bilge well an automatic bilge pump (XA/411 A-H) takes suction.

Each bilge well is provided with a 3-contact type level switch for the automatic operations as follows:

<b>HH (High-High Level)</b>	<ul style="list-style-type: none"> <li>- Alarm in ECOS (1).</li> </ul>
<b>H (High Level)</b>	<ul style="list-style-type: none"> <li>- Automatic bilge pump starting.</li> <li>- Valve (SE*003 VD) on the delivery line opened.</li> <li>- Valve (SE*012VX) to the bilge holding tank opened.</li> <li>- Valve (SE*017 VF) to the separator tank closed.</li> <li>- Valve (SE*033 VF) for O.B. discharge closed (see rule bilge operation).</li> </ul>
<b>L (Low Level)</b>	<ul style="list-style-type: none"> <li>Automatic bilge pump stopping.</li> <li>- Valve (SE*030 VD) on the delivery line closed.</li> </ul>

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The water collected by the automatic bilge system is discharged into the bilge holding tank (one for each pontoon, arranged in the aft pump room double bottom).

Each bilge holding tank is provided with a 3-contact type level switch for the following automatic operations.

HH (High-High Level)	- Alarm in ECOS
H (High Level)	- XA/411 automatic bilge pump stopping.
L (Low Level)	XA/412 rule bilge pump stopping when used for bilge holding tank discharge (to shore or to the separator tank)

An "excessive running" alarm in ECOS is provided for each automatic bilge pump (XA/411).

Each automatic bilge sump well in thruster room is provided (as per Classification Soc. request) with a separate level switch for HH alarm in ECOS.

The above level switch for the pump rooms is located close to separate bilge suction.

The above mentioned operations are classified as "automatic bilge".

Fore and aft thruster-pump rooms are connected by cross-over pipes either for suction and discharge lines.

Two O.B. discharge lines are arranged on the delivery cross-over for each pontoon.

This configuration gives the possibility to take suction from aft to fwd and vice-versa.

When automatic or rule bilge pump is started, ECOS opens the SE\*034 VF valve arranged between the aft and fore sides of the delivery crossover pipe to allow the above operation.

#### 4.3.2.2 Rule Bilge

Bilge wells, with H (high) level alarm switch, are provided inside pontoon spaces where bilge suction is required.

No automatic operation is foreseen.

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The operator, after the H level alarm acknowledgement, can remotely start the bilge pump (XA/412 A-D) and open the relevant suction valve on the suction manifold.

Four bilge pumps (one for each pump room) are provided.

When the bilge pump is started, ECOS provides for the following automatic valve sequence:

- Bilge holding tank valve (SE\*012 VX) closed.
- Valve to separator tank opened (SE\*E017 VD).

The bilge holding tank, which is part of the automatic bilge system, is in this case cut-off.

The delivery line of each XA/412 bilge pump is provided with an oil detector connected to ECOS.

If the oil content in bilge water (when the pump starts, oil detection starts) is above 15 p.p.m., the O.B. discharge valves are kept in closed position (to prevent oily water O.B. discharge) and the bilge water is led into the separator tank (one port and one stbd arranged inside the platform inner bottom).

If the oil content in bilge water is below 15 p.p.m., ECOS closes the valves (SE\*017 VD) to the separator tank and opens the O.B. discharge valve. In this case the (clean) bilge water is discharged into the sea.

In presence of "excessive running" alarm for the automatic bilge pumps, or HH (high-high) alarm in thruster or pump room automatic bilge sump wells, the operator can manually and remotely start the XA/4 12 bilge pump. This pump directly takes suction from the above bilge wells (also automatic bilge pump can be started-stopped remotely).

In this case the valve sequence is the same as described above.

#### 4.3.2.3 Oily Bilge Water Treatment

The bilge water of the bilge holding tank can be discharged into the separator tank using the bilge pump XA/412 for the oil separation service.

With the waste oil pump, the oily water can be discharged to the shore through the relevant station on main deck.

Each separator tank is connected to a separator (XA/428 AA-BA), complete with pump (XD/428 AB-BB) and oil detector unit.



The separator tank is provided with a double level transmitter (redundancy) for the following automatic operations:

*Remote Level Indication*

<b>HH (High-High Level)</b>	Alarm in ECOS
<b>H (High Level)</b>	Starting of the separator pump (treatment in progress)
<b>L (Low Level)</b>	Stopping of the separator pump (treatment stop)
<b>LL (Low Low Level)</b>	XA/149 waste oil pump. Stopping when used for discharging bilge water to the shore

The cleaned water from the separator is directly discharged outboard into the sea if the oil detector measures an oil content below 15 p.p.m. Otherwise, in case of oil content above 15 p.p.m., the oil detector, by means of a 3-way valve, passes the oily water back into the separator tank giving an alarm to ECOS.

The dirty oil from separator is discharged into a waste oil tank (one for each separator) provided with two separated level switches for the following operations:

<b>HH (High-High Level)</b>	Alarm in ECOS
<b>H (High Level)</b>	Starting of the separator pump (treatment in progress)
<b>L (Low Level)</b>	Waste oil pump XA/149 stopping when used for dirty oil discharge to shore, to the sludge tank or to the incinerator plant.
<b>LL (Low Low Level)</b>	XA/149 waste oil pump. Stopping when used for discharging bilge water to the shore

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The upper-hull double bottom is provided with a separate bilge system.

Suction is taken by some ejectors fed with seawater (from SW circulation) and connected to the SW ring by a flexible hose during the bilge operation.

The valves on the ejectors are hand-operated only. Ejector for bilge suction, and H level alarm switches, are provided for bilge service inside low spaces of central caisson; valves on bilge wells are remote controlled.

#### 4.3.2.4 *Leakage Detection for Bracings*

In case of presence of water inside the bracings, the water will flow through the relevant pipes to roper receivers arranged above the cut-off valve (which is always kept in closed position). On the receiver there is a level switch which detects the water presence giving an alarm in ECOS. Opening the a.m. cut-off valve, the water flows to the pump room bilge well (connected to the automatic bilge system).

#### 4.3.2.5 *Leakage Detection for Voids*

Leakage of water into the voids is detected by their respective high level alarm switches or by sounding pipes. The water collects in sumps built into the void floor. The sumps are provided with drain lines with remotely (ECOS) operated valves to drain the water to the bilge sumps in the thruster room or pump rooms.

### 4.3.3 Diesel Oil System

Ref: Doc Title: P&ID Diesel System  
Doc. No: DE-3010.38-5133-944-AMK-525-01 to 05  
DE-3010.38-5133-944-AMK-521 to 524-01  
DE-3010.38-5133-944-AMK-475

Diesel oil system is shown also in simplified form on Fig. 4.3.4.

Diesel oil is carried in tanks located in the port and starboard hulls. Each pump room is provided with one pump to enable transfer between hulls and discharge to the service header, deck fill connections and storage and day tanks.

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**Table 4.3.3.1 - Diesel Oil Transfer Pump Main Characteristics**

Equipment No.		XA/148 A-D
Manufacturer		Garbarino
Model		MU40/250LMP
Capacity	m <sup>3</sup> /hr	37,6
T.M.H.	m	50
Speed	rpm	3470
Electric Motor Power	kW	8,5



The diesel oil transfer pumps (XA/148 A-D) are operated remotely from the ballast control console along with all valves indicated as being power operated.

Diesel oil tanks in the lower hulls have remote level indication displayed on the ballast control console. The diesel oil day tank and settling tank are provided with high-low level alarms arranged to sound and display in the ballast control room.

#### 4.3.4 Lube Oil System

*Ref: Doc Title: P&ID Lube Oil Piping System*

*Doc. No: DE-3010.38-5250-944-AMK-532-01 to.06 (Fincantieri drawing)*

*DE-3010.38-5133-944-AMK-521 to 524-01*

The lube oil system includes lube oil piping and storage tanks. A simplified diagram of the system is shown on Fig. 4.3.5.

Storage tanks are listed in the following table.

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4.3.4.1 Lube Oil Tanks List

Equipment No.	Service	Capacity [litres]	Location
XA214	Air compressors	900	Second deck
XA216	Gas turbine	900	Main deck
XA230	Daily service	700	Drill floor
XA231 A	Mooring windlass	300	Second deck
XA231 B	Mooring windlass	300	Second deck
XA231 C	Mooring windlass	300	Second deck
XA231 D	Mooring windlass	300	Second deck
XA233	Emergency generator	600	
XA243 A	Injection water	900	Lower Hull
XA243 B	Injection water	900	Lower Hull

The main gas turbine engines are arranged for gravity filling from drums that are located and stored on the main deck.

Drain oil from the gas turbine engines and the emergency diesel generator is piped to waste oil tank.

Fill lines are installed for the lube oil tanks terminating on the main deck near machinery spaces arranged for a hose connection and/or funnel for dumping in drums of oil.

The oil storage tanks are fitted with level gauge and trays for filling hand oilers. Bolted oil tight access plates are provided for cleaning the inside of tanks.

A motor driven waste oil pump is provided to facilitate emptying the sludge tank. The discharge from the dirty oil pump is led to a deck connection for discharge to barges or drums.

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### 4.3.5 Seawater / Freshwater System



Ref: Doc Title: *Seawater / Freshwater System*  
 Doc. No: *DE-3010.38-5111-944-AMK-516-01 to 07*  
*DE-3010.38-5111-944-AMK-331 to 339*  
 Doc. Title: *Freshwater/Process Cooling Piping System*  
*DE-3010.38-5120-944-AMK-517-01 to 04*  
*DE-3010.38-5111-944-AMK-341-343,345-348*

Refer to Process Operating Manual for detailed description and operation.

Table 4.3.5.1 - Seawater / Freshwater Pumps Main Characteristics

		Seawater		Freshwater/Process Cooling	
Equipment No.		XA039 A-D	B-511102A-C	XA054 A-B	XA054 A-B
Manufacturer		Garbarino	Frank Mohn	Garbarino	Ahlstrom
Model		QVK 18/320	SE300H	MU250/400	APT54-16
Capacity	m <sup>3</sup> /hr	1550/590	1642	1150	2500
T.M.H.	m	75/34	64.4	55	44.3
Speed	rpm	1750/1150	1770	1750	1200
Electric Motor Power	kW	520-130	600	290	450

#### 4.3.5.1 Seawater Service System

(See Fig. 4.3.6)

The seawater service requirements of the vessel are supplied by the seawater service pumps (XA/039 A-D), located in each of the pump rooms in the lower hulls and by the Seawater Supply Caisson Pumps (B-511102A-C) in the central caisson.

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The pumps are capable of supplying the complete system plus stand-by requirements with further stand-by, at reduced capacity, furnished by the ballast water pumps

The seawater service pumps (XA/039 A-D) may run in high or low speed conditions. They take water from the four low sea chests or the four high sea chests dosed with hypochlorite and pump to a common ring main located in the inner bottom.

The seawater service system supplies cooling water to freshwater cooling system plate coolers and various services including the following: watermakers, air compressors, sanitary system pressure set, diving equipment, and washdown outlets. Some of the water rises to the main deck to join the water from the caisson pumps. The water header on the main deck serves the process cooling water system plate exchangers, riser pull-in winches, gas boost compressor auxiliaries and hose stations.

In addition to satisfying the cooling and service water requirements of the vessel the seawater service system is actuated as a booster supply, providing water to the fire pumps. Two of the seawater service pumps are always available to operate with two of the four fire pumps for fire service.

The seawater service pumps and their related valves in the lower hull pump room are remote operated from the ballast control console. The caisson pumps are remote operated from ECOS and have automatic discharge valves and anti-biofoulant dosing valves opening on pump start and closing on pump stop.

For the seawater service pumps, the operator will decide how many pumps to set on duty (2 or 3) and which one will be the stand-by (in case of three pumps on duty the remaining one will be automatically the stand-by). ECOS system will supervise that this condition is always true and starts the stand-by unit in case of any of the following conditions:

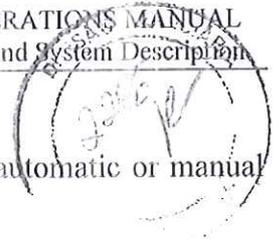
- On duty pump tripped
- Main ring low pressure
- On duty pump delivery pressure low

The pumps could also be individually controlled by setting the manual-automatic software change over to manual.

Each of the four pumps when running sends via ECOS a signal to the chlorinator unit, that will dose the hypochlorite according with the pump speed.

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Some interlocks are provided in the pump starting sequence, either in automatic or manual control.

In case of fire the control of the pumps and of the relevant valves is taken over by the fire fighting control system by inhibiting the control from ECOS.

The seawater pumps electric motors are powered from 440V main switch boards and from emergency switchboards as shown on Fig. 4.3.2.

The starboard fwd seawater service pump (YA/039C) and port aft pump (YA/039B) are connected to the emergency switchboard. These pumps also serve as emergency ballast pumps.

The seawater system has been enlarged by the addition of the three seawater supply caisson pumps (B-511101A-C) to satisfy the additional cooling required by the process plant.

The caisson pumps are of the vertical submerged motor type in caissons inside the central caisson. The pumps lift water from the caisson to the manifold on the tank top. The discharge manifold feeds the seawater distribution header on the main deck which is also fed from the seawater service pumps ring main. The seawater passes through the Central Process Cooling Exchangers (P-512401A-D) and discharges to the sea via the Seawater Coolant Dump Caisson (TD-511103) on the starboard side.

The seawater is dosed with copper and aluminium ions by the anti-biofouling unit (UE-512101) which is regulated by the pump status logic in ECOS.

#### 4.3.5.2 Freshwater System

Ref: Fig. 4.3.7

Two separate freshwater systems are provided: the freshwater service system and the process cooling system.

##### *Freshwater Service System*

The purpose of the freshwater service system is to circulate fresh cooling water in a closed circuit to the cooling systems of the various platform facilities i.e. air conditioning, winches, turbo-generators.

Two Freshwater Pumps (XA/054 A-B) are provided; one on duty and one on stand-by.

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The stand-by pump starts automatically if the first pump is tripped or by the low pressure alarm in the upper ring.

Freshwater is circulated from the common manifold through a F.W. cooler and pumped by one of two pumps to a common outlet manifold where all the users are directly connected via manual valves. The circuit is provided with F.W. expansion tank (XA/076) and chemical dosing tank (XA/072) located on the derrick structure.

The cooler is provided with a three-way thermostatic by-pass valve, set at 36°C. Temperature transmitters are arranged, giving an alarm at 40°C.

By means of ECOS the Operator is able to control the main pumps and monitor the pressure and temperature by the above listed transmitters.

#### *Process Cooling System*

The process cooling system on the main deck is provided for cooling the compressor discharge gas and the compressor and oil pumps auxiliaries.

Water is circulated by 2 of 3 Process Cooling Circulation Pumps (B-512401A-C) through the Central Process Cooling Exchangers (P-512401A-D). The water is cooled from 45 to 32°C and distributed to the users.

The circuit is provided with an expansion vessel (V-512401) on the derrick structure. The system shares a make-up and chemical dosing facility with the heating medium system.

#### **4.3.6 Exhausts and Inlets**

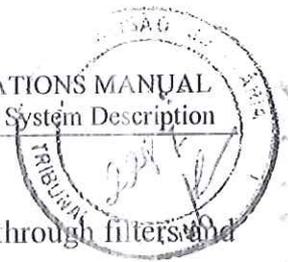
The 3 main generator gas turbine air inlet and exhaust systems are led vertically through the main deck, the exhaust outlets being direct outboard.

Both the ventilation and combustion air systems are provided with filters and silencers.

Waste heat recovery units (WHRU) are installed on two generators (XA/275A and C). All exhaust and inlets are provided with sufficient flexible connections and are adequately supported.

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The three compressor gas turbines on the main deck draw air horizontally through filters and silencers from the aft end and discharge the exhaust gas vertically. All three compressor turbines are provided with WHRU.

#### 4.3.7 Steam, Condensate and Feed System

The system has been removed from the vessel.

#### 4.3.8 Potable Water System

*Ref: Doc Title: Potable Water Piping System Diagram*

*Doc. No: DE-3010.38-5130-944-AMK-518-01 to 06 (Fincantieri drawing)*

The potable water system is shown in the simplified diagram of Fig. 4.3.9.

The potable water system provides water for all plumbing fixtures throughout the vessel, excluding flushing for all toilets and urinals, which use seawater from sanitary pressure set.

The non-chlorinated cold water supply provides make-up for diving area and other machinery services as required. A branch from the water supply is provided to the fuel oil purifiers for priming.

Potable water is also used for make up of the freshwater cooling and heating medium systems and for supplying the high pressure cleaning system (see below).

Washdown outlets are provided in the galley and on the house sides port and starboard in the accommodation area.

The two potable water transfer pumps (XA/103 A-B), one in the port and one in the starboard aft columns are used to discharge water from the columns to the independent potable water tank in the upper hull. The system has provisions for transfer between port and starboard column potable water tanks.

The potable water service pumps (XA/461 A-B) take suction from the independent potable water tank and discharge to the various fixtures and services throughout the vessel. Pressure in the system is maintained by the pressure set (XA/461). Start and stop of the pumps are controlled by pressure switches.

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The controls are arranged such that under normal conditions only one pump is in operation. The potable water may also be produced from seawater by the water maker units (XA/107 A-B).

The hot water from each deck is piped back to the hot water circulating pump (XA/445 A-B) and each return is fitted with a balancing cock. An ultra-violet sterilizer unit (see para. 4.8.3) and a chlorinating unit (XA/727) are installed in the potable water supply header.

*HP Cleaning System*

Ref: Doc. No.: P&ID DE-3010.38-5128-944-AMK-453

The system provides hot or cold high-pressure water to seven (7) washdown hose station. Potable water is fed via an electric heater to the reservoir. The water is maintained at 77°C by circulating the water through the temperature-controlled heater. The water is pumped from the reservoir to the distribution header at 207 barg by the double headed HP feed pump.

**Table 4.3.8.1 - Potable Water /Hot Water Pumps Main Characteristics**

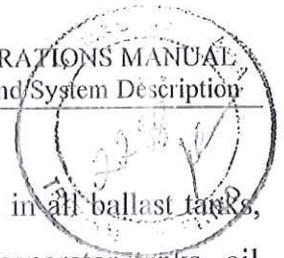
Equipment No.		XA103 A-B	XA461 A-B	XA445 A-B
Manufacturer		Garbarino	Garbarino	Garbarino
Model		MU32/160M	MU32/160ME	MU25/160M
Capacity	m <sup>3</sup> /hr	13.8	20	2,4
T.M.H.	m	40	42	10
Speed	rpm	3500	3500	1750
Electric Motor Power	kW	6.7	6.7	0.67

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**4.3.9 Tank Level and Draft Indicating System and Tank Soundings**

One complete independent tank level indicating system, with sensors installed inside each tank is provided on board.



This system is the electronic type. Tank level transmitters are installed in all ballast tanks, drill water tanks, diesel oil storage hull tanks, potable water tanks, separator tanks, oil overflow tank and draft gauges. The analog output signal from these gauging devices is transmitted to ECOS and displayed on the CCR consoles.

Level and draft indications are displayed on the console in the Central Control Room. Draft sensors are located in separate compartments in the lower hulls. (See also para. 4.6.7.7 - Tank gauging system).

#### 4.3.10 Compressed Air System

*Ref: Doc Nos: DE-3010.38-5134-944-AMK-526, -527, 528-01 to 07  
DE-3010.38-5134-944-AMK-484-01 to 02  
DE-3010.38-5000-944-AMK-452*

See also simplified schematic diagram Fig. 4.3.10.

The compressed air system is supplied by three screw type compressors, each one with a power of 155HP.

The three air compressor units are arranged in a skid together with the seawater cooled air coolers, filters, dehumidifiers, wet air receiver, control panel and all the relevant accessories.

A second skid contains one horizontal 10m<sup>3</sup> dry air receiver.

From the dry air receiver, two headers are provided to supply utility air and instrument air.

The pressure of the instrument air header is regulated at 7.6 barg. The utility air header operates at the same pressure as the receiver and is shut off if the receiver pressure falls below 6 barg.

The utility air header supplies the following users:

- production plant users
- emergency diesel generator (starting)
- mooring windlasses
- pneumatic whistle
- incinerator (sludge atomizing)
- generator waste heat recovery units

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- air winches
- helicopter transportable refuelling system
- fire dampers control
- deluge tank

**NOTE:** The emergency diesel generator is normally started by using the compressed air supplied by the main compressed air header; a dedicated air compressor has been provided for the "cold" starting of the emergency diesel generator.

**Table 4.3.10.1 - Air Compressors Main Characteristics**

Manufacturer	Ingersoll-Rand
Type	Rotary screw, single stage
Model	S970 HH
Inlet Pressure	ambient
Capacity	1260 m <sup>3</sup> /h
Discharge Pressure	10 barg
Driver Type	electric motor
Driver Power	155 kW
Driver Speed	1785 rpm
Operating Ambient Temperature	0 to 50°C

### 4.3.11 Open Drains

*The Open Drains system is shown on drawings:*

- Exterior Deck Drain Piping System: DE-3010.38-5336-944-AMK-547-01 to -07
- Interior Deck Drain Piping System: DE-3010.38-5336-944-AMK-549-01 to -07
- Gravity Drainage Piping System: DE-3010.38-5336-944-AMK-548-01 to -04
- Skim Pit: DE-3010.38-5336-944-AMK-390
- Tank Top Deck Sump: DE-3010.38-5336-944-AMK-393
- Hazardous Open Drains: DE-3010.38-5336-944-AMK-394, -395
- Production Caisson: DE-3010.38-5336-944-AMK-397
- Deluge Drains Collection: DE-3010.38-5336-944-AMK-399

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Refer to Operating Manual for detailed description and operation.

*A. WATER AND INTERIOR*

Drains are provided in all spaces and on all decks where water or oil can accumulate. The drains are divided into two categories, clean and contaminated, which are each divided into two systems, hazardous and non-hazardous. Clean drains are piped overboard and contaminated drains are piped to the contaminated drain-collecting tank.

Deck drains are fitted with a removable strainer plate.

Clean drains are those such as quarters deck, house top and interior quarters deck drains other than W.C. spaces, etc. These may be connected into the clean plumbing deck drains and piped overboard. Weather deck drains are piped into a lower deck drain and not spilled on deck. Drains are provided at all exterior doors and vestibules.

Helicopter deck has a separate drain overboard.

Deck drains from flats in the caissons are led overboard via reach-rod operated stop check valves.

Special deck drains are installed in areas which were to be subject to mud spillage prior to the removal of the drilling equipment, such as the sack storage area and mud processing pump areas.

*B. CONTAMINATED DRAINS*

*(See Fig. 4.3.11)*

The contaminated deck drain system is provided to eliminate the overboard discharge of oily water and other contaminants from spaces such as the interior of all machinery coamings (generators, hydraulic units, watermakers, etc.), generator rooms, machine shop, drill floor, main deck below drill floor and pipe rack, etc.

Contaminated drains are piped to skim pile (YD/73 1A)

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A pneumatic pump (YD/731C) is provided to pump the separated oily water from the skim pile to the matrix separator (YD/731B). Water from the separator is drained overboard and oil is piped to the waste oil holding tank for pumping by YD/731E to the production plant.

Open drains in the processing on the main deck are routed to the Hazardous Open Drains Drum (V-45001) and pumped by P-45002A-B to the produced water degasser.

Process skids provided with deluge water have drains which are routed to the Production Caisson (TD-533601). Oil is separated with floatation gas and the clean water with <20ppm oil discharges to the sea. The oil is removed under level control by pump B-533606A-B to the closed drains system.

Open drains from the tank top aft extension which are too low to enter the hazardous open drains header, are collected in the Tank Top Deck Sump tank (V-533605) and pumped by pump B-533605 to the closed drains system.

#### C. *PLUMBING & SEWAGE PLANT*

Plumbing drains are divided into two categories: clean and soil. Clean drains are all interior drains other than soil. Soil drains are those from toilets, toilet space deck drains, urinals and hospital lavatory, and hospital shower.

Clean drains are discharged overboard. Soil drains are piped to the sewage treatment plant.

All drains piped to the sewage treatment plants are capable of being led overboard directly.

Two 50% capacity sewage treatment plants, suitable for a complement of 130 men, are provided overboard.

#### 4.3.12 Swimming Pool

The swimming pool is located on the main deck in the accommodation area. The water is seawater, supplied by manually controlling the mixing of warm seawater from the process cooling water exchangers with cold seawater to give the required temperature. The water from the swimming pool overflows to the sea.

## 4.4 DECK MACHINERY



### 4.4.1 Mooring System

#### 4.4.1.1 General

The unit is provided with a 16-point mooring system.

The configuration is:

- four windlass sets (one master and three slaves) at each corner of the FPU:
  - port aft: YA/751A + GN-665101A
  - port fwd: YA/751B + GN-665101B
  - starboard aft: YA/751C + GN-665101C
  - starboard fwd: YA/751D + GN-665101D
- four swivel fairleads at each column suitable for 90mm Gr. R4 chain:
  - port aft: YL/751AA-AC + Z-665101A
  - port fwd: YL/751BA-BC + Z-665101B
  - starboard aft: YL/751CA-CC + Z-665101C
  - starboard fwd: YL/751DA-DC + Z-665101D
- four temporary anchors at each corner for temporary mooring

Each windlass set has a control house. Instruments and alarms are duplicated for remote monitoring in the CCR. Anchor emergency release systems are available from the CCR and locally in the control house for the winches. There is no bitter chain end in the chain lockers in order to allow for quick emergency release of the mooring lines.

The anchor system is connected to ECOS as described in paragraphs 4.6.9 and 4.6.10 of this Manual.

#### 4.4.1.2 System Components

The system components are:

##### A. ANCHOR WINDLASS

- Maker: Hydraulik Brattvaag

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- Quantity: 4 sets
- Type: BO 904 L-RL/ BO 904 R-RL
- Weight: 111,370 kg each set incl. power pack and control cabin

Each set of four windlass units consists of:

- One master windlass with power-pack and cabin.
- Two slave windlasses with hydraulic motor.
- One slave windlass without hydraulic motor
- Main power pack motor.
- Power pack servo unit.
- Emergency power pack servo unit.
- Boost pump.
- Local control panel.
- Plates for chain stopper (3 off).

*B. ANCHORS (TEMPORARY MOORING ONLY)*

- - Type: Stevpris MK3
- - Number: 4 (in temporary configuration)
- - Mass per anchor: 18 tonnes

*C. ANCHOR CHAIN WITH ACCESSORIES (HOLD – PETROBRAS TO CONFIRM DETAILS)*

- 16 off studlink chains, 90mm x 450 meters continuous length, Grade R4.
- 12 off "Kenter" links, 90 mm Grade R4.
- 4 off swivel shackles.
- 4 off three link adapters each consisting of: 1 end link, 1 enlarged link and 1 common link.
- 12 off D-type joining shackles with the bolt notched to break at a load of 100 m/t.

**4.4.1.3 Specifications**

- Max. Stalling Load: at least 377 tonnes
- Max Hoisting Capacity: at least 340 tonnes at 0 - 2.7 m/min
- at least 156 tonnes at 0 - 4.5 m/min
- at least 60 tonnes at 0 - 8.9 m/min

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**NOTE:** When powered by only one pump, the windlasses achieve the same pull capacities at approximately half the speed quoted above.

- Max Hoisting Speed: at least 0 - 2.7 m/min at 156-340 tonnes  
at least 0 - 4.5 m/min at 60-156 tonnes  
at least 0 - 8.9 m/min at 0-60 tonnes

**NOTE:** Speeds are approximately halved at the same tension range when the windlass is powered by one pump instead of two.

- Payout Capacity:  
Payout of the chain is controlled using hydrodynamic braking integrated in the hydraulic motors. The hydrodynamic brakes have the following braking capacity on the chain:

up to 500 tonnes at speeds between 0 and 8.5 m/min.

- Max Payout Speed: at least 8.5 m/min.

**NOTE:** For further details and information, see relevant Manual.

#### 4.4.2 Cranes

*Ref. Fig. 4.4.2.1*

The FPU is provided with two electro-hydraulic revolving pedestal cranes:

- Port Crane (22Te, 55m rad.) A-75001
- Starboard Crane (50Te, 44m rad.) A-75004

The cranes and associated equipment are capable of continuous operation in a safe and efficient manner under the range of environmental conditions detailed below.

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Air temperature:	-20°C to +40°C (on deck)
Relative humidity:	100% max
Roll (single amplitude)	8.0° @ 12.9 sec
Pitch (single amplitude)	8.5° @ 12.9 sec
Heave (double amplitude)	24.4 m @ 12.9 sec
Damaged condition	Inclination up to 22°
Wind speed max (operational conditions), 10-sec gust at 10m above mean sea level	25 m/s
Wind speed max (operational conditions), 3-sec gust at 10m above mean sea level	63 m/s

The cranes are capable of operation whilst covered with a uniform layer of snow to a depth of 40mm and ice to a depth of 5mm.

**NOTE:** For "Cranes Operations" refer to Volume 5 of this Manual.

#### 4.4.2.1 Definition of Load Cases

##### *Load Case I: Platform Lifts*

- Wind speed: 25 m/s
- Crane inclination: 3.0°

##### *Load Case II: Supply Boat Lifts*

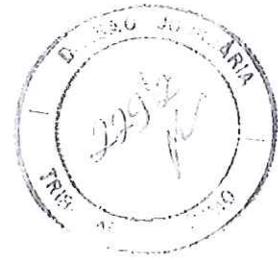
- Wind speed: 25m/s
- Crane inclination: 3.0°
- Sig. wave height  $H_{sig} = 1.6m$

##### *Load Case III: Supply Boat Lifts*

- Wind speed: 25 m/s
- Crane inclination: 3.0°
- Sig. wave height  $H_{sig} = 3.9m$

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4.4.2.2 Specifications



A. STARBOARD CRANE

- Weight of slewing column approx. 65.00 metric tonnes
- Weight of boom: approx. 35.40 metric tonnes

1. Capacity (metric tonnes)

		LOAD CASE I	LOAD CASE II	LOAD CASE III
	Radius [m]	Platform Lifts	Sea Lifts H <sub>sig</sub> = 1.6m	Sea Lifts H <sub>sig</sub> = 3.9m
Main Hoist	10.5	50.0	36.0	24.6
	15	50.0	35.0	23.2
	20	50.1	33.0	22.0
	25	48.9	30.0	20.3
	30	41.9	25.0	17.8
	35	36	21.8	15.5
	40	30	18.5	13.1
	45	25	15.5	11.0
	50	17.0	11.6	7.0
Whip Hoist	12	15.0	10.0	6.0
	54	15.0	10.0	6.0

2. Hook Travel

- Main hoist (2-falls) approx. 40.5 m below boom pivot
- Whip hoist (1-fall) approx. 40.5 m below boom pivot

3. Operating Speeds

Continuously variable hoisting speed from 0-max. speed by means of an electronic power regulator.

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<p><b>Main Hoist</b>  <b>2-fall operation</b></p>	<p>0-20m/min with 50 tonnes          0-23m/min with 40 tonnes          0-29m/min with 30 tonnes          0-36m/min with 20 tonnes          0-38m/min with 10 tonnes          0-40m/min with empty hook</p>
<p><b>Whip Hoist</b>  <b>1-fall operation</b></p>	<p>0-70m/min with 15 tonnes          0-93m/min with 10 tonnes          0-128m/min with 5 tonnes          0-140m/min with empty hook</p>

#### 4. Slewing

Continuously variable slewing speed from 0- max. speed by means of an automatic power regulator:

- 0 – 1.0 rpm with max. load even keel
- 0 – 0.5 rpm with max. load 3° inclination

#### 5. Luffing

Continuously variable luffing speed from 0 - max. speed:

- from max. to min. radius with max. load in 210 sec
- from max. to min. radius without load in 120 sec

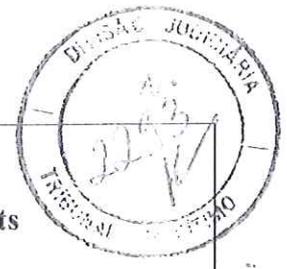
#### 6. Simultaneous Operation

All the motions can be operated at a time with max. load at full speeds.

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**B. PORT CRANE**  
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- Weight of slewing column: approx. 56.40 metric tonnes
- Weight of boom: approx. 20.25 metric tonnes



1. Capacity (metric tonnes)

Radius (metres)	Number of Falls	Platform Lifts	Sea Lifts		
			H <sub>sig</sub> =0.5m	H <sub>sig</sub> =1.6m	H <sub>sig</sub> =3.9m
9	2	22.0	13.5	10.0	6.4
15	2	18.6	11.7	8.8	5.7
18	2	17.4	11.1	8.3	5.4
21	2	16.3	10.5	7.9	5.1
25	2	15.0	9.8	7.5	4.8
26	2	14.8	9.7	7.4	4.7
30	2	13.7	9.1	7.0	4.5
36	2	12.4	8.4	6.4	4.2
40	2	11.6	7.9	6.1	4.0
44	2	10.8	7.4	5.7	3.8
9.3	1	15.0	-	10.0	6.4
15	1	15.0	-	8.8	5.7
18	1	15.0	-	8.3	5.4
21	1	15.0	-	7.9	5.1
25	1	15.0	-	7.5	4.8
26	1	14.8	-	7.4	4.7
30	1	13.7	-	7.0	4.5
36	1	12.4	-	6.4	4.2
40	1	11.6	-	6.1	4.0
44.3	1	10.8	-	5.7	3.8

2. Special Lift

Occasional and supervised, once a year, 9 tonnes/30m at H<sub>sig</sub> = 1.6m

3. Hook Travel

(2-falls) approx. 45.0m below boom pivot

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#### 4. Operating Speeds - Hoisting Gear

Continuously variable hoisting speed from 0 - maximum speed by means of an electronic power regulator.

<b>Two-Fall Operation</b>	0-25 m/min with 22 tonnes 0-40 m/min with 20 tonnes 0-50 m/min with 15 tonnes 0-60 m/min with empty hook
<b>One-Fall Operation</b>	0-60 m/min with 15 tonnes 0-80 m/min with 10 tonnes 0-100 m/min with 7.5 tonnes 0-120 m/min with empty hook

#### 5. Slewing

Continuously variable slewing speed from 0 - max. speed by means of an automatic power regulator.

- 0-1.0 rpm with max. load even keel
- 0-0.6 rpm with max. load 3° inclination

#### 6. Luffing

Continuously variable luffing speed from 0 - max. speed from max. to min. radius with max. load in 100 sec

#### 7. Simultaneous Operation

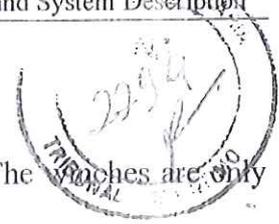
All the motions can be operated at a time with max. load at full speeds.

### 4.4.3 Towing Bridle System

Ref. Fig. 4.4.3.1

The system consists of:

- towing brackets and fairleads on the lower hulls and towing brackets on the second deck level of the forward columns
- One (1) A-frame forward of the lifeboat platform for hoisting the bridles up to second...



deck and securing;

- Two (2) air tuggers to hoist the bridles (XA/691A - XAQ/691B). The winches are only locally operated.

NOTE: The towing arrangement is shown in Volume 5.

4.4.3.1 Specifications

Towing Bridle Recovery Winches	XA/691A - XAQ/691B
Safe Working Load (SWL) - Full Drum Line Pull	49 kN
Norm/Max Air Supply Pressure	8.6/10.0 bar
Design Operating Pressure	6.3 bar
Free Air Consumption	15 Nm <sup>3</sup> /min
Design Temperature	-20 to +40°C
Rope Diameter	19mm
Min. Drum Line Speed	150m
Mid. Drum Line Speed	13 m/min
1st Layer Stalling Effort	100 kN
Elevation	39.624m
Drum	Grooved
Drum Min. Root Dia.	361mm
Brake Arrangement	Single automatic brake
Test Load	6.25 tonnes

NOTE: For further details and information, see relevant Manual.

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## 4.5 MAIN AND AUXILIARY MACHINERY

### 4.5.1 Main and Emergency Generator Engines

#### 4.5.1.1 Main Turbine/Generator Set

The FPU is equipped with three (3) sets of 14.5 MW, 6600 V, 3-phase, 60 Hz gas turbine generators.

Each gas turbine generator set and its associated equipment is housed in a completely self contained, "walk-in" type of steel acoustic enclosure (XA/275A/B/C).

The generator packages are mounted at tank top level in engine room within the upper hull structure on either side. (See Fincantieri drawing no. G5 1000005).

The turbine is capable of black start with essential services provided from the emergency generator set and auxiliary generator. The engine is fitted with an electro-hydraulic facility. The combustion air and the ventilation air are equipped with separate air filtration system and silencers.

The combustion air is obtained from a safe area. The air intake system consists of an air inlet filter, air inlet silencer, inlet ducting (XA/275AU-BU-CU), expansion joints, inlet filter inspection and service doors, all components being in carbon steel construction, water drain system, three gas detectors, differential pressure indicators, three differential pressure switches and all necessary maintenance facilities.

A complete lube oil and control system is fitted for marine type gas turbines.

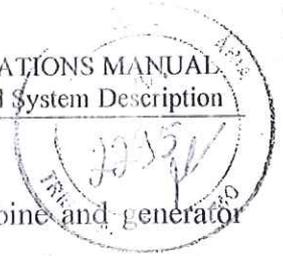
A separate system is fitted for the generator and gearbox.

The systems consist of a cooler filter, pumps and regulating valves as well as devices for protection against low pressure, high temperature and low oil indications.

The oil tank is incorporated into the base of the skid. The gas turbine is provided with dual fuel system. The gas turbine is normally supplied with fuel gas but, during start-up or low gas pressure, the gas turbine is fuelled with marine diesel oil.

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The turbine control system is microprocessor based, and it controls turbine and generator sequencing, fault monitoring, annunciation, gas turbine speed control, temperature monitoring and turbine vibration monitoring. In addition generator vibration and bearing temperatures are monitored.

A serial RS232c data link is provided so that turbine and alternator parameters can be transmitted to customer control and display systems (ECOS).

The turbine operator communicates with the system by normal push-buttons and selector switches. However if changes are required to the sequencing program, a built-in maintenance console is utilised.

#### 4.5.1.2 Emergency Diesel Generator Set

##### A. DESCRIPTION

The FPU is equipped with one 2,650 kVA, 450 V, 3 phase, 60 Hz emergency diesel-generator set (XA/277).

The diesel-generator set and its associated equipment are arranged as a "power pack", including:

- Common base frame.
- Fuel system.
- Lubricating oil system.
- Cooling system (freshwater).
- Starting system (one LP air starting motor, one HP air starting motor).
- Charge air system (turbocharger w/intercooler).
- Speed and load control.
- Protection on device.

The diesel generator set is mounted at main deck level. (See Fincantieri drawing G5 1000005).

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## B. PROCEDURE FOR MANUAL STARTING OF EMERGENCY DIESEL GENERATOR

### Starting

1. Depress start push button on manoeuvring control panel until the engine starts (3-5 s).
2. Check that the following equipment is activated:
  - speed indicator instrument (engine and turbo);
  - service time meter;
  - alarm system and audible horns connected;
  - pressure gauges for lube oil, fuel oil, cooling water, charge air etc.

**CAUTION:** Do not press starting push-button to repeat start attempt within 10 seconds.

3. After start, increase load gradually to one half to the rated value. Do not apply full load until lube oil and cooling water temperatures have reached approximately 40°C.

**WARNING:** IN THE EVENT OF LOSS OF 440V VOLTAGE, THE EMERGENCY GENERATOR STARTS AUTOMATICALLY; THE ABOVE MANUAL STARTING PROCEDURE WILL BE CARRIED OUT FOR MAINTENANCE OPERATIONS, OR IN CASE OF AUTOMATIC STARTING DEVICE FAILURE.

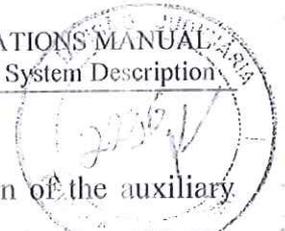
### 4.5.1.3 Auxiliary Generator Set

A new self contained auxiliary generator rated at 818 kW has been installed as part of the P36 Roncador upgrade. This unit is located on the port side above main deck level. This unit is provided to serve some essential services and to re-start main generation in the event that the emergency generator is not available.

The auxiliary generator is connected to the 'B' section busbars of the emergency switchboard.

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Electrical interlocking is provided to prevent long term parallel operation of the auxiliary generator with the main power system. i.e. the auxiliary generator circuit breaker CB-811 cannot be closed unless the bus-section CB 906 and the interconnector CB 803 are both open. Similarly the bus- section CB 906 and/or the interconnector CB 803 cannot be closed unless the auxiliary generator CB 811 is open.

A two-position, ('Permit'/'Inhibit') key operated selector switch is provided to enable one way momentary paralleling of the auxiliary generator with main power system in order to provide 'No Break' power transfer from the auxiliary generator back to the main power system. With the selector switch in the 'Permit' position and with correct volts, phase, and frequency across the interconnector CB 803, then CB 803 can be closed. The closure of CB 803 automatically trips the auxiliary generator CB 811 after approximately one second. For further details refer to IMESA Operating Manual and circuit diagrams.

#### 4.5.1.4 Export Power Transformer

An export power transformer 6.6/13.8KV has been installed as part of the P36 Roncador upgrade. This unit is located in the starboard aft machinery space formerly reserved for a fourth gas turbine generator. The unit is rated at 3.5MVA and is intended for possible future use to feed power, via a future subsea cable, to a moored oil tanker.

The export power transformer is connected to the 6.6KV switchboard XA/872B. A 13.8KV circuit breaker is located adjacent to the transformer to provide interlocking and earthing facilities for the future subsea cable.

#### 4.5.2 Thrusters

As part of the P36 Roncador upgrade, the thrusters have been removed. The auxiliary equipment associated with the thrusters remains in place but has been decommissioned from the overall control scheme.

#### 4.5.3 Watermaker Units

Two watermaker units (XA/107 A-B) are provided on board, located at tank top level in the auxiliary machinery room.

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Watermaker has the following main characteristics:

Capacity:	52 m <sup>3</sup> /h at 20°C
Power Supply/	440 V 3-ph. 60 Hz
Power Consumption:	35 kW max.
Control System:	Fully automatic PLC controlled operation
Dimensions (LxWxH):	4500x1800x1950 mm
Weight:	8,800 kg approx.

Each unit is composed by:

- Feedwater Section (Feed flow pressure 3-5 bar, strainer prefilter rated 200-500 micron).
- Pretreatment Filter (Mediafilter, dechlorination filter, cartridge filter 25 micron, cartridge filter 5 micron, flush pump, centrifugal type).
- Desalination Section (High pressure pump, triplex plunger, capacity 58-68 bar; pulsation damper, reverse-osmosis modules spiral-wound membrane).
- Post Treatment Section (Chlorination system).
- Safety Elements
  - Low and high pressures switches
  - Level switch product tank.
  - Conductivity monitor.
  - Thermal load relays (electric motor).

#### 4.5.4 Water Heaters

Three electric heaters (XA/453A-B-C) are located on tank top, aft in the auxiliary machinery room, to provide hot water for sanitary services.

Each water heater is of the electric type, and has the following main characteristics:

- Capacity tank: 600 litres
- Temperature: up to 65°C

- Electric heating power: 65 kW
- Skid dimensions: 100x100x1800 mm
- Weight: 450 kg
- Instruments:
  - Thermal switch.
  - Low level switch.
  - Safety valve (set at 5.7 bar).
  - Pressure gauge.
  - Temperature gauge.
  - Electric control panel (mounted on tank).



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## 4.6 ELECTRICAL, NAVIGATION AND COMMUNICATION SYSTEM

### 4.6.1 Electric Power Generators and Distribution

Gas turbines generators are designed to operate under following conditions.

Air temperature:	-20°C to +40°C (on deck)
Relative humidity:	100% max
Roll	22,5° @ 12.sec period
Pitch	22,5° @ 12.sec period
List	15°
Trim	15°
Ambient temperature (internal)	0 - 50°C
Air external temperature	-20 to +50°C

The Emergency Diesel Generator, switchboards and control panels and storage batteries are designed for continuous operation up to 35° inclination in all directions.

#### 4.6.1.1 General

The FPU is powered by three Medium Voltage main generators, rated 14,500 kW, driven by gas turbines.

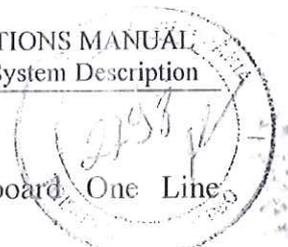
The generators are sized such that two sets can provide the power for all presently envisaged operational requirements.

Electrical Distribution System is shown on drawings:

DE-3010.38-5140-946-AMK-001	Electrical Overall One Line Diagram
DE-3010.38-5140-946-AMK-002	XA\873D 440V Emergency Switchboard One Line Diagram
DE-3010.38-5140-946-AMK-003	XA\872C 440V Main Switchboard No.1 One Line Diagram
DE-3010.38-5140-946-AMK-004	XA\873D 440V Main Switchboard No.2 One Line Diagram

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DE-3010.38-5140-946-AMK-005 XA\873 220V Emergency Switchboard One Line Diagram  
DE-3010.38-5140-946-AMK-006 XA\872E & XA\872F 220V Main Switchboard 1 & 2 One Line Diagram

(These replace Fincantieri drawings:

G6 0700015: Electrical distribution system, schematic diagram.  
G6 0707097: Electric equipment arrangement.  
G6 0700016: Circuit booklet.)

Distribution system comprises the following main switchboards and transformers (Fig. 4.6.1):

- 6.6 kV Main switchboard 1 (XA/872A)
- 6.6 kV Main switchboard 2 (XA/872B)
- 600 V SCR switchboard (FZ/222QF)
- 440 V Main switchboard 1 (XA/872C)
- 440 V Main switchboard 2 (XA/872D)
- 220 V Main switchboard 1 (XA/872E)
- 220 V Main switchboard 2 (XA/872F)
- 440 Emergency switchboard (XA/873)
- 6.6/0,44 kV -3500 kVA transformers (FZ/001 TFA, FZ/001 TFB, FZ/001 TFC, FZ/001 TFD)
- 440/220V - 3000 kVA transformers (FZ/003 TFA - TFB, FZ/004 TFA - TFB, FZ/005 TFA - TFB).

#### 4.6.1.2 6.6 kV Switchboard

Each 6.6 kV switchboard section provides for the following (Fig 4.6.2):

1. Connection of supply from its respective turbine generator sets to the main common 6.6 kV bus.
2. Distribution of power to associated L.V. switchboard via transformers; two (2) per switchboard for 440 V system and one (1) per switchboard section for the 600 V system.
3. Energisation of production motors.
4. Tie breaker to connect each 6.6 kV switchboard to form a common bus.

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5. Manual paralleling facilities to enable generator to bus and bus to bus paralleling.

The 6.6 kV switchboards are located at tank top level, port side, in Switchgear Rooms No.1 and No. 2.

#### 4.6.1.3 Main 440 V System

In each switchgear room (located at tank top level, port side) a main 440 V distribution switchboard is situated. Each switchboard is further divided into 2 bus sections connected by a tie-breaker (Fig. 4.6.3).

Each bus section is fed from the secondary of a 6.6 kV /400 V cast resin 3.5 MVA transformer (FZ/001 TFA, FZ/001 TFB, FZ/001 TFC and FZ/001 TFD). Both transformers for one switchboard are fed from the same 6.6 kV switchboard. This is conducive with the two-independent power system philosophy.

The normal operation of the system is with all primary and secondary breakers closed but with both tie-breakers open (i.e. 4 independent busbar systems).

The 440 V distribution is arranged such that duplicate services are fed from both 440 V main switchboard sections via their respective MCC's.

The switchboards mainly comprise circuit breakers to feed distribution MCC's. The only exception being large motor starters (i.e. SW/ballast and fire pumps) and some power panels.

There are two MCC rooms located above their respective switchboard rooms and also separated by fire rated bulkheads. Other MCC's are distributed at convenient points on the Unit close to the major load concentrations e.g. pump room MCC's, vent and HVAC MCC's.

The emergency switchboard is connected via two (2) interconnectors, one from each 440 V switchboard. These feed two bus sections on the emergency board separated by a tie-breaker (see Emergency 440 V system).

#### 4.6.1.4 Main 220 V System

The main 220 V system (switchboards XA/872E, XA/872F) is fed via two 300 kVA transformers (FZ/003 TFA, FZ/003 TFB). The feeds are taken from separate sections of the 440 V system to maintain the same level of segregation as the 440 V system (see Fig 4.6.5).



The 220 V system comprises two interconnected busbar systems; interlocks prevent energisation via the interconnector when both transformer feeders are closed.

The 220 V switchboard sections are physically located in the same space as their respective 440 V feeding switchboard. This also applies to the transformer, maintaining the independent power system concept.

The system is used for small power distribution and normal lighting. The transformers are sized such that each can carry the 220 V load, assuming normal diversity, thus providing a suitable level of redundancy.

#### 4.6.1.5 Emergency 440 V System

The emergency 440 V switchboard (XA/873) is divided into 2 sections connected by a tie breaker. The emergency generator is connected to the "A" section (Fig. 4.6.6).

Each section of the board is normally fed from its respective 440 V switchboard. Interconnectors are situated at either end. The tie between the emergency bus section is normally open.

The loads fed from the emergency generator are those required by classification societies and regulatory bodies and also those for which a suitable safety case can be made for their inclusion on the emergency supply.

The loads include two 520 kW SW/ballast pumps which are required to lift SW to the Fire ring main. Also included are two 290 kW electrically driven fire pumps. Due to the requirement for simplicity of control emergency switchboard is located at main deck level port side.

#### 4.6.1.6 Emergency 220 V System

Contained in the same switchgear room as the emergency 440 V switchboard is the emergency 220 V switchboard (XA/873) (Fig. 4.6.7).

This switchboard is provided as a single switchboard with no tie breaker. However for redundancy of supply the board is fed from 2 x 300 kVA /220 V transformers. Each transformer is fed from one side of the 440 V emergency switchboard.

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#### 4.6.1.7 220 V UPS System

220 V UPS's supply the following systems:

1. Vessel production and marine control and monitoring system (ECOS).
2. Telecommunications equipment
3. Production control panel where high integrity is required.

Each of the above systems consists of dual redundant UPS units comprising battery charger, batteries and inverters. In the case of item 1 above, both UPS's are also fitted with a bypass transformer, static transfer switch and manual bypass.

The main supplies to the UPS's are fed from the emergency switchboard. The bypass supplies are fed from the normal source. In the event of loosing main AC supply to the UPS's they continue to provide 220V to their respective loads powered by the battery supplies. In the event of loosing AC output from the inverter section an automatic bumpless transfer to the bypass supply is effected via the static transfer switch.

In the event normal source is lost, the UPSs continue to operate fed from the emergency switchboard without any battery drain except during the changeover to the emergency supply.

#### 4.6.1.8 D.C. Systems

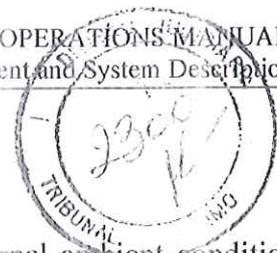
There is no centralised 24 V system; local to equipment D.C. systems exist which generally consist of battery charger and batteries of the recombination type. Generally the input to the chargers is 220 V from the emergency supply.

A 220 V d.c. system is provided for temporary lighting. The arrangement is for Zone 1 operation. Escape lights having integral battery units and chargers and rated also for a Zone 1 hazardous atmosphere are also installed.

The main 6.6 kV switchboards are fed by 2 x 110 V d.c. (one per switchboard section) power supplies with integral batteries and chargers. Each unit is capable of backing up the other if required.

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#### 4.6.1.9 Trace Heating System

All lines and equipment located in areas that are subjected to external ambient conditions and containing water or water vapour are winterised.

Electrical trace heating is active only when the external ambient temperature is below +5.5°C.

The system comprises self-limiting heating cable attached directly to the pipeline or equipment. Trace heating is fed from two 300 kVA transformers dedicated for trace heating service (FZ/004 TFA, FZ/004 TFB). The supply is distributed through switchboard and distribution boards.

#### 4.6.2 Lighting System

##### 4.6.2.1 Regular Lighting

Regular lighting system is supplied from the 220 V main switchboards. The following light panels are fitted:

- External lights / port.
- Tank & second deck / port.
- Tank top / aft.
- Lower Hull - columns- tank top/ port - forward.
- 220 V - Lower Hull - columns - tank top/ port - aft.
- MAIN SWB 1 - Second deck central / fore.
- Second & main deck/ fore.
- Second & main deck / port.
- Tank top / fore.
- External lights / starboard.
- Tank top/ forward.
- Lower H.-col. - tank top / starboard - fore.
- 220 V - Lower H.-col. - tank top / starboard - aft.
- MAIN SWB2 - Main - upper deck - derrick.
- Tank top & second deck / starboard.
- Second deck / fore.
- Tank top & second deck / aft.

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Each light panel comprises automatic circuit-breakers for users (internal/external lights, sockets).

#### 4.6.2.2 *Emergency Lights*

Emergency lights supplied from the 220 V emergency switchboard and provide illumination in the event of power failure.

Following emergency light panels are fitted:

- Main & upper deck / derrick.
- Second & main deck / fwd
- Second deck / aft
- Tank top & second deck / aft
- Lower H.-col. - tank top / aft
- Lower H.-col. - tank top / fwd
- Lower H.-col. - tank top / aft
- Tank top & second deck / fwd
- External light / port.
- External light / starboard.
- Navigation light 2.

Each light panel comprises automatic circuit breakers for users. The emergency lights are installed at following locations:

- Throughout the machinery spaces to permit the performance of essential operations and observations to facilitate restoration of power.
- Throughout the Unit adequately to permit personnel to readily find their way through passageways, up stairways, or by other available means to open decks with all watertight doors closed.
- In the galley, mess room, recreations room, movie room, and the hospital.
- On the heliport.
- At liferaft launching stations.
- At lifeboat stations.
- In the FPU manager's office.
- In the central control room, engine control room and switchgear room.
- In the radio room.
- On the drill floor and in the central caisson area.

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DEPT. TOR  
DIVISÃO DE SERVIÇOS CARTEIRIA

- At all deck cranes.



#### 4.6.2.3 Temporary Lights

Three temporary lights panels are fed from 220 V DC panel; they feed emergency lighting of following main locations:

- thruster & pump rooms
- water injection equipment rooms
- columns
- riser decks
- tank top: compressors, sack storage, change room, corridors, gymnasium, external area, E.C.R., switchboard rooms, purifiers room, stores, compressors, machines rooms, generator rooms, tanks room, water injection manifold area, aft deck extension
- -second deck: dry stores, galley, mess, corridors, winch area, life boats area, external area, sea surface, MCC room, TV room, change, external grating walkway
- main deck: radio room, transmitter room, emergency generator room, lifeboats preparation area, process/utilities areas, production manifold area
- upper deck: drill floor
- helideck.

In case of failure of main supply, temporary light panels are powered by emergency batteries connected to 220 V d.c. panel

Escape lights have an individual integral battery charger.

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#### 4.6.2.4 Signal Lights

Supplementary documentation:

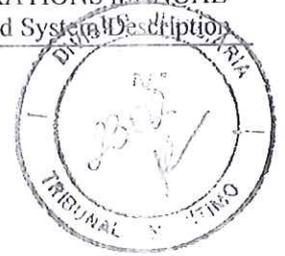
*Fincantieri drawing G 20300027 "Navigation lights and other signalling arrangement"*

Following signal lights are fitted:

Ref.	Description	Colour	Location
6	Fore anchor	white	Fore mast head
7	Aft anchor	white	Aft above main deck level
8	Towing	white	Fore mast
9	Aft towing light	yellow	Aft, above main deck level
10	Not under command	red	Derrick
11	Restricted manoeuvre	white	Derrick
12	Ship constrained by her draught	red	Derrick
13	Ship engaged on sea bottom operations, free side	green	Derrick
14	Ship engaged on sea bottom operations, engaged side	red	Derrick
16	Dangerous load	red	Derrick
23	Aircraft obstruction	red flashing 0.5s ON 0.5s OFF	Derrick
25	Aircraft obstruction	red	Fore mast head

Simplified diagram is shown in Fig. 4.6.9; location is shown in Fig. 4.6.8.





#### 4.6.2.5 Navigation Lights

Following lights are fitted:

Ref.	Description	Colour	Location
1	Fore mast head	white	Fore mast
2	Aft mast head	white	Derrick
3	Starboard side	green	Fore above main deck level stbd
4	Port side	red	Fore above main deck level port
5	Stern	white	Aft, above main deck level

The simplified electric diagram is shown on Fig. 4.6.10; location is shown on Fig. 4.6.8.

#### 4.6.2.6 Pneumatic Whistle

The whistle system is composed of:

- a whistle control panel, located on bridge console;
- a pneumatic whistle (ref. 35, Fig. 4.6.8) located above main deck, fwd, starboard side;
- two pushbuttons, located on bridge wings.

Simplified diagram of the system is shown in Fig. 4.6.11.

#### 4.6.3 Obstruction Lights and Fog Signals

*Supplementary documentation: Fincantieri drawing G 20300027 "Navigation lights and other signalling arrangement plan".*

Obstruction lights and fog signals follow I.A.L.A. recommendations and DOT, CAA, NMD regulations.

Manufacturer of the system: Tideland Signal Ltd

- Two 15-mile white obstruction main lanterns (ref 20, Fig. 4.6.8) flashing Morse code "U" letter every 15 seconds are fitted at second deck level, starboard fwd corner, and port aft corner.

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- Two 10-mile white obstruction secondary lanterns (ref. 21) flashing Morse code "U" letter are fitted near the above ones.
- Two 3-mile red subsidiary lanterns (ref. 22) flashing Morse code "U" letter, in unison with the main lights are fitted at second deck level, starboard aft corner, and port fwd corner.
- One main fog signal with a range of 2 n.m., and one secondary fog signal with a range of 0.5 n.m. (ref. 24) are fitted in each subsidiary light station; fog signals sound letter "U" Morse code every 30 seconds

In case of main light failure an alarm is given in the alarm panel, and the secondary light comes into operation automatically supplied by independent supply (battery located in the light station).

The system is integrated with a switch control unit composed by a photo-cell (sun-switch) which allows the main lights to be automatically activated in darkness.

Main fog signal is sounded when the visibility is less than 2 n.m.; in case of failure of the main fog signal an alarm is given in the alarm panel, and the secondary fog signal comes into operation automatically, supplied by an independent supply (battery located in the station).

The simplified electric diagram is shown on Fig 4.6.12.

An alarm panel provides individual failure indication for each navaid station to show when it has switched from its primary aid to its secondary or standby aid. Battery charger failure or mains failure will also cause an alarm to be generated. The manual control panel enables and disables the automatic control of light and fog stations and permits the fog signal to be operated using a manual push button.

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Description of Figure 4.6.8

Item	Description	
1	Fore mast light (225°), white	2
2	Aft mast light (225°), white	2
3	Starboard side light (112.5°), green	2
4	Port side light (112.5°), red	9
5	Stern light (135°), white	2
6	Fore anchor light (360°), white	1
7	Stern anchor light (360°), white	1
8	Mast light (towing light) (225°), white	2
9	Stern towing light (135°), yellow	1
10	Not under command light (360°), red	4
11	Restricted manoeuvre light (360°), white	2
12	Ship constrained by her draught light (360°), red	2
13	Ship engaged on sea bottom operations light - free side (360°), green	4
14	Ship engaged on sea bottom operations light - engaged side (360°), red	4
16	Dangerous load light (360°), red	2
20	Flashing main light (360° - 15 miles), white	2
21	Flashing secondary light (360° - 10 miles), white	-
22	Flashing subsidiary light (360° - 3 miles), red	2
23	Aircraft obstruction light (360°), red	2
24	Main/secondary fog signal (2.5 miles)	2
25	Aircraft obstruction light, red	2
35	Navigation whistle	1

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#### 4.6.4 Navigation And Searching Equipment

##### 4.6.4.1 Marine Radar System

The following radar system are fitted:

- a) One X band (3 cm) 25 kW transceiver, with a six foot scanner and ARPA facilities.
- b) One S band (10 cm) 30 kW transceiver with a twelve foot scanner and ARPA facilities.

Radar systems comprise:

- central equipment consoles located on the bridge;
- central equipment consoles, display units and scanner/transceiver motors are supplied from the 440 V emergency switchboard.

##### 4.6.4.2 Global Position System

A global position system (GPS) for satellite navigation is provided on board. Receiver and signal processor unit is located on the bridge.

The system is capable of receiving GPS signals in the 1.5 GHz band, and is supplied from VPS B distribution board.

##### 4.6.4.3 Direction Finding Equipment

A radio direction finding equipment Marconi Marine Loadstar 4 is fitted into the bridge console.

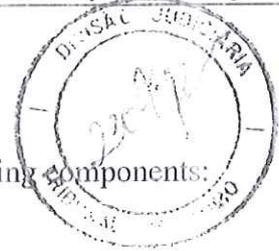
##### 4.6.4.4 Gyrocompass System

A gyrocompass system is installed; the system consists of the following components:

- one master compass
- two bearing repeaters (with stands), on port forward and starboard forward corner
- one course recorder
- one bearing repeater, on front bulkhead of bridge
- six repeater motor or signal; 3 for radars, 1 for satellite communications system, 1 for course recorder, 1 for ECOS.

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#### 4.6.4.5 *Depth Indicator*

A depth sounder system is installed, the system consists of the following components:

- one transducer;
- one recorder;
- one remote display on bridge.

#### 4.6.5 **Communication Equipment**

Communication equipment consist of:

- INMARSAT system;
- lifecraft communication system;
- PA systems (A and B);
- telephone systems;
- sound powered system;
- entertainment system;
- cinema equipment;
- CCTV systems;
- marine radio system;
- crane radio system;
- aeronautical radio system;
- aeronautical beacon;
- VPS for telecommunication system.

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##### 4.6.5.1 *INMARSAT System*

The INMARSAT system is installed to provide emergency and operational speech and data communication worldwide.

The system shall comprise above deck equipment (ADE), below deck equipment (BDE), system control panel, dedicated tele-printer, and two telephone instruments.

The ADE with stabilised antenna is located in a non-hazardous area with an unobstructed all round view. It is housed in a weatherproof dome. Power is derived from the BDE.

The BDE is located in the radio room, and is an integrated part of the control system, implemented in an industrial PC. The equipment is powered from UPS A, ESD post level 1 distribution board.

A system control panel is located in the radio room. The panel enables the operator to control and monitor the system and shall provide the following facilities:

- VDU with facility to display all command and control functions.
- Keypad for entry of parameter values during system configuration and voice call connections.
- Function keypad for selection of required functions or operating mode.
- Distress key for initiation of a pre-programmed distress signal.

A dedicated terminal and printer is located in the radio room for use with the INMARSAT system. It is powered from UPS A ESD level I, distribution board.

A DTMF telephone instrument dedicated to the INMARSAT system is provided in each ECC. A facility to log all calls is provided.

The system shall incorporate self-diagnostic fault finding facilities. The terminal is a standard A class I equipment which complies with the INMARSAT TRD issue 3 specification and of type approved to MPT 1260. It provides full duplex access to the PSTN, telex and data access at speeds up to 2400 bps. Connection for a facsimile machine is provided.

The ADE has antenna stabilisation facilities. The system is interfaced with the vessel telephone system to allow PABX extensions to use the Inmarsat system. All such calls are under to control of the radio operator.

The system is interfaced with the vessels gyrocompass, to allow the Inmarsat system to be used whilst the vessel is underway.

The system is interfaced to the vessel GPS system for future compliance to GMDSS.

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#### 4.6.5.2 *Liferaft Communication System*

*Ref: Fincantieri drawing G6 0742001 Radio Station Connection Diagram*

The four lifeboats and the rescue boat are each provided with an EPIRB (Emergency position indicating radio beacon) to aid location by search and rescue services, and with a VHF marine radio telephone.

An additional BPIRB is located in the radio room.

A lifeboat transceiver MF/HF is located on the bridge.

#### 4.6.5.3 *PA System (A & B)*

The PA 'A' and 'B' systems shall provide the means by which verbal announcements and alarm tones are broadcast throughout the vessel. Each system provides broadcast cover to all areas where personnel normally have access. Each area is covered by loudspeakers and visual alarms fed from two completely independent, and separately located, PA central equipment. Both systems are accessed, simultaneously, from common control panels. The systems allow initiation of alarm tones to loudspeakers and the energising of visual alarms from control panels in the central control room, radio room, and at each central equipment rack. Speech announcements shall be possible from all control panels.

Each PA system comprises central equipment racks and termination racks, each located in a non-hazardous area. In areas where the noise level may exceed 87 dBA the PA speakers are supplemented by A & B system visual alarms.

An interface is provided between PA system A and the PABX to allow telephone extensions with the appropriate "class of service" to make announcements over the PA. A digital speech storage unit is incorporated into the interface between the two systems.

All equipment external to the ECC's and telecomms equipment room is certified to Zone 1 group IIB, temperature T3 standards. Equipment within the ECC's and telecomms equipment room will be covered by post ESD level 1 gas detection. This will allow equipment and/or systems to be isolated if there is gas ingress into any of these external

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Each system is capable of completely independent operation. The PA 'A' system racks are located in the telecomms equipment room and house the control equipment, amplifiers, control panel and power distribution facilities. The racks are powered from UPS A, ESD post level 1 distribution board.

The PA 'B' system racks are located in CCR, and house the control equipment, amplifiers, control panel and power distribution facilities. The racks are powered from UPS B, ESD post level 1 distribution board.

Each PA system is interfaced with the fire and gas system to enable automatic initiation of alarms. Each PA/alarm system is interfaced with the entertainment system to enable silencing of entertainment broadcasts during emergency announcements or when alarms have been initiated.

For PA voice announcement purposes, the following zones are established as follows:

1. Emergency All areas.
2. Public All areas excluding cabins, cabin corridors and recreation areas.
3. Process Process areas.
4. Machinery Machinery spaces.
5. LQ Living quarters/accommodation.
6. Spare.
7. Spare.

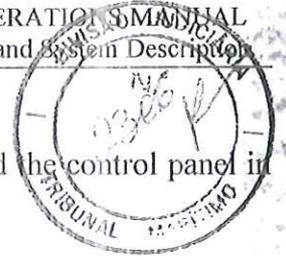
Alarm tone generators shall be provided in the central racks. Four alarm tones are provided as follows:

1. Prepare to abandon Continuous 800 Hz tone.
2. Fire Intermittent 800 Hz tone.
3. Spare Switched 800/600Hz tone, half second alternating

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In addition, a "chime" tone to precede general announcements is provided. Control panels are installed in the PA 'A' rack, PA 'B' rack, central control room, console and radio room console.



The control panel in the 'A' rack is only connected to the 'A' system and the control panel in the 'B' rack is only connected to the 'B' system.

The CCR control panel has priority of access to the PA system and, if necessary, is able to interrupt an announcement already in progress. All other control panels have equal priority of access.

#### 4.6.5.4 Telephone Systems

##### A. TELEPHONE SYSTEM I

A telephone system is provided with telephone instruments located throughout the vessel. Trunk circuits are available for connection to shore.

In plant areas, exposed locations and high noise areas where the levels exceed 87 dBA, telephones are mounted inside acoustic hoods and provided with external visual alarms.

The telephone exchange rack is mounted in the telecomms equipment room and powered from UPS A, ESD Level 2 distribution board.

The PABX shall have an ultimate capacity of 150 extensions and 12 trunk circuits and is equipped with the following:

- Zone I certified telephones
- Office type telephones
- Weatherproof telephones
- 3 trunk circuits
- INMARSAT interface circuit
- Interface circuits to PA system A and PA system B
- Tie lines to telephone system 2

The PABX has the following facilities:

- Call Transfer
- Call Back when Free
- Comprehensive Route Barring
- Executive Interrupt

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- Enquiry Calls
- Conference Calls
- Night Service

A telephone operator's console is provided in the radio operator's console.

*B. TELEPHONE SYSTEM 2*

An emergency telephone system is provided with telephone instruments located as follows:

- Engine Control Room
- One telephone in each of the four thruster rooms
- One telephone in each of the four pumps rooms
- One telephone at the top of each of the four columns
- Emergency Generator Room.
- Central caisson area.
- Central Control Room
- Production manifold area
- Radio room
- One telephone at each of the four lifeboat stations
- One telephone at each of the four muster stations

All telephone instruments shall use push button keying. All telephones shall be Zone I certified.

The telephone exchange (PABX) is mounted in a rack in TER on the second deck, and powered from UPS B, ESD post level 1, distribution board.

The PABX has an ultimate capacity of 50 extension and 6 trunk circuits and is equipped with the following:

- Zone I certified telephones
- INMARSAT system interface

The lines with ESD isolation relays to telephone system I

The PABX has, as a minimum, the following facilities:

- Call transfer
- Call back when free

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- Comprehensive route barring
- Executive interrupt
- Enquiry calls.
- Conference calls.



#### 4.6.5.5 *Sound Powered System*

Sound powered telephones (SPT's) are located as follows:

- Bridge.
- Radio room.

Each SPT is provided with hand-crank ringer/generator, integral microphone, earpiece and audible alarm. No auxiliary power supply is connected to the SPT's. SPT's are only employed as emergency back-up communications systems. All units are certified for use in Zone 1, temperature T3 and group 2B environments.

#### 4.6.5.6 *Entertainment System*

##### *A. GENERAL DESCRIPTION*

The entertainment system comprises central equipment racks in the telecomms equipment room for audio, video and distribution equipment. The equipment in these racks provides 74 audio and video channels for distribution, via a coaxial distribution system to dual socket outlets in the following areas:

- Each cabin (62)
- State rooms
- Conference rooms
- Recreation areas
- Cinema
- Medical areas
- Helicopter reception area
- Galley
- Laundry
- CCR

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B. *DESCRIPTION OF THE AUDIO SYSTEM*

The audio system provides six stereo audio channels to the coaxial cable distribution system for distribution to socket outlets.

The entertainment audio system rack houses two audio tuners, one cassette deck recorder, one compact disc player, audio control and select panel incorporating audio test and monitoring, PA/alarm system override, microphone, and storage drawers.

The entertainment audio system rack is located in the telecomms equipment room and shall be powered from the local 220 V 60 Hz supply. The supply is isolated at ESD level 2.

Each central rack radio tuner receiver shall be capable of demodulating MW, LW and VHF (FM) with following frequency bands:

- MW: 530 - 1600 kHz
- LW: 153-281 kHz
- VHF(FM): 88 - 108 MHz

The PA/alarm system override panel takes an input from each PA/alarm system. All entertainment facilities (audio and video) are switched off as soon as alarms are initiated or an emergency speech announcement is made.

The audio monitor, control, test and select enables the six audio output channels to be configured from the audio sources and 2 stereo channels from the video rack. Headphones and an integral rack mounted loudspeaker are provided for channel monitoring.

The microphone enables the operator to make announcements over a single channel or all channels by a channel selection switch and PTY button. Two entertainment system antennas with 4-way splitters are provided to the audio tuner units to cover:

- a) the MW and LWs and

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(FM) broadcast frequency bands  
The video system provides 6 video channels to the coaxial distribution system for distribution to socket outlets.



The entertainment video system rack houses two DBS receivers, a video control, select, test and monitor panel, a video cassette recorder/player, storage drawers for video cassettes and a video colour monitor/TV.

The entertainment video system rack is located in the telecomms equipment room and fed from the local 220 V 60 Hz supply. The supply will be isolated at ESD level 2.

A complete satellite TVRO station including all cables and connectors is provided to enable reception of satellite TV broadcasts.

A DBS dish antenna is fitted suitable for providing the signal to the distribution system.

Two satellite TV receivers are provided. These receivers are compatible with 11 and 12 GHz transponders, matched to an i.f. within 900 and 1700MHz.

The video test and monitor panel provides test and monitoring of any of the three input and six output channels.

The video cassette recorder/player is of the VHS type capable of accepting tapes of six-hour duration.

The video control and selection panel enables the six (6) video outputs to be configured from the two (2) DBS channels and the cassette recorder/player channel. Monitoring of each channel on the colour TV/monitor is possible.

### C. ENTERTAINMENT DISTRIBUTION SYSTEM

The distribution system is a broadband coaxial network and provides distribution of entertainment audio and video channels.

The entertainment distribution rack located in the Telecomms Equipment Room and supplied from the local 220 V 60 Hz supply.

Signals from the entertainment audio and video systems shall be multiplexed, loaded and amplified onto a passive coaxial distribution network. The system shall feed the double coaxial socket outlets.

All system controls are located at the system racks in the Telecomms Equipment Room.

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The distribution system is passive with no amplification and therefore no power is required to field equipment.

#### 4.6.5.7 *Cinema Equipment*

A video projection system with large screen is provided; it has an integral VCR for replay and recording to the same standard as VCR of entertainment system. The video projection system is connected to the entertainment distribution system to enable DBS channels to be viewed in the cinema.

The system is powered from the local 220 V 60 Hz cinema supply. The supply will be isolated at ESD level 2.

#### 4.6.5.8 *CCTV Systems*

The two monochrome CCTV systems provide surveillance of designated areas of the vessel enabling monitoring for leaks and smoke and of marine and process operations.

##### *General CCTV system*

The general CCTV system shall have cameras located as follows:

- Helideck
- In production areas
- Riser deck
- One in each of the four thruster pump rooms
- One at each of the four windlass positions

Two monitors are located in the CCR, one in the company office and one in the toolpushers office. One of the monitors in the CCR shall be located above the mooring winch desk.

The system is interfaced with the drillers CCTV system and the subsea CCTV system to allow the monitors to monitor any camera on any of the three systems.

The CCTV system central equipment rack is located in the CCR and powered from UPS B, ESD level 2, distribution board.

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#### 4.6.5.9 Marine Radio System

Ref: *Fincantieri drawings:* G6 0742001 "Radio Station Connection Diagram"  
G6 0742002 "Radio Station Layout"

Marine radio system concerns fixed VHF marine radiotelephone, two MF/HF SSB radiotelegraph/telephones and 3 VHF IS marine portable radiotelephones with associated battery chargers shall be located in the Radio Room console. One further fixed VHF marine radiotelephone shall be provided on the bridge. A 2182 kHz watch receiver, a weather facsimile receiver and a Navtex receiver are also provided on the bridge.

A general coverage receiver, shall be provided in the radio room console. This unit may be combined with the MF/HF SSB Radiotelegraph.

##### A. FIXED VHF MARINE RADIO TELEPHONES

The radiotelephones provide a dual-watch facility on the International Marine Distress Channel Frequency of 156.8 MHz (Channel 16) operate on all 55 International Marine Channels in the frequency band 156.025 to 162.025 MHz plus 4 private channels. Transmitter output power is 25W, switchable between 25W & 1W. One unit in CCR and radio room is fixed to 1W operation and powered from respective distribution boards. All 25W radios shall be powered from ESD level 2 distribution boards.

The radiotelephones in the radio room are powered from the SOLAS 24 Vdc power supply and the bridge from UPS B, level 2, 220 Vac distribution board.

The radiotelephones are provided with, and directly connected to a vertically polarised whip antenna located in a suitable position on the vessel.

##### B. MF/HF SSB RADIOTELEGRAPH AND IF/HF TELEPHONY

The MF/HF SSB radiotelephones comply with MPT specification 1224 and 1225 and SOLAS 74. The radiotelephones provide communications on the International Marine Distress Frequency of 2182 kHz and on the public correspondence channels with Maritime Coastal radio stations plus intership channels in the International Marine Band. Distress auto alarm transmission facilities on 2182 kHz are incorporated

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Each radiotelephone shall be provided with separate receive and transmit antennas and ATU. Antenna change-over switches are provided to allow the two radiotelephones to use either of the transmit or receive antenna. The ATU's are IP65 rated.

The radiotelephones in the radio room are powered from the SOLAS 24 Vdc power supply. This supply is interrupted at ESD level 2.

*C. VHF MARINE PORTABLE RADIOTELEPHONES*

The radiotelephones are intrinsically safe and comply with MPT specification 1251. Each hand portable is complete with carrying case, body belt, remote speaker/microphone, integral whip antenna, and 1-hour rapid rechargeable battery.

The portables are supplied with ten synthesised channels pre-programmed to: 6, 8, 10, 12, 13, 14, 16, 67, 72, 77.

*D. 2182 KHz WATCH RECEIVER*

A 2182 kHz watch receiver is provided on the bridge. It shall be powered from 220Vac ESD level 1 UPS B and be provided with a dedicated HF whip antenna.

The watch receiver incorporates muting circuitry so that only distress calls and signals are received.

*E. WEATHER FACSIMILE RECEIVER AND NAVTEX RECEIVER*

A weather facsimile receiver and Navtex receiver Furuno type FA~08 Weather fax & Furuno type NX500 Navtex are provided on the Bridge. They are powered from 220 VAC ESD level 1 UPS B and each are provided with dedicated antennas.

The Weather fax receiver is capable of reception of broadcast weather and sea-state charts from UK and continental meteorological stations.

The receiver has a minimum bandwidth of 150 kHz to 10 MHz.

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*F. GENERAL COVERAGE RECEIVER AND RESERVE RECEIVER*

A general coverage (communications) receiver type Skanti R8001/ITL is provided as a back up to or an integral part of the MF/HF SSB receivers. The receiver is capable of receiving transmissions in the 0.1 to 30 MHz band. The receiver is capable of continuous tuning over the complete frequency range and is also provided with a memory capable of being programmed to ten (10) predetermined frequencies.

*G. RT AUTO-ALARM AND AUTOMATIC KEYING DEVICE*

An Auto-alarm Receiver Type Redifon model AAI, and an Automatic Keying device. Type SP Radio model H1218, are included in the Radio Room Console.

*H. EMERGENCY TRANSMITTER*

One emergency transmitter type SAIT ET150 to comply with Italia MPT and SOLAS 74 requirements is provided in the radio room console.

**4.6.5.10 Crane Radio System**

*Ref: Fincantieri drawing G6 0742001 "Radio Station Connection Diagram"*

A crane radio system for each crane is provided. Each crane is equipped with an intrinsically safe, VHF marine hand portable radio of the same type as described under "Marine Radio System".

Each VHF hand portables is plugged into its own charger/control unit which shall enable connection of a headset with boom microphone, PWP footswitch, external antenna and deck loudhail facilities.

The overall system enables hands free communication by the crane operator to VHF marine hand portable users, supply boats, standby vessels, radio room, central control room, bridge and loudhail over the deck area.

The crane radio system shall be powered from the cranes 220 V 60Hz local supply.

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#### 4.6.5.11 Aeronautical Radio System

To enable operational and emergency communication with helicopters a fixed VHF aeronautical radiotelephone and a VHF aeronautical portable radiotelephone with battery charger are located in each ECC and in the helideck landing control shelter.

The equipment conforms to the requirements of specifications OP15 issued by the UK Civil Aviation Authority and the standards of the International Civil Aviation Organisation.

##### A. *FIXED VHF AERONAUTICAL RADIOTELEPHONES*

The radiotelephone in the Radio Room is located in the radio room console and powered from UPS A, ESD level 1, distribution board. The radiotelephone in the CCR is located in the CCR console and is powered from UPS B, ESD level 1 distribution board.

The radiotelephone in the helideck landing control shelter is bulkhead mounted and powered from UPS A, ESD level 2, distribution board.

Each radiotelephone is directly connected to a suitable whip antenna.

##### B. *VHF AERONAUTICAL PORTABLE RADIOTELEPHONES AND BATTERY CHARGERS*

- The battery charger for the portable in the radio room is panel mounted in the Radio Room console and is powered from the UPS A, ESD level 1, distribution board.
- The battery charger for the portable in the CCR is wall mounted and is powered from the UPS B, ESD level 1, distribution board.
- The battery charger in the helideck landing control shelter is bulkhead mounted and is powered from UPS A, ESD Level 2, distribution board.

Each portable is able to select a minimum of 4 channels in the 118-137 MHz range. Each portable is complete with carrying case, body belt, remote speaker/microphone, integral whip antenna, 6-hours rechargeable battery and headset complete with boom microphone and transmit key switch.

**NOTE:** EACH PORTABLE IS NOT INTRINSICALLY SAFE AND SHALL NOT BE USED IN HAZARDOUS AREAS OR DURING EMERGENCY SHUTDOWNS.

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4.6.5.12 Aeronautical Beacon (NDB)

Ref: Fincantieri drawing G6 0742001 "Radio Station Connection Diagram"

A duplicated aeronautical NDB is provided for direction finding and vessel identification by airborne traffic. The system comprises a duplicated NDB located in a rack in the Telecomms Equipment Room and powered from UPS A, ESD Level 2, distribution board.

A remote control panel is located in the Radio Room console, powered from the NDB rack.

The NDB antenna is an end-fed long wire suspended round the perimeter of the helideck. The antenna is complete with weatherproof (IP65 rated) ATU and junction box which shall be located under the helideck. The ATU is powered from the NDB rack.

The NDB is according with the following specifications:

Frequency	200-600 kHz.
Frequency Stability	+/- 0.005% of assigned frequency.
Class of Emission	AO/A2
Output Power	Maximum 100W fully adjustable down to 25W.
Modulation	400 Hz or 1020 Hz - -5%.
Modulation Depth	Adjustable to 95%.
Identity Code	2,3 or 4 Morse coded letters transmitted at 7 w.p.m. with an evenly spaced periodicity of 10 sec
Radiated Harmonic	Not exceeding -50dB relative to carrier level
Noise Level	<-40dB relative to carrier level
AF Distortion	< 5% at 95% Modulation Depth
Automatic Changeover	Transmitter changeover and alarm to vessels ECOS shall occur if: <ul style="list-style-type: none"> <li>a) Carrier power falls by 3.</li> <li>b) Modulation levels falls by 30%.</li> <li>c) Identity Code transmission fails.</li> </ul>

The system complies with the UK CAA document OP17 and ICAO regulations for locator beacons.

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#### 4.6.5.13 Supervisory System

Alarm outputs from the system racks are marshalled at main distribution frame (MDF) in the Telecomms Equipment Room. A multi-core cable runs from this MDF to interface with ECOS.

The following systems give the following alarm outputs:

INMARSAT	one fault.
PA System A	major and minor fault.
PA System B	major and minor fault.
Telephone System 1	one fault.
Telephone System 2	one fault.
Marine Radio	two faults.
Aero radio	two faults.
Aero beacon	one fault.
Radar	two faults.

#### 4.6.5.14 UPS for Telecommunication System

Two uninterruptible power systems (UPS) each consisting of a charger/rectifier, inverter, static by-pass switch and a battery bank are fitted on board. The UPS is designed to provide for normal operation of all users taken into account the load requirement

The UPS A is located in the Telecomms Equipment Room (TER) supplying equipment in the Radio Room and TER. The UPS B is located in the forward fire pump room on the second deck supplying equipment in the central control room (CCR).

Each UPS is fed from a 440 VAC, 60 Hz, 3-phase distribution board.

Output from the UPS is 220 VAC, 60 Hz, +/-10%, 1-phase.

Each battery bank is sealed, maintenance-free lead acid type and designed and sized to provide normal operation of all relevant equipment for a period of two (2) hours under

20% full/quiescent load conditions.

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UPS A		
Inmarsat System	4500VA	PL1 L1
PA System A	4500VA	PL1 L1 L2
Telephone System 1	340W	PL1
Drillers CCTV System	310W	L1
Fixed VHF Marine Radiotelephones		PL1 L2
MF/HF SSB Radiotelephones		L2
VHF Marine Portable Radiotelephone Chargers		L1
2182 kHz Watch Receiver		L1
Weather facsimile Receiver		L2
General Coverage Receiver		L2
Fixed VHF Aeronautical Radiotelephones		L2
VHF Aeronautical Portable Radiotelephone Chargers		L1 L2
Aeronautical Beacon NDB		L2
UPS B		
PA System B	4500VA	PL1 L1 L2
Telephone System 2	240W	PL1
General CCTV System	730W	L2
Fixed VHF Marine Radiotelephones		L2
MF/HF SSB Radiotelephones		L2
VHF Marine Portable Radiotelephone Chargers		L1
Fixed VHF Aeronautical Radiotelephones		L1
VHF Aeronautical Portable Radiotelephone Chargers		L1
Marine Radar System	(endres til 440 VAC)	L2
Direction Finding Equipment		

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### 4.6.6 Battery System

#### 4.6.6.1 Storage Batteries

Following sealed lead acid stationary batteries are installed on board:

Item	Qty	Equipment Number	Description/Service	Voltage (Volts)	Location
1	2	FZ/001 BAA	H.V. Main SWB 1	110	Switchgear Room No.1 - Tank Top
		FZ/001BAB	Temporary Light		Switchgear Room No. 2 - Tank Top
2	1	FZ/002BA	Temporary Light	220	Battery Room no 3 - Main Deck
3	6	FZ/003BA	Drilling & Production	24	Drilling MCC'S Room no. 3, 2 <sup>nd</sup> Deck
		FZ/004BA	Bridge Various Services		Ladder - Tank Top
		FZ/005BA	PORT AFT Platform		Port Aft Column
		FZ/006BA	PORT FWD Platform		Column Port Fwd
		FZ/007BA	STBD FWD Platform		Column Stbd Fwd
		FZ/008BA	STBD AFT Platform		Column Stbd Aft

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*Main Characteristics*

<b>Battery for H.V. Main SWB1/2</b>	
Type/Qty	No.9 cells VARTA type Vsb 12506
Nominal capacity	60 (42 Ah at -10°C9)
Rated voltage	108 VDC
Rated current	62.1 Amp. (43.5 Amp. at -10°C)
Service duration	30 min
Weight of battery	216 kg
<b>Temporary Light Battery</b>	
Type/Qty	No.110 cells VARTA 6 OPzV 6500/100
Nominal capacity	600 Ah
Rated voltage	220 VDC
Rated current	89.4 Amp
Service duration	6 hours
Weight of battery	4930 kg
<b>Drilling and Production Battery - Bridge Various Batteries - Platform Batteries</b>	
Type/Qty	No.2 cells VARTA type Vsb 12510.
Nominal capacity	100 Ah.
Rated voltage	24 VDC.
Rated current	102 Amp.
Service duration	30 min.
Weight of battery	78 kg.

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**4.6.6.2 Battery Charger Panels**

Each battery charger is filled inside a board, according to following table:

Item	Board Number	Board	Voltage (Volts)	Location
1	FZ/001 QBA	H.V. Main SWB 1	110	Switchgear Room No.1 - Tank Top
	FZ/001 QBB	Temporary Light		Switchgear Room No. 2 - Tank Top
2	FZ/002QB	Temporary Light	220	Battery Room no 3 - Main Deck
3	FZ/003QB	Production	24	MCC's Room no. 3, 2 <sup>nd</sup> Deck
	FZ/004QB	Bridge Various Services		Vano Scale - Tank Top
	FZ/005QB	PORT AFT Platform		Port Aft Column
	FZ/006QB	PORT FWD Platform		Column Port Fwd
	FZ/007QB	STBD FWD Platform		Column Stbd Fwd
	FZ/008QB	STBD AFT Platform		Column Stbd Aft

Power supply: Items 1 & 3 220V-60Hz 3 ph

Item 2 440V-60Hz 3 ph

Each battery charger comprises transformer, a.c. circuit breaker, rectifier, fuses, auto/manual selector, charge regulator, alarms, voltmeter and meter.

Schematic diagrams are shown in Figures 4.6.13 thru 4.6.16.

**4.6.7 Central Operation and Supervisory Station (ECOS)**

**4.6.7.1 General**

The supervision of the marine and production systems is managed from a centralised location, the Central Control Room.

The Central Control Room is continuously manned at all times. Control and monitoring equipment in this room provides the operator interface to the various systems which control the field equipment. Start-up of individual systems in general is performed locally.

The major control systems which have equipment within the Central Control Room are:

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- ECOS
- Subsea
- Oil & Gas Fiscal Metering
- ESD
- Fire Detection
- Fire Control
- Gas Detection
- HVAC
- Watertight Integrity
- Windlass



The major items of equipment for these systems within the Central Control Room are:

- Production Control Panel (ECOS)
- Production Control Console (ECOS)
- ESD Control Panel
- Subsea Control Panel
- Riser QC/DC Control Panel
- Oil & Gas Fiscal Metering Panel
- Fire Detection Panel
- Fire Control Panel
- Gas Detection Panel
- Ballast Control Console (ECOS)
- Windlass Control Console
- PM/DP Console (ECOS)
- Watertight Integrity Panel
- HVAC Control Panel
- Bridge Control Console (ECOS - on Bridge)

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A centralised control and monitoring system permits the supervision and operation of the facilities to be performed from a single location - the Central Control Room (CCR).

A data storage and retrieval system provides records for analysis at a later date.

A dual redundant data highway carries signals to and from the central system to out-stations located in safe areas. These out-stations are hardwired to field equipment and are capable of performing closed-loop control functions at the various packages.

#### 4.6.7.2 *Integrated Network*

ECOS is a distributed integrated system utilising high-speed dual redundant data communications between the major component items of equipment specified herein.

These major components include:

- 1) Central Control Room Section
  - Production Control Panel
  - Production Control Console
  - Ballast Control Console
  - PM/DP Station-keeping Console
  - Peripheral Devices
- 2) Bridge
  - Bridge Control Console
- 3) Field
  - Outstations (RTU 's/Interface Racks)
  - Sensors IO
- 4) Data Highway
  - Dual-redundant communications highway

Certain specialised parts of ECOS are hard-wired and not connected through the data highway.

#### A. *WORKSTATIONS*

Generalised VDU/keyboards are located at various key operational areas, i.e.:

- Production Control Console
- Ballast Control Console

These workstations have access to all collected data on the communications network.

Equipment, such as the station-keeping console, have more specialised VDU/keyboard arrangements without complete access to the communications network data.

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*B. REMOTE TERMINAL UNITS (RTU's)*

Data are communicated to the highway via a number of remote terminal units distributed throughout the vessel. These are of a generalised nature although certain specific characteristics may vary from one unit to another, eg. environmental conditions, intrinsically safe I/O, fluid valve control circuits.

The ballast and production RTU's are fed by:

- two UPS power feeders (220 VAC, 1 phase, 60 Hz) for computer modules
- one normal + one emergency power feeder (220 V AC, 1 phase, 60 Hz) for ballast valve actuators.

The other RTU's are fed by:

- one normal 220 VAC 1-phase, 60Hz
- one 220 V AC; 1-phase, 60 Hz from UPS power feeder.

*4.6.7.3 Ballast Control System (BCS)*

The 4 RTU's for this system are located in the upper hull, over each column and above the damage waterplane.

In the normal operating conditions, the pumps and valves are controlled from the CCR console via VDU/Keyboard and ballast mimic.

Both ballast consoles communicate with dual redundant RTD's at the top of each column via ECOS data highway.

Each of the RTU's incorporates an emergency control mimic on a background of the valves, pumps and piping layout and incorporating valve and pump controls and indications for that quadrant.

The local control mimic includes an analog tank level indicator for each tank in that quadrant.

It is possible to switch control away from ECOS network and operate all quadrant ballast items with BOTH data highways inoperative.

The electric power for the CCRC is supplied from a dual UPS system. Each RTU is fed by:

- two UPS power feeders (220 V AC, 1 phase, 60 Hz for the computer cards; one normal 220 V 60 Hz

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- one emergency 220 V 60 Hz for the valve actuators.

#### 4.6.7.4 Fluids Control System

The 4 RTU's for this system are located in each pump room. The fluid systems that are remotely controlled are typically as follows:

- 1) Drill water system.
- 2) Seawater system.
- 3) Potable water system.
- 4) Freshwater system.
- 5) Fuel oil system.
- 6) Bilge system.
- 7) Tank stripping system.
- 8) Oily Water System.
- 9) Water Injection System.

#### 4.6.7.5 Power Management System (PMS)

##### A. GENERAL

The PMS section of ECOS is able to control the following via hard-wired interface from ECOS RTU's to the Turbine Control Panels (1 per GT, located in the appropriate switchgear rooms):

- Start/stop of GT generators (3 off + 1 future).

The PMS also receives the running status of the GT generators from the Auxiliaries Control Monitoring & Alarm System (ACMAS) section of the ECOS.

The PMS is able to control the following equipment through the 2 HV switchboards:

- Load of GT generators (3 off)
- Stop of water injection pump motors (4 off).

The PMS typically monitors the following by hard-wired interface from the 2 HV switchboards:

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- Local/remote changeover switches for the individual circuits above.
- kVAR, kW, current & frequency for the generators.
- Current for each HV load.
- Status of all HV feeders, breakers & bus-ties.

The PMS monitors winding temperatures for the major transformers.

The PMS enables ECOS to start, load, unload & stop the generators, and to stop the seawater injection pump motors.

This is done manually from a workstation or automatically through simple control logic, e.g. critical alarm or shutdown trip of one generator to shed water injection load(s) and start, or start and load, stand-by generator.

The PMS provides a power protection system to limit and/or reduce the thruster pitch demands from the combined PM/DP console and thruster control consoles. It takes into account the available power, ambient temperature and loads. It is interfaced to the thruster local control panels via ECOS RTU's.

All data are made available on the communications network for hard-copy logging and historical storage/retrieval via ECOS general facilities.

The primary operator interface to the PMS is via the VDU/keyboard facilities of the Workstations within ECOS.

PMS monitoring and control is available at all the workstations within the ECOS.

#### B. OPERATION OF THE SYSTEM FOR COLD STARTING

If the FPU has not been electrically supplied for a long period of time, or at the commissioning, and no power supply is available from the shore, the following operations should be carried-out in order to bring the electrical system of the FPU from "cold" to "live":

- 1) Perform an insulation check of the various sections of the system to ensure that no loss of insulation has occurred.
- 2) Verify that the compressed air cylinders for the emergency diesel generators starting are at the operating pressure; provide to charge the cylinders with compressed air from an external source, on the contrary.

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- 3) Start the emergency diesel generator, operating as detailed in the relevant vendor's technical manual.
- 4) Close the breaker of the emergency generator on the switchboard and the breakers of the emergency 440V switchboard sections A and B.
- 5) At this point the PMS senses the position of these breakers and the switchboard voltages and automatically starts the following emergency switchboard fed equipment in the order indicated separated by suitable time delays:
  - air compressors and both diesel fuel pumps, and open necessary valves, if any
  - freshwater pump XA/054 A, and open necessary valves, if any (XA/054B if A is not available for remote start or fails to start)
  - seawater circulation pump (XA/039B, and open necessary valves, if any (XAI039C if B is not available for remote start or fails to start)
  - start standby turbogenerator on diesel fuel.

**NOTE:** Any 'fail-to-start' does not stop this sequence from continuing.

- 6) When the turbogenerator running status is received (100% speed attained), the PMS issues a load signal to the DSM (digital synchroniser module) of the appropriate load sharing and synchronising panel. The electrical control system will then close the turbogenerator incoming breaker and the PMS will sense 6.6 kV on the main switchboard.
- 7) The 6.6 kV/440V transformer primary feeders and corresponding secondary breakers will be closed by the electrical control system and the PMS will sense voltage on the main 440V and 220V switchboards.
- 8) The electrical switchboard operator will for a short time parallel the main and emergency 440V switchboards at the emergency switchboard and then shutdown the emergency generator completing the automatic start sequence.

For any further details on starting of all auxiliary equipment please refer to ECOS technical manual and to the relevant vendor's technical manuals

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C. OPERATION OF THE SYSTEM FOR POWER RESTORATION AFTER A BLACKOUT

Each bus section of the 440V emergency switchboard is fitted with a voltage sensing relay.

In the event one or both sense a loss of voltage, the emergency generator automatically starts. When volts and frequency are within limits the interconnector breakers to the emergency board from the main 440V boards will be opened. When this is confirmed by the control system, the emergency generator breaker will close and also the tie breaker on the emergency switchboard will close. All loads on the emergency board are thus automatically re-energised from the emergency source on loss of main power or trip of any interconnector breaker.

The following automatic procedure will be implemented by the PMS:

- 1) Blackout is detected by the PMS through loss of voltage on both 6.6 kV, both main 440V, both emergency 440V switchboards and no ESD level 1 or 2A shutdown signal present.

After blackout, the electrical control equipment (not PMS) performs the following:

- the main 440V switchboard tie breakers to emergency 440V are opened
  - the breaker of the emergency generator is closed
  - the emergency 440V switchboard sections A and B tie breaker is closed
- 2) The PMS senses the positions of these breakers and the switchboard voltages prior to initiating the black start procedure as follows.
  - 3) The PMS starts the following emergency switchboard fed equipment in the order indicated, separated by suitable time delays:
    - air compressors and both diesel fuel pumps, and open necessary valves, if any;
    - freshwater pump XA/054A, and open necessary valves, if any (XA/054B if A is not available for remote start or fails to start);
    - seawater circulation pump (XA/039B, and open necessary valves, if any (XA/039C if B is not available for remote start or fails to start);
    - start standby turbo-generator on diesel fuel.

NOTE: Any 'fail-to-start' does not stop this sequence from continuing.

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- 4) When the turbo-generator running status is received (100% speed attained), the PMS issue a load signal to the DSM (digital synchroniser module) of the appropriate load sharing and synchronising panel. The electrical control system will then close the turbo-generator incoming breaker and the PMS will sense 6.6 kV on the main switchboard.
- 5) The 6.6 kV/440V transformer primary feeders and corresponding secondary breakers will be closed by the electrical control system and the PMS will sense voltage on the main 440V and 220V switchboards.
- 6) The electrical switchboard operator will for a short time parallel the main and emergency 440V switchboards at the emergency switchboard and then shutdown the emergency generator, completing the automatic black start sequence.

This black start procedure will not be implemented if the bus between the two main 6.6 kV switchboards is open, or if there is a failure on a serial link between the Turbine Control Panel (TCP) and ECOS.

The mimics associated with these functions are:

- Overall Power Generation and Distribution Mimics
- Turbo-generators and Diesel Mimics

**NOTE:** Each turbo-generator may be manually started or stopped from the controlling PMS console provided that the remote/local switch, on the appropriate TCP is in the "remote" position (see relating procedures in the technical manual of turbo-generator).

#### 4.6.7.6 Auxiliaries Control, Monitoring & Alarm System

The Auxiliaries Control, Monitoring & Alarm System includes the following major components:

- Input/output facility.
- Data processing facility.
- Data recording facility.
- Operator interfaces.

The platform systems covered include:

- Gas Turbines.
- Emergency Generator
- Sewage
- Cathodic Protection
- Refrigerated Space (Galley)
- Chloropacs
- Incinerator
- Sanitary Pressure Set
- Elevators



ECOS communications to such systems are mainly on a hard-wired group alarm type basis.

A serial link is provided between ECOS RTU's in the two switchgear rooms and each gas turbine local control panel (TCP), i.e. three (3) plus one (1) future.

ECOS interface to the emergency generator is hard-wired to the CCR RTU.

Input/output signals from/to the field are communicated to the Auxiliaries, Control, Monitoring & Alarm System through the RTU's of ECOS.

The input/output signals are monitored and controlled by the software logic of the Auxiliaries Control, Monitoring & Alarm System.

All data is available on the communications network for hard-copy logging and historical storage/retrieval via ECOS general facilities.

#### 4.6.7.7 Tanks Gauging System

The tanks which have level indication are as follows:

- Ballast Tanks
- Drill Water Tanks
- Fuel Oil Tanks
- Potable Water Tanks
- Separator Tanks
- Waste Oil Tanks

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The tank levels and draft indications are displayed on the CCR Control Console.

All the level sensors are hard-wired to the nearest RTU's located above each column. These RTU's communicate with the CCR Control Console Room through ECOS data highway. All level sensors are loop powered (24 V DC) from RTU's.

#### 4.6.7.8 Environmental System

**NOTE:** At present the system is not operational.

##### *System Overview*

The Environmental System includes:

- Data Processing System.
- Data Storage Facility.
- Atmospheric pressure sensor.
- Atmospheric temperature sensor.
- Atmospheric humidity sensor
- Current direction & speed sensor.
- Seawater temperature.
- Wave height sensor.

##### *Data Processing System*

A data processing system, which resides in the combined PRS/DPS console, is provided to collect information from sensors and other equipment for display on the PRS/DPS console and at any of ECOS general workstations. The workstations and the PRS/DPS console provide the operator interface to the Environmental System data.

This system is capable of collecting, processing and displaying the following data:

- Wind direction & speed
- Wave parameters
- Water depth
- Roll, pitch, heave, surge & sway
- Draft
- Heading
- Strain measurements on the vessel as required by the classification society
- Atmospheric temperature, pressure & humidity

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- Ten minutes mean wind force
- Ten minutes mean wind direction
- Sea temperature
- Sea state\*
- Range of vision\*
- Clouds\*
- Precipitation\*
- Ice and icing\*

\* Only manual input for recording purposes.

In addition to the instrument sensors specified herein the system allows for manual entry of the above data.

A data storage facility is provided to record and store, for later retrieval on the system, the information collected by the data processing system described above.

#### 4.6.7.9 Production Control System

The major physical components of the Production Control System are:

- a) Central Control Room Equipment:
  - Production Control Panel.
  - Production Control Console (with VDU/keyboard operator stations).
  - Peripheral Devices.
- b) Local Control Room (PCS RTU room) Equipment:
  - Production Outstation(s) (RTU's) including interface rack(s).

#### 4.6.8 Combined Position Mooring and Dynamic Positioning (PM/DP)

NOTE: At present PM/DP system is not operative due to the absence of thrusters.

##### 4.6.8.1 Thrusters

The vessel has been designed to be equipped with four (4) constant speed, variable pitch, fully azimuthing thrusters.

The two thrusters originally installed have been removed for the current FRU upgrade.



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#### 4.6.8.2 Mooring Windlasses

The Unit will be stationed by a passive mooring system consisting of 16 mooring lines, 4 per corner.

One combined local control console is installed at each corner of the vessel.

There is one windlass central control console located in CCR (station-keeping console).

#### 4.6.8.3 CCR Console

The CCR Console's VDU/keyboards is able to control, and give status indications, for all the fluid system equipment, typically including the following:

- Ballast pumps
- Bilge pumps
- Drill water pumps
- Diesel oil transfer pumps
- Seawater cooling pumps
- Freshwater cooling pumps
- Firewater pumps
- Foam pumps
- Ballast valves
- Bilge valves
- Drill water valves
- Fuel oil valves
- Seawater valves
- Potable water valves
- Freshwater valves
- Power availability indicating light
- Heel and Trim indicators
- Seawater pressure indication
- Freshwater pressure indication
- Suction and Discharge pressure indication of each fluid pump

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Auto-Empty of tanks  
Fault alarms and max/min limit alarms

In the event of any incorrect operation of plant or device failure, an audio and visual alarm is automatically activated in the CCR.

#### 4.6.8.4 *Ballast Mimic Panel*

The panel is designed for control and monitoring of the ballast system.

This mimic panel is independently connected to the data highways through its own dedicated PLC.

The mimic provides a pictorial representation of the Unit's ballast systems.

The valves and pumps can be operated individually from the mimic panel.



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## 4.7 CREW ACCOMMODATION AND WELFARE SYSTEM AND EQUIPMENT

### 4.7.1 Ventilation, Air Conditioning and Heating System (HVAC)

#### 4.7.1.1 General

The ventilation and air conditioning system is categorised as follows:

- a) The Living Quarters (2 decks) including Second Deck Maintenance Supervisors Office, Coffee Shop, Laundry, Drying/Changing rooms, conference rooms (2), Offices (3) and Main Deck Radio and Transit rooms are air conditioned and served by the Living Quarters system (four fan and coil units). Heating is electrical.
- b) The following spaces are air conditioned and served by separate plant from the Living Quarters System:

Tank Top Switchgear Rooms Nos. 1, 2, Engine Control Room, Electrical Workshop, Electrical Stores & Hydraulic Workshop, Second Deck Electrical Workshop, ESD/ F&G RTU rooms 1 & 2, ECOS RTU Rooms 1 & 2, Process Gas and Compressor Control Panel Room, MCC Rooms 1 a& 2 and Compressor MCC/ Room.

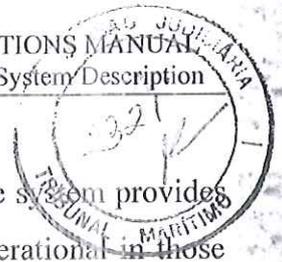
- c) Chemical Injection Area, Deluge Valve Area and Central Caisson hazardous areas are ventilated with negative pressure.
- d) Paint Locker, Emergency Generator Room, non-hazardous areas are ventilated with positive pressure.
- e) Following spaces are ventilated, non-pressurised:

Columns and Lower Hull; Generator Rooms, Machine Shops, Stores, Compressor room, Marine Equipment Store Room, Firepump rooms, Transformer rooms, Inert Gas Generation, Warehouses, Sack Storage, Auxiliary Machinery Space and Open Storage

The Main Deck Process area is naturally ventilated.

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During normal operations the system is designed to run continuously. The system provides standby arrangements which enable the ventilation systems to be kept operational in those areas where failure of the system may result in shutdown of the FPU's safety and support equipment.

System is complete, including filters, fans, pre-heaters, cooling dehumidifying coils, re-heaters, duct work, terminals, closures, louvers, dampers, thermostatic controls, drains, insulation, vapour sealing and lagging, etc., necessary for operation and performance.

System is designed to prevent contamination from dissimilar spaces. Weather supply terminals are located so as to avoid intake from weather exhaust terminals, or any other source of contamination. System is designed to function properly without build up of pressure, when weather and other normally closed doors, hatches, and similar accesses are closed.

Air intakes are located in non-hazardous areas and 4.5 m away from extract outlets. Outlets are preferably located in non-hazardous areas with back draught prevention. Intakes and outlets are generally located on the same vertical face of the sides of the upper hull.

Ventilated system for hazardous and non-hazardous areas are not combined. Where necessary, to prevent the ingress of gas from a hazardous area to a non-hazardous area, the latter is positively pressurised to a differential of at least 50 Pa.

#### 4.7.1.2 HVAC System General Description

##### A. ACCOMMODATION AREAS & MACHINERY SPACES

The heating, ventilation and air conditioning system includes separated systems for "Accommodation Areas" and for "Machinery Spaces" (see simplified diagrams on Fig. 4.7.1.1 and 4.7.1.3).

Conditioning of the accommodation areas is accomplished by means of four (4) air handling units (Equipment numbers: YD/684A-B-C-D), located port and starboard in the second deck and tank top quarters.

Each air handling unit (Fig. 4.7.1.2) is connected to three compressor/condenser units (Equipment numbers: YD/684E-F-G), located in the Tank Top Compressor Room.

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One of the compressor/condenser units is a spare, manifolded for substitution of the running units.

The Warehouse Office, Laboratory (previously mud lab) and Transmitter Room are accomplished by means of autonomous a.c. units (Equipment numbers: YA/678A-B-E).

Conditioning of the machinery spaces is accomplished by means of two air handling units (Fig. 4.7.1.4) (Equipment numbers: YD/684H-J), located in the 2nd deck and tank top.

Each air handling unit is connected to two (2) compressor/condenser units (Equipment numbers: YD/684L-M), located in the 2nd deck machinery spaces fan room.

One of the air handling units and one of the compressor/condenser units is a spare manifolded one for substitution of the other.

Switchgear rooms No.1 and No.2 are accomplished by means of autonomous a.c. units (Equipment numbers: YA/678C-D).

The air supply flows at high velocity (10-15 m/s) to the rooms through galvanised and duly insulated ducting (rectangular or circular).

The air conditioning flow into the rooms is achieved by means of silencer boxes provided with diffusers and dampers manually controlled by an adjustable knob.

The air conditioning, thrown into the rooms by diffusers, flows through the grilles (doors, part to the sanitary spaces (where it is exhausted by separated fans and relevant ducts) and part to the passage ways (where it is recirculated to the air handling units by a separated ducting).

The recirculation ducts are insulated in the section passing outside conditioned areas.

Recirculation ducts from corridors are separated from ducting taking recirculation from other spaces.

Exhaust ducts from toilets are separated from ducting taking exhaust air from other spaces and are provided with dedicated fan.

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Galley is treated by an independent system of forced exhaust air and supply comfort air, medium velocity, by cooling and electric heating coil. The supply systems are provided with washable and fire retardant type marine air filters and dry type air filter gauge. The outside air supplied by centrifugal fans, is distributed through medium velocity rectangular ducts and thrown into the rooms by means of suitable grilles or louvers.

A suitable air circulation is assured by centrifugal fans exhausting the air through relevant ducting escaping directly to the ambient. The canopies are Gaylord type equipped with grease filters. The supply and exhaust ducts are provided with fire dampers of automatic/manual type. The fire damper concerning the galley is to be connected to galley fire extinguishing system.

The electronic control system achieves full automatic thermohygro-metrical control inside the rooms. The direct expansion cooling coils of the air handling units are provided with thermostatic expansion valves and control solenoid valves driven by thermostats. Thermostats of the proportional action type drive electric re-heaters, setting inside design temperature. Each cabin is provided with silencer boxes including an electric re-heater, screened type and driven by relevant individual cabin thermostat. Remaining rooms of the accommodation areas are provided with control system, of the comfort zone type, through temperature average controllers and local re-heating coils. A remote synoptical main control panel is provided including lighting push-buttons and warning lamps concerning HVAC plant equipment as well as machinery ventilation plant equipment. The operator selects manually high-low speed of each fan through a.m. lighting push-buttons (remote) or through electric starters (local).

The condensers, concerning both systems, are fed by freshwater (36°C) off-take from the centralised water cooling system.

In summer period, the air handling units treat the supply air achieving its filtering, cooling and dehumidification, and, if necessary, re-heating with local electric heater in the accommodation area.

In winter period, the air handling units treat the supply air achieving its filtering, heating, humidification while re-heating is achieved by local electric heater if needed.

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Humidification is provided and automatically controlled by on-off humidistat:

- For the Accommodation Area, it consists of electric boilers (440V/3ph/60Hz) with electrodes inserted in a kettle, fed by freshwater (VAPAC System).
- For Machinery Spaces humidification is carried out by steam system fitted out with flow regulator, valves, filter, by-pass.

#### B. AUTONOMOUS AIR CONDITIONING PACKAGE UNITS

##### 1) Warehouse Office

It is served by an autonomous air conditioning package unit. The unit consists in the higher part of the air handling section (single speed) with return-outside mixing box and filter section and in the lower part of one R22 hermetic compressor unit whose condenser is fed by freshwater ( $T = 36^{\circ}\text{C}$ ).

##### 2) Switchgear 1 - 2

These rooms are provided with two identical A.C. integrator package units, one for each room.

Each unit is sized with cooling capacity in order to win the inside extra heat dissipation (15 kW approx.).

These units are similar to the above mentioned units (1), provided with semi-hermetic CARRIER compressor.

##### 3) Transmitter Room

This room is provided with an A.C. integrator package unit, sized with cooling capacity in order to win the inside heat dissipation (2.7 kW) and transmission losses-solar heat gain and with heating capacity in order to maintain inside temperature  $T = 10^{\circ}\text{C}$  min. The unit is similar to the a.m. units (1).

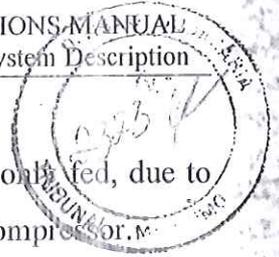
#### C. GALLEY

The Galley is treated by an independent system of forced exhaust air and supply

medium velocity, by cooling and electric heating coil. The supply system is provided with washable and fire retardant type marine air filters and dry type air

filter gauge.

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Main cooling machinery cannot properly work with this cooling coil only fed, due to its lower capacity with respect to the minimum capacity reduction of compressor.

The winter temperature of supplied air (supply fan and natural balancing) will be  $T=16^{\circ}\text{C}$ ; the summer temperature will be  $T=25^{\circ}\text{C}$ .

*D. CONTROL SYSTEM*

The electronic control system, achieves full automatic thermohygro-metrical control inside the rooms.

A remote synoptical main control panel is provided including lighting push-buttons and warning lamps concerning HVAC plant equipment as well as machinery ventilation plant equipment.

High-low speed of each fan is manually selected by the operator throughout a.m. lighting push-buttons (remote) or through electric starters (local).

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4.7.1.3 Air Conditioning Operating Data

A. AIR CONDITIONING SYSTEM

SUMMER	
Outside temperature	35 <sup>0</sup> C
Outside relative humidity	70%
Inside temperature	27 <sup>0</sup> C
Inside relative humidity	50%
Hospital temperature	25 <sup>0</sup> C
Hospital relative humidity	50%
30 <sup>0</sup> C max.	

WINTER	
Outside temperature	- 18 <sup>0</sup> C
Outside relative humidity	60%
Inside temperature	22 <sup>0</sup> C
Inside relative humidity	50%
Hospital temperature	25 <sup>0</sup> C
Hospital relative humidity	50%
Transmitter room temperature	10 <sup>0</sup> C min.

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B. ACCOMMODATION AREAS



Air conditioning volume	3,419 m <sup>3</sup>
Air conditioning flow rate	38,100 m <sup>3</sup> /h
Fresh air flow rate	19,430 m <sup>3</sup> /h
Calculated cooling power	426 kW
Installed cooling power	3x216 kW
Condenser freshwater flow	2x57,000 kg/h
Electric heating power	313.5 kW
Individual re-heating coils power	29.2 kW
Zone ducting re-heating coils power	32.6 kW
Humidification power	122.9 kW
Humidification freshwater flow	220 kg/h
Humidifiers electric power	168.4 kg/h
Electric heating power for galley	9.9 kW
Cooling power for galley	33.7 kW
Installed running electric power for:	
- Air handling units + galley	369.4 kW
- Air handling units and fans	65.3 kW
- Humidifiers	168.4 kW
- Cooling machinery	105 kW

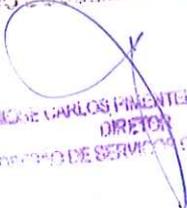
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C. MACHINERY SPACES

Air conditioning volume	2,444 m <sup>3</sup>
Air conditioning flow rate	29,200 m <sup>3</sup> /h
Fresh air flow rate	2,350 m <sup>3</sup> /h
Calculated cooling power	209 kW
Installed cooling power	2x216 kW
Condenser freshwater flow	57,000 kg/h
Steam heating power	2x32.8 kW
Steam heating flow	56.5 kg/h
Individual re-heating coils power	1.3 kW
Zone ducting re-heating coils power	44.8 kW
Humidification power	2x15 kW
Steam humidification flow	25.8 kg/h
Installed running electric power for:	25.8 kg/h
– Air handling units and fans	36.3 kW
– Cooling machinery	52.5 kW

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E. AIR HANDLING UNITS FOR ACCOMMODATION AREA



<b>Equipment number</b>	YD/684A
Quantity	1
Air conditioning flow	6,400 m <sup>3</sup> /h
Fan electric motor type	Cl 32M 4/6 poles
Fan electric motor power	6.3811.87 kW
Net cooling power	77 kW (65,960 fr/h)
Cooling power (+25%)	96 kW (82,450 fr/h)
Electric heating power	61.5 kW
<b>Equipment number</b>	YD1684B
Quantity	1
Air conditioning flow	11,100 m <sup>3</sup> /h
Fan electric motor type	Cl 60L 4/6 poles
Fan electric motor power	12.76/3.82 kW
Net cooling power	124 kW (106,270 fr/h)
Cooling power (+25%)	154 kW (132,830 fr/h)
Electric heating power	89 kW
<b>Equipment number</b>	YD/684C
Quantity	1
Air conditioning flow	11,000 m <sup>3</sup> /h
Fan electric motor type	C160L 4/6 poles
Fan electric motor power	12,76/3.82 kW
Net cooling power	123 kW (105,430 fr/h)
Cooling power (+25%)	152 kW (131,780 fr/h)
Electric heating power	88.3 kW
<b>Equipment number</b>	YD/684D
Quantity	1
Air conditioning flow	9,600 m <sup>3</sup> /h
Fan electric motor type	C160M-T 4/6 poles
Fan electric motor power	8.7/2.61 kW
Net cooling power	104 kW (89,140 fr/h)
Cooling power (+25%)	130 kW (111,410 fr/h)
Electric heating power	74.7 kW

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D. COMPRESSOR/CONDENSER UNITS

Manufacturer	Atisa
Quantity	5
Equipment number	YD/684-E-F-G-L-M
Cooling capacity	216 kW (185,910 fr/h)
Compressor electric motor type	C225M-T 4 poles
Compressor electric motor power	52.5 kW
Condenser freshwater flow	57,000 kg/h
Freon suction pressure	450 kPa (65.27 psi)
Liquid freon pressure	1,600 kPa (232.22 psi)
Condensing temperature	41°C
Saturated vapour suction temperature	7°C

Compressor	
Type	5H60
Speed	1750 rpm
Number of cylinders	6
Bore	3¼ in.
Stroke	2¾ in.
Suction and discharge connections	3 1/8 in. O.D.
Oil charge	481 (21 pt)
Normal oil pressure above suction pressure	310-379 kPag (45-55 psig)
Oil flow rate	13.5 l/min. (3.0 gpm)

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G. AUTONOMOUS A.C. UNITS

1. Warehouse Office

Equipment numbers	YA/678A-
Quantity	2
Air conditioning flow	700 m <sup>3</sup> /h
Fan electric motor power	0.55 kW
Net cooling power	4.8 kW (4,130 fr/h)
Compressor cooling capacity	5 kW (4,300 fr/h)
Compressor electric motor power	1.75 kW
Condenser freshwater flow	1,250 kg/h

2. Switchgear Room No.1, Switchgear Room No. 2

Equipment numbers	YA/678C-D
Quantity	2
Air conditioning flow	3,000 m <sup>3</sup> /h
Fan electric motor power	1 kW
Net cooling power	15 kW (12,900 fr/h)
Compressor cooling capacity	15.5 kW (13,330 fr/h)
Compressor electric motor power	4.75 kW
Condenser freshwater flow	3,600 kg/h

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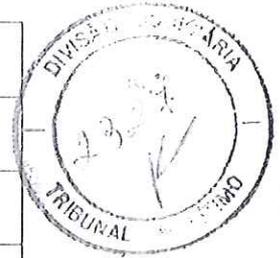
F. AIR HANDLING UNITS FOR MACHINERY SPACES

Equipment Numbers	YD/684J-H
Quantity	2
Air conditioning flow	29,200 m <sup>3</sup> /h
Fan electric motor type	C200L-T 4/6 poles
Fan electric motor power	34.8/11.3 kW
Net cooling power	209 kW (179,750 fr/h)
Cooling power (+25%)	261 kW (224,680 fr/h)
Steam heating power	32.8 kW
Heating steam flow	57 kg/h
Heating steam pressure	300 kPa (43.5 psi)
Humidification power	15 kW
Humidification steam flow	25.8 kg/h

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Equipment number	YD/684BG-CJ-DG
Quantity	3
Type	V60/5-H
Weight	90 kg
Humidification capacity	35.3 kW
Humidification freshwater flow	60 kg/h
Humidifier electric power	46 kW
Heating voltage	440 V, 3 phases, 60 Hz
Full load	68 A



I. ROOMS WITH AUTONOMOUS A.C. UNITS

	Warehouse Office	Transmitter Room	Switchgear 1/ Switchgear 2
Air conditioning volume (m <sup>3</sup> )	25-39	13	
Air conditioning flow rate (m <sup>3</sup> /h)	2x700	600	2x3,000
Fresh air flow rate (m <sup>3</sup> /h)	2x75	-	
Calculated cooling power (kW)	2x4.8	4.8	2x15
Installed cooling power (kW)	2x5	5	2x15.5
Condenser freshwater flow	2x1,250	1,250	2x3,600 kg/h
Electric heating power (kW)		2.8	
Installed running electric power:			
- Heater (kW)		2.8	
- Air handling unit and fans (kW)	1.1	0.55	2
- Cooling machinery (kW)	3.5	1.75	9.5

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3. Transmitter Room

Equipment number	YA/678E
Quantity	1
Air conditioning flow	600m <sup>3</sup> /h
Fan electric motor power	0.55 kW
Net cooling power	4.8 kW (4,130 fr/h)
Compressor cooling capacity	5 kW (4,300 fr/h)
Compressor electric motor power	1.75 kW
Condenser freshwater flow	1,250 kg/h
Electric heating power	2.8 kW

H. HUMIDIFIERS

Equipment number	YD/684AG
Quantity	1
Type	V40/5-H
Weight	55 kg
Humidification capacity	22.9 kW
Humidification freshwater flow	40 kg/h
Humidifier electric power	30.4 kW
Heating voltage	440 V, 3 phases, 60 Hz
Full load	46 A

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LOCATION	SPACE	AIR CHANGE PER HOUR		
		TYPE	SUPPLY	EXHAUST
Tank top	Engine control room	AC	9	-
Tank top	Switchgear room 1-2	AC	13-14	1
Tank top - Port	Cabins	AC	6-12	-
Tank top - Port	Change room	AC	9	11
Tank top - Port	Gymnasium	AC	9	-
Tank top - Port	Lockers	Ind. AC	-	5-7
Tank top - Port	Sauna's change room	Ind. AC	-	10
Tank top - Starboard	Bridge	AC	18	16
Tank top - Starboard	Cabins	AC	6-12	-
Tank top - Starboard control room	Central/production	AC	27	12
Tank top - Starboard	Lockers	Ind. AC	-	5-7
Drying room	Ind. AC	-	20	
Pantry	Ind. AC	-	18	
Private toilets	Ind. AC	-	12	
Public toilets and bathroom	Ind. AC	-	15	

4.7.1.4 Machinery and Non-Air Conditioned Spaces

Spaces not air-conditioned are heated and/or ventilated in accordance with the following table. Spaces not mentioned in the table are treated the same as similar spaces.

NOTE: Abbreviations used in the table are as follows:

- ETA - Electric Tempered Air Heater
- SUH - Steam Unit Heater
- SC - Steam Convectur
- ERH - Electric Radiant Heater

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J. AIR CHANGE (M<sup>3</sup> PER HOUR)

LOCATION	SPACE	AIR CHANGE PER HOUR		
		TYPE	SUPPLY	EXHAUST
Main deck	Radio room	AC	19	-
Main deck	Telecommunication room	AC	17	17
Main deck	Transit room	AC	11	-
Main deck	Vestibule	AC	10	-
Second deck	Coffee shop	AC	12	-
Second deck	Compressor MCC room	AC	18	-
Second deck	ECOS RTU room 1-2	AC	8-9	-
Second deck	Electrical workshop	AC	7	-
Second deck	Laundry	AC+Ind	12	24
Second deck	MCC room 1-2	AC	12-13	-
Second deck	Office	AC	6	-
Second deck	Process gas compressor control room	AC	9	-
Second deck	Warehouse office	AC	17	-
Second deck - Port	Cabins	AC	6-12	-
Second deck - Port	Change room	AC	9	11
Second deck - Port	Conferences rooms	AC	10-11	-
Second deck - Port	Day room non smokers	AC	15	6
Second deck - Port	Day room smokers	AC	14	14
Second deck - Port	Lockers	Ind. AC	-	5-7
Second deck - Port	Offices	AC	9	-
Second deck - Port	TV/movie room	AC	9	9
Second deck - Port	Toilets			
Second deck - Port	Way out			
Second deck - Stbd	Accommodation areas			
Second deck - Stbd	Cabins	AC	6-12	-
Second deck - Stbd	Galley	S/E	30	36
Second deck - Stbd	Hospital	AC	14	17
Second deck - Stbd	Hospital, isolation cabin	AC	9	11
Second deck - Stbd	Lockers	Ind. AC	-	5-7
Second deck - Stbd	Mess room	AC	14	7
Tank top	Hydraulic Workshop	AC	6	-
Tank top	Electric store	AC	5	-
Tank top	Electric workshop	AC	6	-

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Table 4.7.1.1 - Ventilation (continued)

Space	Mechanical		Natural		Summer Max Temp °C	Change /hr	Heating		Remarks
	Supply	Exhaust	Supply	Exhaust			Type	°C	
Engine Control and Switchgear Room	X		X		27	60	ETA	22	Air-conditioned & heated with 2 units. Distribution duct and return plenum are required. One unit is 100% spare
Welding Machine and Mechanical Shop (Port Aft)	X	X			46	20	None		
Water Maker, Air Compressor & Auxiliary Machinery Room	X	X			46	10*	None		2 speed supply fan
Port Lower Hull Pump Rooms	X	X			46	10	None		
Starboard Lower Hull Pump Rooms	X	X			46	10	None		
Port Forward Column	X	X			46	10	None		
Stbd Forward Column	X	X			46	10	None		
Centre Caisson	X	X	X		46	10	None		

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Table 4.7.1.1 - Ventilation

	Mechanical		Natural		Summer Max Temp °C	Change /hr	Heating		Remarks
	Supply	Exhaust	Supply	Exhaust			Type	°C	
Generator Room	X	X			46	60	None	None	4-2 speed supply fans 4-2 speed exhaust fans
LO & P0 Purifier	X	X			46		None	None	2-2 speed exhaust small
Deluge Valve Room	X	X			46	120*	None	None	Negative pressure must be maintained 1-2 speed supply Zone 1 fan 1-2 speed exhaust Zone 1 fan - Explosion proof
Chemical Room	X				46	60*	None	None	2-2 speed supply fans 2-2 speed exhaust fans
Marine supplies store room	X				46	60*	None	None	Natural vent intake louvers
Sack Store	X				46	20	None	None	
Emergency Generator Room	X	X			46	30	None	None	Positive Pressure 1-2 speed supply fan 1-2 speed exhaust fan
Production & Drilling Warehouses Starboard Aft	X				46	10	None	None	

Table 4.7.1.1 - Ventilation (Continued)

Space	Mechanical		Natural		Summer Max Temp °C	Change /hr	Heating		Remarks
	Supply	Exhaust	Supply	Exhaust			Type	°C	
Accommodation A/C, Compressor Room		X	X						
Cellar Deck Area	X	X				60*	None		Negative Pressure
Inert Gas Generator Room 5	X	X			46	10*	None		
ECOS, ESD/F&G Equipment Rooms	X			X			A/C & Space Heater		
Transformer Rooms	X	X			46	10			
Firepump Rooms	X	X			46	10			
Process Gas Compressor Control Room	X			X			A/C & Space Heater	22	
Subsea Control Room	X			X			A/C & Space Heater	22	
FPU Manager's Office, Conference Rooms & Technical Library	X			X			A/C & Space Heater	22	

\*The stated air change rates may be reduced, but depending upon the ventilation system arrangement and equipment heat dissipation allowed for.

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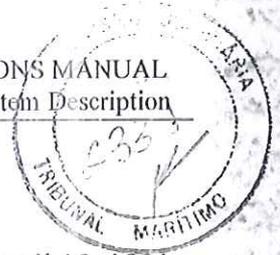


Table 4.7.1.1 - Ventilation (Continued)

Space	Mechanical		Natural		Summer Max Temp °C	Change /hr	Heating		Remarks
	Supply	Exhaust	Supply	Exhaust			Type	°C	
Port Aft Column	X	X			46	10	None		
Starboard Aft Column	X	X			46	10	None		
Elec./Insts & Hydraulic Workshop & Electrical Stores	X			X	27		A/C & Spaces Heater	22	
Change Rooms	X	Use T&S System					ETA Partial A/C	22	
Galley	X	X			41		ETA Partial A/C	22	
Laundry	X	X			41		ETA	22	
Dry Stores	X	X			27	4	ETA	22	
Toilet Exhaust		X	X			20	Electr. Wall Heater	22	
Private Toilet						10			
Mooring Control Houses							ERH	22	

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#### 4.7.2 Sanitary Systems

The systems have been realised according to Italian Regulation no.158 dated April 10, 1991. Sanitary Fixtures are of the private type (arranged inside the one and two man staterooms) for all the crew categories.

A public system of sanitary fixtures has been foreseen as follows:

- a) Gymnasium and Sauna on Tank Top Deck: one sanitary compartment consisting of a toilet, a shower room, and a lavatory room.
- b) Dressing Room on Tank Top Deck: one sanitary compartment consisting of a dressing room, a lavatory room with all relevant fixtures, a wall urinal, two toilets and three shower rooms.
- c) Offices and Conference Rooms on Second Deck: one toilet at the service passage head.
- d) Dressing Room on Second Deck: one sanitary compartment consisting of a dressing room, a lavatory room with all relevant fixtures, as wall urinal, three toilets and three shower rooms.
- e) Galley on Second Deck: a toilet in the adjacent dry deposit zone.
- f) Officer bathroom: a complete bathroom with all relevant fixtures in the sauna zone.

##### 4.7.2.1 Preservation, Packaging, Handling and Distribution Rooms for Provisions

These rooms consist of refrigerating rooms, store rooms, galley with pantry and coffee rooms.

Provisions are embarked by means of crane through a watertight manhole on the No.1 store room ceiling.

##### A. REFRIGERATING ROOMS

The refrigerating rooms are located on Second Deck and comprise:

- one 66 cu. m freeze room at  $-20^{\circ}\text{C}$
- one 53 cu. m chill room at  $+2^{\circ}\text{C}$

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#### 4.7.1.5 Controls and Instrumentation

##### A. CONFIGURATION

Ventilation and air conditioning control is performed through ECOS. Two ventilation and air conditioning motor control centres are located within the internal hull spaces. Each of these MCC's has a PLC combined within it to provide the logic to start/stop fans and close fire dampers. The PLCs are wired to the ventilation and air conditioning control panel in the CCR.

Shutdown signals from the fire and gas panel are sent to each of the vent and HVAC motor control centres, via the ESD system, on a zonal basis.

##### B. FIRE AND GAS SIGNALS

Each ventilation inlet is fitted with one smoke and two HC gas detectors. HC gas detectors are 2 out of 2 voting. Ventilation ducts to the columns have one smoke and two HC gas detectors. Inlets to air handling units have one smoke and three HC gas detectors. The HC gas detectors are 2 out of 3 voting.

A signal from the a.m. detectors automatically closes the fire dampers to that inlet and stops the associated fan.

Differential pressure switches are fitted to hazardous and non-hazardous spaces that are adjacent to one another.

A low-pressure alarm is given at the central/production control room.

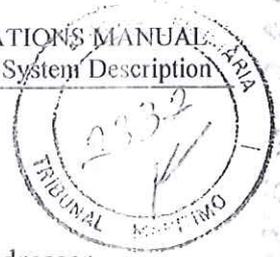
Flow switches are fitted to ducts providing ventilation air to spaces containing equipment critical to the safety operation of the FPU which does not function for any length of time after failure of ventilation.

The switch alarms to the CCR and starts the standby fan automatically.

It shall not be possible to reopen fire dampers from the CCR but only from facilities local to the fire dampers provided the shut-down signal has cleared.

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CENTRO DE SERVIÇOS TÁCTICOS



- 1 Electric immersion heater.
- 3 Garbage cans with cover, 80-litre size.
- 2 Pass-through food-serving openings over hot food table and dresser.
- 2 Commercial double door refrigerators.
- 1 Exhaust hood, over dishwasher and hot food table.
- 1 Exhaust hood with dry chemical fire extinguisher, over range.
- 1 Work table.
- 1 Baker's table.
- 1 Baker's oven double door.
- 4 Dressers.
- 1 L-shaped dresser with drawers and open shelves.
- 1 Table for dishwasher.
- 3 Electric fans, 460 mm diameter, oscillating, marine type, bracketed.
- 1 Lavatory.
- 1 Towel dispenser.
- 1 Liquid soap dispenser.

*D. PANTRY*

A pantry self-service zone is located between the galley and the mess room (comprised however in the mess area); its furnishing comprises:

- 1 Serving dresser approximately 3000 mm with napkin, flatware and tray dispenser, open shelves with battens and drawers under.
- 2 Dressers.
- 1 Pass-through refrigerator, with standard equipment.
- 1 Coffee maker, electric, dual drip.
- 1 Espresso machine, 4 cup.
- 1 Milk dispenser, electric.
- 1 Ice cube maker, electric.
- 1 Soft ice cream machine and dispenser.
- 1 Juice dispenser.
- 1 Drinking fountain.

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The above mentioned rooms are served by two equal independent refrigerating systems. Each system is capable to support the normal load that is to maintain the aforesaid temperature values for an operating time of 16 hours in each 24 hours and with an air temperature of +40°C and seawater temperature of +32°C (summer condition).

The rooms are properly insulated (wall, ceiling and floor) with suitable materials. Warning bells, signalling personnel inside the room are arranged in the galley and in the wheelhouse.

#### B. STOREROOMS

The storerooms are located on the second deck between the refrigerating rooms and the galley.

Walls and ceilings of storerooms are sheathed with zinc plated and painted panels; floor is of painted bare steel.

#### C. GALLEY

The galley is located on the second deck; its floor is tiled with anti-skid ceramics and its walls and ceiling are sheathed with stainless steel sheets. The galley furnishing comprises:

- 1 Range, oven and broiler, electric, all purpose, all AISI 304 stainless steel including back, cooking top, oven under with back shelf.
- 1 Range, griddle top and oven, electric, with back shelf.
- 1 Deep fat frying machine.
- 1 Mixer with 30 litre stainless steel bowl and standard equipment.
- 1 Deep water boiler with perforated liner basket and handling device.
- 1 Dishwasher, automatically timed.
- 1 Hot food table, with insulated sliding door warming cabinet underneath.
- 1 Food waste disposal unit, sink type, with overhead spray assembly.
- 1 Slicing machine.
- 1 Toaster.
- 1 Can opener.
- 1 Thermometer.

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– four (4) places in the hospital  
 for a total of 126 persons.

**4.7.3.1 Accommodations**

Accommodations, mess rooms, living rooms, etc. are located over the waterline, on the Tank Top, Second and Main decks.

Height of accommodations and public spaces is 2,300mm, reduced in some cases to 2,200mm; surfaces and volumes of accommodations are listed in table 4.7.1.

The accommodations walls are made by fireproofing double and single panels with high-density fibreglass core; ceilings are made by light alloy or painted steel panels insulated with fibreglass.

All doors are provided with locks, hold-back devices, rubber-tipped bumpers, knobs or handles, butts, escutcheons, roses, push/kick plates, striker plates, etc., as required to serve the space intended and to comply with Regulatory Bodies Requirements.

All doors, including wardrobes, in accommodation spaces are provided with locks and latch sets.

**Table 4.7.1 - Accommodation Surfaces and Volumes**

Accommodation				Surface sq. m		Volume cu. m	
Destination	Deck	Frame	Places	Rqrd	Effective	Rqrd	Effective
Staterooms (F-G)	2nd	23-14	1	7.5	15.4	15	35.4
Staterooms (A)	Tank top	30-23	2	7.5	14.2	15	32.7
Staterooms (13)	Tank top	30-23	2	7.5	16.9	15	38.9
Staterooms (D)	Tank top	30-23	2	7.5	15.0	15	34.5
Staterooms (H)	Tank top	23-14	2	7.5	14.4	15	33.2
Staterooms (I)	Tank top	23-14	2	7.5	15.0	15	34.5
Staterooms (L)	Tank top	23-14	2	7.5	17.0	15	39.3
Staterooms (C-E)	Tank top 2nd	23-14	2	7.5	15.4	15	35.4
Mess room	2nd	30-23	60*	60	60.7	90	234.8
Auditorium and	2nd	30-23	40*	-	60.7	90	234.8

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 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAIS

#### E. COFFEE ROOMS

Two coffee rooms are provided, one on the second deck and one on the main deck.

#### 4.7.2.2 Fresh/Potable Water System

The fresh/potable water requirement for 125 persons for 36 days is as follows:

- freshwater: 227,328 litres
- potable water: 250,368 litres.

The fresh/potable water system foreseen only one type of potable water contained in storage tanks with a total capacity of 212+212+15.8 cu. m (day tank).

From the day tank the water is diverted to an autoclave (capacity of 2,3000 litres) and properly sterilised and potabilised and sent to the users.

A series of centrifugal pumps are provided to supply the various users at deck levels. The cold water pumps have a head of 40 m and a delivery of 20 tonnes per hour while the hot water pumps have a head of 10 m and a delivery of 2.4 tonnes per hours.

The hot water production is ensured by three electric heaters each providing 570 litres per hour with a 1000 litre storage.

One distilled water system is capable to treat 40 tonnes per day (see also paragraph 4.3.8, Potable Water System).

#### 4.7.2.3 Anti-pollution System

A biological system to purify the sanitary discharges has been installed; it is provided with pump for extracting purified waters and, periodically, mud. Purified waters are then discharged outboard. An incinerator is installed to eliminate solid wastes, sludge and mud. Sludge and mud are collected in suitable sludge tanks.

#### 4.7.3 Equipment for Crew

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The following accommodations for the crew are available onboard:

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**DIRETOR**  
**DIVISÃO DE SERVIÇOS CARTORIAIS**
- SIX (6) one man staterooms
  - three (3) one+one man staterooms
  - fifty-five (55) two-man staterooms

- 1 Book rack.
- 1 Lounge chair.
- 1 End table.
- 1 Wastebasket.
- 1 Curtain for window.



*B. DINING, RECREATION AND MISCELLANEOUS*

- Mess room
- 5 Tables, 1500 mm diameter for 6 men each.
- 6 Tables, 1200 mm diameter for 5 men each.
- 60 Chairs, side with tie down springs.
- 1 Serving dresser with napkin, flatware and tray dispenser, open shelves with battens drawers under.
- 2 Dressers.
- 1 Pass-through refrigerator, with standard equipment.
- 1 Coffee maker, electric, dual drip.
- 1 Espresso machine, 4 cup.
- 1 Milk dispenser, electric.
- 1 Ice cube maker, electric with 4 beverage dispenser.
- 1 Bulletin board.
- 1 Soft ice cream machine and dispenser.
- 1 Juice dispenser.
- 1 Cold bar with back access for filling.
- 1 Drinking fountain.
- 32 Double coat hooks.
- 1 Clock, wall mounted electric, with hinged bezel rings.

*C. AUDITORIUM AND MEETING ROOM*

- 1 Cabinet with shelves, drawers and doors, for tape cassette, radio, television and video tape player.
- 3 Sofas.
- 1 Coffee table
- 2 Book cases
- 2 End tables

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Meeting room							
Games Room	2nd	23-14	20*	-	30.9	-	71.2
Meeting room	2nd	30-23	20*	-	32.6	-	74.9

\* Seating accommodations

Locks for stateroom doors are panic-proof type.

All locks are keyed differently except where there is more than one in the same compartment, in which case these doors are keyed alike.

Accommodation furnishings are as follows:

#### A. STATEROOMS

##### 1) Two-Man Staterooms

- 1 Berth - double, 900 mm x 2000 mm I.D., 3 drawers, lee rail and ladder.
- 1 Chest/Desk with 4 drawers, enclosed base melamine top with provision for locking drawers and matching desk chair.
- 4 Wardrobes with provision for locking.
- 1 Night table.
- 2 Radio shelves with radio/TV antenna outlet.
- 1 Bookrack.
- 1 Armchair.
- 1 Wastebasket.
- 1 Curtain for berth.
- 1 Curtain for window.

##### 2) One-man Stateroom

- 1 Berth - single, 900 mm x 2000 mm I.D., 3 drawers and lee rail.
- 1 Chest/Desk with 4 drawers, enclosed base melamine top with provision for locking drawers and matching desk chair.
- 2 Wardrobes with provision for locking.
- 1 Night table.
- 1 Radio shelf, with radio/TV antenna outlet.
- 1 Sofa.
- 1 Coffee table.
- 1 Armchair.

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DIVISÃO DE SERVIÇOS CARTEIRAS

F. *CHANGE ROOM (PORT - TANK TOP)*

- 36 Single tier lockers.
- 20 Double chrome coat hooks.
- 3 Wood benches.
- 2 Wastebaskets.
- 1 Dirty clothes bag.
- 1 Book rack.



G. *CHANGE ROOM - SAUNA (PORT)*

- 3 Single tier lockers.
- 1 Drinking fountain.
- 1 Sauna - 1500 mm x 2100 mm x 2600 mm, redwood panelled, two tier bench.

H. *CLEAN LAUNDRY*

- 2 Electric clothes washers, heavy-duty commercial type, 15 kg dry capacity.
- 2 Electric clothes dryers, heavy-duty commercial type 25 kg.
- 1 Two-compartment laundry tub with roll rim.
- 1 Supply locker.
- 1 Stainless steel table.
- 2 Soiled line bins.
- 1 Ironing machine, roller type.
- 1 Ironing press.

I. *OFFICES (EACH)*

- 1 Desk DPFT with 6 drawers (OIM - two desks).
- 1 File - legal size, 4 drawers, with lock (toolpusher, 3 files).
- 2 Arm chairs (company man, one chair).
- 1 Book case (toolpusher, 3 book cases).
- 2 Locker - with shelves (one in company man).
- 2 Wastebaskets.
- 1 Key locker.
- 1 Tackboard.
- 1 Markerboard.

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- 1 Writing table
- 1 Magazine rack
- 1 Storage cabinet, 4 shelves with lock
- 4 Card tables
- 7 Lounge chairs
- 15 Armchairs
- 32 Sidechairs
- 1 Bulletin board
- 1ea. Television and radio receiver, tape cassette, and video tape player
- 1 Folding acoustic partition
- 1 Video screen

*D. GAMES ROOM*

- 1 Sofa.
- 1 Coffee table.
- 1 Bookcase.
- 1 Magazine rack.
- 1 Stowage cabinet - 4 shelves, with lock.
- 2 Card tables.
- 12 Sidechairs.
- 4 Lounge chairs.
- 2 Wastebasket.
- 1 Bulletin board.

*E. CHANGE ROOM (PORT - SECOND DECK)*

- 40 Single tier lockers.
- 22 Double coat hooks.
- 1 Book rack.
- 2 Electric clothes washers, heavy-duty commercial type, 8.2 kg dry capacity.
- 2 Electric clothes dryers, heavy duty commercial type, 8.2 kg dry capacity.
- 3 Wastebasket.
- 1 Dirty clothes bag.
- 2 Wood bench.

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*N. ENGINE CONTROL ROOM*

- 1 RMS control console.
- 1 Printer for engine/generator monitoring.
- 1 Clock, wall mounted electric, with hinged bezel rings.
- 1 File cabinet.
- 1 Book case.
- 1 Desk.
- 1 Chair.
- 1 Set of inclinometers.



*O. RADIO ROOM AND VESTIBULE*

- 1 Desk - DPFT
- 2 Armchairs.
- 2 Files, legal size, 4 drawers.
- 1 Locker, equipment, built-in with adjustable shelves.
- 1 Bookcase.
- 5 Tables with drawers and cabinets under.
- 1 Table, open under (vestibule).
- 2 Stools (vestibule).
- 1 Bench (vestibule).
- 1 Tack board.

*P. TRANSIT ROOM*

- 6 Sidechairs.
- 1 Book case.
- 1 Magazine rack.
- 1 Desk, DPFT with 6 drawers.
- 1 Luggage locker.
- 1 Survival suit rack.
- 1 Bulletin board.
- 1 Weight scale.
- 1 Wastebasket.
- 1 File cabinet.

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*J. TECHNICAL LIBRARY, SECOND DECK*

- 1 Desk.
- 1 Chair.
- Shelving.

*K. PLATFORM MANAGER'S OFFICE, SECOND DECK*

- 1 Desk.
- 1 Chair.
- 1 Table.

*L. MAINTENANCE SUPERVISOR'S OFFICE*

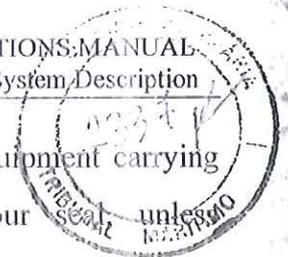
- 1 Table.
- 1 Drawing table.
- 1 L-shaped book case.
- 4 File cabinets.

*M. CENTRAL/PRODUCTION CONTROL ROOM*

- 1 Rig management master control console.
- 1 RMS production system control and vessel system monitoring console.
- 2 Vertical reference unit.
- 1 APM signal acquisition unit.
- 1 Printer for production system reporting and monitoring.
- 1 Gyro.
- 1 Printer for stability computer.
- 1 Clock, wall mounted electric, with hinged bezel rings.
- 2 File cabinets.
- 2 Book cases.
- 2 Desks.
- 2 Chairs.
- 1 Wastebasket.
- 1 Set of inclinometers.
- 1 Converter unit for gyro.

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Air-conditioning pre-heaters, ducts, cooling coils, fans and other equipment carrying chilled or recirculated air are completely installed with vapour condensation can be controlled by other means. All fresh air and supply air ducts to air-conditioned spaces have been insulated.

Insulation for ventilating and heating ducts in concealed areas is installed the same as for chilled air and recirculating ducts.

In areas where insulation may be subject to damage, galvanised metal sheeting or guards, as required, is provided.

The liquid line on all direct expansion is insulated with high density fibreglass with continuous vapour barrier.

*C. FIRE INSULATION*

Fire dampers have been fitted in locations required by Regulatory Bodies. All dampers, including fire dampers, are of metal construction and fitted with an indicator to show the position of the damper and a combined adjusting and locking device so located as to be easily accessible and visible.

*D. ACOUSTIC INSULATION*

Acoustical treatment is provided, where required, to reduce equipment noise (airborne and transmitted) to acceptable levels.

Suitable sound absorbing acoustic insulation, suitably faced have been provided and installed on the ceiling and bulkheads in the engine room, the compressor auxiliary machinery room, and the quarters air-conditioning compressor room where required.

**4.7.4 Elevators**

An elevator is installed in each of the four corner columns for access to the lower hulls. The forward elevators provide access to the watertight column flats, tank top, second deck and pump room levels. The aft elevators provide access to the watertight column flats, tank top, and pump room levels.

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- 1 Armchair.
- 1 TV set.
- 1 VHS video player/recorder.
- 1 AM/FM stereo receiver and tape player.
- 1 Luggage rack.
- 1 Drinking fountain.

*Q. GYM*

- 1 Complete set of gym equipment.

#### 4.7.3.2 *Insulation*

All working areas and accommodation adjacent to unheated or excessively heated spaces have been insulated.

Thermal insulation where required cover the inside surfaces or bulkheads and overheads, including stiffeners, beams bracket, and girders. The insulation is in contact with the surface covered.

#### *A. LIVING AND WORKING SPACES*

Sound absorption is provided in offices, control stations, lounges, messrooms, stateroom, toilets, recreation rooms, laundry, passageways, hospitals, etc.

Sound generating spaces such as laundries, recreation rooms, fan rooms, engine rooms, toilets and showers, etc., in proximity of crew sleeping and lounging areas are insulated on bulkheads, ceilings and decks against sound transmission.

The machine shop, instrument, tool, and electronic room, and all work areas are acoustically insulated from engine room noises.

#### *B. UNHEATED, WORKING AND HEAT PRODUCING SPACES*

All ducts have been installed with high-density fibrous glass insulation board with a factory applied aluminium foil vapour barrier. To further ensure vapour barrier integrity, all seams and joints have been sealed.

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DIVISÃO DE SERVIÇOS CAJOTIAIS



The structure and arrangement shall be made for a Sikorsky model S-61N helicopter (weight 9.3 tonnes).

The edges of the deck are fitted with 1.5 m wide safety net.

A light alloy gutterway is provided around the boundary of helideck, to collect drains (spilled fuel, rainwater, and anti-fire liquids).

Eight flush-fitting tie-down points for securing the aircraft are provided.

A 15m x 15m sisal rope helideck net is positioned over the touchdown (aiming) circle, tensioned to 2225N (minimum).

There are three access points to the landing area:

- one two flight stairway located at starboard side of helideck;
- one two flight stairway located at aft of the helideck;
- one stair joining the main deck and a gangway running beneath the heliport.

The firefighting equipment consists of:

- three foam monitors, one for each access platform;

**CAUTION:** The falling 5:1 gradient is infringed by foam monitor platform No.2, 3.42m outwith the edge of the helideck. Overflight of this platform should be avoided on take-off when the actual wind speed is less than 10 knots.

- One dry-powder fire extinguisher (capacity 250 kg powder) and hose reel. The dry powder extinguisher is installed on the starboard side access platform.
- Four carbon dioxide portable fire extinguishers. The CO<sub>2</sub> fire extinguishers have a capacity of 18 kg and are installed on the starboard side access platform.
- Three fireboxes (complete with hoses and dual purpose nozzles), one for each access platform.

The helicopter deck is delineated by yellow lights which are visible omnidirectionally above the landing area level. They are spaced around the perimeter of the deck.

In addition, floor lighting is provided to illuminate the helicopter deck in such a way that the pilots are not blinded by the glare.

According to the rules, the lights are connected to an emergency power circuit for automatic activation in the event of failure of the main power source.

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Each elevator has a capacity of four men or 680 kg, with a speed of 32 m/min. The elevator is capable of transporting 1,360 kg at a lesser speed.

Each elevator has two doors provide access to each watertight deck level.

The drive system shall be based on thyristor speed control of a squirrel cage AC motor. Speed control shall be of close-loop type using acceleration and deceleration speed reference electronically computed.

Deceleration is electronically controlled by eddy current braking. The electromagnetic brake, consisting of two independently operated brake shoes, is only apply when the speed is approaching zero and shall be of fail-safe type operating on "power-off, brake-on" principle.

The power electronics contain thyristor bridges for the simultaneous control of the drive and braking torque.

Lift car has an emergency hatch; a ladder on the inside wall leads to the emergency hatch is provided. Vertical escape ladders are provided in the elevator trunks. Car doors and landing doors are manually operated.

The elevators are fitted with interlocks that do not permit the cab to move unless the watertight doors are secured at the debarkation levels. An emergency override of the interlock is provided at the call buttons on each of the lower levels.

Warning signs stating that "Doors Shall Be Secured at All Times" and an alarm system with a flashing light at each door; pump room access to the compartment, and a central control room indicate when the door is not secured. An audible alarm within the elevator trunk sounds when the door is not secured or the elevator is in motion.

#### 4.7.5 Helideck

The helideck is a lightweight aluminium structure. It shall be designed and configured to sit onto the steel structure trusses.

The helideck is located approximately 5.2 metres above the main deck of the upper hull and cantilevered out of the vessel at the port forward corner.

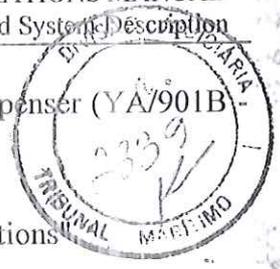
The orientation provides an unobstructed approach pattern as defined by the regulatory bodies requirements (as per Figure. 4.7.5.1).

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An area on the starboard side access platform is reserved for the fuel dispenser (YA/901B - See paragraph 1.2.8 of this Manual).

**NOTE:** See also paragraph 5.5 of this Manual for "Helicopter Operations"



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## 4.8 MISCELLANEOUS EQUIPMENT

### 4.8.1 Repair and Maintenance Facility

#### 4.8.1.1 General

The overall facilities provided for maintenance, overhaul, and repair purposes are as follows:

- Machine shop
- Instrument workshop
- Electrical workshop
- Welding shop

#### 4.8.1.2 Machine Shop and Welding Shop

A machine shop and a welding shop as shown on the General Arrangement Plans and outfitted with the equipment listed below is provided.

##### A. MACHINE SHOP

- 1 each Heavy duty lathe, 1400 mm between centres, 2500 mm deb, with all geared headstock.
- 1 each Drill press, radial type, Rockwell 2000-70-620.
- 1 each Heavy duty 12" bench grinder, Rockwell no. 4C.
- 1 each Heavy duty power hacksaw, Keller no. 4C.
- 1 each Heavy duty hydraulic press, KR. Wilson 137-BH-1.
- 1 each Pipe threader, Ridgid 4" with attachments.
- 1 each Pipe threader, Ridgid 2" with attachments.
- 1 each Bench grinder.
- 1 lot Hand tools, mechanic.
- 1 lot Special tools for tool room.

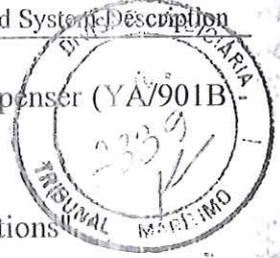
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JOSE CARLOS PIMENTEL GUSMÃO  
DIRETOR DE WELDING SHOP  
DIVISÃO DE SERVIÇOS CARTORIAS

- 1 25 mm steel 1.220 Mx1.830 M welding table with swivel 115 mm jaw vice.
- 1 2 in. H/Duty grinder.
- 2 Lincoln 440 V, 400 amp., DC welding machine.

An area on the starboard side access platform is reserved for the fuel dispenser (YA/901B  
See paragraph 1.2.8 of this Manual).

**NOTE:** See also paragraph 5.5 of this Manual for "Helicopter Operations"



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DIVISÃO DE SERVIÇOS CARTORIAIS

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- 1 each Heavy duty hydraulic press, KR. Wilson 137-BH-1.
- 1 each Pipe threader, Ridgid 4" with attachments.
- 1 each Pipe threader, Ridgid 2" with attachments.
- 1 each Bench grinder.
- 1 lot Hand tools, mechanic.
- 1 lot Special tools for tool room.

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JOSE CARLOS FERNANDES GUSMÃO  
DIRETOR WELDING SHOP  
DIVISÃO DE SERVIÇOS CARTORIAIS

- 1 25 mm steel 1.220 Mx1.830 M welding table with swivel 115 mm jaw vice.
- 1 2 in. H/Duty grinder.
- 2 Lincoln 440 V, 400 amp., DC welding machine.



- 1 Locker 1830 mm high, 915 mm wide, 460 mm deep with double doors and lock.
- 1 Welding electrode oven.
- 1 TIG welding machine.
- 1 Lincoln 600 amp. welding machine.
- 1 lot Cutting torch equipment.

#### 4.8.1.3 Instrument Workshop

An area designated as the instrument workshop with air-conditioned, dedicated to testing and repair and inspection of small precision instruments, controllers, etc. is provided on board.

A "Haven Automation" or equivalent C.A. range modular test bench of heavy duty standards is installed, including:

- pneumatic calibration test module
- electrical calibration test module
- electronic calibration test module
- temperature calibration test module
- vacuum calibration test module
- low pressure manometer test module

#### 4.8.1.4 Electrical Workshop

An area designated as electrical workshop dedicated to maintenance and repairs of motors, switchgears, and so forth is provided on board.

The workshop is complete of instrument air outlets at bulkheads at rear of work bench and also electrical outlets of various voltages: 25 V, AC and DC; 50 V AC and DC; 220 V, DC; 220 V, AC single and three (3) phases and 440 V AC three (3) phase.

#### 4.8.1.5 Tools

A complete outfit of hand tools including wrenches, hammers, chisels, punches, screw drivers, saws, drills, grinders, etc. is provided on board including special tools required for the maintenance of equipment.

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DIRETOR  
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4.8.1.6 *Handling Lifting Equipment*

Service: *Pump Rooms*

- a. Chain hoist with geared trolley type NITCHI - NAVALTECNO Model HGB.

Equipment number	MT*007 PR	
Capacity:	3	Tonnes
Length of load chain:	3	m
Length of hand chain:	4	m
Mm. draw-up dimension:	415	m
Quantity:	4	pieces
Weight:	61	kg

- b. Chain hoist type NITCHI - NAVALTECNO H-50.

Equipment number	MT*008 PR	
Capacity:	3	Tonnes
Length of load chain:	3	m
Length of hand chain:	4	m
Mm. draw-up dimension:	415	m
Quantity:	2	pieces
Weight:	30.5	kg

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 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTÓGRAFOS



Service: *Workshop - Welding Shop*

a. Chain hoist with geared trolley type NITCHI - NAVALTECNO Model HGB.

Equipment number	MT/014 PR	
Capacity:	1.5	Tonnes
Length of load chain:	3	m
Length of hand chain:	4	m
Mm. draw-up dimension:	340	m
Quantity:	1	pieces
Weight:	29	kg

b. Chain hoist with geared trolley type NITCHI - NAVALTECNO Model HGB.

Equipment number	MT/015 PR	
Capacity:	1.5	Tonnes
Length of load chain:	6	m
Length of hand chain:	4	m
Mm. draw-up dimension:	340	mm
Quantity:	1	pieces
Weight:	37	kg

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 DIRETOR  
 DIVISÃO DE SERVIÇOS CARTORIAS

Service: Service Rotor Dismounting Procedure

a. Geared trolley type NITCHI - NAVALTECNO Model GT (geared trolley).

Equipment number	MT*016 PR	
Type:	geared trolley	
Capacity:	10	Tonnes
Length of load chain:	6	m
Quantity:	4	pieces
Weight:	115	kg

b. Chain hoist with trolley type NITCHI - NAVALTECNO Model HGB

Equipment number	MT/017 PR	
Capacity:	15	Tonnes
Length of load chain:	5	Tonnes
Length of hand chain:	6	m
Mm. draw-up dimension:	940	mm
Quantity:	1	pieces
Weight:	440	kg

c. Chain hoist NITCHI - NAVALTECNO Model H-50.

Equipment number	MT/018 PR	
Capacity:	10	Tonnes
Length of load chain:	5	Tonnes
Length of hand chain:	6	m
Mm. draw-up dimension:	790	mm
Quantity:	1	pieces
Weight:	81	kg

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JOSÉ CARLOS PIMENTEL CUSTÃO  
 DIRETOR  
 DIVISÃO DE SERVIÇOS DA TORRE



Service: *Power Turbine Dismounting Procedure*

a. Chain hoist type NITCHI - NAVALTECNO Model H-50.

Equipment number	MT/019 PR	
Capacity:	3	Tonnes
Length of load chain:	5	Tonnes
Length of hand chain:	6	m
Mm. draw-up dimension:	435	mm
Quantity:	2	pieces
Weight:	39	kg

b. Geared trolley type NITCHI - NAVALTECNO Model GT.

Equipment number	MT/020 PR	
Capacity:	3	Tonnes
Length of hand chain:	6	m
Quantity:	1	pieces
Weight:	32	kg

Service: *Lifting Appliances for Open Storage and Corridor*

a. Geared trolley type NITCHI - NAVALTECNO Model GT (geared trolley).

Equipment number	MT/021 PR	
Capacity:	1.5	Tonnes
Length of hand chain:	4	m
Quantity:	2	pieces
Weight:	15	kg

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DIRETOR  
DIVISÃO DE SERVIÇOS CARTORÍARIOS

b. Chain hoist type NITCHI - NAVALTECNO Model H-50.

<b>Equipment number</b>	MT/022 PR	
Capacity:	1.5	Tonnes
Length of load chain:	6	m
Length of hand chain:	4	m
Mm. draw-up dimension:	345	mm
Quantity:	2	pieces
Weight:	23	kg

*Service: Lifting Appliances for Production Warehouse*

a. Geared trolley type NITCHI - NAVALTECNO Model GT (geared trolley).

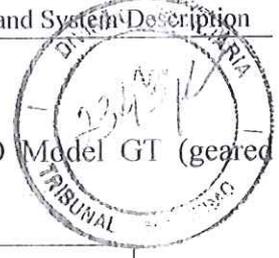
<b>Equipment number</b>	MT/023 PR	
Capacity:	1.5	Tonnes
Length of hand chain:	4	m
Mm. draw-up dimension:	435	mm
Quantity:	3	pieces
Weight:	15	kg

b. Chain hoist type NITCHI - NAVALTECNO Model H-50.

<b>Equipment number</b>	MT/024 PR	
Capacity:	1.5	Tonnes
Length of load chain:	3	m
Length of hand chain:	4	m
Mm. draw-up dimension:	345	mm
Quantity:	2	pieces
Weight:	18	kg

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*Service: Lifting Appliances for Emergency Generator Set*

- a. Geared trolley for chain hoist type NITCHI - NAVALTECNO Model GT (geared trolley).

<b>Equipment number</b>	MT/027 CP	
Capacity:	10	Tonnes
Length of hand chain:	1	m
Quantity:	1	piece
Weight:	115	kg

- b. Chain hoist type NITCHI - NAVALTECNO Model H-50.

<b>Equipment number</b>	MT/028 PR	
Capacity:	10	Tonnes
Length of load chain:	5	m
Length of hand chain:	5.5	m
Mm. draw-up dimension:	790	mm
Quantity:	1	pieces
Weight:	80	kg

- c. Geared trolley type NITCHI - NAVALTECNO Model GT (geared trolley).

<b>Equipment number</b>	MT/029 CP	
Capacity:	500	Tonnes
Length of hand chain:	4.5	m
Quantity:	2	pieces
Weight:	11	kg
The geared trolley is designed for running on a beam type IPE 160		

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d. Chain hoist type NITCHI - NAVALTECNO Model H-50.

Equipment number	MT/030 PR	
Capacity:	500	Tonnes
Length of load chain:	5	m
Length of hand chain:	4.5	m
Quantity:	1	pieces
Weight:	11	kg

*Service: Lifting Appliances for Equipment Transportation from Loading Area (2nd deck AFT/STARBOARD SIDE) to production Warehouse*

a. Chain hoist type NITCHI - NAVALTECNO Model H-50.

Equipment number	MTIO31 CP	
Capacity:	1.5	Tonnes
Length of hand chain:	3.5	m
Quantity:	1	piece
Weight:	15	kg

b. Chain hoist type NITCHI - NAVALTECNO Model H-50.

Equipment number	MT/032 PR	
Capacity:	1.5	Tonnes
Length of load chain:	10	m
Length of hand chain:	3.5	m
Mm. draw-up dimension:	345	mm
Quantity:	1	pieces
Weight:	23	kg

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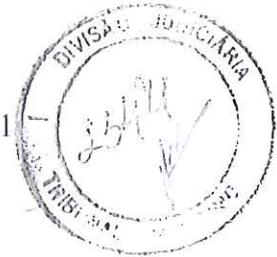
*Service: Tank Top Aft Deck*

a. Crude Oil Booster Pumps

- Manual hoist and trolley:
- Capacity:

Item No. TL-122301

1 tonne SWL



b. Crude Oil Export Pumps

- Manual hoist and trolley:
- Capacity:

Item No. TL-122302

6 tonne SWL

c. Platform Trolley

- Capacity:

2 tonne

*Service: Tank Top Moon Pool Area*

a. Seawater Supply Caisson Pumps

- Manual hoist and trolley:
- Capacity:

Item No. TL-511102

8 tonne SWL

*Service: Riser Platform Area*

a. ESDV Removal

- Electric hoist and trolley:
- Capacity:

Item No. TL-121001

3 tonne SWL

b. ESDV Removal

- Manual hoist and trolley:
- Capacity:

Item No. TL-121002

3 tonne SWL

*Service: Top of Derrick*

a. Flare Tip Removal

Purpose designed jib crane with 2 off 2 tonne line pull, air operated winches:

Item No. GN-541201

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## 4.8.2 Special Equipment

### 4.8.2.1 Incinerator

The incinerator is installed on main deck, fore stbd side, for disposing of sludge, sewage sludge, galley and other solid waste, and it comprises flue gas damper and flue gas fan.

#### Technical Data

- Capacity max. 500,000 kcal/hr
- (2,000,000 BTU/hr)

Based on calorific value the following quantities can be incinerated:

Sludge oil:	max. 80 L/hr (21 GPH)
Sewage sludge:	max. 30 L/hr (8 GPH)
Solid waste:	General shopboard waste from galley, engine room and deck.
Volume per charge:	400 L (15 cu. ft)
Frequency:	2-4 hours/charge

Sludge oil, sewage sludge and solid waste can be burned simultaneously.

The flue gas damper is mounted in the flue gas duct in order to adjust the negative pressure in the combustion chamber and is manually operated.

#### a. Burner

The burning arrangement is in three stages, two for diesel oil with pressure atomising and one for sludge with compressed air atomising.

The sludge burner allows particles up to 8 mm in diameter to pass through. The primary air fan and diesel oil pump are integral parts of the burner. The sludge dosage system is separately mounted on the combustion chamber. The operating switches allow burning alternatives: diesel oil, diesel oil and sludge, or sludge only.

#### b. Electric Panel

Electric panel consists of fuses, all starters, auxiliary relays, indicators and switches, and is mounted on the combustion chamber.

Alarms and automatic shut-off are provided.

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#### 4.8.2.2 U.V. Sterilisation Unit

The U.V. sterilisation unit is installed on tank top, aft, for purifying/disinfecting of potable water.

In this equipment the ultraviolet energy is radiated by low-pressure mercury lamps.

These germicidal lamps are made of a special hard glass that allows the transmission of short-wave ultraviolet energy, predominantly the 254mm wavelength. This light ray has the unique ability to kill all micro-organism in which comes in contact.

The sterilizer is also complete with the following accessories:

- a) Flow control at outlet (max. flow rate 20 m<sup>3</sup>/hr).
- b) Device for easy access to radiation chamber.
- c) Ultraviolet optical sensor.
- d) Lamp-out alert.
- e) L.E.D. ultraviolet lamp operating display panel.
- f) Running time meter.
- g) Automatic valve to stop the water in case of lamp failure.

#### 4.8.3 Riser Pull-in Winches and Control Cabin

Riser pull-in/pull-out operations shall be performed using three winches and a system of sheaves. The following equipment are installed on main deck, portside, forward of the diving well:

- |  |                  |
|--|------------------|
| – One 150 Tonne Main Riser Pull-in Winch         | GN-610001        |
| – One 150 kW Electro-hydraulic Power Pack        | Z-610001         |
| – Two 15 Tonne Auxiliary Riser Pull-in Winches   | GN-610002A/B     |
| – Two 18.5 kW Electro-hydraulic Power Packs      | Z-610002A/B      |
| – One Control Cabin                              | Z-610004         |
| – Remote Control Stations (inside Control Cabin) | PN-610001A/B/C/D |

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#### 4.8.3.1 150 Tonne Main Riser Pull-in Winch and Power Pack

##### A. DESCRIPTION

The winch is of double drum design with one section containing 400m of high capacity 60mm diameter CASAR wire rope for line pulls up to 150 tonnes and the other section containing 400m of 38mm diameter wire rope for line pulls up to 45 tonnes capacity. The 60mm CASAR rope is to be used for second end pull-in of the 6" production risers; the 38mm wire rope is to be used for pull-in of the 4" gas risers, umbilicals, optical and electrical cables. Each rope is selected for the appropriate application with the other rope tied back to the drum flange and allowed to rotate freely with the drum.

The rope exits the winch and passes over a main deck sheave located at the edge of the diving well. The rope then passes down to the bottom of the diving well through a sheave and can be directed either towards the forward or the aft turning sheaves to a movable trolley. It can then be deployed towards the laybarge for connection to the riser and pull-in. Outline procedures of wire installation and pull-in operations are given in Volume 5 of this manual.

Individual chain-driven level wind systems are incorporated at the front of each drum section to ensure tight synchronised reeving of the rope on and off the drum.

The winch is powered by four radial piston type hydraulic motors through planetary gearboxes fitted with pinions on the output shaft end.

##### B. AUTOMATIC LUBRICATION

Located at front end of the winch is an automatic lubrication system consisting of a two-part housing clamped over each rope. Seals are fitted at either end of the housing which retain a grease reservoir in which the rope passes through when paying off or on to the drum.

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*C. DYNAMIC LOAD MONITOR*

Also located between the winch and the main deck sheaves is a gantry frame with an overhead trolley which supports the dynamic load monitoring (DLM) device and accommodates rope movement as it wraps/unwraps from the drum. The DLM is suspended from the trolley by a hook and chain, to protect it from dropping on the deck.

The load monitor is a three-wheel device with an integral shear pin load cell mounted on the top pulley wheel.

A remote tension meter located in the Control Cabin reads data from the load monitor and displays them in tonnes. The 45-tonne load monitor is equipped with an electrical overload trip, which energises if line tension exceeds 5% over the 45 tonne limit, thus causing the winch to stop. This is a safeguard to ensure the operator does not use the 38mm rope to pull the heavier risers.

*D. POWER PACK*

The winch is powered by an electro-hydraulic power pack positioned behind the winch. It consists of 2 x 75 kW motor/pump sets positioned under a hydraulic oil reservoir. The connection between the winch and the power pack is via interconnecting hoses, terminating at bulkheads fixed to either skid. The winch control valves are operated from a remote joystick on the control console located in the Control Cabin.

The 45-tonne operation requires only two hydraulic motors to be driving with max. system pressure up to 110bar. The 150-tonne operation requires all the hydraulic motors to be driving and the system pressure to be limited up to 210 bar by relief valves within the main control valves.

The main control valves are mobile type 3-position valves with proportional solenoid control from the joystick mounted on the control console. The solenoids are 24V dc operated with the signal being fed from the joystick via a constant power supply unit and amplifier all of which are housed within the control console.

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The pumps are fitted with a constant power option which allows the operator maximum use of the motor power to provide high speed or maximum load conditions to suit system demand, without producing excessive heat or power loss. The pump is also provided with a "pressure cut-off" which will shut the pump down should the pressure exceed 215 bar.

The hydraulic oil tank is fitted with a return line filter, breather, temperature/level gauge and suction elements. The return oil is cooled by sea water coolers positioned under the oil tank. The coolers are automatically activated when energising the pumps but can be turned off at the control console to suit climatic conditions.

A lamp on the console provides a visual warning of high oil temperature. Pressure gauges are fitted on the control console and locally on the power pack frame.

#### *E. OPERATION AND CONTROL*

##### *Winch Control*

Push buttons are provided on the control console for selection of either 45-tonne operation (running one pump) or 150-tonne operation (running two pumps).

- Energise pump 1 for 45-tonne operation or
- Energise pumps 1 & 2 for 150-tonne via key selector switch

**NOTE:** On removal of the key the winch will return to the 45-tonne operation mode

- Move control lever **forward** to allow winch to "Pay-in"
- Move control lever **back** to allow winch to "Pay-out"
- Release lever to spring return to centre in neutral position and stop the winch

**NOTE:** Control lever is of proportional type whereby the amount of movement is relative to the speed (rpm) of the winch drum.

##### *Dynamic Line Tension Monitoring*

Line tension in tonnes and length in metres are digitally displayed on screens above the control console. The monitors are supplied calibrated to suit the wire ropes in use. For re-calibration procedures refer to winch operating manual.

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### *Alarms/Emergency Control*

Visual alarms are provided on the control consoles for:

- High oil temperature
- Low oil level
- Motor tripped

Emergency stops are provided on the control console and at the power pack. These are red push-button type which must be turned to release.



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Table 4.8.3.1 150Te Riser Main Pull-in Winch - Technical Data

<b>150 Tonne Winch</b>	<b>GN-610001</b>
Manufacturer	NIM Engineering Ltd
<i>High Load Drum Section</i>	
Max Safe Working Load	150 tonnes
Rope Capacity	400 metres
Rope Diameter	60mm
Rope Type	CASAR SUPERPLAST
Rope MBL	326 tonnes (3200 kN)
Rope SWL	169.7 tonnes (1665 kN)
Brake Capacity (outer layer)	187.5 tonnes
Rope Speed (outer layer)	4 m/min
<i>Low Load Drum Section</i>	
Max Safe Working Load	45 tonnes
Rope Capacity	400 metres
Rope Diameter	38mm
Rope Construction	6x36 IWRC
Rope MBL (test)	92.80 tonnes
Brake Capacity (outer layer)	56.25 tonnes
Rope Speed (outer layer)	3.4 m/min
Weight	31750 kg
<b>150 kW Power Pack</b>	<b>Z-610001</b>
2x75 kW electric motors	440v / 3ph / 60Hz, 4 pole
Protection	IP56
2 x hydraulic axial piston pumps	0-120cc/rev variable displacement with constant power control
Hydraulic Oil Tank Capacity	1,000 litres
Hydraulic Oil Type	I.S.O. VG 32
Max Working Pressure	210 bar
Max S.W. cooling required	140 lpm @ max 10 bar
Max S.W. operating temperature	30 deg C
Weight	2600 kg

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#### 4.8.3.2 15-Tonne Auxiliary Riser Pull-in Winches and Power Packs

Two identical auxiliary riser pull-in winches shall be used during flexible riser and steel catenary riser (SCR) pull-in/pull-out operations and also for installation of the main pull-in wire ropes for said operations. The functions of the auxiliary riser pull-in system are:

- a) to assist with installation of the main pull-in wire rope at the desired riser slot
- b) to provide lateral directional control during pull-in of the aft flexible risers, forward production and gas lift risers and SCR's
- c) to assist with retrieval of laybarge wire rope during riser pull-out operations

Each drum contains 400m of 26mm wire rope. The ropes exit the winches and pass over main deck sheaves located at the edge of the diving well. The ropes then pass down to the bottom of the diving well through two sheaves and can be directed either towards the forward or aft auxiliary sheaves, snatchblocks and trolleys. Detailed procedures of wire installation and pull-in operations are included in Volume 5 of this manual.

##### A. DESCRIPTION

Each winch consists of two fabricated frames on which the following are mounted:

- drum assembly
- spooling gear
- drive/motor assembly
- 18.5 kW power pack

The drum is driven by a radial piston hydraulic motor via a right angle planetary gearbox directly through a keyed bore in the drum shaft.

The wire rope spooling device is running on a scroll shaft, operated automatically via a chain drive connecting the drum shaft with the scroll shaft.

##### B. AUTOMATIC LUBRICATION

Located at front end of the winch is an automatic lubrication system consisting of a two-part housing clamped over each rope. Seals are fitted at either end of the housing which retain a grease reservoir in which the rope passes through when paying off or on to the drum.

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C. *DYNAMIC LOAD MONITOR*

Also located between the winch and the main deck sheave is a gantry frame with an overhead trolley which supports the dynamic load monitoring (DLM) device and accommodates rope movement as it wraps/unwraps from the drum. The DLM is suspended from the trolley by a hook and chain, to protect it from dropping on the deck. The load monitor is a three-wheel device with an integral shear pin load cell mounted on the top pulley wheel.

A remote tension meter located in the Control Cabin reads data from the load monitor and displays them in tonnes.

D. *POWER PACK*

The winch is powered by an 18.5kW electro-hydraulic power pack positioned above the winch and bolted to the winch side frame. It consists of an 18.5 kW motor/pump set positioned under the hydraulic power oil tank reservoir. The winch control valves are operated from a remote joystick on the console located in the Control Cabin.

The hydraulic oil tank is fitted with a return line filter, breather, temperature/level gauge and suction elements. The return oil is cooled by seawater coolers positioned under the oil tank. The coolers are automatically activated when energising the pumps but can be turned off at the control console to suit climatic conditions. A lamp on the control console provides a visual warning of high oil temperature. Pressure gauges are fitted on the control console and locally on the power pack frame.

E. *OPERATION AND CONTROL*

The following controls are provided in the Control Cabin:

- Lever operated proportional directional control (pay-in/pay-out) giving variable speed at the winch and spring centred for safety
- System pressure gauge
- Emergency stop
- Switch operated hydraulic oil heater, with light indicator
- Switch operated hydraulic oil cooler, with light indicator
- Low oil level warning light indicator
- Pump running/tripping indicator

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- Running line monitor
- dynamic load monitoring
- overload
- distance meter indication



**Table 4.8.3.2 15Te Riser Auxiliary Pull-in Winches - Technical Data**

<b>15-Tonne Winches (2 off)</b>	<b>GN-610002A/B</b>
Manufacturer	NIM Engineering Ltd
Max SWL (outer layer)	15 tonnes
Rope Capacity	400 metres
Rope Diameter	26mm
Rope Type	6x36 IWRC closed socket one end
Rope MBL (test)	43.8 tonnes
Brake Capacity (outer layer)	18.75 tonnes
Rope Speed (outer layer)	5 m/min
Weight	2444 kg
<b>Power Pack (2 off)</b>	<b>Z-610002A/B</b>
18.5 kW electric motor	440v / 3ph / 60Hz, 4 pole
Protection	IP56
Hydraulic axial piston pump	28cc/rev variable displacement with constant power control
Hydraulic Oil Tank Capacity	150 litres
Hydraulic Oil Type	I.S.O. VG 32
Max Working Pressure	210 bar
Max S.W. cooling required	17 lpm @ max 10 bar
Max S.W. cooling temperature	30 deg C
Weight	470 kg

**4.8.3.3 Control Cabin**

The Control Cabin is positioned such that it allows the operator to view and monitor fully the winching operation through two windows fitted with toughened glass. An independent unit fitted on the aft side wall supplies air conditioning.

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Within the control cabin separate the remote panels and consoles are fitted for operation the main and auxiliary winches. Line tension monitoring digital-display units are mounted in polyglass enclosures above the consoles.

Also mounted within the Control Cabin is the control unit for the riser monitoring system (underwater camera); refer to Section 4.8.4.

#### 4.8.4 Riser Monitoring System

*Ref: Doc. Nos: DE-3010.38-1320-140-NBD-356-01 to -05  
DE-3010.38-6000-966-NBD-393-05, -06, -08, -10, -11*

##### 4.8.4.1 General Description

The riser monitoring system shall be used during pull-in/pull-out operations of all flexible risers except the aft risers and SCR's. It comprises a compact running frame which houses an underwater camera, pan and tilt with two lamps.

The system is deployed from strategic locations at the port or starboard spider decks by a pneumatic winch and runs down a pair of wire guidelines deployed from a SCU (surface control unit) system controller. The SCU console is located within the Control Cabin along with a colour monitor and video recorder.

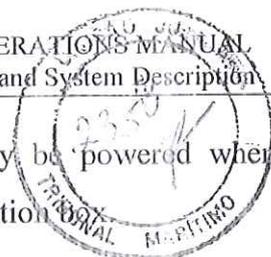
A cable is run from the SCU console to a marshalling box located in the Control Cabin, and then to a junction box located on the port spider deck amidships from where two deck cables are run to the port and starboard locations of the pneumatic winch. Each of the deck cables has an EExd connector fitted at the winch end which will mate into the TV junction box - the deck cable which is not utilised will be fitted with EExd protective covers.

The camera frame can be lifted or lowered via its pneumatic winch, which has fitted 100 metres of electro-mechanical cable. This cable also carries all voltage and signals required to operate the camera system.

The cable has a strain termination fitted to the armour wire, which in turn is secured to the camera frame. Electrical connection is achieved from a 21-way Burton connector moulded onto the cable, which mates into the underwater junction box. From there individual tails fit into the camera, pan & tilt and lamp.

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A safety switch has been fitted to ensure that the system can only be powered when submerged in the water and this tail also feeds from the underwater junction

The system can be connected/disconnected rapidly at the frame by removing one bolt and one multi-way plug.

The clump weight has its own pneumatic winch fitted with 200m of wire rope and has removable 50kg weights to enable easier handling around the platform.

#### 4.8.4.2 Main Parts

The main parts of the Riser Monitoring System (Tag No: UQ-610003) are as follows:

##### A. CONTROL CONSOLE PN-610003

The camera control console is located within the riser pull-in Control Cabin. It consists of a 17U rack cabinet, which houses the SCU, a 14" Sony colour NTSC monitor and a Panasonic NTSC VCR.

All subsea power is controlled via the Surface Control Unit and water-switch mounted on the subsea frame, which controls the voltages to the camera, lamps and pan & tilt unit. This configuration ensures that as soon as the equipment is recovered from the splash zone all subsea power will be isolated. The purpose of this switch is two-fold: "

- Safety: Stops the system being powered in a Zone 1 area
- Reliability: Extends the life of the lamps by not operating in air

Most of the controls and indicators are self explanatory – for a detailed description of all controls and functions refer to manufacturer's Technical Manual.

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Table 4.8.4.1 Functional and Performance Characteristics

Control Console	PN-610003
Manufacturer	Kongsberg Simrad
Power Supply Input	115/230 V (auto selection), 50/60Hz
Power Consumption	732W max.
Power Supply Output Subsea Step Down Isolation Transformer; output LIM protected	110V ac secondary tapping, 1000 VA
A.C. Output to Lamps	110V 500W
A.C. Output to Pan & Tilt Unit	110V 2A max.
D.C. Output to Camera	24V 1.5A max.
D.C. Output to Camera Focus/Zoom	Bi-state $\pm 12V$ , 1.5A max or tri-state 12V, 0V + open
D.C. Output to Auto Focus	0V and open
D.C. Output to Iris Override	N/A
Video Input/Output	PAL/NTSC 1V p-p (nominal) 75W unbalanced or balanced
Video Gain	0-3 dB (adjustable)
Video Bandwidth	>10 MHz
Operating Temperature	0° to 40°
Storage Temperature	-20° to 60°
Dimensions 19" rack mount unit	TBD
Weight	TBD

B. WINCH LOCATION SELECTOR CABLE

This cable connects from the SCU to the marshalling box all located within the riser pull-in Control Cabin.

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*C. JUNCTION BOXES*

An electrical marshalling box (JB-CD-274) is located in the Control Cabin. It is fitted with connectors for up to four (4) cables terminating to EExd cable glands. The winch location cable is permanently plugged to one connector whilst the other three connectors are spare. From this junction box a deck cable connects to junction box (JB-CD-275) located on the port spider deck midship below the sheaving platform. Two deck cables are run from JB-CD-275 to the vicinity of the port and starboard locations of the pneumatic winch and left coiled on cable rack.

*D. DECK CABLES*

Two deck cables are routed from JB-CD-275 to the vicinity of the port and starboard locations of the pneumatic winch and left coiled on cable rack. Each is terminated with an EExd plug for quick connection into the winch J.B. Protective covers are fitted on each termination.

*E. TV UMBILICAL PNEUMATIC WINCH GN-610004*

The main function of this winch is to lift and lower the camera cage. It is fitted with 100 metres of electromechanical cable which also passes all electrical voltages and signals to the subsea package. The winch has fitted a stationary EExd J.B. with mating connector to the deck cable. EExd slip-rings and a rotary EExe J.B inside the cable drum maintains continuity of all electrical signals.

Lifting/lowering control is achieved locally by a proportional control lever.

*F. CLUMP WEIGHT WINCH GN-610010*

The clumpweight winch is a standard hoist air winch designed to lift the clumpweight with 8mm wire through a 3" snatch block and a fixed point.

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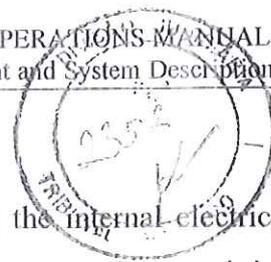
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Table 4.8.4.2 Riser Monitoring System Winches

<b>TV Pneumatic Winch</b>	
Equipment No.	GN-610004
Manufacturer	Lawson
Drive (Pneumatic)	Single geared motor c/w brake
Safe Working Load	1000 kg
Max. Drum Speed	10 rpm
Coiling Speed	0-23 m/min
Length of Umbilical Coiled	150m on 3 layers
Diameter of Umbilical Cable	23mm
Mass of Winch and Umbilical Cable	1000 kg
Mass of Umbilical (air)	1.47 kg/m
Optimum running pressure	6 bar
Air consumption	540 m <sup>3</sup> /hr
<b>Clump Weight Winch</b>	
Equipment No.	GN-610010
Manufacturer	EMCE
Model	LV-750 ED
Drive (Pneumatic)	Type VS6
Safe Working Load	750 kg
Mass of Winch and Cable	170 kg
Coiling Speed	5 m/min
Length of Cable Coiled	200m on 5 layers
Cable Diameter	8mm
Mass of Umbilical (air)	1.47 kg/m
Optimum Running Pressure	6 bar
Air Flow	75 l/sec
Air Consumption	270 m <sup>3</sup> /hr
Hand Control Valve on Winch	1" 5/3

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G. *TV UMBILICAL*

100m of contra-helicallly wound steel armour cable protecting the internal electrical cable which consists of one RG59 coax and multi-core conductors and transmitting electrical power and signals to/from the subsea equipment as well as hoisting/lowering the camera package.

The top end is clamped onto the drum and terminated into the winch rotary JB with the bottom end mechanically terminated into a Bullet type strain termination enabling it to fix quickly by means of a 24mm nut and bolt arrangement onto the camera cage.

The electrical soft cable, which emerges from this, has a moulded 21-way Burton plug which mates into the underwater junction box.

H. *CAMERA CAGE + CLUMP WEIGHT Z-610100*

The camera cage is manufactured in 316 stainless steel. It is designed to dock on top of the Clump Weight and is dome-shaped to prevent snagging on FPU structures. The umbilical strain termination fits through the top hole guide and is secured by a 24mm nut and bolt. This enables the camera to be hoisted/lowered by the TV winch via the 24" cable sheave.

There are four guideline gates on each of the two sides which have to be fitted on the 8mm guide wire.

The 8mm clump weight winch wire is fed through the two nylon sheaves, from the 3" snatch block, fitted on a padeye on the bottom shell directly above the camera deployment location and is fixed to another padeye of the bottom shell by a shackle.

*Refer also to Drgs DE-3010.38-1320-140-NBD-356-01 and -02 and Manufacturer's Technical Manual.*

The clump weight then provides the guidelines for the running of the camera frame to the desired depth location. All subsea equipment is installed within this frame, i.e.

- Underwater J.B.
- Pan & tilt
- Lamps
- Camera
- Water switch

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As the weight of the camera cage is only 91kg, provision is also made to add further ballast to the cage from the bottom cross member. This may be necessary if the vertical cable run to the 24" sheave is too long and the weight of the cable exceeds the weight of the cage.

The Clump Weight is fabricated in 316L stainless steel weighing 200kg and is designed to support sixteen 50kg ballast lead weights to bring the total mass to 1000kg, to minimise motions due to wave and current drag forces during underwater inspection.

A T-bar lifting hook is also provided for the one- or two-man lifting and installation of the ballast weights.

*I. UNDERWATER JUNCTION BOX*

Constructed in stainless steel, it is used for interconnecting wire tails and distributing the wires to the lamps etc.

The Safety Water Switch is also attached to this J.B. and when submerged in water a signal activates relays in the SCU which in turn permits voltage to be supplied to the subsea package, thus preventing power from being applied when the package may be located in a hazardous area.

The junction box and water switch have been pressure tested to 100 metres water depth.

*J. TV COLOUR ZOOM CAMERA OE-1367*

The underwater camera is contained in titanium alloy housing and is pressure rated for 3000 metres water depth

The camera operates in NTSC format and provides excellent light sensitivity and image definition with an auto focus function. The water-compensated optical zoom lens allows conventional close-up inspection capability and a 12:1 magnification for powerful stand-off inspections.

The supplied camera provides a manual iris override to help the operator to view into dark areas with a light background.

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Also supplied, as an optional extra is a perspex protective lens fitted to the camera to prevent scratching of the lens.

The camera employs the Burton 5507-2008 connector.



*K. UNDERWATER LAMP OE11-131*

Two off 250W lamps are supplied. The lamps are individually switched to give a total of 500W of lamp power.

They are constructed in titanium alloy and are pressure rated to 3000m water depth. Replaceable quartz halogen bulbs produce a broad light spectrum ideally suited to colour video inspection.

The lamps are designed to operate at 120 V a.c. for maximum intensity. This voltage is derived from the SCU.

The lamps rely on the water for cooling, so it is essential that they are not run for more than one minute outside the water or permanent damage will occur.

The lamps employ the Burton 5507-1503 connector.

*L. PAN & TILT OE10-100*

The pan and tilt is constructed in stainless steel and is pressure rated to full ocean depth by means of the oil filled compensation system. The unit is fitted onto the camera cage sitting vertically on the pan shaft looking forward with brackets on both tilt flanges: one fixing the camera and one lamp and the other with lamp only.

The unit is designed to operate at 155V ac derived from the SCU and has internal limit switches set for 90° from centre up/down and 100° from centre left/right.

The pan & tilt unit employs the Burton 5507-2006 connector.

Care should be taken to ensure that the camera is fitted at the correct position to prevent either rear cable fouling or camera knocking against the frame.

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*M. SHEAVES AND SNATCHBLOCKS*

Two 24" sheaves are supplied for the TV umbilical cable – one serving as a diverter sheave to the desired camera deployment location and one fitted on a padeye directly above the deployment location to support the camera frame.

Both sheaves are manufactured with a steel block and head fitting with a nylon wheel to help reduce weight. There is room to fit the TV umbilical between the head fitting and wheel but the sheave has side opening facility if required.

These sheaves have been tested for a SWL of 6 tonnes on the head fitting and 3 tonnes line pull. Two 13.5 tonne bow shackles are provided with each sheave for installation.

Two 3" McKissock snatch blocks are supplied for the 8mm clump weight wire. One installed as a diverter sheave approximately above the desired camera deployment location and one fitted on a padeye directly above the deployment location to guide the wire down to the clump weight, through the nylon sheaves and up to a fixed support on the bottom shell.

These sheaves have been tested for a SWL of 2 tonnes on the head fitting and 1 tonne line pull. Four 2-tonne bow shackles are provided for installation of the snatchblocks.

**4.8.4.3 Operation and Control**

*Ref: Doc. Nos: DE-3010.38-1320-140-NBD-356-01 to -05  
DE-3010.38-6000-966-NBD-393-05, -06, -08, -10, -11  
Kongsberg Simrad Riser Monitoring System: Technical Manual*

Detailed installation and deployment procedures are described in the manufacturer's manual which should be read in conjunction with the above referenced drawings.

Four camera hatches are provided on the starboard spider deck and one on the port spider deck for camera system deployment. Moreover, two camera deployment platforms are provided on the port fwd and starboard fwd spider deck walkways. Over each deployment location there is a set of three padeyes for the 24" sheave and the guide wires.

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The winches are normally located on the starboard sheaving platform and are bolted on suitable supports. This location serves all starboard and starboard forward riser pull-in operations. Over the winches a set of two padeyes is fixed for installation of the diverter sheaves.

For port and port forward riser pull-in operations the winches must be relocated temporarily to the port spider deck inboard the diving well hatch. Winch supports are provided at this location. The 3-tonne electric hoist shall be used for relocation of the winches from starboard to port spider deck.

Access to the padeyes for sheave and wire installation will be by a movable ladder. Rigging will be as per the above referenced drawings.

#### 4.8.5 Riser Protection Nets

##### 4.8.5.1 General Description

Ref: Doc. No: DE-3010.38-1320-140-NBD-355-01 to -05  
RL-3010.38-1320-140-NBD-942-01

Two identical polyester fibre rope nets, manufactured by Southwest Ocean Services Inc., are fitted on port and starboard spanning between the aft and forward columns. The nets are designed to protect the port and starboard flexible risers from supply boat impact.

The nets are designed such that a single horizontal line can withstand impact from a 5000-tonne supply boat at 0.5m/sec speed.

Each riser protection net consists of four horizontal lines, 112mm diameter, and 69 vertical ropes, 38mm diameter, at 1524mm spacing. The horizontal lines are spaced 3048mm apart thus providing a rectangular net 40.77m long and 9.144m high with grids of 1524x3048mm. All polyester lines are completely encapsulated with orange polyurethane elastomer. Reflective marker sleeves are fitted round the top two horizontal lines at regular intervals. The bottom two horizontal lines are submerged at operating draft of 22m.

One end of each horizontal line is fixed to the aft column through double padeyes and a high strength steel pin. The other end is passed through a bend shoe located on the forward column and is connected to a vertical tension rod within the tensioner porch.

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The nets are passive and require sufficient tension at all times. During installation a nominal line tension of 40 tonnes has been applied using hydraulic jacks to the tension rods. To minimise wave loading and sagging of the net, a minimum of 27 tonnes nominal pretension must be maintained during the life of the net.

#### 4.8.5.2 *Inspection and Maintenance*

Periodic inspection is recommended to confirm pretension of the nets (gauge supplied) and minimum sag. In particular after the first six months from installation, lines should be re-tensioned to take up any creep of the polyester ropes.

The above water sections of each net should be visually inspected:

- every three months
- after a major storm
- after any impact by a supply vessel or other object even if contact appears minor

Below water sections of each net should be visually inspected:

- annually and, if possible, in conjunction with inspections of the fairleads when the Unit is deballasted to 18m draft whereby the entire net is above waterline
- after any collision where damage is suspected below waterline or there is any significant damage to the above water section

Such inspections can be performed from a support vessel.

The terminations of the horizontal lines can be inspected from the landing platforms on the aft columns. Annually, at least one rope must be closely inspected round the bend shoe, particularly at the extra jacket fitted along the lower tangent point as most wear will occur at that point. To allow proper inspection, tension should be released such that the rope is slightly loose. The second line from the top should normally be inspected, since the top line will support it when tension is relaxed.

For detailed inspection and tensioning procedures refer to manufacturer's manual.

Periodic greasing of the mechanical parts (tension rods and nuts) is recommended using a suitable greasing agent.

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**Watertight doors characteristic summary table  
(Remote controlled -Hydraulically operated)**

Door No.	Deck	Clear Opening	Closing Direction	Frame	Hydrostatic Head (m)
1P	2438 A.B.L.	762 x 1676	Right	14 Port	42
1S	2438 A.B.L.	762 x 1676	Left	14 Stbd	42
2P	2438 A.B.L.	1066 x 1676	Left	19-20 Port	41
2S	2438 A.B.L.	1066 x 1676	Right	19-20 Stbd	41
3P	2438 A.B.L.	1066 x 1676	Left	23 Port	39
3S	2438 A.B.L.	1066 x 1676	Right	23 Stbd	39
4P	2438 A.B.L.	1066 x 1676	Left	24-25 Port	39
4S	2438 A.B.L.	1066 x 1676	Right	24-25 Stbd	39
5P	2438 A.B.L.	762 x 1676	Right	30 Port	37
5S	2438 A.B.L.	762 x 1676	Left	30 Stbd	37
6P	2438 A.B.L.	1066 x 1676	Right	49-50 Port	39
6S	2438 A.B.L.	1066 x 1676	Left	49-50 Stbd	39
7P	2438 A.B.L.	1066 x 1676	Right	51 Port	39
7S	2438 A.B.L.	1066 x 1676	Left	51 Stbd	39
8P	2438 A.B.L.	1066 x 1676	Right	54-55 Port	41
8S	2438 A.B.L.	1066 x 1676	Left	54-55 Stbd	41

Door No.	Deck	Clear Opening	Closing Direction	Frame	Hydrostatic Head (m)
9P	2438 A.B.L.	762 x 1676	Left	60 Port	42
9S	2438 A.B.L.	762 x 1676	Right	60 Stbd	42
10P	21336 A.B.L.	762 x 1676	Right	Aft Port Column	22
10S	21336 A.B.L.	762 x 1676	Left	Aft Stbd Column	22
11P	21336 A.B.L.	762 x 1676	Left	Aft Port Column	22
11S	21336 A.B.L.	762 x 1676	Right	Aft Stbd Column	22
12P	21336 A.B.L.	762 x 1676	Right	Fore Port Column	22
12S	21336 A.B.L.	762 x 1676	Left	Fore Stbd Column	22
13P	21336 A.B.L.	762 x 1676	Right	Fore Port Column	21
13S	21336 A.B.L.	762 x 1676	Left	Fore Stbd Column	21
14PF	28946 A.B.L.	762 x 1676	Left	Fore Port Column	15
14SF	28946 A.B.L.	762 x 1676	Right	Fore Stbd Column	15
14PA	28946 A.B.L.	762 x 1676	Left	Aft Port Column	15
14SA	28946 A.B.L.	762 x 1676	Right	Aft Stbd Column	15
15	Tank Top	762 x 1676	Right	56-57 Stbd	7
16	Tank Top	762 x 1676	Left	56-57 Port	7
17	Tank Top	762 x 1676	Left	54-55 Stbd	7
18	Tank Top	762 x 1676	Right	19-20 Stbd	7
19	Tank Top	762 x 1676	Left	19-20 Port	7
20	Tank Top	762 x 1676	Left	54-55 Port	7
23	Second Deck	762 x 1676	Right	55-56 Stbd	4
24	Second Deck	1500 x 1676	Left	52-53 Stbd	3
27	Second Deck	762 x 1676	Left	18-19 Stbd	4
28	Second Deck	762 x 1676	Right	18-19 Port	4
31	Second Deck	762 x 1676	Right	53-54 Port	3
32	Second Deck	1500 x 1676	Right	57-58 Port	4
33	Second Deck	762 x 1676	Right	23 Stbd	3
34	Second Deck	762 x 1676	Left	23 Port	3

Hatch No.	Deck	Clear Opening	Hydrostatic Head (m)
35	Column El.28956 A.B.L - Stbd/Fwd	914 x 914	15,5
36	Column El.28956 A.B.L - Port/Fwd	914 x 914	15,5
37	Column El.28956 A.B.L - Port/Aft	914 x 914	15,5
38	Column El.28956 A.B.L - Stbd/Aft	914 x 914	15,5
39	Tank Top El.36576 A.B.L. - Port/Fwd	600 x 600	8
40	Tank Top El.36576 A.B.L. - Stbd/Fwd	600 x 600	8

FIGURE 4.1.4.1 - SHEET 1

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Weathertight/Gastight doors

Door No.	Type of Door	Location		Swing	Notes
		Deck	Position		
1	Accomodation Door Type H	Tank Top	Generator Room No. 2	L.H	
2	Accomodation Door Type C	Tank Top	F.W. Pump Room	L.H	
3	Accomodation Door Type C	Tank Top	Passage F.W. Pump Room	R.H.	
4	Accomodation Door Type A	Tank Top	Mechanics Workshop	R.H.	
5	Accomodation Door Type A	Tank Top	Electrical Shop	R.H.	
6	Accomodation Door Type A	Tank Top	Electrical Store	L.H	
8	Accomodation Door Type C	Tank Top	Ventilation MCC Room	L.H	
9	Accomodation Door Type H	Tank Top	Generator room No. 4	L.H	
10	Accomodation Door Type C	Tank Top	Switchgear Room No.1	L.H	
20	Accomodation Door Type C	2nd Deck	Stairway	R.H.	
21	Accomodation Door Type C	2nd Deck	Electrical Workshop No.2	R.H.	
22	Accomodation Door Type A	2nd Deck	Passage	R.H.	
23	Accomodation Door Type C	2nd Deck	Passage	L.H	
24	Accomodation Door Type C	2nd Deck	Production Warehouse	L.H	
26	Accomodation Door Type C	2nd Deck	Production Warehouse	R.H.	
28	Accomodation Steel Weather Door	2nd Deck	Air Lock	R.H.	
11*	Weathertight Steel Door C	Tank Top	Passage	L.H	Weathertight
36*	Weathertight & Gastight NI821300A Execution A	Main Deck	Marine Equipment Storage Room	R.H.	Weathertight
37*	Weathertight Steel Door NI821100A Execution A	Main Deck	Incinerator	L.H	Weathertight
38*	Weathertight Steel Door NI821100A Execution A	Main Deck	Incinerator	R.H.	Weathertight
29*	Weathertight Steel Door	2nd Deck	Muster Area	L.H	Weathertight
49	One Leaf Spray Proof Door NI821610C	EL.48768	Emergency Generator Room	L.H	
50	Weathertight Insulated NI821100A Execution A	Main Deck	Box ATU Room	R.H.	
52	Weathertight Steel Door	Main Deck	Muster Area (under)	R.H.	
53	Weathertight Steel Door	Main Deck	Muster Area (under)	R.H.	
54	Weathertight Steel Door	Main Deck	Muster Area (under)	R.H.	
55	Weathertight Steel Door	Main Deck	Muster Area (under)	R.H.	
12*	Weathertight Steel Door	Tank Top	Walkway on bridge exterior	L.H	Weathertight
56	Sliding Steel Door	Upper Deck	Drill Floor Fwd/Stbd Side		
57	Sliding Steel Door	Upper Deck	Drill Floor Fwd/Port Side		

\* Door with remote open/shut visual indication in the Central Control Room

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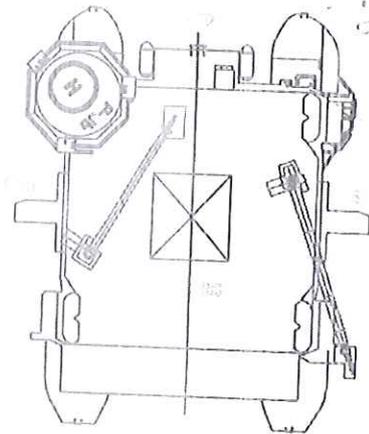
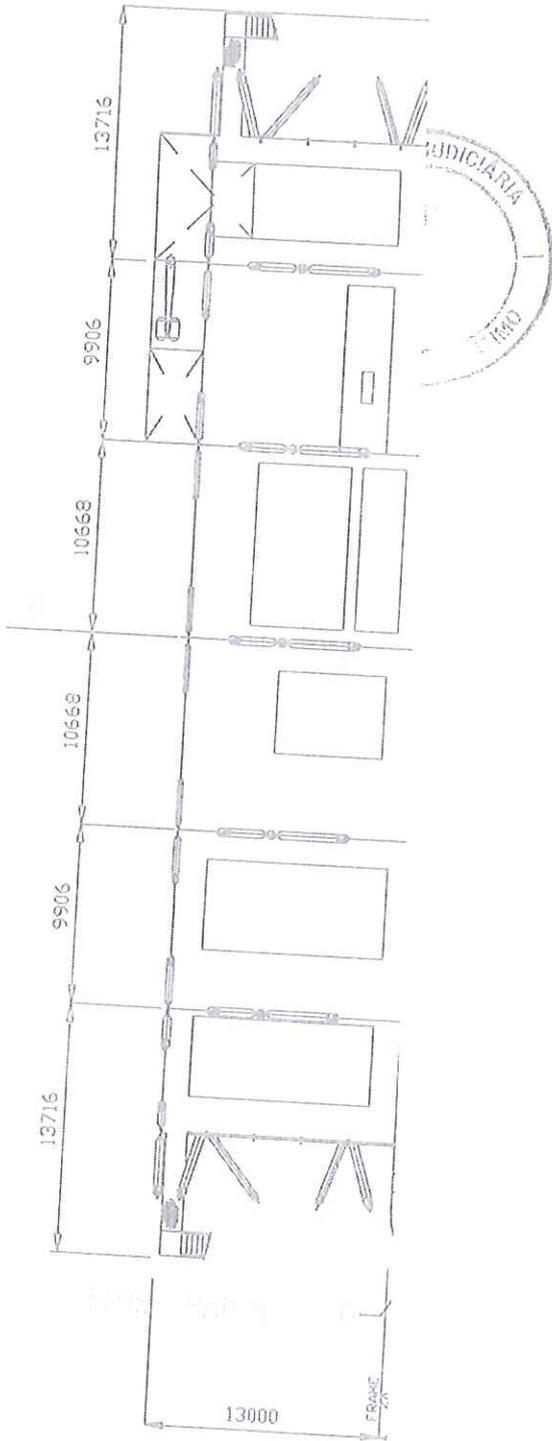




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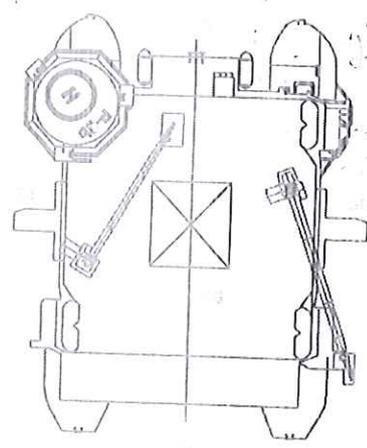
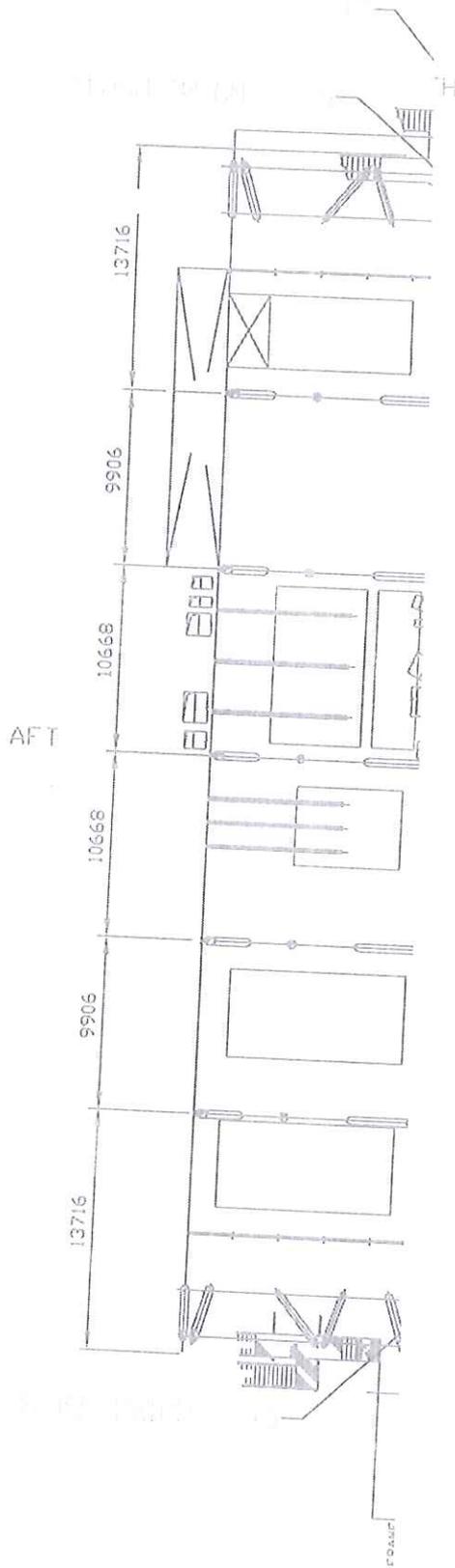


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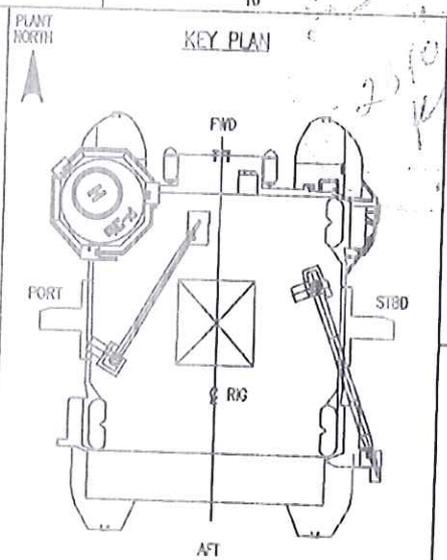
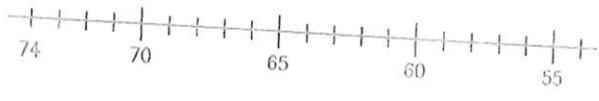
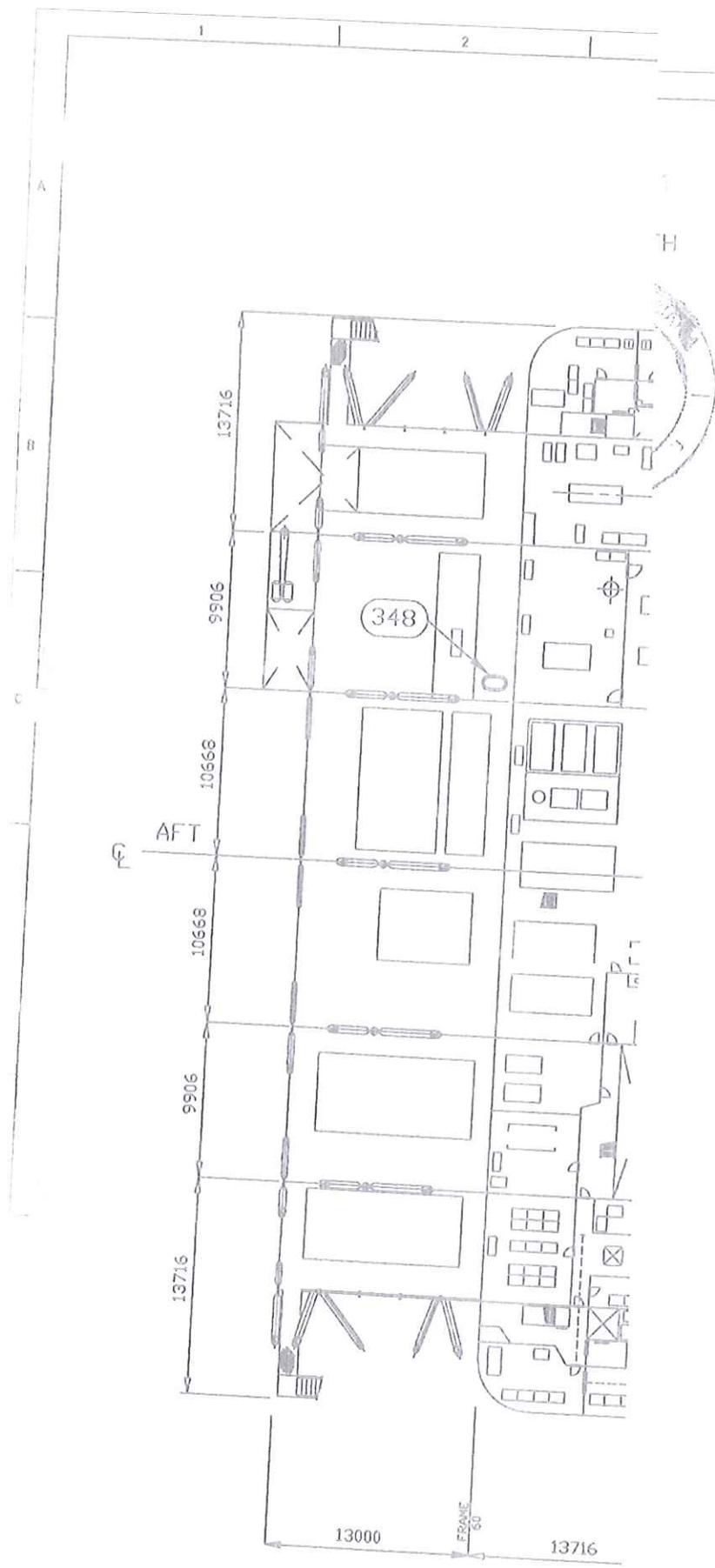
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**REVISION CHANGE NOTICES**

Rev.	Location Changes	Brief Description of Change
A	Main Text	Removed ref. to Engine Control Room, thrusters and drilling operations
A	6.4	Revised according to Fire and Gas Alarm Philosophy
A		Added Abbreviations & Definitions

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**ABREVIATIONS**

**DEFINITIONS**

**SAFETY PLANS AND ESCAPE ROUTES**

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## 6.1 GENERAL

The main purpose of Emergency Action Plan is to describe the emergency preparedness measures established for alert, danger limitation, rescue, evacuation and normalisation when hazardous situations and/or accidents have occurred on board the Petrobras-36.

Any activity at sea in connection with production of oil/gas has a certain amount of risks attached to it. These may be human errors, technical malfunctions or other external occurrences or incidents that may cause hazardous situations.

Because of this, it is very important to have established an efficient emergency preparedness organization for the operation of Petrobras-36. The member of this organisation must be well trained to ensure quick and efficient handling of any emergency situation that may arise.

The training and exercise program must be worked out in such a way that it always complies with the instructions in this Action Plan.

By using this Action Plan as basis for exercises, one will assure that each member of the emergency organisation know their duties and responsibilities by heart if an emergency situation should arise onboard.

A high degree of emergency preparedness shall at all times be maintained onboard in order to handle any arising emergency situation at the shortest possible notice.

Petrobras-36 and its crew may operate in remote areas and should therefore be able to handle an emergency by themselves utilizing personnel and equipment available onboard.

However, if there is the slightest doubt about the situation being of an extent exceeding the capabilities of the resources available onboard, request for external assistance shall be forwarded immediately.

The Action Plan shall be updated as necessary, taking into consideration every change in work situations, like change of Operator, change of location, change in environment, Regulatory requirements, etc.

The Quality Assurance/Safety Manager is responsible for distributing updated versions of this chapter to the holders of controlled copies.

Hereinafter you will find a list of drawings that can be helpful in emergency situations.

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Safety Plan – Legend of Symbols	DE-3010.38-5400-947-AMK-130
Safety Plan – Columns & Riser Platforms El. 21335 – El. 18228 ABL	DE-3010.38-5400-947-AMK-131
Safety Plan – Tank Top El. 36575 ABL	DE-3010.38-5400-947-AMK-132-01
Safety Plan – Tank Top El. 36575 ABL	DE-3010.38-5400-947-AMK-132-02
Safety Plan – Second Deck El. 39624 ABL	DE-3010.38-5400-947-AMK-133-01
Safety Plan – Second Deck El. 39624 ABL	DE-3010.38-5400-947-AMK-133-02
Safety Plan – Main Deck El. 42672 ABL	DE-3010.38-5400-947-AMK-134-01
Safety Plan – Main Deck El. 42672 ABL	DE-3010.38-5400-947-AMK-134-02
Safety Plan – Main Deck El. 46024 & El 51816 ABL	DE-3010.38-5400-947-AMK-135-01
Safety Plan – Lower Hulls El 2570 – El 5514 ABL	DE-3010.38-5400-947-AMK-136-01
Safety Plan – Lower Hull & Columns El 9144 – El 21335 ABL	DE-3010.38-5400-947-AMK-137-01
Safety Plan – Columns El. 18228 – El 21336, El 28956 – El 32004 ABL	DE-3010.38-5400-947-AMK-138-01
Escape Routes Above Main Deck El. 46024 & El. 51816 ABL	DE-3010.38-5400-947-AMK-110
Escape Routes Main Deck El. 42672 ABL	DE-3010.38-5400-947-AMK-111
Escape Routes Second Deck El. 39624 ABL	DE-3010.38-5400-947-AMK-112
Escape Routes Tank Top El. 36576 ABL	DE-3010.38-5400-947-AMK-113
Escape Routes Columns & Riser Platform El.28956 - El.35000 ABL	DE-3010.38-5400-947-AMK-114
Escape Routes Layout Columns El 18228-El 21336, El 28956-El 32004 ABL	DE-3010.38-5400-947-AMK-140
Escape Routes Layout Lower Hull & Columns El 2570-El 5514 ABL	DE-3010.38-5400-947-AMK-143
P36 Life Saving and Survival Equipment Location Plan(s)	DE-3010.38-5400-947-AMK-155-01
Mooring System - Layout and Anchor Pattern	DE-3010.38-1320-962-NBD-336

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Reference may also be made to the following documents:

Project Index of Applicable Standards	LD-3010.38-1200-940-PPC-002
Fire & Gas Detection Cause & Effect Charts	DE-3010-5400-947-AMK-601
Active Fire Protection Report	ET-3010.38-5423-947-AMK-904
Fire Protection Philosophy	ET-3010.38-5400-947-AMK-910
Mooring System - Layout and Anchor Pattern	DE-3010.38-1320-962-NBD-336

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## 6.2 EMERGENCY ORGANISATION

### 6.2.1 Offshore Emergency Preparedness Organisation

Fig. 6.2.1 shows how the emergency preparedness organization onboard Petrobras-36 is structured. The figure illustrates the chain of commands, and the communication lines in case of an emergency situation.

### 6.2.2 Deputies for Emergency Preparedness Organisation Key Personnel

All Section Supt.'s and their deputies shall have a thorough knowledge of the Action Plan and the instructions that regulate their duties in an emergency situation.

If one or more of Section Supt.'s are missing or are not available, their deputies shall take over their responsibilities for carrying out actions or measures to bring the situation under control (see Fig. 6.2.2).

### 6.2.3 Areas of Responsibility Onboard

The Section Supt.'s are responsible for their respective areas also when it comes to emergency measures. The respective Section Supt.'s will be Damage Control Leader if an emergency situation arises in following areas:

#### *Production Supt.:*

Competence in areas where installed production equipment.

#### *Maintenance Supt.:*

- all Engine Rooms
- all Switchboard Rooms
- Boiler Room
- all Auxiliary Machinery Rooms
- all Ballast Pump Rooms



- Workshops

### *Marine Supt*

Living Quarters and all other areas not covered by the Production Supt. and the Maintenance Supt.

## 6.2.4 Alerting Procedures

### *A INTERNAL ALERTING - INSTRUCTIONS TO EVERYONE ONBOARD*

#### *1. General:*

Any person onboard the Unit shall, upon discovery of an emergency/dangerous situation or any situations that may become dangerous, immediately report this to the Bridge with the following information:

- Who is reporting
- What does the dangerous or emergency situation consist of
- What actions have been initiated
- If anyone is injured or missing.

Control Room Operator shall then alert the FPU Manager.

#### *2. In Case of Fire:*

- Release the fire alarm.
- Start fire fighting with available fire-fighting equipment as long as this does not endanger you.

#### *3. In Case of Man Overboard:*

- Cry out to raise attention of other personnel.
- Throw over board nearest life buoy with light attached.
- Do all you can to keep the distressed person in sight.

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*B. ALARM SIGNALS*

Reference is made to the Station Bill posted onboard.

*C. EXTERNAL ALERTING*

9. If an emergency situation arises, the onshore Rescue Control Centre (RCC), Stand-by Vessel and any other ships/vessels in near vicinity shall be notified by the Radio Operator upon orders from the FPU Manager or his deputy.

Such notification to the RCC shall contain:

- The Unit name
- The Unit position
- The nature of emergency situation
- Number of persons onboard
- Number of injured and/or missing persons
- Nature of assistance required
- Measures taken onboard
- Weather conditions

If the situation permits, all details of the incident should be notified in writing.

*D. NOTIFICATION OF AUTHORITIES*

The Authorities shall always be notified where accidents or emergency situations require help from shore.

The FPU Manager will coordinate this notification and ensure that the relevant Authorities are kept informed of the situation and steps taken to remedy the situation and bring it back to normal.

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Accidents and emergencies that require reporting are:

- a) Accidents involving serious injuries, loss of life, missing persons or man overboard
- b) Fire/explosion
- c) Total loss or damage that may shut down the Unit
- d) Drifting Unit
- e) Total loss or damage to stand-by vessel or supply vessel
- f) Loss of well control
- g) Blow-out or other acute emergency situation
- h) Gas escape
- i) Radiation (loss of radioactive source )
- j) Helicopter accident
- k) Sabotage or criminal action
- l) Diving accident
- m) Pollution
- n) Infringement of the safety zone
- o) Evacuation



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In case of accidents and dangerous situations that infringe the safety of life, environment or property, RCC shall be notified, stating actions taken and planned.

Notification shall be passed on directly to RCC, primarily through Coastal Radio Station in accordance with the appropriate procedures of the Radio Regulations.

### 6.2.5 Communication

The Radio Operator on duty remains in the radio room during emergency situations, and from there he contacts stand-by vessel, RCC, Petrobras offices onshore etc. upon orders from the FPU Manager.

If the radio station must be evacuated, the Radio Operator shall bring with him the portable emergency transmitter. The FPU Manager shall be informed about this.

The Radio Operator off duty shall assist the FPU Manager in the Emergency Operation Centre and shall arrange contact with the radio station for sending/receiving messages externally. Further he shall receive and keep records of reports from the Section Supt. with regard to personnel, and he shall record all in- and outgoing messages/decisions in connection with actions initiated onboard.

### 6.2.6 Emergency Operation Centre (EOC)

The main EOC is the Bridge. In emergency the EOC will be manned by.

- FPU Manager
- Radio Operators (off duty)
- Control Room Operator (on duty)
- Engine Room Operator

Note: If main EOC due to the situation cannot be used, the alternative EOC can be the Engine Control Room.

### 6.2.7 Stand-by Vessel

If a stand-by vessel is required, it will be part of Petrobras-36 emergency organization.

It shall operate in the close vicinity of the Unit, and give assistance in case an emergency situation requiring the assistance of the stand-by vessel should arise onboard.

The Master of the stand-by vessel decides the degree of help that will be given to the Unit in each case.

When the stand-by vessel arrives at its position in the vicinity of the Unit, the FPU Manager shall make sure that he gets all the required information on the stand-by vessel according to the standard form. The form is to be filled out and posted on the Bridge and in the Central Control Room.

The FPU Manager shall instruct the Master of the stand-by vessel to report any changes in the vessel's degree of alertness.

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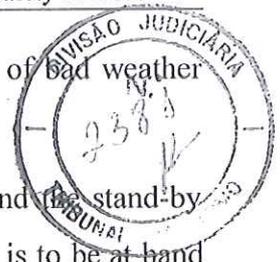
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DIVISÃO DE SERVIÇOS OPERATIVOS

It is to be agreed upon listening times and reporting contact during periods of bad weather conditions.

The FPU Manager shall arrange frequent exercises between Petrobras-36 and the stand-by vessel. A copy of the stand-by vessel 's emergency preparedness action plan is to be at hand onboard Petrobras-36.

It is the duty and responsibility of the Master of the stand-by vessel to ensure that the vessel has at all times the highest degree of alertness to undertake its duty as a stand-by vessel.

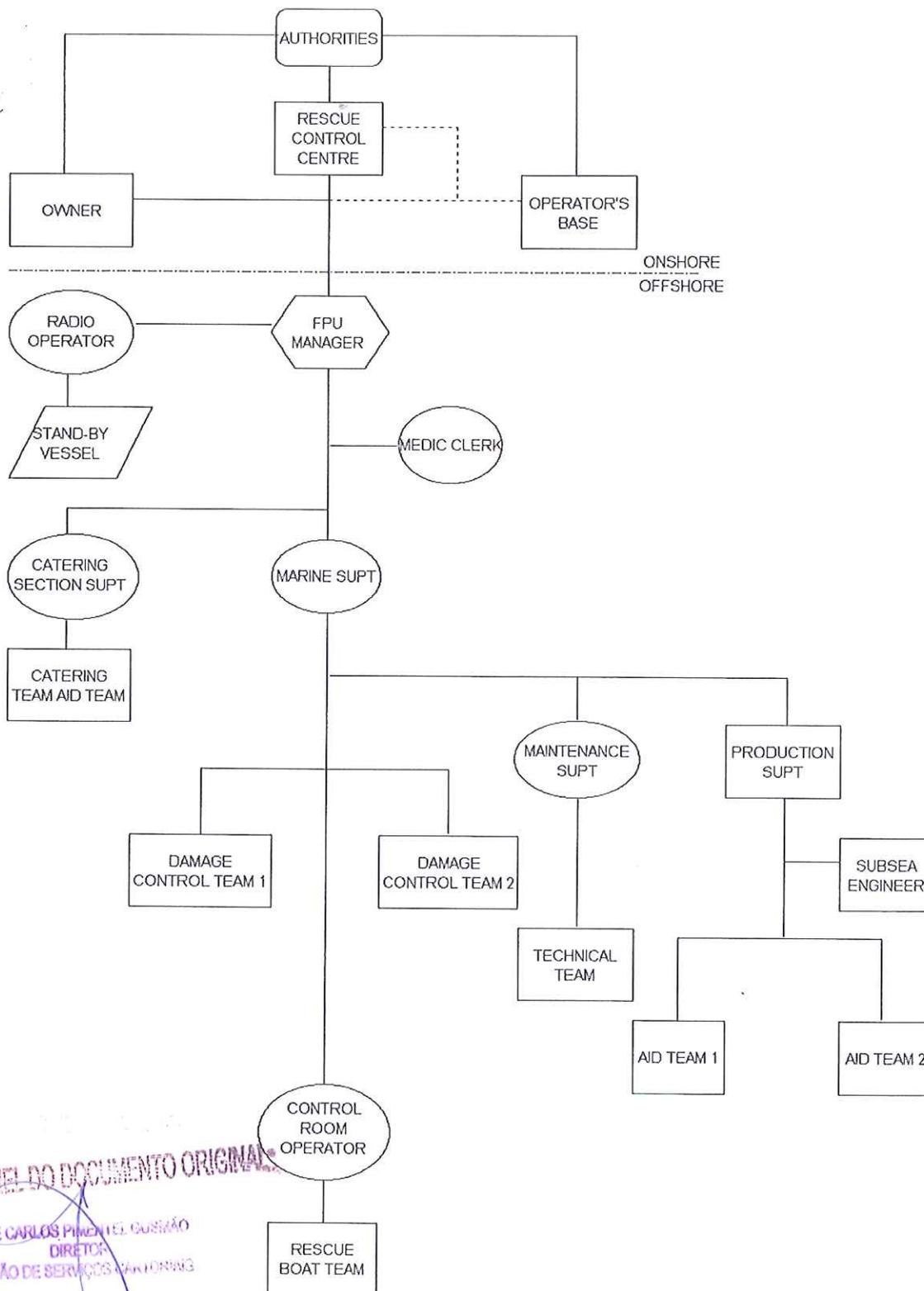
The Master of the stand-by vessel shall undertake the task of having personnel status for the Unit's personnel posted on the bridge and in the radio room, and that such status always is up to date. The FPU Manager shall ensure that this information is made available to the Master of the stand-by vessel.



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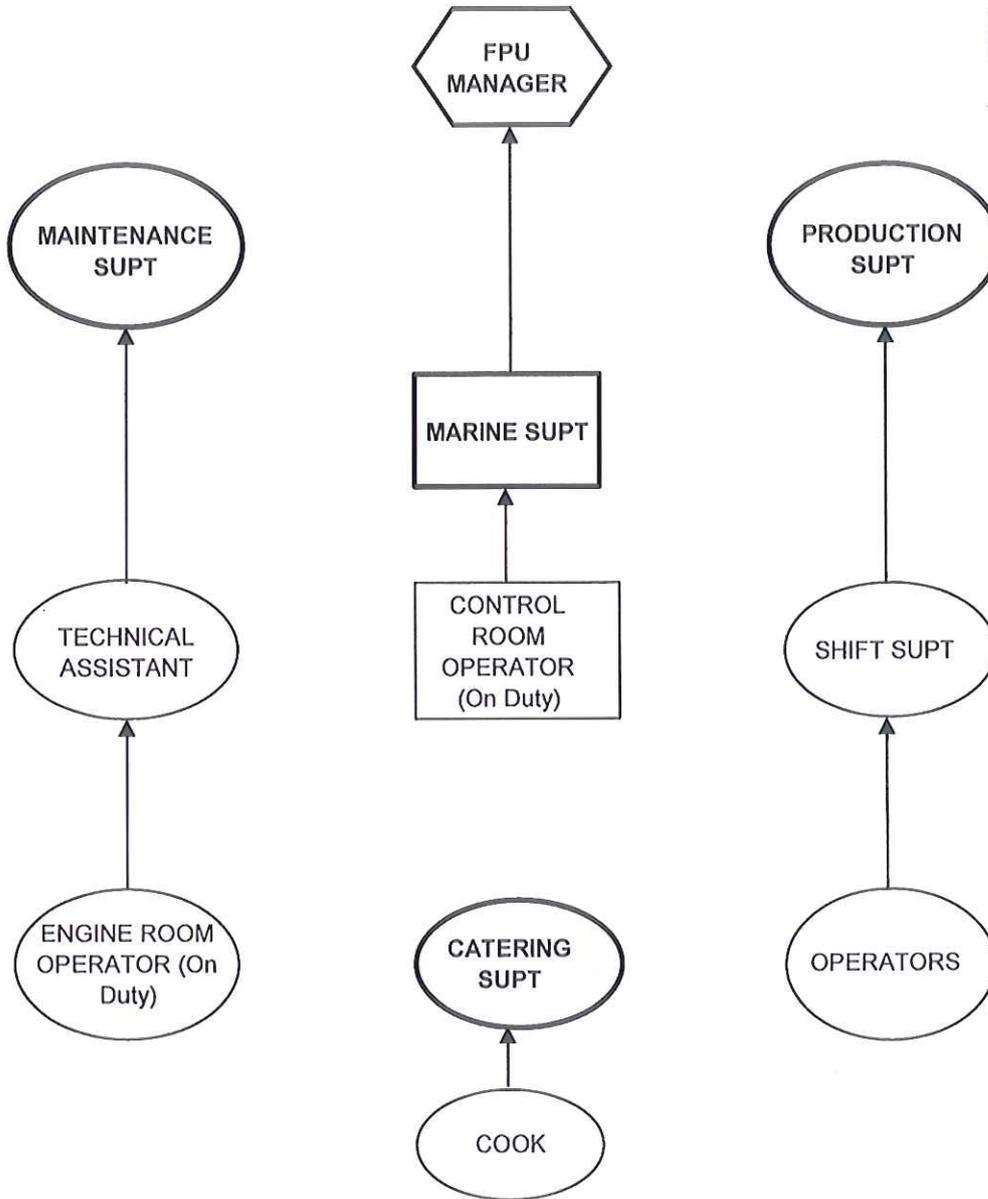
Figure 6.2.1 Emergency Preparedness Organisation Chart



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Figure 6.2.2 Plan of Deputies



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## 6.3 EMERGENCY ACTION PLAN AND RESPONSIBILITY

### 6.3.1 Introduction

This Emergency Action Plan describes the measures to be initiated if an emergency situation should arise, and appoints personnel responsible for initiating these actions. All persons that have assignments in the emergency preparedness organization must know their duties and be trained in those duties through training and exercises held onboard.

The FPU Manager has the responsibility to ensure that Petrobras-36 emergency organization is given proper training and exercises in damage control.

Drills as realistic as practicable shall take place every seven days. The drill shall take place without any prior notice, unless production operations are in such a critical phase that drills may endanger the Unit.

### 6.3.2 Standing Assignments in Any Emergency Situation

The following instructions apply for all emergency situations that may arise onboard.

#### 6.3.2.1 FPU Manager RESPONSIBILITIES

The FPU Manager has the overall responsibility for the operation and the safety of the Unit, and as such has the commanding authority in all emergency situations.

He shall coordinate and give orders and instructions regarding all damage control measures and activities that are initiated to bring the situation under control.

The FPU Manager has the responsibility to initiate notification of the stand-by vessel, Rescue Control Centre and Petrobras and Owner's onshore bases.

The FPU Manager has the deciding authority about evacuation of the Unit, regardless whether it is a partial or a full evacuation. However, the decision should be made after consulting with the Section Supt.'s.



Whatever mode of evacuation is decided upon is dependent on the nature of the emergency situation that has arisen, the size of it, and the probability of bringing the situation under control.

It is the responsibility of the FPU Manager to arrange for a registration of the personnel that are to be evacuated. The function may be delegated but with duties to report to the E.O.C. (Emergency Operation Centre).

The FPU Manager may delegate some of his tasks and duties but not his responsibilities.

*ATTENTION:*

The FPU Manager shall direct all actions of damage controlling measures from the Emergency Operation Centre in cooperation with the Section Supt.'s.

*DUTIES:*

- Man the Emergency Operation Centre.
- Establish contact with Section Supt.'s in charge of damage control.
- Evaluate information from Section Supt.'s and decide what damage control measures to be initiated.
- Issue orders on alerting of
  1. Personnel onboard.
  2. Stand-by vessel (if required).
  3. RCC (Rescue Control Centre).
  4. Base office.
- Give orders to shut down ventilation fans as required.
- Order shutting down production operations and protection of equipment as required.
- Order establishing safe zones for personnel not involved in damage controlling measures.
- Inform Catering Supt. of safe zones.
- Evaluate all available information continuously to stay updated regarding the nature, extent and development of the situation.
- Evaluate the necessity of evacuating non-essential personnel and order such as required.

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- Evaluate need for "Shut Down" and total evacuation of the Unit.
- When situation is considered to be under control, order securing of incident site and surroundings and advise personnel.

### 6.3.2.2 Marine Superintendent

#### RESPONSIBILITIES

The Marine Supt. shall take command in cases where the FPU Manager is not present or in other ways unable to carry out his duties.

The Marine Supt. is in charge of all actions and activities of damage control measures onboard the Unit within his area of responsibility (see Paragraph 6.2.3). He will act as Damage Control Supt. in these situations.

He has command of the Damage Control Teams.

He shall direct the establishment of mustering stations and reception station for injured personnel in cooperation with the FPU Manager and the Medic Clerk dependent on the type of emergency. He has the responsibility for safeguarding the lifeboats and liferafts to maintain their integrity.

He shall initiate and supervise search and rescue parties looking for missing personnel.

The Marine Supt. shall at all times keep the FPU Manager informed of the results of damage control measures initiated and on the development of the situation.

He shall check that personnel he is in charge of, i.e. Damage Control Teams, is accounted for and inform the FPU Manager.

#### DUTIES UPON HEARING AN ALARM:

Contact the Emergency Operation Centre.

- Lead and instruct the Damage Control Teams.
- Initiate search and rescue of missing persons.
- Arrange protection of lifesaving equipment.

Refer also to instructions for each emergency situation for more detailed description of specific duties.

### 6.3.2.3 Maintenance Superintendent

#### RESPONSIBILITIES

The Maintenance Supt. is in charge of all actions and activities of damage control within his area of responsibility (see also paragraph 6.2.3).

He is in charge of maintaining power and to keep necessary machinery running during an emergency situation, i.e. fire pumps, discharging pumps, etc.

He has the responsibility of all ventilation fans and starting of other machinery as required.

Maintenance Supt. reports to the FPU Manager when he is in charge of damage control measures, and he shall keep him informed on the result of damage control measures initiated and on the development of the emergency situation.

He has command of the Technical Team.

During actions within the Maintenance Supt.'s area of responsibility, he shall cooperate with and advise the Marine Supt. who will direct the Damage Control Teams under his command to bring the situation under control.

During action outside his areas of responsibility he shall release personnel as required and otherwise assist with the Technical Team where it may be necessary. He shall check that personnel he is in charge of, i.e. Technical Team, is accounted for, and inform the FPU Manager.

The Maintenance Supt. shall keep the FPU Manager informed on the condition of all equipment and possible technical problems that may lead to emergency situations and/or may worsen the emergency situation.

#### DUTIES UPON HEARING AN ALARM:

- Contact the Emergency Operation Centre.
- Close down ventilation to engine room and living quarters in cooperation with the FPU Manager.



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- Report to the FPU Manager immediately if any problems of technical nature occur, or if other circumstances arise making the situation worse.
- Close down power supply to incident area in cooperation with Marine Supt.

Refer also to instructions for each emergency situation for more detailed description of specific duties.

#### 6.3.2.4 *Production Superintendent*

##### *RESPONSIBILITIES*

He is in charge of all actions and activities of damage control within his area of responsibility during emergency situations (see also Paragraph 6.2.3).

He has command of Aid Teams.

During actions within the Production Supt.'s area of responsibility, he shall cooperate with and advise the Marine Supt. who will direct the Damage Control Teams under his command to bring the situation under control.

In emergency situations outside his area of responsibility he shall secure the wells and the equipment including adjoining areas. He shall release personnel as required for damage control and otherwise assist as required. It is his responsibility to see that all the required procedures for interruption of production operations and securing of the wells are being followed.

The Production Supt. reports to the FPU Manager when he is in charge of damage control measures. He shall keep the FPU Manager continuously informed on the development of the situation, the need for additional material, equipment or personnel for damage controlling measures.

He shall keep the FPU Manager informed on status regarding production operations during the emergency.

##### *DUTIES:*

- Establish contact with Emergency Operation Centre.
- Shutdown to safeguard the well in agreement with the FPU Manager.

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- Provide for equipment needed to safeguard production equipment.
- Deploy personnel to report to Marine Supt. as required.
- Report to the FPU Manager immediately if situations arise that may endanger the production equipment.

Refer also to the instructions for each emergency situation for more detailed description of specific duties.

#### 6.3.2.5 Catering Superintendent

##### *RESPONSIBILITIES*

In emergency situations or on the sound of alarms it is the responsibility of the Catering Supt to arrange a thorough search of the living quarters and make sure that everyone is awake, utilizing the Catering Team.

When the living quarters have been searched and found empty, he shall report to the FPU Manager and await further orders.

If parts of the living quarters are inaccessible, or if somebody is missing, he shall report this to the FPU Manager immediately.

Upon evacuating the living quarters it is the responsibility of the Catering Supt. to see to all guests and other personnel not involved in damage control measures are directed to a safe mustering station.

When the living quarters have been searched and evacuated, the Catering Supt. shall order the Catering Team to report to the Medic Clerk.

##### *DUTIES UPON HEARING AN ALARM:*

- Establish contact with Emergency Operation Centre.
- Initiate awakening, search and evacuation of personnel in living quarters.
- When this is necessary arrange escort of said personnel to safe mustering station or safety zone on orders from FPU Manager.
- Report to the Emergency Operation Centre if parts of the living quarters are inaccessible for search, and there is reason to believe that there may be people trapped.

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#### 6.3.2.6 *Radio Operator (On Duty)*

##### *RESPONSIBILITIES*

The Radio Operator shall remain in the radio station and put on survival suit.

He shall further make contact and advise the stand-by vessel, Rescue Control Centre (RCC), base etc. upon orders from the FPU Manager.

He shall maintain contact with the surroundings as long as there is an emergency situation.

If the radio station must be evacuated, the Radio Operator shall bring the portable emergency transmitter with him. The FPU Manager shall be informed about this situation.

When the situation is under control again, he shall advise the stand-by vessel, the Rescue Control Centre, the base etc. of this.

#### 6.3.2.7 *Radio Operator (Off Duty)*

He shall muster in the Emergency Operation Centre.

The "off duty" Radio Operator shall assist the FPU Emergency Operation Centre.

He shall further establish contact with the radio station for external sending of messages.

He shall also keep account of personnel onboard as reported by the various Section Supt.'s.

He shall keep continuous log on the development of the situation, damage control measures initiated and the results of these measures.

#### 6.3.2.8 *Control Room Operator*

The Control Room Operator shall remain in the Control Room. Upon automatic fire or gas alarms he shall initiate search party to investigate if the alarm is true or false.

He shall actuate fire alarm or other alarms when needed and advise the FPU Manager of all emergency situations.

He shall start the main fire pump and emergency fire pump as necessary.

He shall put on necessary safety equipment (gas masks, breathing apparatus, survival suit, etc.)

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Further he shall initiate required closing down of machinery, power supply, ventilation fans etc. as ordered by FPU Manager or Maintenance Supt.

Inform the FPU Manager if the situation becomes so critical that it may be necessary to evacuate the Control Room.

Close down non-essential machinery if the Control Room is being evacuated, unless other orders have been issued.

He shall lead the Rescue-boat Team in case of man-overboard alarm, and will appoint who of the Maintenance Workers shall man the Rescue Boat.

#### 6.3.2.9 Control Room Operator (Off Duty)

Shall muster at lifeboat (as required) and prepare the lifeboat for launching. He is appointed lifeboat leader.

#### 6.3.2.10 Engine Room Operator

Shall muster at lifeboat (as required) and prepare the lifeboat for launching. He is appointed lifeboat leader.

#### 6.3.2.11 Subsea Equipment Engineer

In any emergency the Subsea Engineer will report to the Production Supt. and upon order take necessary measures, according to his area of responsibility, i.e. to safeguard the wells.

#### 6.3.2.12 Medic Clerk

The Medic Clerk shall make the hospital ready for reception of injured personnel.

The Medic Clerk shall upon orders make ready a secondary reception station for injured personnel.

Further the Medic Clerk shall give lifesaving first aid treatment to personnel being brought in; he shall, if necessary, arrange contact through Radio Operator, with shore based doctor/hospital for assistance. The Medic Clerk shall lead and instruct the Catering Team when they have reported to the hospital.

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#### 6.3.2.6 *Radio Operator (On Duty)*

##### *RESPONSIBILITIES*

The Radio Operator shall remain in the radio station and put on survival suit.

He shall further make contact and advise the stand-by vessel, Rescue Control Centre (RCC), base etc. upon orders from the FPU Manager.

He shall maintain contact with the surroundings as long as there is an emergency situation.

If the radio station must be evacuated, the Radio Operator shall bring the portable emergency transmitter with him. The FPU Manager shall be informed about this situation.

When the situation is under control again, he shall advise the stand-by vessel, the Rescue Control Centre, the base etc. of this.

#### 6.3.2.7 *Radio Operator (Off Duty)*

He shall muster in the Emergency Operation Centre.

The "off duty" Radio Operator shall assist the FPU Emergency Operation Centre.

He shall further establish contact with the radio station for external sending of messages.

He shall also keep account of personnel onboard as reported by the various Section Supt.'s.

He shall keep continuous log on the development of the situation, damage control measures initiated and the results of these measures.

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The Control Room Operator shall remain in the Control Room. Upon automatic fire or gas alarms he shall initiate search party to investigate if the alarm is true or false.

He shall actuate fire alarm or other alarms when needed and advise the FPU Manager of all emergency situations.

He shall start the main fire pump and emergency fire pump as necessary.

He shall put on necessary safety equipment (gas masks, breathing apparatus, survival suit, etc.)

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DIRETOR



Further he shall initiate required closing down of machinery, power supply, ventilation fans etc. as ordered by FPU Manager or Maintenance Supt.

Inform the FPU Manager if the situation becomes so critical that it may be necessary to evacuate the Control Room.

Close down non-essential machinery if the Control Room is being evacuated, unless other orders have been issued.

He shall lead the Rescue-boat Team in case of man-overboard alarm, and will appoint who of the Maintenance Workers shall man the Rescue Boat.

#### 6.3.2.9 Control Room Operator (Off Duty)

Shall muster at lifeboat (as required) and prepare the lifeboat for launching. He is appointed lifeboat leader.

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Shall muster at lifeboat (as required) and prepare the lifeboat for launching. He is appointed lifeboat leader.

#### 6.3.2.11 Subsea Equipment Engineer

In any emergency the Subsea Engineer will report to the Production Supt. and upon order take necessary measures, according to his area of responsibility, i.e. to safeguard the wells.

#### 6.3.2.12 Medic Clerk

The Medic Clerk shall make the hospital ready for reception of injured personnel.

The Medic Clerk shall upon orders make ready a secondary reception station for injured personnel.

Further the Medic Clerk shall give lifesaving first aid treatment to personnel being brought in; he shall, if necessary, arrange contact through Radio Operator, with shore based doctor/hospital for assistance. The Medic Clerk shall lead and instruct the Catering Team when they have reported to the hospital.

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### 6.3.2.13 Damage Control Team No. 1

This team consists of persons from the shift that is on duty and comprises the following persons:

- Crane Operator (team leader)
- Maintenance Workers (smoke divers)

Damage Control Team No. 1 shall initiate the first action to be taken in the situation that has arisen to bring the situation under control.

#### *DUTIES*

- Muster at fire station (as required)
- Put on fire fighting/smoke diving equipment.
- Contact Emergency Operation Centre for orders when ready.
- Report to incident site with smoke diving equipment.
- Initiate damage control measures upon instruction from Marine Supt.

### 6.3.2.14 Damage Control Team No. 2

The team consists of persons from the shift that is off duty.

The Damage Control Team No. 2 consists of the following persons:

- Crane Operator (team leader)
- Maintenance Workers (smoke divers)

Damage Control Team No. 2 will be subordinated the Marine Supt..

The team's main function shall be to support or relieve Damage Control Team No. 1 in damage control measures initiated, or take over their normal working duties depending on the situation.

#### *DUTIES*

- Muster at fire station (as required)
- Put on fire fighting/smoke diving equipment

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DE OPERAÇÕES DE CARTAGENS

- Contact Emergency Operation Centre when ready
- Stand-by
- Report to Marine Supt. on order from EOC.



#### 6.3.2.15 Technical Team

The team is subordinated to the Maintenance Supt. and shall assist him in closing down ventilation, fire dampers, watertight doors etc. according to orders. They muster in Engine Control Room when hearing the alarm.

#### 6.3.2.16 Aid Team No. 1 and No. 2

The production teams are subordinated to the Production Supt.. The primary function of the Aid Teams is to safeguard the wells and production equipment. If fire occurs on the competence areas, they shall immediately initiate necessary damage control measures to bring the situation under control.

#### 6.3.2.17 Catering Team / First Aid Team

The Catering Team is subordinated to the Catering Supt.. The team shall undertake arousing and search through the living quarters.

The Catering Team is also designated as Aid Team and will as such be subordinated to the Medic Clerk.

The Catering Team shall, when the living quarters have been found empty, report to the Medic Clerk in the hospital and assist as necessary.

The Catering Team consists of the following personnel:

- Cooks
- Catering assistants

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### 6.3.2.18 Lifeboat Rescue Boat Personnel

The following personnel have been appointed responsible for preparing the lifeboats/rescue boat and for checking that all personnel have mustered at the lifeboat stations as ordered:

- Control Room operators / Engine room Operators off duty (leaders)
- Motormen (for engine)
- Roughneck off duty (assist boat leaders)

These persons muster at the lifeboat station upon an emergency alarm and start preparing the lifeboats/rescue boat for evacuation. They report to the FPU Manager.

In addition to the above personnel, when the abandon ship order has been given, Crane Operators, Roustabouts and Radio Operators will join the lifeboat crews and act as follows:

- Crane Operators: On order from Boat Leader releases hook.
- Roustabouts To check release of the fwd hook.

### 6.3.3 Debriefing/Complementary Work

The FPU Manager and the Section Supt. shall inspect the site of accident and record all visible damages.

Photographs of damaged site are excellent evidence material.

A meeting should be held with key personnel who were involved in the damage control measures and a thorough summary of the situation should be given.

Topics to be discussed could be:

- What happened and why
- What measures were initiated to bring the situation under control
- What was the effect of these measures
- Did the system and emergency plan function as intended
- Should any other measures have been initiated
- What was the experience after the incident
- Could anything have been done better

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- What can be done to prevent similar situations to occur in the future

The incident shall be logged, and the incident, initiated measures and any recommendations shall be described in a report. One copy of this report to be sent to base office onshore for information.

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## 6.4 FIRE AND GAS DETECTION AND ALARMS

The objectives of the Fire and Gas system for the Petrobras-36 are:

- Monitoring:
  - Detect fires at their incipient stage
  - Detect ingress of smoke or flammable gas into areas where it may present a hazard
  - Facilitate manual alarm initiation by personnel throughout the installation
- Alarm:
  - Alert Control Room operator of any fire or loss of containment of flammable gas
  - Alert Control Room operator of any failure of F&G detectors, equipment or circuits
  - Alert personnel on board to an incident
- Executive Actions:
  - Distribute signals to appropriate Control Shutdown systems (HVAC, PSD etc.) to initiate actions to mitigate a potentially hazardous situation.

On the sound of fire/gas alarm or otherwise being alerted of fire/explosion/gas leakage on the Unit, the DAMAGE CONTROL LEADERS (Marine Supt., Maintenance Supt. or Production Supt. as per competence areas) shall contact Central Control Room for information on the situation.

### 6.4.1 Fire

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A FIRE/EXPLOSION IN DECK/LIVING QUARTERS ETC.

DAMAGE CONTROL LEADER = Marine Superintendent.

#### *Alarm*

- In accordance with the Station Bill

*FPU Manager*

- Establish contact with stand-by vessel and order it in assistance position.



*Marine Superintendent*

- Inspect the incident site to establish the extent of the situation and report to FPU Manager immediately.
- Order preparation of additional fire fighting equipment.
- Make arrangement for bringing injured personnel to hospital or safety-zone for treatment.

*Damage Control Team*

- To be utilized in firefighting/safeguarding operations or search and rescue as required.

*B FIRE/EXPLOSION IN ENGINE ROOM, BOILER ROOM ETC.*

DAMAGE CONTROL LEADER = Maintenance Supt.

*Alarm*

- In accordance with the Station Bill

*Maintenance Supt.*

- Inspect the incident site to establish extent of situation and report to FPU Manager immediately.
- Close down ventilation system and fire dampers at incident site.
- Release emergency stop and quick closing valves.
- Consult with FPU Manager to decide whether mobile or stationary fire fighting equipment should be used.

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*Marine Supt.*

- Lead safe guarding of area adjacent to incident site in cooperation with Maintenance Supt.

- Order preparation for additional fire fighting equipment in cooperation with the Maintenance Supt..
- Make arrangement for bringing injured personnel to hospital or safety zone for treatment.

*C FIRE/EXPLOSION ON PRODUCTION AREAS*

DAMAGE CONTROL LEADER = Production Superintendent.

*Alarm*

In accordance with the Station Bill

*Production Supt.*

- Undertake inspection of incident site to establish the extent of the situation.
- Evaluate the possibility of bringing the situation under control and inform the FPU Manager immediately.
- Check that the production operation has been stopped and that power supply to the area has been cut off.
- In cooperation with Marine Supt. ensure that surrounding areas are safeguarded and that orders for additional supply of fire fighting materials or personnel are followed.
- Implement procedures for safeguarding of production equipment.
- Report to the FPU Manager on development and immediately inform him about any complications or other circumstances that may have influence on damage control or the Unit's integrity.

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*Marine Superintendent*

- Lead safeguarding of area adjacent to incident site in cooperation with Production Supt..
- Establish safety zone for personnel not engaged in damage control measures in cooperation with FPU Manager.
- Order preparation for additional fire fighting equipment in cooperation with the Production Supt.
- Make arrangement for bringing injured personnel to hospital or safety zone for treatment.



#### 6.4.2 Automatic Actions upon Detection of Flammable Gas

This section describes the generic automatic actions that should be initiated following detection of flammable gas in various areas. These actions form the basis of the Fire and Gas Cause and Effect charts to which reference should be made for 'specific' fire zone actions, which take precedence. These automatic actions shall be achieved by a combination of the F&G, ESD, PA/GA, PSD, HVAC and Electrical Systems.

The automatic actions described below are generally at three levels in ascending order of seriousness:

- Single head activation
- Confirmed low level (20%LEL) gas
- Confirmed high level (60%LEL) gas

The shutdown hierarchy in ascending order of priority is as follows:

- **Shutdown Level 1** Partial shutdown of process or utilities
- **Shutdown Level 2** Total shutdown of process without affecting utilities
- **Shutdown Level 3P** Total shutdown of process and 'non essential' utilities without isolation of power generation or main generation distribution.
- **Shutdown Level 3T** Total shutdown of process and 'non essential' utilities with isolation of power generation and main generation distribution.
- **Shutdown Level 4** Manual depressurisation and 'prepare to abandon' facility.

#### 6.4.3 Gas Detected in Any Fire Zone

A single gas detector operating at low (20%LEL) or high (60%LEL) level gas automatically initiates the following:

- Audible and visual alarm at the ECOS workstation.
- HVAC Shutdown/Closure (dependant on detection location)

Confirmed 20%LEL operation of any two gas detectors automatically initiates the following:

- Audible and visual alarm at the ECOS workstation.

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- General Platform Alarm (GPA).
- Electrical isolation of all installation welding and small power socket outlets.
- Start designated fire pumps.
- HVAC Shutdown/Closure (dependant on detection location)

Confirmed 60%LEL operation of any two gas detectors automatically initiates all of the above, plus the following:

- Level 3 Shutdown. (Partial or Total dependant on detection location)

#### 6.4.4 Automatic Actions upon Detector Malfunction

All detectors, instruments and circuits forming part of the F&G system shall be fully monitored and self checking so that any malfunction shall initiate an audible and visual alarm at the ECOS workstation.

#### 6.4.5 Alarms, Annunciation and Manual Controls

##### 6.4.5.1 General Platform Alarm (GPA)

The F& G system initiates a GPA via the PA/GA system.

The GPA initiating signal to the Telecoms system shall be activated by any of the following:

- Confirmed fire detected within a process and utility fire zone
- Confirmed high OR low level gas detection
- Operation of a Manual Alarm Call point
- Operation of any fixed fire protection system

In areas with high noise levels, an audible GPA (or PAPA) is augmented by a YELLOW strobe type warning beacon initiated only from the Telecoms system.

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DIVISÃO DE SEGURANÇA



## 6.4.6 Manual Alarm Call Points (MAC)

Manual alarm call points are provided throughout the FPU so that the location of an abnormal incident can be speedily announced to the Central Control Room Operator and all installation personnel.

### 6.4.6.1 Description of MACs

Manual alarm call points are double action devices, of the lift flap and break glass type. They mechanically latch in position until reset locally.

Manual alarm call points are red in colour and have a pale yellow photoluminescent backing plate with MANUAL ALARM CALL POINT in black letters for identification.

### 6.4.6.2 Location of MACs

Call points are mounted at a height of 1.4 m above deck or platform level and are generally located as follows:

- At exits on recognised access or escape routes
- At a density such that a person does not have to travel more than 15m to initiate an alarm
- Local to hydrants and portable fire extinguishers

### 6.4.6.3 Automatic Actions upon Activation of MACs

Activation of a manual call point shall initiate the following automatic actions:

- Audible and visual alarm at the ECOS workstation
- Initiate a General Platform Alarm (GPA)
- Start designated fire pumps

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## 6.4.7 Extinguishant Manual Release Stations

### 6.4.7.1 Description of Extinguishant Manual Release Station (MRS)

Deluge manual release stations comprise a manual valve forming an integral part of the deluge system fusible plug pneumatic trigger line. The manual valve is located in an enclosure painted with red and white diagonal stripes.

CO<sub>2</sub> manual release stations are double action devices of the lift flap and break glass type. They mechanically latch in position until reset locally and are painted safety yellow with a red safety coloured stripe.

### 6.4.7.2 Location of Extinguishant MRS

Deluge and CO<sub>2</sub> manual release stations are mounted at a height of 1.4m above deck or platform level and are generally located adjacent to escape routes at exits from the protected area.

### 6.4.7.3 Automatic Actions Upon Activation of Extinguishant MRS

Manual operation of any fixed firewater extinguishing system MRS shall initiate the following:

- Audible and visual alarm at the ECOS workstation
- Operation of related fixed fire protection system
- General Platform Alarm (GPA)
- Level 2 Shutdown.
- Electrical isolation of process and utilities area welding and small power socket outlets
- Isolation of hydrocarbon and fuel flow to and from the affected area

Close installation riser ESD valves

Start designated fire pumps

- Shutdown/electrical isolation of equipment in the affected area (certain areas only)

Manual operation of any fixed CO<sub>2</sub> extinguishing system MRS shall initiate the following:

- Audible and visual alarm at the ECOS workstation.
- Operation of related fixed fire protection system.
- Activate fire zone pre-discharge alarms.
- Initiate a General Platform Alarm (GPA).
- Shutdown/closure of ventilation system for the affected area.
- Start designated fire pumps.
- Level 2 Shutdown. (Compressor turbine enclosures only).
- Change CO<sub>2</sub> status lights (Compressor turbine enclosures only).
- Isolation of fuel flow to the affected area. (Compressor turbine enclosures only).
- Isolation of fuel flow to the generator. (Emergency generator area only).



#### 6.4.8 CO<sub>2</sub> Systems for Gas Compressor Turbine Enclosures

This section details the interface between the F&G system and gas compressor turbine enclosure CO<sub>2</sub> systems. See Table 6.1 for details of protected areas.

For each turbine enclosure the compressor vendor shall provide a dedicated CO<sub>2</sub> system which shall comprise main and standby cylinder banks.

A manual 'main/standby' cylinder bank changeover switch shall be located at the CO<sub>2</sub> skid.

It is possible to initiate CO<sub>2</sub> system operation as follows:

- Manually, from an ECOS workstation.
- Manually, from a CO<sub>2</sub> manual release station located adjacent to the turbine enclosure.
- Manually, by operation of a mechanical release adjacent to the CO<sub>2</sub> skid.
- Automatically, due to co-incident fire detection.

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Solenoid valves are provided in both 'main' and 'standby' banks to facilitate release of CO<sub>2</sub>.

Solenoids shall be energised to release the discharge mechanism.

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Normally the 'main' cylinder bank shall discharge unless the 'standby' has been selected at the CO<sub>2</sub> skid. However, it is possible to initiate operation of either bank from the ECOS workstation.

An adjustable timing facility is provided to set a 20-second delay between system initiation and release of CO<sub>2</sub>. During this period audible and visual pre-discharge warnings are given. These comprise a red flashing/rotating beacon(s) inside the enclosure and sufficient audible internal and external sounders to alert personnel of an imminent CO<sub>2</sub> discharge.

A lamp with a red domed lens and the legend "Carbon Dioxide System Activated/Discharged" is provided each side of the protected enclosure, adjacent to points of entry. The lamp shall flash during the 20-second pre-discharge period and go steady on release of CO<sub>2</sub>.

After release of the CO<sub>2</sub> system, lamps and beacons shall remain in the condition indicated until reset at the CO<sub>2</sub> skid and F&G system.

Release of CO<sub>2</sub> is inhibited if all turbine enclosure doors are not fully closed. Position switches provided at each door are configured to open-circuit the solenoid valves of both 'main' and 'standby' CO<sub>2</sub> banks, when necessary, and initiate a status alarm at the ECOS workstation.

Alternatively a key lock interlock system may be implemented to ensure that turbine enclosure doors can not be opened unless the CO<sub>2</sub> system is mechanically locked off.

Pressure switches are located on the CO<sub>2</sub> release and discharge pipework to indicate system initiation and discharge status. Provision is made for warning of low pressure in either CO<sub>2</sub> cylinder bank.

Unit control logic for each gas compressor turbine enclosure CO<sub>2</sub> system forms part of the Fire/Gas & Ventilation Control Module which manages all internal and external interfaces including shutdown of enclosure ventilation systems, etc.

The following interfaces with ECOS fire and gas system are provided:

- |             |   |
|-------------|---|
| - From ECOS | Initiate discharge of main cylinder bank    |
| - From ECOS | Initiate discharge of standby cylinder bank |
| - To ECOS   | Confirmed gas detected                      |
| - To ECOS   | Confirmed fire detected                     |

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DIVISÃO DE SERVIÇOS TÉCNICOS

- To ECOS CO<sub>2</sub> discharged
- To ECOS Enclosure doors open



#### 6.4.9 Centralised CO<sub>2</sub> System

This section details the interface between the F&G system and the centralised CO<sub>2</sub> system protecting various designated areas throughout the installation. See Table 6.1 for details of protected areas.

The centralised CO<sub>2</sub> bank system comprises main and standby cylinder banks. Cylinder banks are sized such that a full discharge is capable of supplying the largest single area to be protected. For other areas, only the required quantity of cylinders is released.

A manual 'main/standby' cylinder bank changeover switch is located at the CO<sub>2</sub> skid.

Operation of each area CO<sub>2</sub> system may be initiated as follows:

- Manually, from an ECOS workstation.
- Manually, from a CO<sub>2</sub> manual release station located adjacent to the area protected.
- Manually, by operation of a mechanical release adjacent to the CO<sub>2</sub> skid.

To facilitate discharge into a selected area the appropriate dedicated pilot cylinder solenoid valve and manifold directional valve solenoids have to be opened in sequence. There are therefore two solenoids in each cylinder bank per area protected. Solenoids are energised to release the discharge mechanism.

Normally the 'main' cylinder bank shall discharge unless the 'standby' has been selected at the CO<sub>2</sub> skid. However, it is possible to initiate operation of either bank from the ECOS workstation.

An adjustable timing facility is provided to set a 20-second delay between system initiation and release of CO<sub>2</sub>. During this period audible and visual pre-discharge warnings are given. These comprise a red flashing/rotating beacon and an audible sounder inside the area protected to alert personnel of imminent CO<sub>2</sub> discharge.

A lamp with a red domed lens and the legend "Carbon Dioxide System Activated/Discharged" is provided adjacent to points of entry to the protected area. The lamp shall flash during the 20-second pre-discharge period and go steady on release of CO<sub>2</sub>.

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DIRETOR  
DISTRITO DE MATOSINHOS

After release of the CO<sub>2</sub> system, lamps and beacons shall remain in the condition indicated until reset at the CO<sub>2</sub> skid and F&G system.

Release of CO<sub>2</sub> is inhibited if all the protected area doors are not fully closed. Position switches provided at each door are configured to open circuit the solenoid valves of both 'main' and 'standby' CO<sub>2</sub> banks, when necessary, and initiate a status alarm at the ECOS workstation.

If the doors of a protected area are open for more than 20 seconds, an alarm shall be initiated at the ECOS workstation.

A manual 'lock-off' isolation valve is located on the common discharge line and is monitored for both 'open' and 'closed' condition.

A manual valve is located between each manifold and each protected area discharge line. Valves are monitored for a 'not open' condition.

Pressure switches to monitor systems are as follows:

- 'Pilot Cylinder Low Pressure' PSL for each of the main and standby pilot systems to warn of inadequate pilot gas pressure to operate the system.
- 'System Initiated' PSL for each protected area pilot system which will initiate system pre-alarms and time delayed discharge of CO<sub>2</sub>.
- 'Manifold High Pressure' PSH for each of the main and standby CO<sub>2</sub> discharge manifolds to warn of pressure increase due to cylinder leakage, etc.
- 'Confirmed System Discharge' PSH in each protected area CO<sub>2</sub> discharge pipework.

In the event of a system discharge request not being followed by a 'Confirmed System Discharge' within 20 seconds, a suitable alarm shall be annunciated at the ECOS workstation.

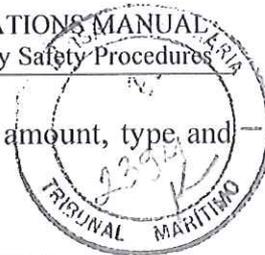
#### 6.4.10 Crew Actions upon Detection of Flammable Gas

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*FPU Manager*

- Immediately man the Emergency Operation Centre and lead the action.



- Establish communication with Production Supt. to obtain a report on amount, type, and source of the escaping gas.
- Investigate the reason for gas alarm and evaluate the need for general alarm.

*Production Supt.*

- Stop production operations.
- Cooperate with FPU Manager in investigation of gas alarm.

**LEVELS 3 OR 4**

*FPU Manager*

- Give order to the crew to put on gas masks or breathing apparatus.
- Order all personnel not involved in damage controlling measures to muster upwind; give mustering stations in cooperation with Marine Supt..
- Order Radio Operator to inform stand-by vessel and order it upwind, and to inform Rescue Control Centre of the situation.
- Give order to Control Room Operator to shut down ventilation fans to living quarters and engine room as required.
- Evaluate shutting down generators and starting of emergency generator.
- Shutdown production in consultation/cooperation with Production Supt.
- Give orders to continuous watching of gas detectors.
- If escape of gas reaches 10ppm, evaluate the necessity of evacuating all redundant personnel and visitors.
- If escape of gas reaches 20 ppm evacuation of all redundant personnel and visitors to be initiated if weather conditions permit.
- When the dangerous gas situation is over, arrange for gas monitoring onboard.
- Decide after consulting Production Supt. when the Unit may be considered safe and inform crew accordingly on P.A.

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DIRETOR

DIRETOR DE OPERAÇÕES

*Radio Operator (on duty)*

- Alert stand-by vessel, possible supply vessel alongside discharging/loading, and order them upwind on order from the FPU Manager.

*Production Superintendent*

- Immediately check the competence areas.
- Check that the personnel have put on breathing apparatus.
- Decide methods to bring the escaping gas under control and inform FPU Manager.

*Production Teams*

- Upon gas alarm put on breathing apparatus.
- Stop operations and check for "flow".
- When ordered, shut down system.

*Marine Superintendent*

- Check that all personnel not engaged in damage control measures have mustered upwind.
- Order Damage Control Teams to put on breathing apparatus, and check all doors and hatches to living quarters, engine room etc. are closed and ventilation fans are stopped.
- Arrange reception station for possible gas-poisoned personnel.
- Lead evacuation of redundant personnel upon order.
- Arrange filling of used air bottles as required and check that air intake for compressor is free of gases.
- Check that "on duty" personnel in Control Room have put on breathing apparatus.
- Initiate search parties for missing persons.

*Maintenance Supt.*

- Check that engine room, boiler room and generator room are free of gas.
- Order shutdown of all unnecessary machinery to eliminate ignition sources.



*Control Room Operator (on duty)*

- Put on protective clothing and breathing apparatus as required and stay in the Control Room.
- Close down ventilation fans upon order.
- Stop generators and start emergency generator upon order.

*Catering Superintendent*

- Arrange for visitors and others to be taken care of and escorted to mustering station upwind.

*All Personnel*

- Upon hearing gas alarm, put on gas masks or breathing apparatus and, unless involved in damage control measures, muster upwind as ordered.

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DIVISÃO DE SERVIÇOS CARTORIAIS

**Table 6.1 SCHEDULE OF CO<sub>2</sub> PROTECTED AREAS**

**Package Systems**

Gas Compressor Turbine Enclosure Train A	UQ-122304
Gas Compressor Turbine Enclosure Train B	UQ-122306
Gas Compressor Turbine Enclosure Train C	UQ-122308

**Central CO<sub>2</sub> System UQ-542501**

- Battery Room No.1
- Battery Room No.2
- Battery Room No.3
- Battery Room No.4
- Compressor Control Room
- Compressor MCC Room
- Compressor UCP/UPS Room
- Emergency Generator Rooms
- Engine Control Room
- HV Switchgear Room No.1
- HV Switchgear Room No.2
- MCC Room No.1
- MCC Room No.2
- Radio Room
- RTU Room
- Telecom UPS No.4
- Telecomms Equipment Room
- UPS Room No.1
- UPS Room No.2
- UPS Room No.3
- Ventilation MCC/ UPS Room

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DIVISÃO DE SERVIÇOS CARTÓGRAFOS



## 6.5 HELICOPTER CRASH

During landing and take-off the helideck of the Unit shall be manned with at least 3 men:

- Marine Supt. (Helicopter Landing Officer)
- Two (2) Maintenance Workers (Fire Guards)

The Helicopter Landing Officer and the Radio Operator will be in direct contact with the helicopter during in-flight and take-off. The Fire Guards shall be fully equipped with protection equipment and ready for actions. All personnel in charge shall remain in a protected area during in-flight and take-off.

### 6.5.1 Helicopter Crash Onboard

DAMAGE CONTROL LEADER = Marine Supt.

*Alarm:*

- In accordance with the Station Bill

*Helicopter Landing Officer (Marine Supt.)*

- Shall immediately initiate necessary contingency measures, if he notices during landing or take-off of the helicopter something that may indicate that the helicopter has technical problems and may crash on the Unit.. If the crash has already occurred, the foam fire fighting equipment to be activated immediately and not stopped until the helideck is completely covered with foam, unless ignition has occurred.

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DIRETOR  
DIREÇÃO DE SERVIÇOS CAJTORIAS

*Radio Operator*

- Upon a helicopter crash immediately notify the FPU Manager, the Control Room Operator, the Helicopter Company, the Rescue Control Centre and the stand-by vessel.

*Control Room Operator. (On duty)*

- Shall, on receipt of the message that a helicopter crash on the Unit is imminent, or that the crash has already occurred, release fire alarm.

*FPU Manager*

- Performs his general emergency duties.

*Marine Superintendent*

- Initiate the following:
  - a) Immediate evacuation of the personnel in the helicopter, if this is possible.
  - b) If fire has started, initiate immediate fire fighting procedure.
  - c) Direct Damage Control Team No. 1 in lifesaving efforts (from windward side).
  - d) Arrange for transportation of rescued/injured persons to the hospital or safe place.
  - e) Keep FPU Manager informed about the situation.
  - f) Direct Damage Control Team No. 2 in damage controlling measures.

*Damage Control Teams No. 1 & 2*

- Each team consists of two men with protection suits and smoke diving equipment
- Shall contact the Control Room and confirm that the situation is understood

*Shall report to the Marine Supt. on helideck/incident site. Team*

- Shall contact the Control Room and confirm that the situation is understood.
- Shall bring stretcher and report at ladder to helideck on windward side, ready to bring injured personnel to hospital.

*All Other Personnel*

- Shall report to their positions in accordance with instructions for fire on deck, and initiate those measures described there.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL:

NOTE:

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OPERACIONAL  
CARTOGRAFIA

If the helicopter crash occurs on any part of the Unit other than the helideck, and fire breaks out, follow the instructions for "Fire/Explosion in Deck/Living Quarters" with the exception of procedures for saving life from the helicopter.

### 6.5.2 Helicopter Crash Close by the Unit

DAMAGE CONTROL LEADER = FPU Manager



*Alarm:*

- P.A. announcement

If a helicopter crashes in the vicinity of the Unit, all possible measures must be initiated to save the passengers and crew.

Anyone who observes a helicopter crashing into the sea must immediately contact the Control Room and give the position of the wreck.

Upon being alerted of a helicopter crash, the following persons shall act:

*FPU Manager*

- Take over as "On Site" coordinator.
- Give orders to muster rescue boat crews and prepare rescue boat for launching.
- Order alert of stand-by vessel to rescue the helicopter.
- Evaluate launching of the rescue boat.
- Evaluate if the Medic Clerk should be ordered to assist in the rescue boat.
- Check radio communication with the rescue boat (VHF).
- Order Radio Operator to call on other vessels in the vicinity and request assistance.
- Transmit MAYDAY RELAY signal about the situation.
- Post lookout on the highest possible location onboard the Unit, equipped with binoculars and VHF for communication with the stand-by vessel, rescue boat, etc.
- If it becomes necessary to arrange for search for survivors/perished persons on account of wind and sea, recommend search pattern and procedures to be followed. FPU Manager to coordinate the search operation.

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*Control Room Operator - on duty*

- When being alerted of a helicopter crash, immediately inform the FPU Manager and inform the members of the Man-Overboard Team over the P.A. Put on survival suit. When relieved by Control Room Operator off duty or FPU Manager, proceed to rescue-boat and act according to orders.

*Control Room Operator - off duty*

- Muster in Control Room and relief Control Room Operator on duty.

*Rescue Team*

- Perform their duties as described for Man Overboard situations.

*Medic Clerk*

- Upon order dress in survival suit and report to rescue boat, bringing first aid equipment. Keep the FPU Manager informed on the necessity of immediate evacuation of injured persons.

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DIRETOR  
DIVISÃO DE SERVIÇOS GERAIS

## 6.6 EVACUATION



### *Alarm:*

- In accordance with the Station Bill

### *FPU Manager*

The FPU Manager shall:

- Order emergency message to be sent on 2182 kHz and Channel 16 on VHF.
- Advise stand-by vessel of decision and mode of evacuation to be used.
- Alert Rescue Control Centre and base office.
- Issue orders to stop production operation and shut down the wells.
- Issue order to Maintenance Supt. to stop all unnecessary machinery.

The FPU Manager is responsible for making the decision on evacuation, and initiating it. The FPU Manager in consultation with Section Supt.'s makes the decision on whether the evacuation should be partial or total.

Mode of evacuation will be decided upon depending on the actual situation, but in essence there are two main methods:

- a) Evacuation by helicopter
- b) Evacuation by lifeboats

When the decision of partial evacuation has been reached, personnel will be advised by courier and informed over the P.A. system.

When "Prepare Evacuation" alarm has been sounded, the following instructions apply:

### *Marine Supt.*

- Issue instruction that all injured personnel are to be brought to the lifeboat stations.

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*Lifeboat Team*

- Start preparation of lifeboats for launching
- Check personnel allocated to lifeboats in accordance with lifeboat lists
- Keep FPU Manager informed about status for lifeboats and personnel
- Lead the embarkation and lowering of lifeboats upon order from FPU Manager
- Check that VHF in lifeboats are working
- Start lifeboat motors

*Radio Operator on duty*

- Shall perform his general emergency duties as described in paragraph 6.2.5.

*Maintenance Supt.*

- Keep necessary machinery and power supply intact
- Make sure all technical personnel leaves engine room

*Production Supt.*

- Make sure that closing down the production operation and shutting off the system is done according to the procedures.
- Report to the FPU Manager when everything is under control.
- Make sure that all personnel leaves the competence areas

*Medic Clerk*

- Muster at lifeboat station bringing first aid equipment for treatment of injured personnel.

*Other Personnel*

- Put on survival suits, life jackets, including as much warm clothing as possible.
- Report to your lifeboat station in accordance with the Station Bill as soon as possible.

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DIRETOR  
DIVISÃO DE SEGURANÇA



*Evacuation List*

Upon a possible evacuation from the Unit, whether partial or a stepped up evacuation, while damage controlling measures are still being carried out, the personnel will be evacuated dependent on whether their presence onboard may be required.

*General Priority List:*

- Service personnel and visitors
- Parts of catering personnel
- Storekeeper
- Rest of subordinate catering personnel
- Production personnel, with the exception of Production Supt.
- Cooks and Catering Supt.
- Technical personnel, with the exception of Engine Room Operator, Electrician and Maintenance Supt.
- Rest of marine crew and one Radio Operator, Engine Room Operator, Electrician
- Radio Operator
- Production Supt.
- Maintenance Supt. and Marine Supt.
- FPU Manager

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

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DIRETOR  
DIVISÃO DE SERVIÇOS CARTÓRIOS

## 6.7 MARINE SITUATIONS

### 6.7.1 Drifting Vessel/Vessel on Collision Course

DAMAGE CONTROL LEADER = FPU Manager

*Alarm:*

- P.A. announcement

If a situation arises where a drifting vessel or a vessel on collision course endangers the integrity of the Unit, the following persons shall action:

*FPU Manager*

- If the danger is imminent, release "Prepare Evacuation" alarm and announce on the P.A. system about the danger threatening the Unit
- Request stand-by vessel to intervene
- Order shut down of ongoing production operation
- Make a plot of the vessel that threatens the Unit, by use of radar
- If the stand-by vessel does not have sufficient power and size to move a drifting vessel, request assistance from supply boat or anchor handling vessels in the vicinity.
- Towards vessels underway on collision course:
  - Use pyrotechnic signals to attract attention.
  - Continuously call the unknown vessel on VHF Channel 16.
  - Request stand-by vessel to use all available means to attract attention of the unknown vessel.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

JOSE CARLOS DE MOURA  
DIRETOR  
DIVISÃO DE SERVIÇOS CAIS/OPERA

*Marine Supt.*

- Execute manning of anchor windlass remote control to be ready to pull off location.



*Production Supt.*

- Make ready for shutting down production operation.
- On orders, stop production/ operation in accordance with the procedures for such operation.
- Notify FPU Manager when ready.

*Maintenance Supt.*

- Prepare main engine
- Start up on orders
- Make sure that all necessary machinery is running, and that there is sufficient power supply.

*Radio Operator on duty*

- Alert stand-by vessel on order with request of intervention of the unknown vessel.
- Call upon supply- and anchor handling vessels in the vicinity for assistance as required.

*All Other Personnel*

All other personnel not engaged in pulling the Unit off location, shall:

- Muster at their dedicated lifeboat station according to Station Bill, dressed in warm clothing and survival suit.
- Upon order to evacuate, the procedure laid down in paragraph 6.6 "Evacuation" shall be followed.

### 6.7.2 Mooring Failure

DAMAGE CONTROL LEADER = FPU Manager

*Alarm:*

- P.A. announcement

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DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAS

The following procedure is to be followed in cases where two or more mooring lines lose their holding power.

If such situation occurs the following personnel shall:

*FPU Manager*

- Order the Maintenance Supt. to start generator sets.
- Order the Marine Supt. to adjust tension in remaining anchor lines.
- Order Production Supt. to prepare for shutdown of production operations.
- Ask possible tugs, anchor handling vessels or supply ships to be ready to assist.

*Marine Supt.*

- Order manning of remote control panel for anchor winches and adjust the line tension to get as good distribution of the forces as possible.
- Order manning of cranes and winches other than anchor winches.

*Maintenance Supt.*

- Prepare generator sets and report when ready.
- Startup generator sets on order.
- Make sure that all necessary machinery is running, and that there is sufficient power supply.

*Production Supt.*

- Make ready for shutdown of production operations.
- Upon order, shutdown production operations and report when ready.
- Report to Emergency Operation Centre when ready.

*Crane Operator*

- Man the crane and assist in handling of chains, wires and ropes if necessary.

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*Damage Control Teams Nos. 1 and 2*

- Man other winches than anchor winches.
- Handle mooring and towing equipment as necessary.



### 6.7.3 Uncontrolled Drifting

DAMAGE CONTROL LEADER = FPU Manager

*Alarm:*

- In accordance with the Station Bill

Uncontrolled drifting occurs when the anchor lines are broken and any assist vessels are insufficient to keep in position or to manoeuvre the Unit.

At this stage, the production operations are assumed shut down.

If this is the case, following instructions apply.

*FPU Manager*

- Order start-up of emergency generator if necessary.
- Request stand-by vessel or possible other vessels close to the Unit for towing assistance.
- Order "Not Under Command" signalling.
- Order all personnel to put on survival suits.
- Order preparation for evacuation, by lifeboats and liferafts and/or helicopter. The degree of evacuation will continuously be evaluated, dependent on the development of towing procedure, drifting direction, weather conditions etc.
- Order full evacuation when this is found necessary.

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DIVISÃO DE SERVIÇOS CARTORÍARIAS

*Marine Supt.*

- Lead the efforts to secure towing lines between the Unit and the stand-by vessel or possibly other vessel(s).
- Order manning of crane(s) and necessary winches.

*Maintenance Supt.*

- Start the emergency generator if necessary.
- Secure as much as possible of the machinery in case there will be an evacuation.

*Production Supt.*

- Secure the production equipment as good as possible in case of evacuation.

*Radio Operator*

- Upon order request surrounding vessels for towing assistance.

*Crane Operator*

- Man the crane and assist in handling of wires and ropes if necessary.

*Damage Control Teams Nos. 1 and 2*

- Man necessary winches.
- If possible, secure towing line from Unit to other vessel(s) as ordered by Marine Supt..

*All Personnel*

- Upon evacuation order, follow the procedure laid down in paragraph 6.6 "Evacuation".

**6.7.4 Reduced Stability**

DAMAGE CONTROL LEADER = Marine Supt

*Alarm:*

- P.A. announcement

Events that would decrease the seaworthiness and thus stability are:

- damage leading to flooding of compartments and/or tanks
- shifting of centre of gravity (variable deck load)



Events such as these may cause undesired inclination or submerging of the Unit.

In such cases the following persons shall:

*FPU Manager*

- Identify the cause/event of the reduced seaworthiness.
- Cooperate with the Marine Supt. regarding damage control measures.
- Alarm the Rescue Control Centre and base if the situation could not be brought under control.

*Marine Supt.*

- Decide/direct damage controlling measures, in cooperation with the FPU Manager.
- Cooperate with Maintenance Supt. if one or more of the following actions are necessary:
  - Filling/discharging of water ballast tanks to bring the Unit back to upright position.
  - Close all water- and weather-tight means of closures, i.e. doors, ventilators, hatches.
- Locate the area of damage.
- Isolate the damaged compartment(s) to avoid progressive flooding into other compartments.
- Evaluate the flooded weight and its inclining moment.
- Cooperate with the Production Supt. regarding damage controlling are measures:
- Order the Damage Control Team to bring inclining weights back to position.
- Establish contact with supply vessel for unloading of items etc. to reduce the vertical centre of gravity if necessary.

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*Maintenance Supt.*

- Cooperate with the Marine Supt. in efforts to bring the vertical centre of gravity down and to get the Unit to upright position, i.e. running of pumps etc.

*Production Supt.*

- Cooperate with the Marine Supt. in shifting/lowering/removing of weights to make the vertical centre of gravity go down.

*Radio Operator on duty*

- On order from the FPU Manager, inform the Rescue Control Centre and base about the situation

*Control Room Operator(s)*

- Assist the Marine Supt. and the Maintenance Supt. as necessary.

*Damage Control Teams*

- Report to the Marine Supt. and assist as necessary with shifting/removing of weights etc.

*Technical Team*

- Report to the Maintenance Supt. and if unintentional filling of tanks/spaces has taken place. Look for leakages and investigate the possibility to stop these.

*Production Teams*

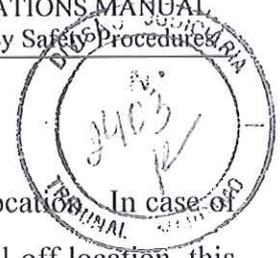
- Report to the Production Supt. and assist as required in manual blocking of valves or venting etc.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL:

NOTE:

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DEPARTAMENTO DE SERVIÇOS OPERACIONAIS

If it is impossible to regain the Unit's seaworthiness, an evacuation according to procedures laid down in paragraph 6.6 "Evacuation" will take place as necessary.



### 6.7.5 Pulling Off Location

These instructions have been developed based on an emergency pull-off location. In case of other emergencies not involving danger of gas/explosion, that requires pull-off location, this procedure shall be modified accordingly.

#### GENERAL

Procedure differs according to Emergency Shut-Down levels reached as per danger of gas/explosion (Paragraph 6.4.2).

*NOTE:* FPU Manager, Marine Supt., Maintenance Supt., Control Room Operator, Radio Operator and Crane Operator to be familiar with procedures for emergency release of anchor chains.

- Keep ready in the Central Control Room Position Reference System plots of chain length adjustments to move unit away from the location in directions 0- 45- 90- 135- 180- 225- 270- 315 degrees relative to Unit's heading.
- Release of chains shall only be activated on order from FPU Manager.
- When in operation, clutches to the chain wheels of the anchor windlasses shall be maintained disengaged.
- Connected hand pumps on each winch control cabinet are provided to manually release the brakes.
- Prior to any attempt to pull-off location, receive confirmation from Production Supt. that the disconnection has been successful.

*Instructions in case of shut-down prior to reaching LEVEL 1*

*NOTE:* In this case the main generators can still be used.

- Perform shutdown(s) on production/utilities systems as required according to circumstances.

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*Instructions in case of shut-down prior to reaching LEVEL 2*

- Perform shutdown(s) on production/utilities systems as required according to circumstances.
- From control console in Bridge, release anchor chains as required according to circumstances.
- If situation allows, restart generators and anchor windlasses.
- Adjust chain lengths and tensions in order to keep the Unit in wanted position.

*Instructions in case of total shut-down (LEVEL 3)*

In case of total shutdown, the FPU manager shall evaluate carefully if one shall go on with the procedure or evacuate the Unit.

- Perform shutdown on production systems as required according to circumstances.
- Ascertain environmental conditions.
- Check if windlasses areas are gas free.
- Using hand hydraulic pump, release anchor chains as required according to circumstances.
- If situation allows, restart generators and anchor windlasses.
- Adjust chain lengths and tensions in order to keep the Unit in the wanted position.

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DIVISÃO DE SERVIÇOS CANTONIAIS



*Rescue Team*

- Report to the Control Room that the situation is understood.
- Dress in survival suit and muster at the rescue boat.
- Board the rescue boat and wait for instructions from the FPU manager to launch this.

*Crane Operator*

- Muster at rescue station and lower the boat upon orders from FPU Manager.
- Man the crane and make ready for using the basket.

*Medic Clerk*

- Report to the Control Room that the situation is understood.
- Prepare for transportation of necessary equipment for treatment of shock or hypothermia to reception point onboard the Unit or stand-by vessel.

*Catering Team*

- Bring stretcher to reception point on the Unit and bring the victim to the hospital.

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DIVISÃO DE SERVIÇOS GERAIS

## 6.9 POLLUTION



### *Alarm:*

- P.A. announcement

The pollution in question is supposed to come from the Unit itself or as a result of the Unit's operations.

The main pollution will be oil or discharge with a certain amount of oil. If this happens, the following instructions apply.

### *FPU Manager*

- Man the Emergency Operation Centre.
- If there is any leakage, order the Production Supt. or the Maintenance Supt. to stop the outlet if possible.
- Alert the stand-by vessel about the polluted discharge, and request for commencing of oil recovery.
- Inform the Rescue Control Centre and base.
- Evaluate in cooperation with the master of the stand-by vessel the need for assistance in oil recovery.

### *Maintenance Supt.*

- If there is a leakage within his area of responsibility, together with the Technical Team, stop the leakage if possible.

### *Production Supt.*

- If there is a leakage within his area of responsibility, together with the Production Team, stop the leakage if possible.

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*Radio Operator*

- Establish contact with the stand-by vessel, inform them about the pollution and ask them to start oil recovery.
- Inform the Rescue Control Centre and the base and if necessary ask for assistance in the oil recovery work.

*Technical Team*

- Assist the Maintenance Supt. as necessary.

*Production Teams*

- Assist the Production Supt. as necessary.

É CÓPIA FIEL DO DOCUMENTO ORIGINAL

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DIRETOR  
DIVISÃO DE SERVIÇOS CARTEIRAS

## 6.10 ADMINISTRATIVE SITUATIONS



### 6.10.1 Medical Assistance in Cases of Serious Accidents

#### *Alarm:*

- P.A. announcement

If an accident occurs onboard of such a magnitude or characteristics that the Medic Clerk requires external medical advice or assistance, the following instructions apply.

#### *FPU Manager*

- Establish contact with doctor or hospital, but leave the direct contact with doctor/hospital to the Medic Clerk.
- On evacuation of the patient, agree with the doctor on the following:
  - Transportation arrangement.
  - Alerting the hospital.
  - Transportation from helicopter to hospital.
  - Medical escort.
  - Advise base office, and inform on what has been decided upon between the Unit and the doctor/hospital.
  - Request Operator's Representative to arrange for helicopter transportation.

#### *Medic Clerk*

- Lead Catering Team.
- Escort the victim(s)/patient(s) from site of incident to hospital or helideck.
- Inform the FPU Manager about the condition of the patient(s).
- Communicate directly with the doctor and give all relevant information regarding the patient.

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- If it is decided to evacuate the patient, get all necessary information from the doctor regarding the transportation.
- Prepare the patient(s) for transportation.
- Escort the patient(s) to shore if necessary.

*Marine Supt.*

- Assist the Medic Clerk
- Lead Catering Team if requested so by Medic Clerk.

*Catering Team*

- Report to the Medic Clerk in the hospital.
- Bring stretcher and first aid equipment to the injured. If the accident is on drill floor, also bring dedicated slings for transportation of stretcher by overhead crane and catwalk machine.
- Give first aid treatment.
- Bring the injured to the hospital.
- Bring the injured to the helideck on order.

*Radio Operator*

- Arrange communication with the doctor/hospital on order.
- Give the Medic Clerk first priority on communication with shore.

*Requisition of Helicopter*

When requesting helicopter transportation for injured/sick personnel give following details:

- Name and position of Unit.
- Number of patients.
- Number of stretcher patients.
- Advise if medical escort is necessary.
- Landing arrangements (Type of helideck).

- Weather conditions.

#### *Evacuation of the Patient(s)*

Following information on the patient(s) to be given:

- Name, age and address.
- Treatment given (medicine given, time and amount).
- Time for setting tourniquet, splints, compress bandage or similar.



NOTE: Information is to be attached to the patient(s) in such a way that it may not be torn off or removed unintentionally.

### 6.10.2 Handling of Dead Persons

In cases of death caused by accident:

- The victim may not be moved before the police arrive or permission to move the body has been given by the police.
- The body/bodies must be covered up.
- If the deceased must be moved, take pictures from several angles with a Polaroid camera at the incident site before moving takes place.
- If an injured person dies before the requested assistance and transportation arrives, call off all initiated medical actions.
- Arrange transportation of the deceased to shore.
- Inform the police about the incident.
- Give all pertaining information.
- Request base office to clarify with the police on such matters as investigation, autopsy and other possible measures to be initiated, such as informing next of kin.
- If the incident is of such nature that it is necessary to hold a maritime inquiry, the marine investigator in charge of the area where the Unit is located is to be advised.
- Remember abstract of logbook.

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DIVISÃO DE SERVIÇOS CARTORÁRIOS

## 6.11 CRIMINAL ACTS

By criminal acts it is meant the occurrence of incidents like:

- Smuggling onboard and/or use of narcotics/alcohol
- Thefts/larceny
- Acts of violence
- Homicide
- Arson

If a situation arises onboard that involves one or more of the above mentioned situations, the following instructions apply.

### *FPU Manager*

- Secure the scene of crime and post guards.
- Secure evidence.
- Initiate investigation.
- Take depositions.
- Inform base office.
- Inform police, if possible through base office.
- Place suspects in custody.
- Arrange to have persons under the influence of alcohol or drugs taken care of.
- Arrange to have victims of acts of violence taken care of and given proper treatment.

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When advising the police, the following information must be at hand:

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DIVISÃO DE SEGURANÇA

Type of crime, time and date of incident.

- Injured or dead persons.
- Safety measures initiated against suspect(s) or aggressor(s).

- Other security measures and securing of evidence.
- Required assistance.
- Other relevant information.
- The FPU Manager should via the base office inquire the Maritime Investigator if it is necessary to hold a maritime inquiry.



*Marine Supt.*

- Assist the FPU Manager
- Arrange with necessary guards and safeguarding the scene of crime.

*Medical Clerk*

- Give medical treatment to injured or intoxicated persons.
- Advise the FPU Manager if medical assistance is necessary or evacuation of injured or of intoxicated/drugged persons is required.

*Radio Operator*

- Advise the base office as ordered.
- Establish communication between the Unit and doctor/hospital if necessary.

É CÓPIA DEL DO DOCUMENTO ORIGINAL.

JOSÉ CARLOS FIMENLE GUSMÃO  
DIRETOR  
DIVISÃO DE SERVIÇOS CARTORIAIS

A handwritten signature in blue ink, written over the typed name of José Carlos Fimle Gusmão.

## 6.12 BOMB THREATS, HIJACKING ETC.

Reference is made to the separate and confidential Anti-terror Plan.

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DIRETOR  
DIVISÃO DE SERVIÇOS OPERACIONAIS



### 6.13 SEARCH/RESCUE ONBOARD AFTER AN EVACUATION

After an evacuation of the Unit, it might be necessary to go back onboard to search for missing/dead persons and/or perform other rescue work. For this purpose a "Rescue Team" has been appointed consisting of the following personnel:

- FPU Manager (team leader)
- Marine Supt.
- Maintenance Supt.
- Production Supt.
- Crane Operator
- Welder
- Electrician I
- Medic Clerk

Prior to sending the Rescue Team onboard, this must be clarified and coordinated with the Authorities to ensure that this is safe.

The team members should not risk their own lives to try to save others.

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## 6.14 DANGEROUS RADIATION

### *Alarm:*

- P.A. announcement

### *General*

The State Institute of Radiation Hygiene has worked out regulations for handling of radioactive isotopes. Such isotopes may be used for well logging, density and level gauging and radiography. Radiation hazard may occur if radioactive material is lost, mislaid, exposed to fire or explosion or to severe mechanical stress.

### *a) Storage:*

The subcontractors authorized for using radioactive components onboard shall provide an approved, properly marked, locked box for storage of all radioactive material onboard the Unit. They shall also provide approved standard containers for transportation of such material. The container shall be stored at a remote place but within range of a crane.

### *b) Physical Characteristics of Radioactive Sources:*

A list of the radioactive sources which may be used in a given work situation shall be inserted into the Contingency Plan.

### *c) Possible Occurrence:*

- Loss during transportation or when stored onboard.

### *Alerting Instructions*

Any person being aware of radioactive isotopes being lost or mislaid shall immediately report to the FPU Manager. The FPU Manager will give the Radio Operator the necessary instructions for announcing information on the P.A. system.

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DIVISÃO DE SERVIÇOS CARTEIARIA

*DUTIES*



*FPU Manager*

When notified of an accident involving a radioactive source:

- a) Order all personnel away from the hazard area by announcement via the P.A. system.
- b) Immediately block off the hazard area and inform the personnel onboard of any other safety precautions which must be followed.
- c) Have the Radio Operator inform the Rescue Control Centre.

*Radio Operator.*

Upon FPU Manager's instruction, give information to the personnel via the P.A. System and inform the Rescue Control Centre.

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DIRETOR  
DIVISÃO DE SERVIÇOS CANTOARIAS

A handwritten signature in blue ink, written over the typed name of José Carlos Pimentel Gusmão.

## ABBREVIATIONS

ABS	American Bureau of Shipping
CCR	Central Control Room
CO <sub>2</sub>	Carbon Dioxide
ECOS	Central Operation and Supervisory Station
EOC	Emergency Operation Centre
F&G	Fire and Gas
FGP	Fire and Gas Panel
ESD	Emergency Shut Down
FSD	Full Scale Deflection
FPU	Floating Production Unit
GPA	General Platform Alarm
HTA	Heavier Than Air
IP	Institute of Petroleum
IR	Infra-Red
LEL	Lower Explosion Limit
LTA	Lighter Than Air
MAC	Manual Alarm Call point
MRS	Manual Release Station (for Extinguishant)
PA/GA	Public Address/General Alarm
PAPA	Prepare to Abandon Platform Alarm
PSD	Process Shutdown
PSH	Pressure Switch High
PSL	Pressure Switch Low
RC	Rate Compensated
RINA	Registro Italiano Navale
Supt('s)	Superintendent(s)
ROR	Rate of Rise
RCC	Rescue Control Centre
TER	Telecommunications Equipment Room
TR	Temporary Refuge
UCP	Unit Control Panel
UEL	Upper Explosive Limit
UPS	Uninterruptable Power Supply
UV	Ultra-Violet

É CÓPIA FIEL DO DOCUMENTO ORIGINAL:

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DIVISÃO DE SERVIÇOS OPERACIONAIS

## DEFINITIONS

### *CONFIRMED FIRE*

Operation of any of the following:

- a fusible plug in the heat detection system.
- a fixed fire protection system.
- co-incident operation of two flame detectors in a turbine enclosure.



### *CONFIRMED HIGH GAS*

Co-incident operation of any two gas detectors at high-level alarm setting, generally within a single fire zone.

### *CONFIRMED LOW GAS*

Co-incident operation of any two gas detectors at low level alarm setting, generally within a single fire zone.

### *CONTROL STATION*

Control Stations are the areas of the installation that are required to be kept manned or operational in order to effect control and monitoring functions during an emergency.

Control Stations comprise the CCR and Radio Room. A dedicated gas detection/shutdown system is provided for these areas (and associated TER and battery/UPS rooms) to enable them to remain operational for as long as safely possible.

### *ELECTRICAL EQUIPMENT*

Any piece of apparatus that uses electrical current for its operation. This includes fire and gas detectors, loudspeakers and instruments, as well as the more typical equipment such as motors, generators, distribution gear, etc.

### *ELECTRICAL ISOLATION*

The purpose of electrical isolation, as an executive action of the F&G system, is to achieve one or more of the following actions:

- Minimise the probability of ignition of accidental flammable gas releases.

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- Remove the sources of electrical ignition.
- Minimise the risk of electric shock to fire fighters entering an area.

*EXECUTIVE ACTION*

An executive action describes a physical control function performed by the F&G system, e.g. PSD initiation, extinguishant release, ventilation & fire damper control, electrical isolation, firewater controls, etc.

Executive actions will generally be the result of confirmed fire or gas detection, or manual initiation of a MAC, fixed fire protection system etc.

*FIRE ZONE*

An area on the installation bounded by external boundaries, A or H class fire divisions or extent of deluge.

*FIRE AND GAS SYSTEM*

The Fire and Gas system, as a term in this document, encompasses the whole composition of the installations' F&G detection equipment, monitoring and control functions, field devices, control panel hardware, protection systems, etc.

*CENTRAL CONTROL ROOM (CCR)*

The CCR is located in the TR area and is deemed to be the Primary Emergency Control Centre.

*NON-HAZARDOUS AREA*

By implication, an area is deemed to be non-hazardous if it is not classified as Class 1, Division 1 or Division 2.

*SPURIOUS ALARM*

False activation of a sensor or system.

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*UNCONFIRMED ALARM*

Single operation of any single electronic heat, smoke, flame or gas detector.

*CLASS 1 HAZARDOUS AREAS*

Locations in which flammable gases or vapours may be present in the air, in quantities sufficient to produce explosive or ignitable quantities.

They include the following:

*CLASS 1, DIVISION 1*

Hazardous concentrations of flammable gases or vapours continuously, intermittently or periodically present under normal conditions.

*CLASS 1, DIVISION 2*

Volatile flammable liquids or flammable gases present, but normally confined within closed containers or systems, from which they can escape only under abnormal operating conditions.



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## SAFETY PLANS AND ESCAPE ROUTES

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**REVISION CHANGE NOTICES**

Rev.	Location Changes	Brief Description of Change
A	7.1, 7.2, 7.3, 7.4, 7.5, 7.6, 7.11, 7.14  7.7  7.9  7.12, 7.13, 7.15	Loading Conditions updated with  Inclined lightship weight & COG  Allowable VCG Curve updated with  load condition VCGs added.  Detailed Hydrostatics included  Revised Reports Included.

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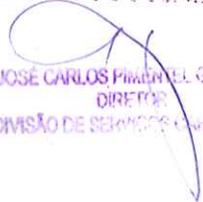
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## 7 STABILITY BOOK

This section contains the important technical data for ensuring the unit's stability margin remains safe during all operations.

This manual should be read and used by a qualified and experienced Stability Officer. All operations should be properly planned and approved by the Unit's Master prior to commencement.

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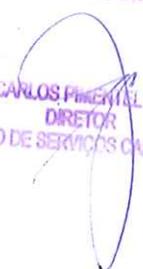
**7.1 LOADING CASES FOR TRANSIT, OPERATING, SURVIVAL & CONDITIONS**

Loading Conditions attached:

Description	Draft	Comments
Maximum Operating Draft	22.0m	300 Tonnes misc. deck load
Fairlead Inspection Draft	18.0m	300 Tonnes misc. deck load
Transit to Field Condition	11.0m	300 Tonnes misc. deck load

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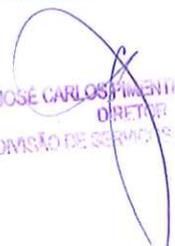


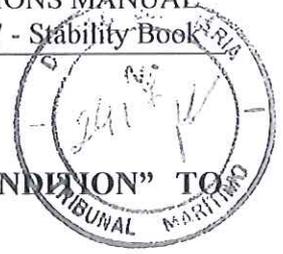
**7.2 BALLASTING FROM DRAFT = 11.0M “TRANSIT CONDITION” TO DRAFT 18.0M  
“TRANSIT SURVIVAL CONDITION”**

Loading Conditions attached:

Description	Draft	Comments
Stage 1 – Standard Transit Condition	11.00m	
Stage 2	11.74m	
Stage 3	12.10m	
Stage 4	12.80m	
Stage 5	15.90m	
Stage 6	18.00m	

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**7.3 BALLASTING FROM DRAFT = 11.0M "ON SITE TRANSIT CONDITION" TO  
DRAFT = 18.0M "PRE-MOORING INSTALLATION CONDITION"**

Loading Conditions attached:

Description	Draft	Comments
Stage 1 – Standard Transit Condition	11.00m	
Stage 2	11.74m	
Stage 3	12.10m	
Stage 4	12.80m	
Stage 5	15.90m	
Stage 6	18.00m	

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**7.4 BALLASTING FROM DRAFT = 18.0M “PRE-MOORING INSTALLATION CONDITION” TO DRAFT = 22.0M “POST MOORING INSTALLATION”**

*Subject to Mooring Installation Procedures to be defined by Installation Contractor*

Loading Conditions attached:

Description	Draft	Comments
Pre-Mooring Condition	18.0m	
Four Lines Connected & Tensioned	18.0m	
Eight Lines Connected & Tensioned	18.0m	
Twelve Lines Connected & Tensioned	18.0m	
Sixteen Lines Connected & Tensioned	18.0m	
Ballast Down to Operating Draft	22.0m	

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## 7.5 BALLASTING FOR RISER INSTALLATION CONDITIONS

*Subject to Riser Installation Procedures and Riser Pull-in Sequence*

Loading Conditions attached:

Description	Draft	Comments
2 SCR & all Port Risers Attached	22.00m	These Conditions are worst cases - all individual conditions should be assessed by the Stability Officer
2 SCR & all Port & Aft Risers Attached	22.00m	
2 SCR & all Port, Aft & Stbd Risers Attached	22.00m	
2 SCR & all Risers Attached	22.00m	

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**7.6 BALLASTING FROM DRAFT = 22.0M “OPERATING CONDITION” TO DRAFT = 18.0M “INSPECTION CONDITION”**

Loading Conditions attached:

Description	Draft	Comments
Stage 1	22.00m	
Stage 2	21.00m	
Stage 3	20.00m	
Stage 4	19.00m	
Stage 5	18.00m	

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## 7.7 MAXIMUM ALLOWABLE V.C.G.

Attached:

Allowable VCG Curve for the Petrobras 36.

Notes:

1. Operation outside the range 11.0m to 22.0m has not been approved by the Classification Society.
2. The Unit may remain at one of three drafts, 22.0m, 18.0m & 11.0m. All other drafts have been considered as temporary transition drafts only. The unit must not remain at temporary drafts without a Stability Analysis Approved by the Classification Society.
3. Allowable VCG at transition drafts is based upon the IMO criteria of  $GM > 0.3m$ .

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## 7.8 CAPACITY PLANS

The following drawings are included:

GA of Pontoon Tanks & Spaces	DE-3010.38-1320-962-NBD-367-01
GA of Pontoon Tanks & Spaces elevation	DE-3010.38-1320-962-NBD-367-02
GA of Pontoon Tanks & Spaces elevation	DE-3010.38-1320-962-NBD-367-03
GA of Pontoon Tanks & Spaces Columns	DE-3010.38-1320-962-NBD-367-04
Central Caisson Tank Layout	DE-3010.38-1320-962-NBD-367-05
Tank Capacity Tables	DE-3010.38-1320-962-NBD-367-06
Tank Capacity Tables	DE-3010.38-1320-962-NBD-367-07
GA of Double Bottom	DE-3010.38-1320-962-NBD-367-08
GA Tank Top to U/S Main Deck	DE-3010.38-1320-962-NBD-367-09
GA Main Deck & Above	DE-3010.38-1320-962-NBD-367-10
Storage & Laydown Main Deck	DE-3010.38-1320-962-NBD-367-11
Storage & Laydown Tank Top	DE-3010.38-1320-962-NBD-367-12
Storage & Laydown Second Deck	DE-3010.38-1320-962-NBD-367-13

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## 7.9 HYDROSTATIC DATA

Hydrostatic Data is attached for the range 10.0m to 25.0m along with the Hydrostatic Curves Plan

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**7.10 CAPACITIES AND CENTRES OF GRAVITY**

Tables for the following tanks are included:

LCG is from FP, TCG +ve to Stbd, VCG is from USK

Seawater Ballast Tanks	1 PORT	1 STBD
Seawater Ballast Tanks	2 PORT	2 STBD
Seawater Ballast Tanks	3 PORT	3 STBD
Seawater Ballast Tanks	4 PORT	4 STBD
Seawater Ballast Tanks	5 PORT	5 STBD
Seawater Ballast Tanks	6 PORT	6 STBD
Seawater Ballast Tanks	7 PORT	7 STBD
Seawater Ballast Tanks	11 PORT	11 STBD
Seawater Ballast Tanks	13 PORT	13 STBD
Seawater Ballast Tanks	16 PORT	16 STBD
Seawater Ballast Tanks	17 PORT	17 STBD
Seawater Ballast Tanks	18 PORT	18 STBD
Seawater Ballast Tanks	19 PORT	19 STBD
Seawater Ballast Tanks	20 PORT	20 STBD
Seawater Ballast Tanks	21 PORT	21 STBD
Seawater Ballast Tanks	22 PORT	22 STBD
Seawater Ballast Tanks	23 PORT	23 STBD
Seawater Ballast Tanks	24 PORT	24 STBD
Seawater Ballast Tanks	25 PORT	25 STBD
Seawater Ballast Tanks	26 PORT	26 STBD
Chain Locker Ballast Tanks	1 PORT	2 PORT
Chain Locker Ballast Tanks	3 STBD	4 STBD
Chain Locker Ballast Tanks	5 PORT	6 PORT
Chain Locker Ballast Tanks	7 STBD	8 STBD
Drill Water Tanks	8 PORT	8 STBD
Drill Water Tanks	9 PORT	9 STBD
Drill Water Tanks	14 PORT	14 STBD
Drill Water Tanks	15 PORT	15 STBD
Potable Water Tanks	1 PORT	1 STBD
Potable Water Day Tank		
Fuel Oil Tank	10 PORT	10 STBD
Fuel Oil Tank	12 PORT	12 STBD
Fuel Oil Overflow Tank	PORT	STBD
Diesel Oil Sludge Tank	N1 PORT	N1 STBD
Diesel Oil Settling Tank	N1 PORT	N4 STBD
Diesel Oil Day Tank	N2 PORT	N3 STBD
Diesel Oil Service Tank		
Drains Storage Tanks	N1 PORT	N1 STBD
Waste Oil Tanks	N1 PORT	N1 STBD
Bilge Holding Tanks	PORT	STBD

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### 7.11 LOADING CASES FOR SEA CHEST MAINTENANCE

Loading Conditions attached:

Description	Draft	Comments
Maintenance of four Seachests on Port side	21.99m	No change to Ballast Arrangement required

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## 7.12 STABILITY ANALYSIS - RINA (1999)

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7.13 MANUAL CALCULATION OF DISPLACEMENT, TRIM AND STABILITY



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### 7.14 OPERATIONS FOR DAMAGE CONTROL

Loading Conditions attached:

Description	Draft	Comments
Emergency Dump of Separator A into Port Drains Storage Tank	22.00m	Assume stbd drains tank is closed
Emergency Dump of Separator A into Port Drains Storage Tank - <b>Correction</b>	22.00m	
Emergency Dump of Separator A free flood port & stbd Drains Storage Tank	22.00m	
Emergency Dump of Separator A free flood port & stbd Drains Storage Tank - <b>Correction</b>	22.00m	
Emergency Dump of Separator A into Stbd Drains Storage Tank	22.00m	Assume port drains tank is closed
Emergency Dump of Separator A into Stbd Drains Storage Tank - <b>Correction</b>	22.00m	
Flooding of Column Tank VS 32 Stbd 3	22.16m	
Flooding of Column Tank VS 32 Stbd 3 - <b>Correction</b>	22.00m	
Flooding of SW Ballast Tank 21S	22.49m	
Flooding of SW Ballast Tank 21S - <b>Correction</b>	22.00m	
Flooding of SW Ballast Tank 22S	22.61m	
Flooding of SW Ballast Tank 22S - <b>Correction</b>	22.00m	
One Mooring Line Failure	22.63m	
One Mooring Line Failure - <b>Correction</b>	22.00m	

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### 7.15 INCLINING TEST REPORT AND LIGHTSHIP DETERMINATION



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## 7.16 CROSS CURVES OF STABILITY

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## 7.16 CROSS CURVES OF STABILITY

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### REVISION CHANGE NOTICES

Rev.	Location Changes	Brief Description of Change

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**1. SUMMARY**

This document reports the results of the Inclining Test performed for the Petrobras-36 FPU. The Inclining Test was carried out in accordance with the Inclining Test Procedure (ref. 4) in the Baie Des Sept Îles, Canada on the 17<sup>th</sup> October 1999. The unit was moored in a sheltered location and ballasted down to a draft of 18.94m where the displacement of the rig was calculated at 51820.4 metric tonnes. The deadweight survey was completed and the inclining test was then performed with environmental forces almost negligible.

The Inclination Test was performed using concrete weights moved longitudinally over the deck of the Unit. A total of eight shifts were made and the moment-tangent plots (appendix C) clearly showed that accurate results had been obtained.

The results were analysed both without and with a correction for the wind conditions recorded at the time. Statistical analysis indicates that when the inclining moments are corrected for wind effects a slightly better trend line is obtained. The  $GM_{fluid}$ , calculated from the gradient of the moment-tangent plot, is 6.87m. The resulting lightship weight and centre of gravity have been calculated as:

<b>Lightship</b>	<b>31164.5 Tonnes</b>
<b>LCG (Fr. Fpp)</b>	<b>60.62 Metres</b>
<b>TCG (+ve stbd)</b>	<b>-0.30 Metres</b>
<b>VCG (Fr. USK)</b>	<b>29.67 Metres</b>

A review of the operational stability of the Unit indicates all stability margins have increased to the following values:

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<b>Condition</b>	<b>Draft (m)</b>	<b>Δ (tonnes)</b>	<b>VCG (m)</b>	<b>Allow VCG (m)</b>	<b>Margin (m)</b>
Operating	22.0	56503	22.18	23.04	0.86
Fairlead Inspection	18.0	50389	24.18	25.23	1.05
Transit	11.0	37083	27.06	44.90	17.84

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## 2. INTRODUCTION

The semi-submersible FPU P36 (hereinafter referred to as the Unit) is being upgraded for production duties offshore Brazil in the Roncador Field.

Modifications to the platform are in excess of 8000 tonnes; therefore an inclining test has been performed in order to calculate the new lightship weight and centre of gravity of the unit.

## 3. REFERENCES

No	Title	Rev	Document No.
1	RINa – Rules for the construction and classification of MODU's		Effective from January 1997
2	Fincantieri – Inclining Test Report & Lightship Determination		BKLT.MC/CAL N.201
3	Principles of Naval Architecture		SNAME
4	Inclining Test Procedure	A	ET-3010.38-1320-974-NBD-943
5	Sounding Tables	O	RL-3010.38-1320-941-NBD-658-01
6	Stability Analysis	B	RL-3010.38-1320-960-NBD-908
7	Force and Motion Analysis	D	RL-3010.38-1320-960-NBD-906
8	Weight Control Report	V	RL-3010.38-1320-915-NBD-903

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#### 4. PREPARATIONS FOR THE INCLINING TEST

##### *Deadweight Survey*

A deadweight survey was carried out by Davie Industries (Appendix A) to determine all items not part of the Unit lightship and all items of the lightship not yet installed.

The survey was carried out and summarised in four parts:

1. **Solid Deductions**

Items which are not part of the lightship or which are not yet installed in their correct position, in particular stores and spares being shipped to Brazil, pipe spools not yet installed etc.

2. **Solid additions**

Items which are not on board but will be installed prior to the unit commencing operations and items which need to be relocated to their final location, in particular electric cable, pipe spools, etc.

3. **Liquid deductions**

Variable liquid weights including seawater ballast, fuel oil, potable water, etc.

4. **Liquid additions**

Liquids in equipment or pipework that are part of the lightship but were not present at the time of the survey.

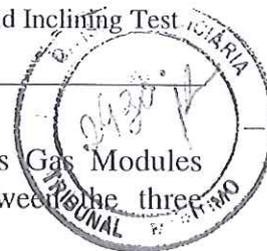
Particular attention was paid to the following areas:

- a. Pipe spools that were fabricated but not installed were stored close to their final location, thereby requiring only a modification to the pipe spool's centre of gravity.
- b. For electrical cables not installed, their weight and centre of gravity were calculated from the relevant work packs. All electrical cable drums stored onboard were treated as deadweight items.
- c. For work packs identified up to the 8<sup>th</sup> October 1999, which contained material not installed by Davie Industries, material takeoffs were carried out, and additions made to the deadweight survey.
- d. All inclining weights and supporting timbers were weighed with a calibrated scale and witnessed. Report sheet in Appendix A.
- e. A detailed inventory of all stores and spares onboard was made, all items were considered as deadweight since no permanent spares list existed at the time of the survey.
- f. All Ansell Jones marine equipment, sea chest covers and other permanent marine items were considered as part of the lightship with their permanent stowage location as the Marine Store (situated on the main deck).

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- g. A detailed inventory of fittings and pipe insulation for the Process Gas Modules (PGM's) was made, and the final weight distributed evenly between the three packages.
- h. All tanks containing liquid were sounded prior to the inclining test taking place. After completion of the inclining test the seawater ballast tanks, fuel oil tanks and potable water tanks were re-sounded in order to ensure no significant changes had occurred.

#### *Inclining Equipment and Data Recording*

The inclination of the Unit was carried out using 22 prefabricated concrete weights of approximately 8 tonnes each. Prior to being placed onboard each weight was repaired, reinforced with a steel jacket, painted and then weighed with a calibrated scale. The weighing certificates are attached in Appendix A.

Six draft reading devices were positioned around the rig, four on the forward/aft ends of the fairlead boxes and two (one port & one starboard) on the central caisson. The scales were permanently attached, requiring only that a damping tube be positioned alongside in order to read the draft.

The Unit had four anemometers to record wind speeds; two were located on the forward end of the platform above the main deck and one located on each of the cranes. Each recorded the wind speed in metres per second and the two above the main deck also recorded the direction.

Prior to commencing the inclining test the mooring lines were slackened so that they hung vertically down, therefore only the weight of the chain needed to be considered in the deadweight survey. During the inclining test the mooring tensions were recorded in order to ensure that there was no change in the external load the lines were applying to the Unit.

The inclinations were recorded at three stations using pendulums, damped in an oil bath. A backup inclinometer was prepared in case of emergency. An additional pendulum and an inclinometer were available to check for any changes to the heel. Pendulum motions were recorded approximately 10 minutes after the weight shift was finished, ten oscillations were recorded and the mean taken.

#### *Inclining Test*

Personnel from Davie Industries (Davie) carried out the inclining test. All readings were reported to Noble Denton Europe Limited (NDE) for analysis and checking. Representatives of Petromec, Brasoil and RINa witnessed and accepted the results of the Inclining Test.

A set of preliminary calculations and results were prepared and signed by all parties onboard at the completion of the inclining test (see appendix F). Minor corrections have been made in this report following a review of the site calculations.

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**5. RESULTS**

*Draft Mark Readings and Unit Displacement*

Upon completion of the ballasting operations, the draft readings were taken and used to compute the displacement of the Unit. One set of draft readings was taken before the inclining test commenced and another after the fourth shift had been completed. Due to small wavelets during the first set of readings they have been discarded in favour of using the draft readings made during after the fourth weight shift when near flat water conditions were observed.

The calculation to determine the Unit displacement is contained in Appendix C (pages 2 & 3). The displacement as calculated using the second set of data and the associated hydrostatic properties for this displacement are shown in the table 5-1 below.

DRAFT	DISPL.	LCB	TCB	VCB	WPA	LCF	TCF	KM <sub>T</sub>	KM <sub>L</sub>
(m)	(tonnes)	(m)	(m)	(m)	(m <sup>2</sup> )	(m)	(m)	(m)	(m)
18.94	51820.4	-0.72	-0.02	7.92	1485.1	-0.04	-0.04	27.30	27.80

**Table 5-1 Petrobras 36 Draft and Hydrostatic Properties during the Inclining Test**

*Deadweight Survey*

The deadweight survey was carried out as described in section 4. The following results were obtained, note – negative values are deductions, positive values are additions

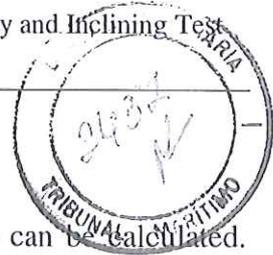
Description	Weight (Tonnes)	LCG (m)	TCG (m)	VCG (m)	I <sub>trans</sub> (m <sup>4</sup> )	I <sub>long</sub> (m <sup>4</sup> )
SW Ballast	-19269.20	51.15	0.71	5.74	3444.6	10976.1
Oils	-261.20	75.91	-4.67	38.11	525.4	227.2
PW, Misc. Liquids	-311.20	84.31	0.67	25.74	127.8	575.3
Packages	-16.20	89.71	-5.45	49.25	0.0	0.0
Liquid Additions	50.53	72.67	9.06	42.38	0.0	0.0
Solid Deductions	-941.83	49.98	-4.18	27.45	0.0	0.0
Solid Additions	93.23	71.32	2.54	52.32	0.0	0.0

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**Table 5-2 Results of Deadweight Survey of Petrobras 36**

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### Determination of $GM_{fluid}$

From the pendulum readings for each shift the heel angle (as a tangent) can be calculated. This value can then be used with the known moment causing the angle to calculate the  $GM_{fluid}$  value as shown in the formula below.

$$GM_{Fluid} = \frac{w.d}{\Delta \tan \phi}$$

where:

$w$  = weight moved across deck

$d$  = distance of weight shift

$\Delta$  = Unit displacement

$\phi$  = angle of heel

It is however more accurate to plot the moments ( $w.d$ ) against the tangents ( $\tan \phi$ ) and compute the GM from the best-fit trend line.

Equation 5-1 is however only true if there are no other external forces causing a change in the heel angle, for instance the effects of wind and current or a change in mooring line tensions might need to be considered.

Wind speeds and mooring line tensions during the inclining test were monitored and recorded during the actual pendulum reading stage. The readings are contained in Appendix B. No significant change was recorded in the mooring tensions, however the wind speed and direction varied during the inclining test.

To account for the wind effect of the inclining test, the longitudinal wind force coefficients were extracted from the Force and Motion Analysis (ref. 7). Since the transverse coefficients do not effect the trim angle during the inclining test they can be ignored. A mean wind speed and direction was computed for each weight shift and the longitudinal wind overturning moment computed. This value can then be used to correct the weight shift moment. For a more detailed explanation of this calculation see Appendix E.

Once a corrected moment has been calculated the moment-tangent plot can be created and the resultant trend line applied. Using Excel 97 a plot is created and the trend line fitted. Excel also records the  $R^2$  correlation value giving an indication of the consistency of the results. The moment tangent plot with a correction for wind is shown overleaf.

From the moment tangent plot trend line the  $GM_{fluid}$  is calculated as:

$$GM_{fluid} = \frac{12000}{0.03372 \times 51820.4} = 6.87 \text{ metres}$$

$$\text{Correlation value } R^2 = 0.99988$$

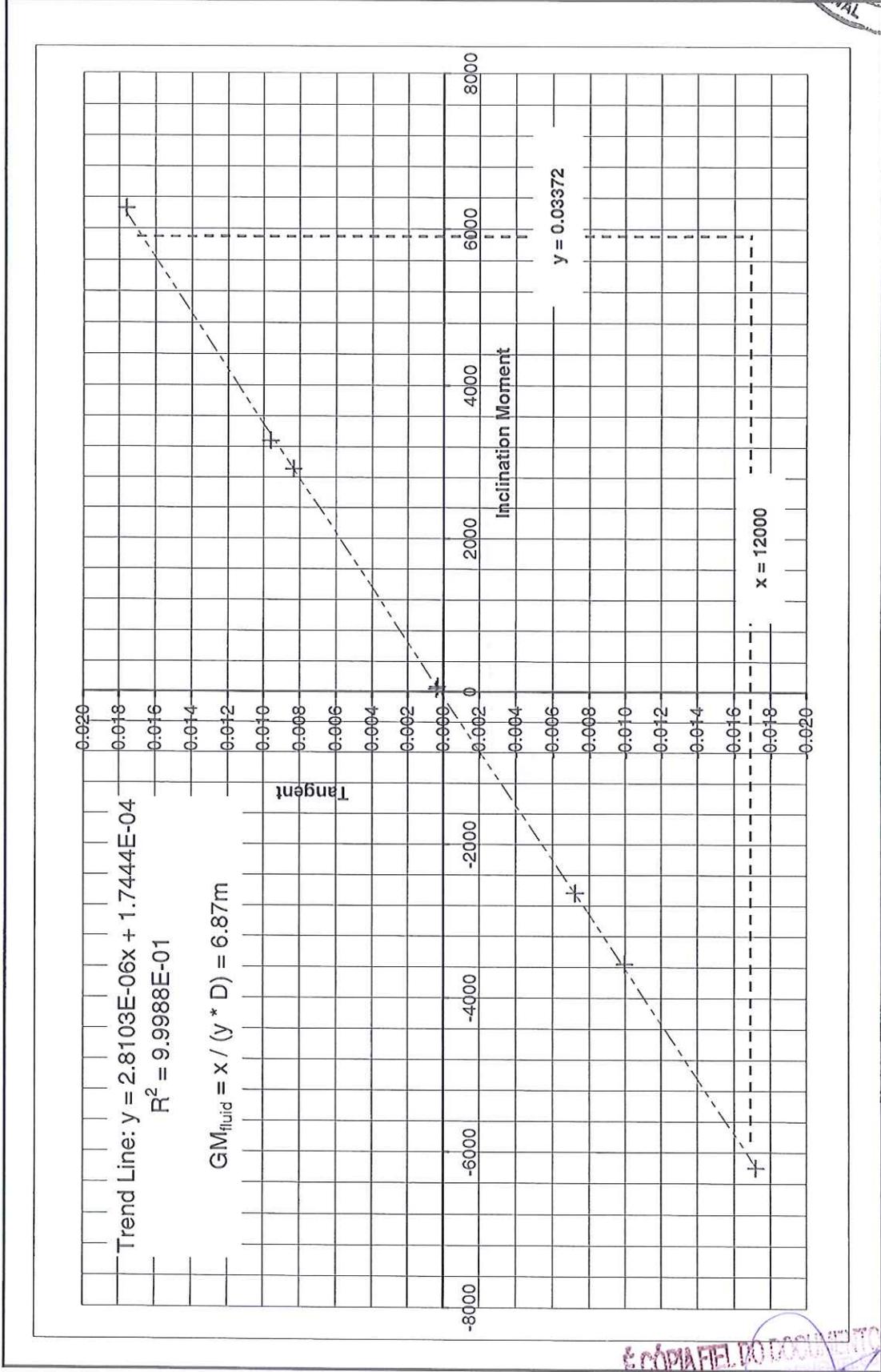
Note that a correlation value this close to 1.00 indicates that very good consistency has been achieved during the test, however, good correlation may only show that the errors have been consistent.

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Moment - Tangent Plot for Inclining Test of Petrobras 36 (with Wind Corrections)



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*Determination of Lightship Weight and Centre of Gravity*

With the completion of the deadweight survey and inclining test the lightship Weight and centre of gravity can be accurately calculated. Appendix C contains the details of the calculations. The weight and centre of gravity of the unit is calculated as follows:

The vertical centre of gravity is calculated by correcting the  $GM_{fluid}$  for free surface and then subtracting this value from the metacentre height i.e.

$$KG = KM_L - (GM_{fluid} + fsc)$$

The longitudinal and transverse centres of gravity are calculated from the trim and heel of the Unit from which the centre of gravity relative to the centre of buoyancy can be computed.

$$LCG = LCB + [(KM_L - BG) \times t] \text{ where } t = \text{layer correction}$$

$$TCG = TCB + \tan \theta_{heel} \times \left[ \left( BM_T - \frac{FS}{\Delta} \right) - BG \right]$$

The lightship weight is calculated by summing the calculated displacement and the deadweight deductions and additions.

Based on the above results the calculated displacement and centre of gravity of the rig during the inclining test is shown in the table below along with the computed lightship weight of the Petrobras 36.

Description	Weight (Tonnes)	LCG (m)	TCG (m)	VCG (m)	I <sub>trans</sub> (m <sup>4</sup> )	I <sub>long</sub> (m <sup>4</sup> )
Displacement During Inclining Test	51820.40	57.10	-0.02	20.70	4097.8	11778.6
Calculated Lightship	<b>31164.53</b>	<b>60.621</b>	<b>-0.296</b>	<b>29.669</b>	0.0	0.0

**Table 5-3 Displacement during Inclining Test and Calculated Lightship of Petrobras 36**

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## 6. CONCLUSIONS AND QUALIFICATIONS

The lightship weight calculated falls within the net weight and factored weight reported in the final Weight Control Report (Ref. 8). From table 6-1 below it can be seen that the inclined weight was 345 tonnes less than WCR rev. V, and 560 tonnes less than the original predicted lightship (it should be noted that the original weight report had no weight values for the riser decks or any SCR equipment – significant weights).

Report No.	Dry Weight* (tonnes)	LCG (m)	TCG (m)	VCG (m)
Report O (Original)	31725.3	61.51	0.43	30.19
Report V (Current)	31421.4	60.83	0.20	30.07
Inclined Lightship	31164.5	60.62	-0.30	29.67

Table 6-1 Predicted Lightship and Inclined Lightship

The longitudinal centre of gravity has moved forward from the last WCR, and the vertical centre of gravity has decreased. Both the inclined values improve the stability margins calculated in Appendix D. The transverse centre of gravity was considerably adrift from its WCR predicted position. It was known throughout the construction phase that the TCG was always located on the portside of the Unit not the starboard as predicted by the WCR. It is assumed that the error occurs in the reporting of the removed items where it was known that COG values were not accurately recorded.

The Inclining Test was performed systematically and accurately by all parties involved. The deadweight survey and the inclining test can be considered to give an accurate lightship weight when the Unit completes construction.

However in order to ensure that another deadweight survey and/or an inclining test is not required prior to final classification the following should be noted:

1. As each work pack is completed the final weight should be noted and marked against the calculated value. If there is a significant difference, this should be noted in a lightship modification form.
2. An unknown number of workpacks were to be issued by Davie Industries after the 8<sup>th</sup> October 1999, no estimate was included in the deadweight survey for these and they should be monitored during the final construction stage in Brazil and a lightship modification made as necessary.
3. Any other changes made to the Unit not recorded in this report will require a lightship modification to be made.

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MEMORANDUM

Appendix A

Deadweight Survey



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Appendix B



Inclining Test Readings – Drafts, Pendulums, Wind & Mooring Tensions

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## Appendix C



### Determination of Metacentric Height and Lightship Characteristics

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## Appendix D

### Stability Loading Conditions for the Petrobras 36

*E cópia para o arquivo de referência*

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## Appendix E

### Explanation of Wind Correction Calculations

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Appendix F

Site Calculations



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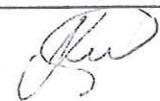
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**CERTIDÃO**

CERTIFICO que, nesta data 10 encerrado o 60 volume  
do processo E - Ref ao processo 39.489/01  
P - 36

O referido é verdade e dou fé.

Ans 10 de abril de 2007.



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SECRETARIA DE CIVILIS E FIMES DE CISMÃO  
DIRETOR  
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