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TECHNICAL SPECIFICATION

Nº I-ET-3010.1M-5520-800-P4X-004

REV. 0

BÚZIOS

SHEET 2 of 10

TITLE:

AUTOMATION NETWORK REQUIREMENTS

NP-1

ESUP

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PRELIMINARY



1 INTRODUCTION

1.1 Objective

- 1.1.1 This specification describes the minimum requirements for the supply of equipment for all automation LAN network devices, to be installed at the UNIT, covering all equipment, material and certification tests.

1.2 Abbreviations

ABNT	<i>Associação Brasileira de Normas Técnicas</i>
AC	Alternating Current
ANSI	American National Standards Institute
ASTM	American Society for Testing and Materials
CAT	Category
DC	Direct Current
DHCP	Dynamic Host Configuration Protocol
DIO	Fiber Optic patch panel
EIA	Energy Information Administration
HTTP	HyperText Transfer Protocol
IEC	International Electrotechnical Commission
IGMP	Internet Group Management Protocol
INMETRO	<i>Instituto Nacional de Metrologia, Normalização e Qualidade Industrial</i>
IP	Ingress Protection
ISO	International Organization for Standardization
LACP	Link Aggregation Control Protocol
LAN	Local Area Network
LLDP	Link Layer Discovery Protocol
LSZH	Low Smoke Zero Halogen
MRP	Media Redundant Protocol
MSTP	Multiple Spanning Tree Protocol
MTE	<i>Ministério do Trabalho</i>
NEXT	Near-End Crosstalk
NTP	Network Time Protocol
OSPF	Open Shortest Path First
OTDR	Optical Time-Domain Reflectometer
PC	Physical Contact
PL	Permanent Link
PIM-SM	Protocol Independent Multicast - Sparse Mode
PIM-SSM	Protocol Independent Multicast - Source-Specific Mode
RADIUS	Remote Authentication Dial In User Service
RFC	Request For Comments
RJ-45	Registered Jack - 45
RSTP	Rapid Spanning Tree Protocol
SC	Square Connector
SNMP	Simple Network Management Protocol
SSH	Secure Shell
STP	Spanning Tree Protocol
TACACS	Terminal Access Controller Access-Control System
UTP	Unscreened Twisted Pair
U/UTP	Unscreened cable with Unscreened Twisted Pair



TIA	Telecommunications Industry Association
VDC	Volts of Direct Current
VLAN	Virtual LAN
VRRP	Virtual Router Redundancy Protocol

2 REFERENCE DOCUMENTS, CODES AND STANDARDS

2.1 External references

2.1.1 International Codes, Recommended Practices and Standards

ISO - INTERNATIONAL ORGANIZATION FOR STANDARDIZATION IEC - INTERNATIONAL ELECTROTECHNICAL COMMISSION

ISO/IEC 18010 Pathways and spaces for customer premises cabling

ISO/IEC 14763-2 Planning and Installation

ISO/IEC 14763-3 Testing of Optical Fiber Cabling

ISO/IEC 11801-1 Information technology-Generic cabling for customer premises-Part 1: General requirements

ISO/IEC 11801-2 Information technology-Generic cabling for customer premises-Part 2: Office Premises

ISO/IEC 11801-3 Information technology-Generic cabling for customer premises-Part 3: Industrial premises

2.1.2 Brazilian Codes and Standards

ABNT - ASSOCIAÇÃO BRASILEIRA DE NORMAS TÉCNICAS

NBR 16415 Caminhos e Espaços para Cabeamento Estruturado

INMETRO - INSTITUTO NACIONAL DE METROLOGIA, NORMALIZAÇÃO E QUALIDADE INDUSTRIAL

PORTARIA Nº 179
(18/MAIO/2010)

REGULAMENTO DE AVALIAÇÃO DA CONFORMIDADE DE EQUIPAMENTOS ELÉTRICOS PARA ATMOSFERAS POTENCIALMENTE EXPLOSIVAS, NAS CONDIÇÕES DE GASES E VAPORES INFLAMÁVEIS E POEIRAS COMBUSTÍVEIS

PORTARIA Nº 89
(23/FEVEREIRO/2012)

ALTERAÇÃO DA PORTARIA INMETRO Nº 179, DE 18/MAIO/2010.

2.1.3 Classification Society

2.1.3.1 The DETAIL DESIGN PHASE shall be submitted to approval by Classification Society. The design and installation shall take into account their requirements and comments.

2.1.3.2 The design, installation and operation shall strictly follow the classification society requirements, along with the specific requirements identified in this document, including also all referenced documents' requirements.

2.2 All MTE – Ministério do Trabalho regulations (NRs) shall be followed. Brazilian regulation (MTE section) and INMETRO regulation superpose all codes and regulations listed in item 2, since they are enforced by Brazilian law.

3 ENVIRONMENTAL AND OPERATION CONDITIONS

3.1 For operational and environmental conditions additional to this section, see I-ET-3010.1M-1200-800-P4X-001 - INSTRUMENTATION ADDITIONAL TECHNICAL REQUIREMENTS.

3.2 All materials used shall be non-hygroscopic, flame retardant and resistant to corrosion caused by marine environmental and hydrocarbon continuous contact.

3.3 Equipment shall be suitable to withstand the dynamic loads imposed by the vessel motions during tow and on location.

3.4 All panels, materials and equipment proper to be used in hazardous areas, shall have conformity certificates complying with "PORTARIA INMETRO Nº 179, de 18/maio/2010", and its annexes, changed by "PORTARIA INMETRO Nº 89, de 23/fevereiro/2012" and its annexes, and shall be approved by Classification Society. All equipment installed in outdoor areas shall be suitable for Zone I, Gas Group IIA, T3 IP 56. All equipment installed in non-classified indoor areas shall have ingress protection of IP 42.

3.5 All electrical and electronic devices, beyond mechanical parts of the equipment, shall be designed and constructed in a tropicalized version. Tropicalization process comprises application of reinforced protective resin Class 2 according to IEC 61086 and fungus proof according to ASTM G21 in all printed circuit boards, use of anti-rust materials and accessories and other implementations according to MANUFACTURERS' experiences and related rules, aiming to provide a robust and reliable construction.

4 STRUCTURED CABLING

4.1.1 The description below aims to establish the requirements of the automation Network in accordance with the requirements of ANSI/EIA/TIA 568-B2-1 and ISO 11801 for CAT 6.

4.2 Cabling

4.2.1 UTP Cable

- a. Twisted pair cable (UTP) shall comply with the requirements of ANSI/EIA/TIA 568-B2-1 and ISO 11801 for Category 6 (CAT6).
- b. The LAN cabling system shall use LSZH (Low Smoke Zero Halogen) UTP CAT 6 cable or other submitted for PETROBRAS approval.
- c. All UTP CAT 6 cabling shall be terminated in the CAT 6 Patch Panels with 24 positions (1U high) inside the automation rack.
- d. All the UTP cables shall have both ends identified. All the other components of the network shall be identified in the same way: patch panel, fiber optic cables, patch cords and sockets.
- e. All connections shall be according to EIA/T568-A standard.

4.2.2 Optical Cable

- a. Areas outside the accommodation, in the industrial area or areas where cable lengths exceed 100 meters shall be cabled with optical fiber according to ANSI/EIA/TIA 568-B3, as described below.
- b. Optical fiber cable with 6 fibers 62.5 x 125 with SC optic termination.
- c. Fiber Optic shall be terminated in proper optical patch panel with SC termination and media converter (GigaEthernet RJ-45 electrical to SC optical termination) 19" rack standard inside Automation Panels.

4.3 CAT 6 RJ45 Female Connectors

The RJ 45 female connectors shall comply with the requirements of Standard ANSI/EIA/TIA 568-B2 Category 6, and shall be used as access points in the work areas (outlets).

4.4 Patch Cords

4.4.1 Patch cords shall be factory-tested, with RJ45 connectors, unshielded balanced cable (U/UTP), consisting of four conductors in hard copper, nominal diameter of 24 AWG and insulation in high-density polyethylene, according to the standard ABNT NBR 14565.

4.4.2 All patch cords shall be factory tested for Cat.6 of ANSI / EIA / TIA 568 B.2.

4.4.3 Patch cords performance values shall be in the middle of the range of values determined by ANSI / EIA / TIA for NEXT.

4.4.4 To present a halogen-free structure and flame retardant composition with LSZH denomination, complying with the specification of non-propagation of fire, including vertical burning, acidity degree and low gas emission, complying with the following standards: IEC 60754, IEC 61034 and IEC 60332.

4.4.5 Connectors in accordance with the T568A schematic.

4.5 Racks

4.5.1 Racks for LAN network shall follow the specification below:

4.5.2 It shall be closed, 19 inches standard, 40U height, minimum depth of 1000 mm (internal dimensions) and 800 mm of useful width (internal dimensions).

4.5.3 It shall have AC universal standard sockets 19 inches standard;

4.5.4 Glazed door with safety glass at the front;

4.5.5 02 (two) fans in the top and two fans in bottom of rear door for air heat exchange

4.5.6 02 (two) Vertical cable organizer

4.5.7 Internal light

4.6 Cable organizer

4.6.1 It shall be installed one 19 inches closing horizontal cable organizer with 1U between each equipment installed inside the automation rack.

4.7 CAT 6 Path panels

4.7.1 Patch Panel shall be metallic with 19 inches width, according to ANSI/TIA/EIA-310D, with 24 RJ-45 female ports and 1U of height.

4.8 DIO – Fiber Optic patch panel

4.8.1 All fibers inside the automation racks shall be terminated in fibers optic patch panels - DIO. It shall be 19 inches 1U rack mounted, front articulated drawer type, steel frame.

4.8.2 Equipped with optical cable assembling kit, fusion splice protectors and fiber storage for all fibers.

4.8.3 All pig tails and adapters shall be terminated in a SC connector.

4.9 Fiber Optic Patch Cord

4.9.1 The connectors shall be compatible with equipment and DIOs.

4.9.2 The polishing of the connectors shall be PC type.

4.9.3 The optical cords shall comply with the ABNT standards NBR 14433 e ABNT NBR 14106.

5 EQUIPMENT DESCRIPTION

5.1 SWITCHES

5.1.1 This technical specification describes the following switch sets:



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- a. L2 Switches
- b. L3 Switches

5.2 Technical Characteristics common to all Switches

5.2.1 All Switch sets of this specification have the main purpose of Ethernet frame switching, providing connectivity to the local automation network and shall have the following technical characteristics.

5.2.2 Protocols and Functions

- 5.2.2.1 Spanning Tree Protocol - STP, according to standard 802.1d-2004 (MAC Bridges - Spanning Tree/Rapid Spanning Tree);
- 5.2.2.2 Rapid Spanning Tree Protocol - RSTP, according to standard 802.1w-2001 (Rapid Spanning Tree), current addition of standard 802.1d-2004;
- 5.2.2.3 Multiple Spanning Tree Protocol - MSTP, according to standard 802.1s-2002 (Multiple Spanning Tree) current addition of standard 802.1q-2011;
- 5.2.2.4 VLAN Tagging, according to standard 802.1q-2011 (Virtual Bridged LAN - VLAN/Multiple Spanning Tree);
- 5.2.2.5 Link Aggregation, according to standard 802.3ad, 802.1ax-2008 with LACP support;
- 5.2.2.6 Flow Control, according to standard 802.3x-1997 (Flow Control at Gigabit Uplink and Full duplex port);
- 5.2.2.7 Link Layer Discovery Protocol – LLDP, according to standard 802.1AB (Station and Media Access Control Connectivity Discovery);

5.2.3 Management Characteristics

- 5.2.3.1 SSHv2 Remote Access via SSHv2;
- 5.2.3.2 Authentication via RADIUS or TACACS+ server;
- 5.2.3.3 Support IGMPv2 and IGMPv3, as well as the snooping process according to the proposed standards RFC 2236 - Internet Group Management Protocol, version 2 (11/1997) and RFC 3376 - Internet Group Management Protocol, version 3 (10/2002).
- 5.2.3.4 Syslog, according to RFC 5424 (The Syslog Protocol);
- 5.2.3.5 Network Time Protocol, according to RFC 1305;
- 5.2.3.6 If management is supported through a web interface, it shall be via HTTPS.
- 5.2.3.7 Support SNMPv2 and SNMPv3 protocols. SNMPv3 shall also be available with encryption.

5.3 Technical Characteristics for L2 switches

5.3.1 High Availability Characteristics

5.3.1.1 Media Redundant Protocol (MRP) according to standard IEC 62439-2 or similar.

5.3.2 Support integration with RSTP or MSTP.

5.3.2.1 Support one of these ring coupling protocol: Ring-Coupling (Hirschmann), Dynamic Ring Coupling (Moxa), Standby Coupling (Siemens) or similar.

5.4 Technical Characteristics for L3 switches

That set of equipment shall support all L2 features plus the following characteristics:

L3 Characteristics

5.4.1 Dynamic routing protocol OSPFv2, according to RFC 2328

5.4.2 Virtual Router Redundancy Protocol - VRRP, according to RFC 3768

5.4.3 DHCP Relay Support

5.4.4 Protocol Independent Multicast - Sparse Mode - PIM-SM, according to RFC 7761

5.4.5 Protocol Independent Multicast - Source-Specific Mode - PIM-SSM, conforming to RFC 4607.

6 EQUIPMENT DESCRIPTION - FIREWALLS

6.1.1 It shall be provided, installed and configured Firewalls **CISCO ASA 5506-X (HOLD)** with Security Plus License, working as main and backup, according to specs below:

Code	Description	Quantity
ASA 5506-X-SEC-BUN-K9	Cisco ASA 5506 Appliance with Unrestricted Firewall License including Security Plus License and 8 x 1 GE Integrated I/O	02

6.1.2 It shall be supplied one 48 VDC power supply for each firewall.

6.1.3 CONTRACTOR will be responsible for equipment basic configuration with all parameters provided by PETROBRAS during the project detailed.

6.1.4 The firmware version required for this equipment to be connected in the PETROBRAS NETWORK will be informed by PETROBRAS during the project detailed.

7 CERTIFICATION NETWORK TESTS

7.1 Structured Cabling Network shall be certified and an evidential report shall be submitted to PETROBRAS.



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- 7.2 Acceptance testing of structured cabling shall be performed at 100% points.
- 7.3 At least the Permanent Link (PL) certification shall be done according standard ABNT NBR 14565: 2013 or ISO / IEC 11801: 2002 for the appropriate Category / Class.
- 7.4 In the case of an external network point using RJ45 connectors, the certification shall use the channel mode according to standard ABNT NBR 14565: 2013 or ISO / IEC 11801: 2002 for the appropriate Category / Class.
- 7.5 Optic Cabling Network shall be certified and an evidential report shall be submitted to PETROBRAS.
- 7.6 Acceptance tests on optical cables shall be performed on 100% of the fibers.
- 7.7 The backbone test shall be performed at 850 nm and 1,300 nm windows for multimode fibers and at 1,310 nm and 1,550 nm for the single-mode fibers according to ISO / IEC TR 14.763-3
- 7.8 The attenuation shall be measured using light source and power meter.
- 7.9 Attenuation points using OTDR shall be characterized.
- 7.10 Measurements shall occur in both directions (A to B and B to A).

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