PETROBRAS	TECHNICAL SPECIFICATION	Nº:	I-ET-3010.00-5516-764-PPT-002
	CLIENT: SRGE		SHEET: 1 of 20
	JOB: TELECOMMUNICATION VOICE		
	AREA: -		
TIC	TITLE: TOPSIDES TELEPHONY SYSTEM		INTERNAL
			OI/CS

MICROSOFT WORD / V.2016 / I-ET-3010.00-5516-764-PPT-002_A.docx

INDEX OF REVISIONS

REV.	DESCRIPTION AND/OR REVISED SHEETS
0	ORIGINAL ISSUE
A	REVISED WHERE INDICATED

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE	APR/08/22	OCT/25/2022							
DESIGN	PROJ-US	PROJ-US							
EXECUTION	Y3S7	Y3S7							
CHECK	CY22	CY22							
APPROVAL	X187	X187							

INDEX

1. SUBJECT

1.1 The subject of this document is to establish the criteria and basic characteristics for the detailed design, supply, installation and configuration of TOPSIDE TELEPHONY SYSTEM that shall be installed in PETROBRAS FPSO Unit, to provide Telephone Communication.

1.2 TOPSIDE TELEPHONY SYSTEM shall enable internal voice communications in the FPSO Unit and between the FPSO Unit and PETROBRAS Operational Base.

2. ABBREVIATIONS

ABNT	Associação Brasiliera de Normas Técnicas (Brazilian Association of Technical Standards)
AC	Alternating Current
ANATEL	Agência Nacional de Telecomunicações (Brazilian Telecommunication Authority)
ANSI	American National Standards Institute
ART	Anotação de Responsabilidade Técnica (Technical Responsibility Note)
ASTM	American Society for Testing and Materials
AWG	American Wire Gauge
BT	Terminals Blocks
BUZ	Buzzer
CCR	Central Control Room
CDT	Telephone Distribution Box
CJT	Telephone Junction Box
CMP	External bells
DC	Direct Current
DGT	General Telephone Distributor
DIO	Optical Distribution Drawer
EIA	Electronic Industries Alliance
EPR	Eethyl-Propylene Rubber
FPSO	Floating, production, storage and offloading
GMDSS	Global Maritime Distress Safety System
GPS	Global Positioning System
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
LST	Telephone Signaling Lamp
LSZH	Low Smoke Zero Halogen
MDF	Main Distribution Frame
MODU	Mobile Offshore Drilling Unit
NORMAM	Normas da Autoridade Marítima (Maritime Authority Standards)
OSI	Open Systems Interconnection

PABX	Private Automatic Branch eXchange
PDD	Data Distributor Panel
PLL	Phase Locked Loop
PoE	Power Over Ethernet
QSIG	Q signaling
RF	Radio Frequency
SIP	Session Initiation Protocol
TCP	Transmission Control Protocol
TDM	Time-division multiplexing
TIA	Telecommunications Industry Association
SOLAS	Safety Of Life At Sea
UPS	Uninterruptible Power Supply
UTP	Unshielded Twisted Pair
VAC	Volts Alternating Current
VDC	Volts Direct Current
VoIP	Voice over Internet Protocol
WAN	Wide Area Network

3. REFERENCE DOCUMENTS, CODES AND STANDARDS

3.1 International Standards

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

b. IEC 60092-502: Electrical installations on ships

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

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

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

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

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

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

c. IMO Harmonization of GMDSS Requirements for Radio Installations on Board SOLAS Ships.

d. IMO LSA Code – International Life-Saving Appliance Code.

e. IMO MODU Code - Code for the Construction and Equipment of Mobile Offshore Drilling Units.

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

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

h. IMO Resolution A.888 – Criteria for the Provision of Mobile-Satellite Communication Systems in the Global Maritime Distress and Safety System (GMDSS).

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

j. ISO 7240-19 – Fire Detection and Alarm Systems - Design, installation, commissioning and service of sound systems for emergency purposes.

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

c. NR-30: Plataformas e instalações de apoio – anexo II.

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

e. It shall be followed all others NR's – Normas Regulamentadoras (Regulatory Standards) from Ministério da Economia (Brazilian Ministry of Labor) applicable to this Technical Specification.

f. ICA 63-10 – Estações Prestadoras de Serviços de Telecomunicações e Tráfego Aéreo.

g. NORMAM 01/DPC – Normas da Autoridade Marítima para Embarcações Empregadas na Navegação em Mar Aberto.

h. NORMAM 27/DPC – Normas da Autoridade Marítima para Homologação de Helipontos Instalados em Embarcações e em Plataformas Marítimas.

i. ANATEL – any applicable resolution from Agência Nacional de Telecomunicações

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 CONTRACTOR shall provide all the materials to install all equipment, accessories, cables and infrastructure that compose the TOPSIDE TELEPHONY SYSTEM.

4.2 For the location of topside telephones it shall be considered TOPSIDE INDUSTRIALTELEPHONY ONE LINE DIAGRAM.

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

4.4 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.

4.5 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.

4.6 For the cable trays definitions follow the I-ET-3010.00-5140-700-P4X-002 – SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS.

4.7 For electrical requirements definitions follow the I-ET-3010.00-5140-700-P4X-003 - ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS

4.8 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.

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

4.10 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.

4.11 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).

4.12 In outdoor areas, exposed to marine atmosphere, CONTRACTOR shall avoid the galvanic corrosion of junction boxes supports, horns supports and bolts. Galvanic insulation shall be implemented wherever contact between different metallic materials is needed.

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

4.14 CONTRACTOR shall supply only equipment, accessories, cables and materials homologated by National Telecommunication Agency (ANATEL), whenever required by Brazilian standards and laws.

4.15 CONTRACTOR shall supply the 2-way voice communication system and all equipment, cables, accessories with TYPE APPROVAL issued by Classifying Society and in technical conformity with the International and National standardization organism: ABNT, IEC and INMETRO.

4.16 The equipment and materials shall be supplied packed in suitable cases/box for long periods of storage and also be protected against mechanical impact and adverse weather conditions.

4.17 CONTRACTOR shall provide full integration and interoperability between the TOPSIDE and HULL TELEPHONY SYSTEMS.

4.18 CONTRACTOR shall consider, at least, a 20% spare in cables pairs, terminals block, box penetration holes and other items of the infrastructure of the hull Telephony System.

4.19 Electrical equipment installed in external (open) safe areas, foreseen to operating during emergency shutdown ESD-3 shall be certified for installation in hazardous areas Zone 2 Group IIA temperature T3.

4.20 All cables conductors shall be terminated on needle terminals (Figure 1) or European Terminal Pin (Figure 2) to connect on SAK terminal blocks or similar.

Figure 1: Examples of needle terminals.

Figure 2: Examples of European Terminal Pins

4.21 On outdoor areas, exposed a marine atmosphere, CONTRACTOR shall beware to mitigate the galvanic corrosion of junction boxes support and bolts. Galvanic insulation shall be implemented where contact between different metallic materials is necessary.

4.22 All equipment of the Topside Telephony System, located in external and in industrial areas, shall be installed under conditions whereby there is always a floor below them so as to provide protection and easy access for servicing.

4.23 In order to avoid humidity and water ingress inside the junction boxes, CONTRACTOR shall apply appropriate material, according to IEC standards, in the screw thread, bolts, cable glands, cover plugs and joints.

4.24 The Telephone distribution boxes (CDTs) shall have the cable glands installed facing lateral sides and/or bottom side. Cable glands installed facing upward are not acceptable. It is also not acceptable any opening facing the upward of the box, even if it is closed by cover plug.

4.25 The booths for the Telephony System shall be in different color than the booths for PAGA System and it shall be identified with a visible plate written in Brazilian Portuguese as a Telephone equipment of Telephony System.

4.26 In each diving areas shall be foreseen the installation of a Telephone Distribution Box (CDT) in order to prepare to connect the PAGA systems to the Diving Container.

4.27 CONTRACTOR shall ensure by inspection of a qualified personnel that all equipment installations are according to the IEC/ABNT standards requested in this technical specification.

5. SYSTEM DEFINITIONS

5.1 The PABX is a part of the HULL TELEPHONY SYSTEM scope and it will be installed in the Telecom Lower Room, located on Accommodation Module.

5.2 The PABX of HULL TELEPHONY SYSTEM will be installed and configured by the vendor representative with training and certificate complying with the model supplied for the project, including the interconnection with PETROBRAS corporative telephony network.

5.3 CONTRACTOR shall consider that both systems are fully integrated, HULL TELEPHONY SYSTEM and TOPSIDE TELEPHONY SYSTEM with the PETROBRAS Corporate Telephony System.

5.4 Interface Box – Hull external areas

5.4.1. CONTRACTOR shall connect the TOPSIDE TELEPHONE NETWORK at the hull interface box – Telephone Distribution Box (CDT).

5.4.2. CONTRACTOR shall consider that this Interface Hull – Topside CDT will be supplied and installed for HULL TELEPHONE SYSTEM provider.

5.4.3. Only for information and reference, CONTRACTOR shall consider the CDT arrangement, as follow once the final quantities shall be defined in detailed design.

5.4.4. CONTRACTOR shall install and connect one telephone cable from Hull interface box to each crane telephone junction box or straight to slip ring inside crane.

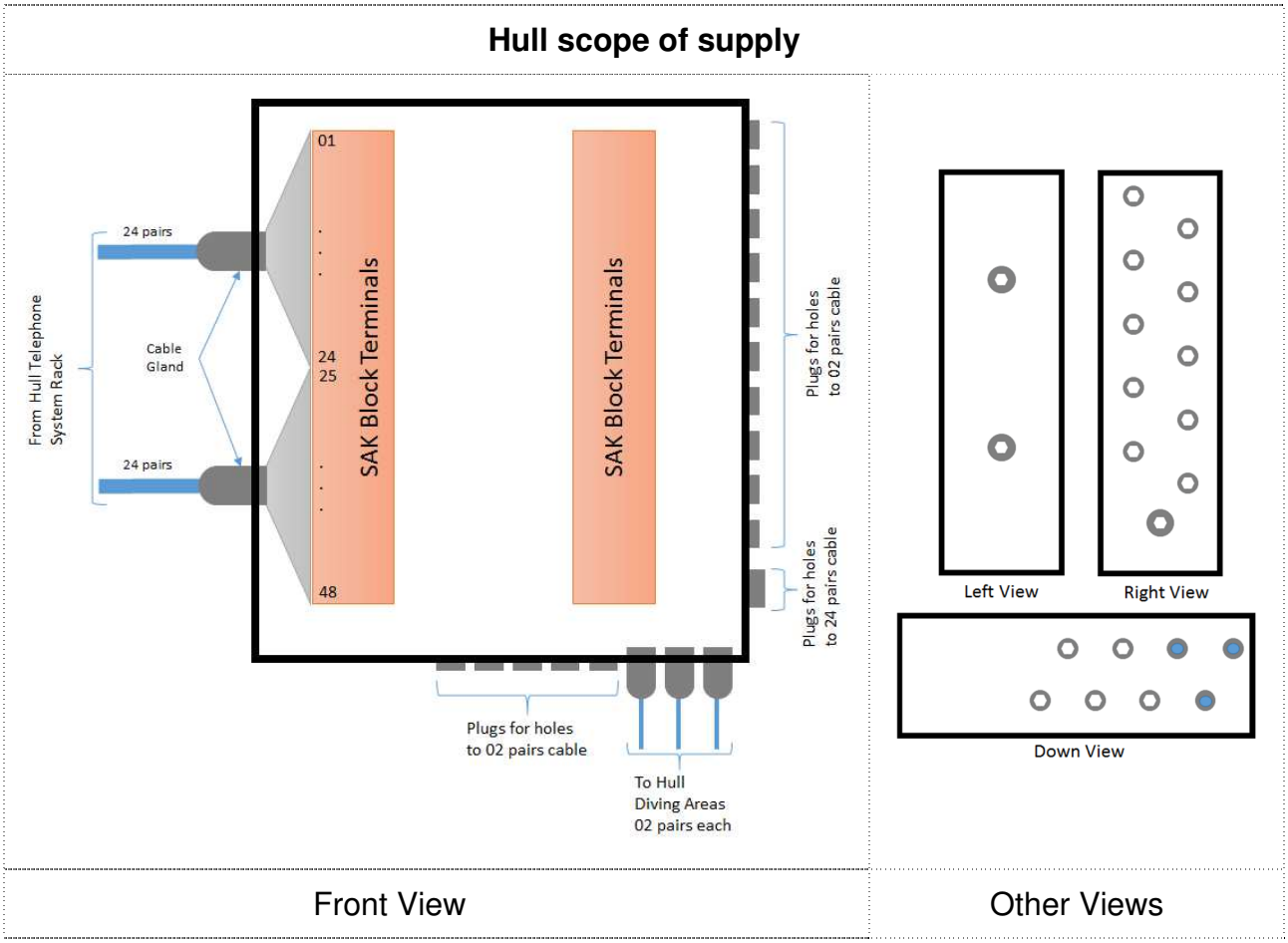

Figure 3: Example of CDT connections

a. 02 (two) holes for cable of 24 pairs and cable gland, according to environment and standards applicable (from Hull DGT);

b. 01 (one) hole for cable of 24 pairs and stopper plug, according to environment and standards applicable;

c. 05 (five) holes for cable of 02 pairs and cable gland, according to environment and standards applicable (for Diving Station);

d. 20 (twenty) holes for cable of 02 pairs and stopper plug, according to environment and standards applicable.

e. 01 (one) hole for cable of 06 pairs and stopper plug, according to environment and standards applicable (for M-13).

f. 01 (one) hole for cable of 10 pairs and stopper plug, according to environment and standards applicable (for M-17).

5.4.5. CONTRACTOR shall consider as an example the following drawing as a final configuration for Interface Box for TOPSIDE TELEPHONE NETWORK connections. The HULL TELEPHONY ONE LINE DIAGRAM shall be followed to

estimate the final quantities. The final quantity shall be defined in the Detailed Design.

Topside supply of scope

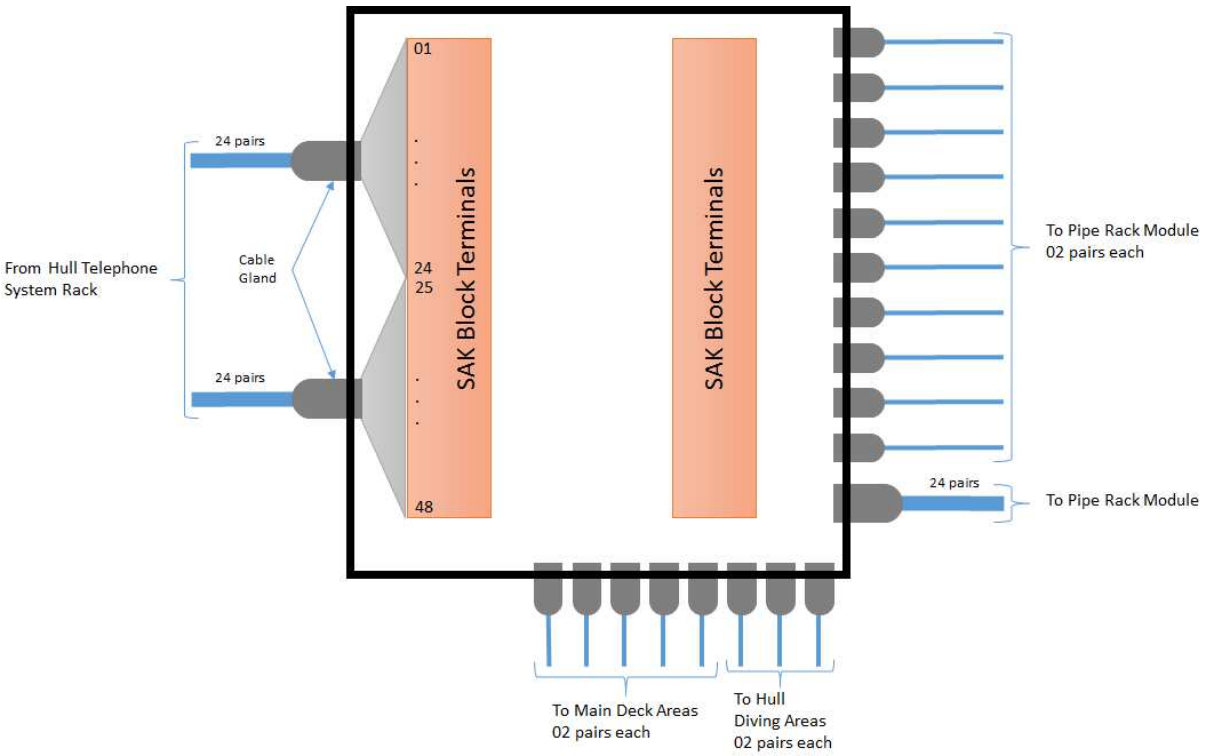

Figure 4: Final Configuration for Interface Box for TOPSIDES TELEPHONE NETWORK connections.

a. 23 (twenty-three) cable glands for 02 pairs cable, in accordance with environment and standards applicable, or

b. 01 (one) cable gland for 06 pairs cable, in accordance with environment and standards applicable, and

c. 01 (one) cable gland for 10 pairs cable, in accordance with environment and standards applicable.

5.4.1. CONTRACTOR shall provide all materials and accessories (stopper plug, cable gland …) according to TOPSIDE TELEPHONE SYSTEM cables and CDT specification to maintain its water tightness and protection type required.

5.5 Acoustic Hood and Acoustic Booth

5.5.1. It shall be used at very noisy places and it shall have a type of shield that fits around it, with weather-proof and explosion-proof telephone set (TEL), which reduces the noise generated when that equipment is being used. Built of fiberglass or injected ABS plastic.

5.5.2. For use in areas with surrounding noise level higher than 80 dB.

5.5.3. CONTRACTOR shall provide and install support structure and assembly plate for telephone with respective distribution box mounted outside the cabin.

5.5.4. In closed areas protected by any gas for fire extinguishing (like CO2, inergen, etc), only acoustic hoods (half-body) shall be used and with noise level higher than 80 dB a headphone shall be provided. In such areas, it shall be provided gas singling lamp as per Safety discipline requirements.

5.5.5. All other acoustic booth required shall be full size with proper illumination inside.

5.6 Protection box

5.6.1. Enclosure used for housing telephone handsets.

5.6.2. Component used for sheltering weather-proof or explosion-proof telephones, supplied in a non-metallic material, in accordance with IEC and ABNT standards, with side opening door mounted on hinges permitting at least 180 degrees of opening, fitted with doorknob, rubber lid sealing gasket and possibility of attachment to a steel structure or to masonry.

5.7 Terminal Block

5.7.1. Blocks for connecting electrical conductors of telephone networks, installed in DGT, CDT's and CJT's.

5.7.2. Terminal Blocks (BT's) shall be arranged to facilitate differentiation between the circuits from different networks.

5.8 Telephone Distribution Box (CDT)

5.8.1. Telephone Distribution Box is the intermediate or peripheral box or switchboard for distribution of telephony sub-networks.

5.8.2. Telephone Distribution Box shall be used to connect cables of the telephone system.

5.8.3. It shall be built of non-metallic materials like polycarbonate, anti-static polyamide, ABS plastic, fiberglass and others.

5.9 Telephone Junction Box (CJT)

5.9.1. Peripheral box used for splicing and shunting of telephony networks, limited to hook-up of 04 (four) cables.

5.10 Cable Glands

5.10.1. Devices used for mechanical attachment of the electrical cables to the distribution boxes or panels providing the use of such units.

5.10.2. All Cable Glands shall be designed, manufactured and tested in accordance with the applicable existing requirements. For selection of the Cable Glands used on the different types of cables, according to its maximum and minimum dimensions and features of its internal and external layers.

5.10.3. The Cable Glands shall not be manufactured in cast aluminum and/or nylon.

5.11 Telephone Signaling Lamp (LST)

5.11.1. According to IMO Resolution A.1021 – Codes on Alerts and Indications, table 7.1.3 – Call Signals, Telephone Color Signals shall be White/Clear.

5.11.2. White color lamps, rotating or blinking light, at least, 10 Watts/10 Joules of power or 300 Cd (Candela)/300 lx (Lux) @ 1 m**,** which is better, for use with acoustic booth or acoustic hood in areas where the surrounding noise level exceeds 80 dB.

5.12 Buzzer (BUZ) or Bell (CMP)

5.12.1. It shall be used with acoustic booth or acoustic hood in areas where the surrounding noise level exceeds 80 dB.

5.13 Buzzer and Signaling Lamp (BLT)

5.13.1. This device unites the signaling lamp and buzzer in the same device.

5.13.2. Each BLTs shall be powered by dedicated circuit breaker from a dedicated electrical panel with spares.

5.14 Telephone Cables

5.14.1. The cables shall contain an insulation cover made in ethyl-propylene rubber (EPR) for use in free and industrial areas, as well as internal cables and panels.

5.14.2. The cables in all lodging areas shall contain an insulation cover made in halogen-free rubber, with proper thermal characteristics, ozone and corona effect resistant, in addition to withstanding the following thermal conditions:

a. A maximum of 85ºC in continuous operations (damp or dry places);

b. 130ºC under emergency over-load conditions;

c. 200ºC under short-circuit conditions;

d. All cables shall be low voltage type (250 Volts AC).

5.14.3. External Identification

a. All cables shall be identified on the outside along their length (at maximum intervals of 2.0 m), by the following information:

   i. Type of cable;

   ii. Formation of conductors;

   iii. Sectional area of conductors in mm^2;

   iv. Name of manufacturers;

   v. Commercial reference of manufacturers.

b. Each item of cable shall be supplied in reels or on spools, in continuous runs, with the length established in the purchase documentation;

c. Each spool or reel shall be identified on the outside by the number of the purchase document, total length of purchase, total length of run, gauge in mm^2, make-up of cable and any other data called for in the purchase documentation.

5.14.4. Other requirements in according with Classifying Society

a. Cables for circuits that shall operate under fire conditions and cables crossing machinery space category A, as defined by SOLAS, shall be certified for circuit integrity under fire conditions, according to IEC60331. CONTRACTOR shall attend this need without costs to PETROBRAS.

b. The Classifying Society shall supply a list with the places or a document of rules to be followed by the CONTRACTOR, where these requirements shall be informed.

c. CONTRACTOR shall submit the detailed design with the cables list for approval by the PETROBRAS and Classifying Society.

5.15 Telephone Set (TEL)

5.15.1. Non-Hazardous Areas

5.15.1.1. Environments with artificial ventilation (offices):

a. IP Telephone set, OpenScape Desk Phone CP 600 SIP, OpenScape Desk Phone CP 200 SIP, or better, made by Unify.

b. Connectors shall be RJ-45 type.

5.15.1.2. Environments with natural ventilation (non-offices areas):

a. Push-button wall type automatic TEL, shall be used with protection suitable for the prevailing environmental conditions.

b. Depending on the noise level of the environment, shall be used accessories such as Buzzer with Signaling Lamp (BLT).

5.15.1.3. Hazardous Areas

a. Push-button wall type automatic TEL's, shall be used with protection suitable to the prevailing environmental conditions (area classifying).

b. Dependent on the noise level at the respective surroundings areas, it shall be used accessories such as external bells (CMP's), acoustic buzzers (BUZ's), signaling lamps (LST's), Buzzer with Signaling Lamp (BLT), etc.

5.16 Cable Trays

5.16.1. Whenever possible power cables and telephony cables should be run in separate trays to prevent electromagnetic interference. When this is not possible, the telephony cables can share the cable trays with low voltage cables, however dividers strip shall be installed to provide an electromagnetic barrier.

6. TECHNICAL REQUIREMENTS

6.1 The detailed design shall foresee the possibility, through strategic installation of components, to minimize the number of connections and this way, optimize costs of materials and/or work to be done.

6.2 The detailed design of Telephony System shall be effected in such a manner as to permit the maximum possible number of facilities (equipment, cables and accessories), to be installed during the construction of unit at shipyard site (on shore).

6.3 The detailed design shall make it possible, through installation of CDT (Telephony Distribution Box) at each strategic points of each module, level or area, that the off-shore installation shall be restricted merely to the interconnections between modules (CDT's), avoiding the need of running large numbers and lengths of cables in this phase.

6.4 All telephone armored cables from Telephone Distribution Box (CDT), installed outside of accommodation module on industrial area, shall be terminated at the SAK block terminals or similar.

6.5 Equipment shall have its casing suitably grounded. The grounding connection by simply supporting the casing on the steel structure of the unit will not be considerate appropriate.

6.6 Equipment, cables, boxes, materials and accessories for installation in the industrial areas of the unit (outdoor or indoor) shall be specified and assembled in accordance with applicable standards.

6.7 The boxes and panels shall be made with side opening door mounted on hinges permitting at least 180 degrees of opening. In addition, a space of at least 01 (one) meter wide shall be left between the front of the boxes or panels and any other structure or piece of equipment, to facilitate maintenance.

6.8 Equipment and materials shall be specified, manufactured and assembled in accordance with applicable standard.

6.9 The equipment and CDT's for industrial areas shall be built in such a manner that, after installation, the rear face stay spaced away from the wall support.

6.10 Equipment enclosures and boxes shall be supplied with all cable passage holes sealed with plastic plugs in the holes to be used and definitive plugs (made of the same material as the equipment and accessories) in the spare holes.

6.11 The terminals installed inside the Distribution Boxes shall be type SAK or similar.

6.12 For transitions between external and internal areas, it shall use MCT that shall be sealed with rubber stoppers to prevent the passage of gases between different compartments, in accordance with applicable standard.

6.13 To ensure proper operation of the Telephony System, it shall be taken into account the necessary care to maintain telephone cables far from energy cables in accordance with applicable standard. Crossings, if any should occur, shall be arranged at right angles.

6.14 All cables shall be suitable for installations in cable trays, cable ladders, conduits, shapes or ducting, the last-named exceptionally, and subject to consultation with PETROBRAS in damp or dry exposed to rainfall, liquid hydrocarbon splashing, marine atmosphere and exposure to sunshine.

6.15 Cables shall have no curves in their routing tighter than the limit values specified by manufacturers and in accordance with applicable standard.

6.16 Cables shall not have splices at any point of their run.

6.17 Armored cables shall be used only in areas in which there is considerable probability of accidents and to interconnection with Topsides and industrial area and in accordance with applicable standard.

6.18 Lashing down of cables shall comply with the following criteria:

a. Horizontal runs, at intervals of less than 2.0 m;

b. Vertical runs, at intervals of less than 1.0 m;

c. Curves at ends only (beginning and end).

6.19 Cables and conductors shall be identified at both ends by means of plastic rings.

6.20 Cables shall be terminated in cable glands classified in accordance with the equipment they will be attached to. When equipment is not suited to the use of cable glands, the cables shall have their ends terminated with sweated-on sleeves or self-melting tape.

6.21 Telephony cables shall have its outer sheaths in color different from black, preferably in orange color; to define this color, CONTRACTOR shall be made understandings with PETROBRAS.

6.22 Boxes shall not be located in areas in which they would be exposed to the environmental elements. If this should occur, suitable boxes for the purpose and built of weather-proof and with UV protection materials shall be used.

6.23 All grounding cables shall be specified and installed in accordance with applicable standard.

6.24 For external areas with surrounding noise levels higher than 80 dB, telephones shall be installed in acoustic booth or acoustic hood:

a. Environment areas with noise levels from 80 to 95 dB should be considered the acoustics attenuator equal or higher than 20 dB;

b. Environment areas with noise levels higher than 95 dB should be considered acoustics attenuator equal or higher than 35 dB.

6.25 For internal areas with surrounding noise levels higher than 80 dB, telephones shall be installed as following:

a. In the acoustic hood for environment areas with noise levels from 80 to 95 dB and should be considered the acoustics attenuator equal or higher than 20 dB;

b. In the acoustic hood with headset accessory for environment areas with noise levels higher than 95 dB and should be considered acoustics attenuator equal or higher than 35 dB.

6.26 Telephones (TEL) installed on harsh areas shall be housed in cabinets with ingress protection grade for the respective environmental conditions and in accordance with applicable standard.

6.27 Telephones (TEL) housed in acoustic booths shall have Buzzers with signaling lamps (BLT) to perform the “ring sound” function, due the high noise area.

a. These buzzers and lamps should be fed from “UPS” or “battery system” to assure its safe operation and in accordance with applicable standard.

b. The BUZ/BLT ringtone shall have a different sound than the PAGA emergency alarm sound, so that there is no possibility of these two sounds being confused.

6.28 Desk type telephones (TEL) shall be used only in offices, control-room, meeting rooms, etc.

6.29 Wall type telephones (TEL) shall be used only in panel room, laboratory, equipment rooms, machinery spaces, warehouses, external areas, etc.

6.30 Close to all telephone sets there shall be a list of the main telephone extensions numbers of the FPSO Unit where the emergency extension shall be highlighted and shall have a procedure to access the interface with PAGA System. The list with the extension numbers will be provided by PETROBRAS.

6.31 In industrial areas, the list of extensions shall be made or fixed in place with suitable material to support harsh environments.

6.32 Acoustic booths shall be installed with the front protected from the main source of noise (which accounts for the greater proportion of the ambient noise).

6.33 Wall type telephones (TEL) shall be installed with their center of gravity about 1.50m above the floor.

7. SCOPE OF SUPPLY

7.1 CONTRACTOR shall supply, install, test and commissioning the Topside Telephony System in PETROBRAS Unit including all necessary material, within the scope of the Contract and in accordance with this Technical Specification in the locations described below:

7.2 A Telephony System shall be provided in TOPSIDE areas, including: offices, equipment room, panels room, diving areas, piping rack main corridor and piping rack upstairs corridor.

7.2.1. In equipment rooms and panels rooms shall be foreseen (01) one telephone in each floor.

7.3 Telephones Set and Quantity

7.3.1. The telephone sets final quantities shall comply with TOPSIDE INDUSTRIAL TELEPHONY ONE LINE DIAGRAM, as quantity estimate below:

a. 09 (nine) telephones for industrial areas in accordance with Ingress Protection Enclosure rating and Protection Type adequate for hazardous areas (Ex.e) zone 01 and applicable standard (IEC 60529 and IEC 60079).

b. 06 (six) telephones for internal areas in accordance with Ingress Protection Enclosure rating and Protection Type adequate for weather areas and applicable standard (IEC 60529 and IEC 60079).

c. 12 (twelve) telephones set Unify OpenScape Desk Phone CP 200 SIP, or superior, for the indoor areas, including licenses.

d. 02 (two) IP Wireless Telephone Set, Wireless Phone Cisco 8821-EX SIP or better, made by Unify.

7.4 01 (one) electrical panel with 25 (twenty-five) circuit breakers to power BLTs.

8. DIMENSIONING CRITERIA

8.1 Sizing Network Cabling

8.1.1. For sizing of the terminal strips in the CDT's, the following premise shall be taken into account:

NT = PA + PR + PP

Where:

- PR = 0.3 x PA
- NT = Number of pairs for the terminal strips.
- PA = Active Pairs - number of pairs terminating in the CDT, for hooking up terminal equipment (telephones, facsimile devices, telephone receptacles, data equipment, etc.);
- PR = Reserve Pairs - number of pairs terminating in the CDT, on the terminal strips, for expansion of the Telephone System;

- PP = Passing Pairs - number of pairs terminated in the CDT and connected to another consecutive CDT.

8.1.2. Telephone cables for each run shall be sized in accordance with the following formula:

NF = 1.2 x NT

Where:

- NF = Final number of pairs (quantity)
- NT = Total number of terminal pairs.

8.2 CONTRACTOR shall consider the figure below as summarized supply scope between of HULL and TOPSIDE TELEPHONY SYSTEM providers, for reference:

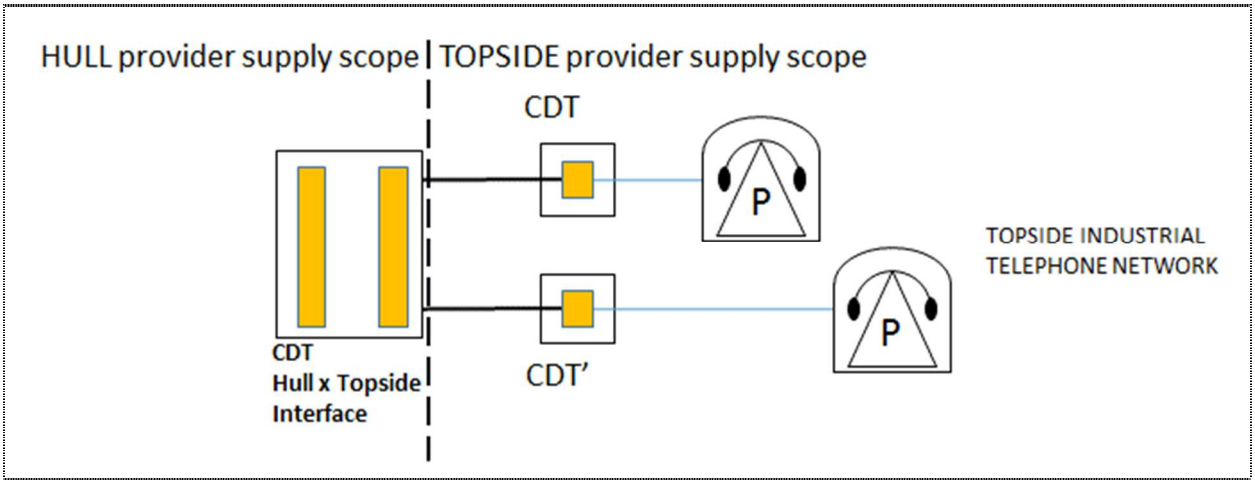

Figure 5: Scope of supply – Hull and Topside

9. COMMISSIONING

9.1 For Commissioning activities CONTRACTOR shall follow 03 (three) distinct phases: visual inspection, test measurements and documentation verification.

9.1.1. On visual inspection phase, shall be verified the:

a. Detailed design infrastructure requirements;

b. Grounding and bonding;

c. Equipment and boxes placement and fixation: CDT, TEL, LST, etc;

d. Cables placement and organization on cable trays or ladder;

e. Cables, conductors, boxes and equipment labeling (TAG);

f. Cables organization, fixation on panels or distribution boxes;

g. Conductors organization, fixation and termination in panels or distribution boxes;

h. Cables and conductors organization, fixation and termination on equipment.

9.1.2. On test measurements phase, shall be verified the:

a. Operating equipment: TEL, LST…

b. Cables continuity;

c. Cables impedance;

d. Cables capacitance;

e. Cables resistance;

f. Cables inductance.

9.1.3. On document verification phase, shall be verified the:

a. Identification Report: Equipment, racks, panels, boxes, cable, conductors, pathway identifier (TAG);

b. Cable Summary Report: specification, cable type, terminating positions, available pairs, available conductors,

c. End-to-End Circuit: associated termination positions.

9.1.4. As a matter of acceptance, incoming and outcoming call tests shall be done locally and to Brazil and the automatically switchover between AC to DC power and vice-versa shall succeed.