

| | | |
|---|---------------------------|-----------------------------------|
|  | TECHNICAL SPECIFICATION | No. I-ET-3010.00-5400-947-P4X-010 |
| | CLIENT: | SHEET: 1 of 11 |
| | JOB: | - |
| | AREA: | |
| SRGE | TITLE: FIRE EXTINGUISHERS | INTERNAL |
| | | ESUP |

MICROSOFT WORD / V.2013 / I-ET-3010.00-5400-947-P4X-010_B.DOC

INDEX OF REVISIONS

| REV. | DESCRIPTION AND/OR REVISED SHEET |
|------|---|
| 0 | ORIGINAL ISSUE |
| A | REVISED WHERE INDICATED DUE TO CONSISTENCY ANALYSIS |
| B | UPDATED BY TECHNICAL GROUP OF FIRE EXTINGUISHERS |

| | REV. 0 | REV. A | REV. B | REV. C | REV. D | REV. E | REV. F | REV. G | REV. H |
|-----------|-------------|-----------|-------------|--------|--------|--------|--------|--------|--------|
| DATE | SEP/19/2018 | JUL/21/20 | DEC/05/2022 | | | | | | |
| DESIGN | ESUP | EPS | EPS | | | | | | |
| EXECUTION | ADINAN | YMYC | EH7T | | | | | | |
| CHECK | DANIELA | B79G | B79G | | | | | | |
| APPROVAL | B.FERREIRA | UP6E | EK9U | | | | | | |

INFORMATION IN THIS DOCUMENT IS PROPERTY OF PETROBRAS, BEING PROHIBITED OUTSIDE OF THEIR PURPOSE.
FORM OWNED TO PETROBRAS N-381 REV. L



TECHNICAL SPECIFICATION

No. I-ET-3010.00-5400-947-P4X-010

REV. B

SHEET: 2 of 11

TITLE:

FIRE EXTINGUISHERS

INTERNAL

ESUP

SUMMARY

| | | |
|----------|---|----------|
| 1 | SCOPE | 3 |
| 2 | ABBREVIATIONS | 3 |
| 3 | APPLICABLE REGULATIONS, CODES AND STANDARDS | 3 |
| 4 | TECHNICAL REQUIREMENTS | 4 |
| 4.1 | GENERAL REQUIREMENTS..... | 4 |
| 4.2 | SPECIFIC REQUIRIMENTS ACCORDING TO THE TYPE OF FIRE EXTINGUISHER..... | 5 |
| 4.3 | PROTECTING LOCKERS..... | 11 |
| 4.4 | MINIMUM DOCUMENTS REQUIRED | 11 |

| | | | |
|---|-------------------------|-----------------------------------|----------------|
|  | TECHNICAL SPECIFICATION | No. I-ET-3010.00-5400-947-P4X-010 | REV. B |
| | TITLE: | | SHEET: 3 of 11 |
| | FIRE EXTINGUISHERS | | INTERNAL |
| | | | ESUP |

1 SCOPE

This specification defines guidelines and minimum requirements for supplying of Fire Extinguishers to be installed in an offshore unit.

2 ABBREVIATIONS

The following abbreviations are applicable:

- DPC: *Diretoria de Portos e Costas*.
- FPSO: *floating, production, storage and offloading*
- INMETRO: Instituto Nacional de Metrologia, Qualidade e Tecnologia

3 APPLICABLE REGULATIONS, CODES AND STANDARDS

Regulations to be followed in the design, installation and testing of the fire extinguishers are stated below. SUPPLIER shall produce evidence of having complied with all regulations, always in their latest editions, as well as with the requirements defined in this specification. In case of items in conflict with this document, PETROBRAS shall be consulted and the item shall be submitted to Petrobras' approval.

- 3.1 IMO - SOLAS: Convention for the Safety of Life at Sea – 1974 and Amendments in Force.
- 3.2 Requirements of the Classification Society of the Unit.
- 3.3 Brazilian Maritime Regulations - *Regulamentos Aplicáveis da Autoridade Marítima Brasileira (DPC)* – NORMAM.
- 3.4 Brazilian Ministry of Labor and Social Security – Brazilian Regulatory Standards - NR37 – Health and Safety on Oil Platforms.
- 3.5 ABNT-NBR 15808: *Extintores de Incêndio Portáteis* (meaning: Portable Fire Extinguishers – Brazilian Technical Standards Association).
- 3.6 ABNT-NBR 15809: *Extintores de Incêndio Portáteis sobre Rodas* (meaning: Wheeled Fire Extinguishers - Brazilian Technical Standards Association).
- 3.7 ABNT-NBR 9695: *Pó para Extinção de Incêndio* (meaning: Chemical Powder for Fire Extinguishing – Brazilian Technical Standards Association).
- 3.8 ABNT-NBR 12693: *Sistemas de Proteção por Extintor de Incêndio* (meaning: Fire Extinguishing Systems – Brazilian Technical Standards Association).

| | | | |
|---|-------------------------|-----------------------------------|----------------|
|  | TECHNICAL SPECIFICATION | No. I-ET-3010.00-5400-947-P4X-010 | REV. B |
| | TITLE: | | SHEET: 4 of 11 |
| | FIRE EXTINGUISHERS | | INTERNAL |
| | | | ESUP |

- 3.9** ABNT-NBR 12962: *Extintores de Incêndio – Inspeção e Manutenção* (meaning: Fire Extinguisher – Inspection and Maintenance - Brazilian Technical Standards Association).
- 3.10** ABNT NBR ISO 9809-1: *Cilindros para gases – Cilindros de aço sem costura, recarregáveis para gases – Projeto, construção e ensaios – Parte 1, 2 e 3* (meaning: seamless gas cylinders – Design, building and testings – Parts 1, 2 and 3 - Brazilian Technical Standards Association).
- 3.11** ABNT-NBR 16357: *Cilindro de aço, sem costura, para fabricação de extintores de incêndio portáteis e sobre rodas com carga de até 10 kg de CO₂ — Requisitos e métodos de ensaio* (Seamless Steel cylinder for Manufacturing of Up-To-Ten-kilogram Wheeled CO₂ Fire Extinguishers – Requirements and Methods for Testing - Brazilian Technical Standards Association).
- 3.12** ISO 12944-2: *Paints and varnishes - Corrosion protection of steel structures by protective paint systems - Part 2: Classification of environments.*
- 3.13** ABNT NBR-5601: *Aços inoxidáveis – Classificação por composição química* (meaning: Stainless steel – Chemical Composition type - Brazilian Technical Standards Association).
- 3.14** ABNT NBR-7195: *Cores para segurança* (meaning: Safety colors - Brazilian Technical Standards Association).
- 3.15** NFPA 10: Standard for Portable Fire Extinguishers.

4 TECHNICAL REQUIREMENTS

4.1 GENERAL REQUIREMENTS

- 4.1.1** The class of extinguishers, their charge (amount of agent), extinguishing capacity, quantity and location shall be defined in the project approved by the Maritime Authority, by the Class and Flag of the Unit and shall follow item 3 (Applicable regulations, codes and standards).
- 4.1.2** It is mandatory the specification, selection and use of fire extinguishers with higher rated extinguishing capacity, lower weight and longer time between maintenance.
- 4.1.3** Protecting lockers shall be provided for portable fire extinguishers located in external areas in order to protect them against saline atmosphere and interperateness [CX environment (offshore areas with high salinity) according to ISO 12944-2 standard]. The wheeled extinguishers shall be provided with waterproof covers in red or transparent canvas, waxed and with anti-UV

| | | | |
|---|-------------------------|-----------------------------------|----------------|
|  | TECHNICAL SPECIFICATION | No. I-ET-3010.00-5400-947-P4X-010 | REV. B |
| | TITLE: | | SHEET: 5 of 11 |
| | FIRE EXTINGUISHERS | | INTERNAL |
| ESUP | | | |

treatment, such that they are completely wrapped in order to protect them from the sea air and interperateness.

4.1.4 Fire extinguishers shall have INMETRO seal certification, be on validity period and be ready for swift use in designated local. When leaving for definitive location, the remaining warranty period of the fire extinguishers cannot be less than 90% of the manufacturer's warranty period.

4.1.5 The extinguisher instruction label, INMETRO seal and others affixed on the extinguisher shall be in Brazilian Portuguese, be water resistant, not fade and remain legible throughout the warranty period.

4.1.6 All fire extinguishers, their parts and pieces shall be supplied new, without defects and undamaged. Fire extinguishers that have been reconditioned and/or have been recharged and/or repainted are not accepted.

4.1.7 All protecting lockers and protective covers shall be supplied new, without defects and undamaged.

4.2 SPECIFIC REQUIRMENTS ACCORDING TO THE TYPE OF FIRE EXTINGUISHER

Technical requirements established in this specification apply to equipment, accessories and materials listed below:

4.2.1 Portable fire extinguishers – Stored Pressure Dry Chemical Powder Fire Extinguishers (ABC):

4.2.1.1 Technical characteristics and construction details shall be as required in ABNT-NBR 15808 and technical requirements listed below:

- Extinguishing agent: monoamonium phosphate (at 90% concentration). Suitable for beginning of firefighting class A, B and C.
- Extinguishing Capacity (minimum degree): according to Table 1.
- Nominal Load Capacity: according to Table 1.
- Maximum time for complete discharge (effective discharge time): according to Table 1.
- The load shall be kept under constant pressure (direct pressurization). The normal charging pressure shall remain stable until the end of the warranty period.
- The cylinder shall contain dry chemical powder and propellant pressurization gas (expeller gas) inert, non-corrosive, non-toxic, non-flammable and with a dew point below -20°C. Note: If the expelling gas represents more than 3% in the mixture, it shall be declared by the manufacturer.

- The discharge valve shall be of the intermittent type, in forged brass, with a steel handle and trigger, and have a carrying handle and a locking device to prevent accidental activation.
- The extinguisher shall be equipped with a control device to interrupt and restart the discharge, as many times as there is a charge. Trigger-type device.
- The extinguisher shall have a pressure indicator (manometer) with a relief device to allow pressure to be released in the event of a leak in the Bourdon tube. This shall permanently indicate its internal pressure, with the pointer and dial protected by a transparent and watertight cover/casing. Pointer shall be in yellow color.
- The discharge hose shall be provided in non-collapsible and non-slip rubber, with a brass connector.
- The extinguisher shall be painted with anti-corrosion paint in color safety red [DIN 6164 RAL 3001 (7.5: 8.5: 3) / Munsell 5R 4/14 - according to ABNT NBR 7195], and shall withstand the marine / saline atmosphere, environment type CX according to ISO 12944-2;
- The extinguisher shall be provided with a suitable means, attached to the body of the bottle, to hang it on a hook on the wall, allowing its quick use.
- Manufacturer Warranty: 5 (five) years.
- Weight of extinguisher when fully loaded: do not exceed 20 kg.
- Approximate dimensions - According to Table 1.

Table 1: Extinguisher characteristics.

| Extinguishing Capacity (minimum degree) | Nominal Load Capacity [kg] | Effective Discharge Time [s] | Approximate Dimensions | |
|---|----------------------------|------------------------------|------------------------|-------------|
| | | | Height [mm] | Weight [mm] |
| 2A: 40B: C | 2,3 | 15 | 400 | 100 |
| 4A: 80B: C | 4,5 | 25 | 500 | 125 |
| 6A: 120B: C | 9 | 30 | 600 | 150 |

4.2.2 Wheeled fire extinguishers – Stored Pressure Dry Chemical Powder Fire Extinguishers (ABC):

4.2.2.1 Technical characteristics and construction details shall be as required in ABNT-NBR 15809 and technical requirements listed below:

- Extinguishing agent: monoammonium phosphate (at 90% concentration). Suitable for beginning of firefighting class A, B and C.
- Extinguishing Capacity (minimum degree): 20-A:120-B:C.

- Nominal Load Capacity: 25 Kg.
- Maximum time for complete discharge (effective discharge time): 35 seconds.
- The load shall be kept under constant pressure (direct pressurization). The normal charging pressure shall remain stable until the end of the warranty period.
- The cylinder shall contain dry chemical powder and propellant pressurization gas (expeller gas) inert, non-corrosive, non-toxic, non-flammable and with a dew point below -20°C. Note: If the expelling gas represents more than 3% in the mixture, it shall be declared by the manufacturer.
- The discharge valve shall be of the intermittent type, in forged brass, with a steel handle and trigger, and have a carrying handle and a locking device to prevent accidental activation.
- The extinguisher shall be equipped with a control device to interrupt and restart the discharge, as many times as there is a charge. Trigger-type device.
- The extinguisher shall have a pressure indicator (manometer) with a relief device to allow pressure to be released - in the event of a leak in the Bourdon tube. This shall permanently indicate its internal pressure, with the pointer and dial protected by a transparent and watertight cover/casing. Pointer shall be in yellow color.
- The extinguisher shall have a relief valve in chromed brass and regulated to relieve excess pressure.
- Cylinder made of steel plate, welded longitudinally, with closure by cap (top and bottom).
- The discharge hose shall be provided in non-collapsible and non-slip rubber, with a brass connector. With at least 8,0 m length and endowed with diffuser, squirt or pistol. For the helideck application, rubber hose shall have sufficient length to reach the touchdown circle, starting from extinguisher location.
- The extinguisher shall be painted with anti-corrosion paint in color safety red [DIN 6164 RAL 3001 (7.5: 8.5: 3) / Munsell 5R 4/14 - according to ABNT NBR 7195], and shall withstand the marine / saline atmosphere, environment type CX according to ISO 12944-2;
- Wheels with rubber tires for good grip on the road.
- Approximate dimensions: 1200mm x 260mm (height x diameter).
- Manufacturer Warranty: 5 (five) years.

4.2.3 Portable fire extinguishers – Stored Pressure HFC Fire Extinguishers – (236fa/Hexafluoropropano (FE-36®))

4.2.3.1 Technical characteristics and construction details shall be as required in ABNT-NBR 15808 and technical requirements listed below:

- Extinguishing agent: FE-36 [1,1,1,3,3,3-Hexafluoropropane (HFC-236fa)]. Suitable for beginning of firefighting class A, B and C.
- Extinguishing Capacity (minimum degree): 1-A:10-B:C.
- Nominal Load Capacity: 4,5Kg.
- Maximum time for complete discharge (effective discharge time): 25 seconds.
- The load shall be kept under constant pressure (direct pressurization). The normal charging pressure shall remain stable until the end of the warranty period.
- The discharge valve shall be of the intermittent type, in forged brass, with a steel handle and trigger, and have a carrying handle and a locking device to prevent accidental activation.
- The extinguisher shall be equipped with a control device to interrupt and restart the discharge, as many times as there is a charge. Trigger-type device.
- The extinguisher shall have a pressure indicator (manometer) with a relief device to allow pressure to be released - in the event of a leak in the Bourdon tube. This shall permanently indicate its internal pressure, with the pointer and dial protected by a transparent and watertight cover/casing. Pointer shall be in yellow color.
- The discharge hose shall be provided in non-collapsible and non-slip rubber, with a brass connector.
- The extinguisher shall be painted with anti-corrosion paint in color safety red [DIN 6164 RAL 3001 (7.5: 8.5: 3) / Munsell 5R 4/14 - according to ABNT NBR 7195], and shall withstand the marine / saline atmosphere, environment type CX according to ISO 12944-2.
- The extinguisher shall be provided with a suitable means, attached to the body of the bottle, to hang it on a hook on the wall, allowing its quick use.
- Manufacturer Warranty: 5 (five) years.
- Weight of extinguisher when fully loaded: do not exceed 20 kg.
- Approximate dimensions: 524mm x 137mm (height x diameter).

4.2.4 Portable fire extinguishers – CO₂ Fire Extinguishers

4.2.4.1 Technical characteristics and construction details shall be as required in ABNT-NBR 15808, ABNT-NBR 16357, ABNT NBR ISO 9809-1/2/3 and technical requirements listed below:

- Extinguishing agent: carbon dioxide.
- Suitable for beginning of firefighting class B and C.
- Extinguishing Capacity (minimum degree): 5-B:C.
- Nominal Load Capacity: 6,0Kg.
- Maximum time for complete discharge (effective discharge time): 25 seconds.
- The discharge valve shall be of the intermittent type, in forged brass, with a steel handle and trigger, and have a carrying handle and a locking device to prevent accidental activation.
- The extinguisher shall be equipped with a control device (Trigger-type) to interrupt and restart the discharge, as many times as there is a charge.
- The diffuser and the handle shall be free of metal parts that could come into contact with the operator's hand. The handle shall be made of material with low thermal and electrical conductivity.
- Discharge valve shall be intermittent type, forged brass, with cable and trigger of steel, equipped with safety valve with rupture disc.
- The discharge hose shall be provided in non-collapsible and non-slip rubber, with a brass connector and having a mesh of metallic material between the rubber layers.
- The extinguisher shall be painted with anti-corrosion paint in color safety red [DIN 6164 RAL 3001 (7.5: 8.5: 3) / Munsell 5R 4/14 - according to ABNT NBR 7195], and shall withstand the marine / saline atmosphere, environment type CX according to ISO 12944-2.
- The extinguisher shall be provided with a suitable means, attached to the body of the bottle, to hang it on a hook on the wall, allowing its quick use.
- The bottle conformation shall allow it to be kept in a vertical position, when freely resting on the floor.
- Manufacturer Warranty: 5 (five) years.
- Weight of extinguisher when fully loaded: do not exceed 20 kg.
- Approximate dimensions: 600mm x 165mm (height x diameter).

4.2.5 Portable fire extinguishers - wet chemical agent Fire Extinguishers

4.2.5.1 Construction details shall be as required in ABNT-NBR 15808 and NFPA-10 Standard and the main technical requirements listed below:

- Extinguishing agent: wet chemical agent (potassium acetate solution or potassium citrate solution).
- Suitable for beginning of firefighting class K (cooking liquids such as cooking oil, and animal or vegetable-based greases).
- Extinguishing Capacity (minimum degree): K.
- Nominal Load Capacity: 6,0L.
- Maximum time for complete discharge (effective discharge time): 55 seconds.
- The load shall be kept under constant pressure (direct pressurization). The normal charging pressure shall remain stable until the end of the warranty period.
- The cylinder shall contain wet chemical agent and propellant pressurization gas (expeller gas) inert, non-corrosive, non-toxic, non-flammable and with a dew point below -20°C . Note: If the expelling gas represents more than 3% in the mixture, it shall be declared by the manufacturer.
- The extinguisher shall be equipped with a control device (Trigger-type) to interrupt and restart the discharge, as many times as there is a charge.
- The extinguisher shall have a pressure indicator (manometer) with a relief device to allow pressure to be released - in the event of a leak in the Bourdon tube. This shall permanently indicate its internal pressure, with the pointer and dial protected by a transparent and watertight cover/casing. Pointer shall be in yellow color.
- The extinguisher shall have safety valve.
- The discharge valve shall be of the intermittent type, in forged brass, with a steel handle and trigger, and have a carrying handle and a locking device to prevent accidental activation.
- The extinguishing agent bottle shall be made of stainless steel AISI-304L (ABNT NBR-5601) or superior, with a polished finish and without painting. Metallurgy selected shall be able to withstand marine/saline atmosphere, type CX environment per ISO 12944-2.
- Manufacturer Warranty: 5 (five) years.
- Weight of extinguisher when fully loaded: do not exceed 20 kg.

| | | | |
|---|---------------------------|-----------------------------------|-----------------|
|  | TECHNICAL SPECIFICATION | No. I-ET-3010.00-5400-947-P4X-010 | REV. B |
| | | | SHEET: 11 of 11 |
| | TITLE: FIRE EXTINGUISHERS | | INTERNAL |

- Approximate dimensions: 495mm x 222mm (height x diameter).

4.3 PROTECTING LOCKERS

- All portable extinguisher installed outdoors (outside of rooms) shall be kept packed in lockers to be protected from marine/salt atmosphere and the weather conditions.
- Lockers shall be made of orthophtalic polyester resin strengthened with fiberglass and U-V protection.
- The outside of lockers shall be painted with safety red color [DIN 6164 RAL 3001 (7,5: 8,5: 3) / Munsell 5R 4/14 – according to ABNT NBR 7195].
- Door of the locker shall be provided with a built-in puller and with latches and hinges made of chrome-plated brass.
- Estimated dimensions: 970mm x 470mm x 346mm (Height x Width x Depth).
- Estimated weight: 10 Kg.
- The supplier shall also provide Extinguishers accessories for attachment thereof included shipyard installations and work sites.

4.4 MINIMUM DOCUMENTS REQUIRED

4.4.1 The SUPPLIER shall provide the technical documents listed below:

- Fire Extinguisher instructions label shall be in Brazilian Portuguese language.
- Invoices and Manufacturer's Warranty Certificate.
- Certificates and stamp certification INMETRO.
- Drawings for each type of extinguisher along with the following information: height, diameter, weight, construction materials, details for attachment, assembly drawings and building details of equipment / accessory, operation and maintenance manual, details of valves and safety devices.
- Operation manual, maintenance manual and data sheet book.
- List containing extinguishers furnished with respective characteristics (extinguish agent, class, load, extinguish capacity, dimensions and weight).