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	JOB: TELECOMMUNICATION POWER		
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TIC	TITLE: TOPSIDES SHUTDOWN TELECOMMUNICATION SYSTEM		INTERNAL
			OI/CS

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1. SUBJECT

1.1 The subject of this document is to establish the criteria and basic characteristics for the detailed design, supply, installation and commissioning of the shutdown telecommunication system that shall be installed in PETROBRAS FPSO Unit.

2. ABBREVIATIONS

ABNT	Associação Brasileira de Normas Técnicas (Brazilian Association of Technical Standards)
AIS	Automatic Identification System
ANATEL	Agencia Nacional de Telecomunicações (Brazilian Telecommunication Authority)
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials,
AWG	American Wire Gauge
CCR-OA	Central Control Room Operation Ambiance
CENELEC	Comité Européen de Normalisation Électrotechnique (European Committee for Electrotechnical Standardization)
CISPR	Comité International Spécial des Perturbations Radioélectriques (International Special Committee on Radio Interference)
CREA	Conselho Regional de Arquitetura e Urbanismo (Brazilian Engineering Counsel)
DC	Direct Current
EIA	Electronic Industries Alliance
EN	Européen Normes (European Standard)
FPSO	Floating, production, storage and offloading
GMDSS	Global Miritime Distress Safety System
GPS	Global Positioning System
IDU	Indoor Data Unit
IEC	International Electrotechnical Commission
IEEE	Institute of Electric and Electronic Engineers
INMETRO	Instituto Nacional de Metrologia (National Institute of Metrology)
IMO	International Maritime Organization
IP	Internet Protocol
IS	Intrinsic Safe
ITU	International Telecommunication Union
LAN	Local Area Network
LED	Light Emitting Diode
LSZH	Low Smoke Zero Halogen
MODU	Mobile Offshore Drilling Unit
NR	Norma Regulamentadora (Regulatory Standard)
OSI	Open Systems Interconnection
RF	Radio Frequency
TIA	Telecommunications Industry Association
TVRO	TV Receiver Only
SOLAS	Safety Of Life At Sea
UHF	Ultra High Frequency
UPS	Uninterruptible Power Supply
UTP	Unshielded Twisted Pair

VAC	Volts Alternating Current
VDC	Volts Direct Current
VHF	Very High Frequency
VSAT	Very Small Aperture Terminal
WAN	Wide Area Network

3. REFERENCE DOCUMENTS, CODES AND STANDARDS

3.1 International Standards

a. IEC 1000-4-2: Electrostatic discharge (ESD) requirements

b. IEC 60079: Electrical apparatus for explosive gas atmospheres - all parts

c. IEC 60092-502: Electrical installations on ships

d. IEC 60331: Tests for electric cables under fire conditions - circuit integrity – all parts

e. IEC 60529: Degrees of protection provided by enclosures (IP code)

f. IEC 60533: Electrical and electronic installations in ships - electromagnetic compatibility

g. IEC 60945: Maritime navigation and radiocommunication equipment and systems – general requirements – methods of testing and required test results

h. IEC 61000: Electromagnetic compatibility (EMC) series - all parts

i. IEC 61892-1: Mobile and fixed offshore units – electrical installations – part 1: general requirements and conditions

j. IEC 61892-2: Mobile and fixed offshore units – electrical installations – part 2: system design

k. IEC 61892-7: Mobile and fixed offshore units - electrical installations - part 7: hazardous area

l. CENELEC CLC/TR 50427 - Assessment of inadvertent ignition of flammable atmospheres by radio-frequency radiation – Guide

m. CISPR 22 - Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement

n. EN 55022 - Information technology equipment – Radio disturbance characteristics – Limits and methods of measurement

o. IMO MODU Code - Code for the Construction and Equipment of Mobile Offshore Drilling units.

p. IMO Resolution A.1021 – Codes on Alerts and Indications.

q. IMO Resolution A.801 – Provision of Radio Services for the Global Maritime Distress and Safety System.

r. IMO SOLAS – International Convention for the Safety of Life at Sea.

s. IEEE 802.1Q™-2005: "IEEE standard for Local and metropolitan area networks: Virtual Bridged Local Area Networks".

t. IEEE 802.2™-1989: "Information Processing Systems - Local Area Networks - Part 2: Logic link control"

3.2 Brazilian Standards

a. INMETRO PORTARIA Nº 115 (21/março/2022): regulamento de avaliação da conformidade de equipamentos elétricos para atmosferas potencialmente explosivas, nas condições de gases e vapores inflamáveis e poeiras combustíveis.

b. It shall be followed all others NR's: Normas Regulamentadoras (Regulatory Standards) the Secretaria de Trabalho do Ministério da Economia (Secretary of Labor of the Brazilian Ministry of Economy) applicable to this Technical Specification.

c. NR-10: Segurança em instalações e serviços em eletricidade

d. NR-37: Segurança e saúde em plataformas de petróleo

e. ANATEL: regulations of Agência Nacional de Telecomunicações.

f. NORMAM 01/DPC: Embarcações Empregadas na Navegação em Mar Aberto.

3.3 Classification Society

3.3.1. The detailed design shall be submitted to approval by Classification Society. The design and installation shall take into account their requirements and comments.

4. GENERAL REQUIREMENTS

4.1 For PETROBRAS detailed design requirements for installation, configuration, tests training and commissioning, CONTRACTOR shall comply with the DESCRIPTIVE MEMORANDUM I-MD-3010.00-5510-760-PPT-001 – GENERAL CRITERIA FOR TELECOMMUNICATIONS DESIGN.

4.2 For telecommunications symbols, the detailed design shall comply with the Technical Specification: I-ET-3000.00-0000-940-P4X-002 – SYMBOLS FOR PRODUCTION UNITS DESIGN.

4.3 For telecommunications TAGs, the detailed design shall comply with the Technical Specification: I-ET-3000.00-1200-940-P4X-001 – TAGGING PROCEDURE FOR PRODUCTION UNITS DESIGN.

4.4 All electrical requirements for telecom package shall be in accordance with I-ET-3010.00-5140-700-P4X-003 – ELETRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE, I-ET-3010.00-5140-700-P4X-001 - SPECIFICATION FOR ELECTRICAL DESIGN FOR OFFSHORE UNITS, I-DE-3010.00-5140-700-P4X-003 - GROUNDING INSTALLATION TYPICAL DETAILS and I-ET-3010.00-5140-700-P4X-005 - REQUIREMENTS FOR HUMAN ENGINEERING DESIGN FOR ELECTRICAL SYSTEMS OF OFFSHORE UNITS.

4.5 Equipment and accessories installed in outdoor or industrial areas shall be suitably rugged and their external bodies shall be made in non-metallic material, suitable for harsh environments and in accordance with IEC and ABNT standards, apart

from the ones whose classification area require to be metallic as Ex-d junction boxes.

4.6 Brackets, bolts, nuts, washers and any other mechanical fixing elements shall be made in stainless steel.

4.7 In case of difficulty for supplying some accessory with external body made with non-metallic materials, it will be necessary to submit them for analysis and approval of PETROBRAS.

4.8 It shall be avoided equipment and accessories with their external bodies built in aluminum alloy. Anything different shall be submitted to PETROBRAS approval. In case of approval, this alloy shall not contain in its composition more than 0.25% of copper and shall comply with the ASTM-B-179 standard (ANSI alloy 356.1).

4.9 The equipment and accessories shall attend the ingress protection degree, protection type, classifications zone and groups established by IEC / ABNT.

4.10 All equipment that will make part of technical proposal shall have type approval certificate by Classifying Society and technical conformity with the International and National standardization organism: ABNT, IEC, INMETRO.

4.11 The equipment and materials shall be supplied packed suitable for long periods of storage and be protected against mechanical impact and adverse weather conditions.

4.12 Telecommunications shutdown system shall be designed that the risk of unintentional stoppages caused by malfunction in a shutdown system and the risk of inadvertent operation are minimized.

4.13 All documents of the shutdown telecommunication system shall be submitted to classification society for approval.

5. SYSTEM DEFINITIONS

5.1 Telecommunications equipment that represents an ignition source shall be deactivated automatically in case of flammable gas detection.

5.2 ESD Telecom main requirements for the Safety Discipline and Automation discipline to design gas detectors and identify circuits to be interconnected to CSS System are:

5.2.1. Equipment installed in outdoor area shall only receive a shutdown signal from the CSS if the presence of gas is really detected in the place. Any gas detection in another area of the platform must not generate a command signal in the CCS logic regarding that equipment associated with that antenna.

5.2.2. For detection methodology by area, based on the position already informed by the Safety discipline, it will only be acceptable detectors type line-of-sight. Therefore,

the Safety discipline needs to receive a proposal from CONTRACTOR to locate these detectors anywhere it is required for approval.

5.2.3. Only radios that propagates RF signal by their outdoor antennas above than 6W and any electrical equipment without Ex certification installed outdoor shall receive automatically signal from CSS System to be powered off.

5.2.4. Outdoor equipment certified for Zone 2 area or outdoor antennas that propagates RF power under 6W shall not be powered off.

5.2.5. Equipment without Zone 2 certification in any other outdoor area of the platform must be turned off by the ESD logic commands.

6. TECHNICAL REQUIREMENTS

6.1 To meet the requirements of CENELEC CLC / TR 50427 in order to avoid ignition possibility of flammable gases in Topsides areas, the transmission equipment with RF power above 6W shall be powered off due to flammable gas detected in antenna deck.

6.2 Radio-frequency transmitters will induce electric currents and voltages in any conducting structure on which they impinge. The magnitude of the induced current and voltages depends upon the shape and size of the structure relative to the wavelength of the transmitted signal and on the strength of the electromagnetic field.

6.3 If this happens in a location where a potentially flammable atmosphere may be present, a hazardous situation can occur. However, the possibility of ignition will depend on many factors including whether the spark can deliver sufficient energy to ignite a particular flammable atmosphere. In the event of an emergency such as a gas leakage, the hazardous areas can under certain conditions be extended.

6.4 CONTRACTOR shall study all possibilities described in CLC / TR 50427 to be implemented in antenna installation in order to avoid power off the radio-frequency transmitters with RF power above 6W.

6.4.1. It shall be considered the distance between antennas, the distance between antennas and electric conductive structures, the distance of the antennas and the hazardous area and the use of non-conductive material in the antennas supports like fiberglass.

6.5 To meet the requirements of IEC 61892-1 all electrical equipment installed in external areas that require to be kept operational in emergencies shall, as a minimum, fulfil requirements in relation to zone 2 hazardous area classification.

6.6 The detailed design shall consider powering off all telecommunications equipment with electrical components installed in the external area not certified to operate in zone 2, when flammable gas is detected in areas where the equipment installed are not certified for hazardous classified areas, as the antennas area, for example.

6.7 Antenna areas and areas with electrical non Ex device installed shall be monitored by dedicated gas detectors according to FIRE AND GAS DETECTION STUDY and its SAFETY DATA SHEET.

6.8 All telecommunications electrical panels shall have interface with CSS-HFGS in according with I-ET-3010.00-5520-861-P4X-001 - CONTROL AND SAFETY SYSTEM – CSS in order to permit the selective load disconnection in case of gas detected in antenna installation areas.

7. SCOPE OF SUPPLY

7.1 CONTRACTOR shall supply, install, test and commissioning the Telecommunications Shutdown System, following all technical requirements described in this technical specification, in order to guarantee compliance with all requirements described in IEC 61892-1 and CENELEC CLC / TR 50427.

8. DIMENSIONING CRITERIA

8.1 The table below present a preliminary study considering all telecommunications equipment that shall be powered off due to have electrical components installed in external area without classification for zone 2 or emission a RF power above the 6W.

Item	System	Equipment	Analysis of the presence of electrical equipment installed in external area [IEC 61892-1]	Analysis of RF emission at levels above 6W [IEC 60079-0 and BSI CLC/TR 50427:2004]	Reason to power off
1	Operational radios	VHF/FM-SMM base station radios	No	Yes	RF emission above 6W
2	Operational radios	UHF base station radios	No	Yes	RF emission above 6W
3	Operational radios	LTE base stations	No	Yes	RF emission above 6W

Table 1: equipment suggested to be powered off

9. COMMISSIONING

9.1 CONTRACTOR shall, as a technical commissioning activity, check, test and evaluate the operation of panels, installations, protections and redundancies, in their components or in the set, in order to permit or authorize their use under normal operating conditions.

9.2 The following verifications shall be checked as scope of commissioning activities in accordance with Contract and this Technical Specification.

a. Annotation of the plate data;

b. Continuity and interconnection;

c. Analysis of the philosophy of protection and measurement;

d. Wiring insulation;

e. Fuse check;

f. Analysis of the heating system;

g. Analysis of results;

h. Final Inspection with issued report.

9.3 CONTRACTOR shall provide all items needed to carry out the commissioning activities of the Shutdown Telecom System.

9.4 CONTRACTOR shall follow all verifications that are scope of commissioning activities in accordance with Contract documents and this Technical Specification.

9.5 The final ESD acceptance test shall be done after Automation CSS System is complete.