



TECHNICAL SPECIFICATION

Nº: I-ET-3010.1M-1200-800-P4X-001

CLIENT: SRGE

SHEET: 1 of 11

JOB: REFERENCE BASIC DESIGN

1001056398 0010

AREA: BÚZIOS

DP&T-SRGE

TITLE: **INSTRUMENTATION ADDITIONAL TECHNICAL REQUIREMENTS**

NP-1
ESUP

MICROSOFT WORD / V. 2003 / I-ET-3010.1M-1200-800-P4X-001_0.DOC

INDEX OF REVISIONS

REV.	DESCRIPTION AND/OR REVISED SHEETS
0	ORIGINAL ISSUE

PRELIMINARY

	REV. 0	REV. A	REV. B	REV. C	REV. D	REV. E	REV. F	REV. G	REV. H
DATE	MAY/23/19								
DESIGN	ESUP								
EXECUTION	GNIEDU								
CHECK	ANDRÉ LUIS								
APPROVAL	RAFAELJOSE								


INFORMATION IN THIS DOCUMENT IS PROPERTY OF PETROBRAS, BEING PROHIBITED OUTSIDE OF THEIR PURPOSE

FORM OWNED TO PETROBRAS N-381 REV. L



SUMMARY

1	INTRODUCTION	3
1.1	Object	3
1.2	Definitions.....	3
1.3	Abbreviations.....	3
2	REFERENCE DOCUMENTS, CODES AND STANDARDS	3
2.1	External References	3
2.2	Internal Documents	4
3	ENVIRONMENTAL AND OPERATING CONDITIONS.....	5
3.1	General.....	5
3.2	Installation Environment	6
3.3	Electromagnetic Interference Sources	6
3.4	Vibration	6
3.5	Mechanical Shocks	7
3.6	Storage.....	7
3.7	Available Power Supply.....	7
3.8	Available Instrument Air Supply.....	8
4	TECHNICAL REQUIREMENTS	8
4.1	Identification Criteria.....	8
4.2	Transmission and Control Signals.....	8
5	TESTS REQUIREMENTS	8
5.1	General.....	8
5.2	Ambient Air Temperature	8
5.3	Humidity	9
5.4	Salt Mist.....	9
5.5	Electromagnetic Compatibility	9
5.6	Vibration	10
5.7	Power Supply Variations	10
5.8	Insulation Resistance	10
5.9	Inclinations	10

	TECHNICAL SPECIFICATION	Nº: I-ET-3010.1M-1200-800-P4X-001	REV. 0
	AREA:	BÚZIOS	
	TITLE:	INSTRUMENTATION ADDITIONAL TECHNICAL REQUIREMENTS	
		SHEET 3 of 11	NP-1
			ESUP

1 INTRODUCTION

1.1 Object

1.1.1 This document establishes the Instrumentation and Automation Additional Technical Requirements for the UNIT

1.1.2 These requirements are general information related to all systems or refer to subjects that are not defined in other documents and some are remarks that shall be considered at detailed design phase.

1.2 Definitions

1.2.1 Refer to I-ET-3010.00-1200-940-P4X-002 - GENERAL TECHNICAL TERMS.

1.3 Abbreviations

The following abbreviations are used in this document:

AEPR	Automation & Electrical Panels Room
CSS	Control Safety System
ESD	Emergency Shutdown
HART	Highway Addressable Remote Transducer
IP	Ingress Protection Ratings
PLC	Programmable Logic Controller
SOS	Supervision and operation System

2 REFERENCE DOCUMENTS, CODES AND STANDARDS

2.1 External References

2.1.1 International Codes, Recommended Practices and Standards


ASTM - AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM	G21	STANDARD PRACTICE FOR DETERMINING RESISTANCE OF SYNTHETIC POLYMERIC MATERIALS TO FUNGI
------	-----	--

IEC - INTERNATIONAL ELECTRO TECHNICAL COMMISSION

IEC	60068	ENVIRONMENTAL TESTING
IEC	60079	EXPLOSIVE ATMOSPHERES
IEC	60092-504	ELECTRICAL INSTALLATIONS IN SHIPS - PART 504: AUTOMATION, CONTROL AND INSTRUMENTATION
IEC	60529	DEGREES OF PROTECTION PROVIDED BY ENCLOSURES (IP CODE)
IEC	60533	ELECTRICAL AND ELECTRONIC INSTALLATIONS IN SHIPS - ELECTROMAGNETIC COMPATIBILITY (EMC) – SHIP WITH A METALLIC HULL
IEC	61000	ELECTROMAGNETIC COMPATIBILITY (EMC)
IEC	61086	COATINGS FOR LOADED PRINTED WIRE BOARDS

	TECHNICAL SPECIFICATION		Nº: I-ET-3010.1M-1200-800-P4X-001	REV. 0
	AREA: BÚZIOS			SHEET 4 of 11
	TITLE: INSTRUMENTATION ADDITIONAL TECHNICAL REQUIREMENTS			NP-1
			ESUP	
IEC	61892	(CONFORMAL COATINGS)	MOBILE AND FIXED OFFSHORE UNITS -ELECTRICAL INSTALLATIONS	
IEC	CISPR-16		SPECIFICATION FOR RADIO DISTURBANCE AND IMMUNITY MEASURING APPARATUS AND METHODS	
INMETRO – INSTITUTO NACIONAL DE METROLOGIA, NORMALIZAÇÃO E QUALIDADE INDUSTRIAL				
PORTARIA 179 (18/MAIO/2010)		REGULAMENTO DE AVALIAÇÃO DA CONFORMIDADE PARA EQUIPAMENTOS ELÉTRICOS PARA ATMOSFERAS EXPLOSIVAS, NAS CONDIÇÕES DE GASES E VAPORES INFLAMÁVEIS E POEIRAS COMBUSTÍVEIS.		
PORTARIA 89 (23/FEVEREIRO/2012)		ALTERAÇÃO DA PORTARIA INMETRO Nº 179, DE 18/MAIO/2010.		
2.1.2 Classification Society				
The detailed design shall be submitted to approval by Classification Society. The design and installation shall take into account their requirements and comments.				
2.2 Internal Documents				
2.2.1 Project Specification				
I-ET-3010.1M-1200-800-P4X-005		FIELD INSTRUMENTATION		
I-ET-3010.00-1200-800-P4X-013		GENERAL CRITERIA FOR INSTRUMENTATION PROJECTS		
I-ET-3010.00-1352-130-P4X-001		FLOOR GRATINGS, TRAY SYSTEMS AND GUARDRAILS MADE OF COMPOSITE MATERIALS		
I-ET-3010.00-5140-700-P4X-001		SPECIFICATION FOR ELECTRICAL DESIGN FOR OFFSHORE UNITS		
I-ET-3010.00-5140-700-P4X-002		SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS		
I-ET-3010.00-5140-700-P4X-003		ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS		
I-ET-3010.00-5520-861-P4X-001		CONTROL AND SAFETY SYSTEM – CSS		
I-ET-3010.00-5520-861-P4X-002		SUPERVISION AND OPERATION SYSTEM – SOS		
I-ET-3010.00-5520-888-P4X-001		CSS/SOS PANEL		
I-RL-3010.1M-1200-940-P4X-001		GENERAL SPECIFICATION FOR AVAILABLE UTILITIES		
I-RL-3010.1M-1350-960-P4X-009		MOTION ANALYSIS		
I-RL-3010.1M-1350-960-P4X-001		PRELIMINARY ACCELERATION DATA		
I-ET-3000.00-1200-940-P4X-001		TAGGING PROCEDURE FOR PRODUCTION UNITS DESIGN		

	TECHNICAL SPECIFICATION	Nº: I-ET-3010.1M-1200-800-P4X-001	REV. 0
	AREA:	BÚZIOS	
	TITLE:	INSTRUMENTATION ADDITIONAL TECHNICAL REQUIREMENTS	
		SHEET 5 of 11	NP-1
			ESUP

3 ENVIRONMENTAL AND OPERATING CONDITIONS

3.1 General

- 3.1.1 All equipment and instrumentation devices shall be suitable to withstand the dynamics loads imposed by wave motions during tow and on location. For a detailed evaluation of maximum expected motions and accelerations during transit and operational conditions, see I-RL-3010.1M-1350-960-P4X-009 – MOTION ANALYSIS and I-RL-3010.1M-1350-960-P4X-001 – PRELIMINARY ACCELERATION DATA.
- 3.1.2 All equipment and their components, instruments shall be suitable for service and storage under tropical conditions of high temperature, high humidity, and heavy rainfalls and resistant against mold and fungus.
- 3.1.3 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.
- 3.1.4 All electrical/electronic instruments and equipment located in hazardous areas shall be according to IEC 60079 and IEC 61892-7 standards.
- 3.1.5 Electrical equipment installed in external areas, that shall be kept operating during emergency shutdown ESD-3P and ESD-3T shall be certified for installation in hazardous areas Zone 1 Group IIA temperature T3.
- 3.1.6 All instruments, junction box, 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 shall be approved by Classification Society.
- 3.1.7 All materials used shall be non-hygroscopic, flame retardant and resistant to corrosion caused by marine environmental and hydrocarbon continuous contact and they shall be in accordance with the Classification Society requirements.
- 3.1.8 All equipment, panels and instrumentation devices shall be suitable to be installed at the following minimum environmental and operating conditions described in item 3.2.

3.2 Installation Environment

3.2.1 Indoors Equipment

3.2.1.1 Air conditioned area

- Operational Temperature: 24 °C (± 1%, normal situations)/40°C (emergency situations);
- Maximum Temperature 45 °C (room)/70 °C (panel) (See note);
- Relative Air Humidity: 50% (± 5%);
- Salinity: 1 mg of NaCl/m³ of air.

NOTE: In emergency situations, the room temperatures will operate normally at 35°C, however may reach up to 45°C. In Panels and equipment shall be designed to withstand room temperature 45°C (like external panels) and ambient air temperature of 70°C without reduction of equipment's life expectancy and without operational interruptions.

3.2.1.2 Not air conditioned area

- Maximum Temperature: 45 °C (ambient air)/70 °C (panel)
- Minimum Temperature: 4 °C;
- Max. Rel. Air Humidity: 100%;
- Min. Rel. Air Humidity: 30%;
- Salinity: 1 mg of NaCl/m³ of air.

3.2.2 Outdoors equipment

3.2.2.1 Operating conditions

- Temperature: 4 °C to 45 °C;
- Relative Air Humidity: 100%;
- Salinity: 1 mg of NaCl/m³ of air;
- Altitude above sea level: 30 m (ship deck).

3.3 Electromagnetic Interference Sources


- UHF and VHF;
- Portable Radios.

All equipment, panels and instrumentation devices shall be comply with the standards series IEC 61000.

3.4 Vibration

3.4.1 Vibration Sources

- Diesel generator and reciprocating machines;
- Cranes;
- Helicopters;
- Platform structure.

	TECHNICAL SPECIFICATION	Nº: I-ET-3010.1M-1200-800-P4X-001	REV. 0
	AREA:	BÚZIOS	
	TITLE:	INSTRUMENTATION ADDITIONAL TECHNICAL REQUIREMENTS	
		SHEET 7 of 11	NP-1
			ESUP

3.4.2 Vibration Characteristics

3.4.2.1 Eventual

- Frequency: 5 Hz to 10 Hz;
- Period: 30 s to 1 min;
- Amplitude: ± 1.0 mm.

3.4.2.2 Continuous:

- Frequency: 10 Hz to 200 Hz;
- Period: Continuous;
- Acceleration: 1.5 g.

3.5 Mechanical Shocks

3.5.1 Shock Sources

- Transportation;
- Operation.

3.5.2 Characteristics:

- Acceleration: 5 g (peak);
- Duration: Less than 10 ms;
- Frequency: Maximum of 2/s.

3.6 Storage

- Maximum Temperature: 60 °C;
- Minimum Temperature: 10 °C;
- Max. Rel. Air Humidity: 90%;
- Min. Rel. Air Humidity: 40%.

3.7 Available Power Supply

3.7.1 For instrumentation and automation equipment, available power supply is defined in technical specification I-ET-3010.00-5140-700-P4X-003 – ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS. The different power supplies inside the panel shall be converted and distributed, including where necessary an AC/DC stabilized power supply unit for the cabinet internal distribution of 24 Vdc. For further details, see I-ET-3010.00-5520-888-P4X-001 – CSS/SOS PANEL

3.7.2 Electrical equipment shall be capable of withstanding transient voltage variations. For further details refer to – I-ET-3010.00-5140-700-P4X-002 SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS

3.7.3 For Package Units, other power supplies will be available, depending of the specific system requirements. For details see I-ET-3010.00-5140-700-P4X-003 – ELECTRICAL REQUIREMENTS FOR PACKAGES FOR OFFSHORE UNITS;

3.8 Available Instrument Air Supply

For details about specifications for air quality, see I-RL-3010.1M-1200-940-P4X-001 – GENERAL SPECIFICATION FOR AVAILABLE UTILITIES

4 TECHNICAL REQUIREMENTS

4.1 Identification Criteria

4.1.1 Refer to I-ET-3000.00-1200-940-P4X-001 – TAGGING PROCEDURE FOR PRODUCTION UNITS DESIGN.

4.2 Transmission and Control Signals

4.2.1 Pneumatic Instrumentation

- 20 to 100 kPa (0.2 to 1.0 bar). Also 40 to 200 kPa (0.4 to 2.0 bar) is allowed for the control valves, whenever necessary.

4.2.2 Electronic Instrumentation

- 4 – 20 mA plus digital communication with HART protocol, certified by the HART FOUNDATION.

4.2.3 Thermocouples

- Output signal in the range of millivolts (mV).

5 TESTS REQUIREMENTS

5.1 General

5.1.1 Control, safety and monitoring equipment and devices (power supplies, workstations, microcomputers, data servers, communication cards, controllers, I/O racks and network devices, among others) shall be designed to operate satisfactorily under the environmental conditions stipulated by the Classification Society and project documents.

5.2 Ambient Air Temperature

5.2.1 For proper test classification, the following locations are foreseen:

- a) Machinery spaces and AEPR;
- b) Indoor panels, racks and consoles installed in AEPR;
- c) Pump rooms;
- d) Open deck (such as: Topsides area, Main deck, etc.) and inside panels, racks or consoles installed in Open deck and Pump rooms.

Table 1 – Ambient air temperature by Location

Location	Range of Temperature
(a)	+ 5 °C to + 55 °C
(b)	+ 5 °C to + 70 °C
(c)	- 25 °C to + 55 °C
(d)	- 25 °C to + 70 °C

5.3 Humidity

- a) Location to avoid condensation: relative humidity up to 96% at all relevant temperatures;
- b) General: relative humidity up to 100% at all relevant temperatures.

5.3.1 In order to comply with the ambient air temperature and humidity requirements described above, the equipment/devices shall be tested in accordance with I-ET-3010.00-5140-740-P4X-002 – SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS.

5.4 Salt Mist


5.4.1 The applicable salt-contamination atmosphere is to be 1 mg/m³ of air, at all relevant temperatures and humidity conditions. In order to comply with this salt mist requirement, the equipment shall be subject to specific test severity in according to IEC 60092-504. The test procedure shall be in accordance with IEC 60068-2-52 Test Kb.

5.5 Electromagnetic Compatibility

5.5.1 Electronic equipment shall be designed to operate properly under conducted and radiated disturbance levels and shall not affect the operation of any other equipment or system. The equipment shall be subject to the specific type tests procedures and severity listed in Table 3.

Table 3 – Type tests for electromagnetic compatibility approval

Test	Procedure	Severity
Electrostatic discharge	IEC 61000-4-2 level 3 severity standard	IEC 60092-504
Electromagnetic field	IEC 61000-4-3 level 3 severity standard	
Conducted radiofrequency interference	IEC 61000-4-6 level 2 severity standard	
Conducted fast transients (burst)	IEC 61000-4-4 level 3 severity standard	
Conducted slow transients (surge)	IEC 61000-4-5 level 2 severity standard	
Radiated emissions	IEC CISPR 16-1; CISPR 16-2	

	TECHNICAL SPECIFICATION	Nº: I-ET-3010.1M-1200-800-P4X-001	REV. 0
	AREA:	BÚZIOS	
	TITLE:	INSTRUMENTATION ADDITIONAL TECHNICAL REQUIREMENTS	
		SHEET 10 of 11	NP-1
		ESUP	

Conducted emissions	IEC CISPR 16-1; CISPR 16-2
---------------------	----------------------------

5.6 Vibration

5.6.1 The vibration levels are those indicated in IEC 60092-504. The test procedure shall be in accordance with IEC 60068-2-6 Test Fc.

5.7 Power Supply Variations

5.7.1 It shall be designed and manufactured such that they are capable of operating satisfactorily under the variations of voltage, frequency and harmonic distortion of the power supply. For further details refer to I-ET-3010.00-5140-700-P4X-002 – SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS.

5.7.2 In order to guarantee the properly operation under these severe power supply conditions, the equipment shall be tested to the type tests procedures and severity listed below:

5.7.3 Power Supply Failure

5.7.3.1 The test conditions for power supply failure are those indicated in IEC 60092-504 and the test procedure shall be in accordance with IEC 61000-4-11.

5.7.4 Power Supply Variations

5.7.4.1 The test conditions for power supply variations shall be in accordance with I-ET-3010.00-5140-740-P4X-002 – SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS.

5.7.4.2 The test procedure for power supply variations shall be in accordance with IEC 61000-4-11.

5.7.5 Conducted Low Frequency Interference (harmonics)

5.7.5.1 The test conditions for harmonic distortion are those indicated in IEC 60092-504 and the test procedure shall be in accordance with IEC 60533.

5.8 Insulation Resistance

5.8.1 The insulation resistance applicable to electrical and electronic equipment is those indicated in IEC 60092-504.

5.9 Inclinations

5.9.1 The functional tests are performed at the rated operational voltage. The severities shall be in accordance with IEC 60092-504. The testing conditions are the following ones:



TECHNICAL SPECIFICATION

Nº: I-ET-3010.1M-1200-800-P4X-001

REV. 0

AREA: BÚZIOS

SHEET 11 of 11

TITLE: INSTRUMENTATION ADDITIONAL TECHNICAL REQUIREMENTS

NP-1

ESUP

- Static test:
 - Inclination to the vertical at an angle of at least 22.5°, then inclination to at least 22.5° on the other side of the vertical and in the same plane;
 - Inclination to the vertical at an angle of at least 22.5° in plane at right angle to the one used previously, then inclination to at least 22.5° on the other side of the vertical and in the same plane;
- Dynamic test:
 - The equipment is to be rolled to an angle of 22.5° each side of the vertical with a period of 10 s;
 - The test in each direction is to be carried out for not less than 15 min.

PRELIMINARY