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1. INTRODUCTION

This Technical Description has been prepared having basis on Brazilian Labor Secretary Ordinance 916 of July 30th, 2019, for machines and equipment and serve as a guide for the SELLER to comply with its requirements. The full compliance with NR-12 is mandatory.

The Brazilian Economy Ministry often issues technical notes clarifying items in NR-12. The user of this Technical Description shall consider these publications, since they reflect the understanding of the enforcement or regulatory bodies regarding the legal requirements established in this regulatory standard.

This Technical Description contains mandatory technical requirements and covers others Regulatory Standard that are also, but not only, applied into the Unit Plant as a Guideline to help SELLER to comply with Brazilian Labor Secretary Standards.

2. REFERENCE DOCUMENTS

2.1 BRAZILIAN REGULATIONS

- NR-12- “SEGURANÇA NO TRABALHO EM MÁQUINAS E EQUIPAMENTOS” (Equipment and Machinery Labor Safety)
- NR-17 – “ERGONOMIA” (Ergonomics)
- NR-37 – “SEGURANÇA E SAÚDE EM PLATAFORMAS DE PETRÓLEO” (Safety and Health at Oil Marine Platform)

2.2 BRAZILIAN STANDARDS

- ABNT NBR ISO 3864-1: “Símbolos gráficos — Cores e sinais de segurança - Parte 1: Princípios de design para sinais e marcações de segurança” (Graphical symbols – Colors and Safety Signs)
- ABNT NBR ISO 3864-2: “Símbolos gráficos - Cores de segurança e sinais de segurança - Parte 2: Princípios de design para rótulos de segurança de produtos” (Graphical symbols – Colors and Safety Signs)
- ABNT NBR ISO 12100: “Segurança de máquinas — Princípios gerais de projeto — Avaliação e redução de riscos” (Safety of machinery — General principles for design — Risk assessment and risk reduction)



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3. DEFINITIONS


ABNT – “Associação Brasileira de Normas Técnicas” (Brazilian Association of Technical Standards).

Seller – Hired Company which is responsible for the supply of materials and execution of engineering services, including manufacturers, packagers, main contractor, subcontractors, suppliers, sub suppliers, integrators, constructors, and all technical personnel involved.

Buyer - It is defined as the company that is buying the FPSO, Petrobras

CREA – “Conselho Regional de Engenharia e Agronomia” (Regional Council of Engineering and Agronomy).

Vendor – The company responsible for machines or packages fabrication, construction or assembly.

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4. COMPLIANCE WITH NR-12

4.1 SCOPE

- 4.1.1 All machines and equipment shall be designed, manufactured, assembled and inspected according to codes and Brazilian or international standards related thereto.
- 4.1.1.1 NR-12 requirements are addition to design standards and shall be attended. It is the SELLER responsibility to comply with the requirements of NR-12.
- 4.1.2 SELLER shall attend the requirements of this technical specification for all equipment and machines under the NR-12 scope. The ANNEX I – PRELIMINARY LIST OF MACHINES AND EQUIPMENT TYPE UNDER NR-12 SCOPE shows a preliminary type of equipment list for NR-12 scope. SELLER shall issue the final list, in Portuguese, indicating all equipment under the NR-12 scope, according to ANNEX II– NR-12 Reference List for all machines and equipment of the unit that are within the scope of the NR-12.

4.2 REQUIREMENTS

- 4.2.1 SELLER shall issue a record listing all machines and equipment of the unit that are within the scope of the NR-12, according to the model of ANNEX II– NR-12 Reference List for all machines and equipment.
- 4.2.1.1 SELLER shall issue a drawing with the localization of machines and equipment based on the list of ANNEX II– NR-12 Reference List for all machines and equipment, including ITEM number. This drawing must be in accordance with the model of ANNEX III– NR-12 Drawing model for machines and equipment positioning.
- 4.2.2 Color, size of letter, numbers and symbols indicated in machines or equipment shall comply with ABNT NBR ISO 3864-1 and NBR ISO 3864-2.
- 4.2.3 Where machinery and equipment are installed, the circulation areas shall be properly demarcated and in accordance with official technical standards, including the item 5 of NBR ISO 12100.
- 4.2.4 Starting and stopping devices for machinery and equipment shall be designed, selected and installed in such a way that:
- they are not located in their danger zones;
 - may be switched on or off in an emergency by anyone other than the operator;
 - prevent involuntary activation or shutdown by the operator or in any other accidental manner;
 - cannot be bypassed.
- 4.2.5 The start, stop, drive and control components that make up the machine operating interface shall:
- enable the installation and operation of the emergency stop system; and
 - operate at an extra low voltage up to 25 VAC or up to 60 VDC, or have another mode of protection against electric shock, in accordance with current official Technical Standards.

4.2.6 Danger zones of machinery and equipment shall be provided with safety systems characterized by fixed guards, movable guards and interlocking safety devices to ensure the protection of the health and physical integrity of workers.

4.2.7 Power transmissions and their interconnected moving or accessible machinery and equipment components shall be fitted with fixed guards or movable with interlocking devices that prevent access from all sides.

4.2.8 Fixed guards must be painted in accord with NBR 7195.

4.2.9 Machines and equipment that present a risk of rupture of parts, projection of materials, particles or substances shall have protections that guarantee the health and safety of workers.

4.2.9.1 Special attention shall be paid for some equipment and parts, but not only:

- ◆ Pumps and compressors coupling guards;
- ◆ Workshop equipment
 - grinding machines;
 - workshop lathe;
 - Milling cutter;
 - Drilling machine;
 - Automatic electric saw;
 - Hydraulic press;
- ◆ Equipment gears, pulley, v-belt, impellers, protection guards;
- ◆ Electric shocks protection and grounding;
- ◆ Galley equipment, as food mixer, blenders, slicers, fruit juicer, dough cylinder machine, potato peeler and etc;
- ◆ Laundry equipment, as washing and drying machines;

Hazard and ergonomic analyze, hazard zone and electric shock protections to avoid fingers and eyes injuries, correct color identification, warning signaling are applied according to NR-12 requirements.

4.2.10 Emergency shutdown devices (switch) shall be positioned in places easily accessible and viewable by operators at their workplaces and by others and kept permanently accessible.

4.2.11 Warning stickers to inform electrical voltage is required.


4.2.12 Hoses, piping and other pressurized components shall be located or protected in such a way that a rupture of these components and fluid leaks cannot cause work accidents.

4.2.13 Hoses used in pressurized systems shall have an indication of the maximum permissible working pressure specified by the manufacturer.

4.2.14 Workstation surfaces shall not have sharp corners, rough, sharp surfaces and sharp-edged edges or burrs at the points of contact with segments of the operator's body, and fasteners such as nails, rivets and screws to do not add risks to the operation.

4.2.15 Fuel tank filler neck and other materials shall be located no more than 1.50 m (one meter and fifty centimeters) above the floor or than a support platform to perform the task.

4.2.15.1 Machines and equipment with fuel tanks (or tanks with inflammable liquids) must have containment barriers to prevent leakage. Those barriers must be in accord with technical standards.

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- 4.2.16 When any part of the equipment presents a risk of burns to workers, protective methods such as thermal insulating, barriers, etc. shall be used.
- 4.2.17 Machinery and equipment shall have safety alerts and safety signs, to warn workers and third parties about the risks to which they are exposed.
- 4.2.18 Safety signs shall:
- be prominent on the machine or equipment;
 - be in a clear and visible location;
 - be easy to understand.
- 4.2.19 Markings on machinery and equipment shall:
- be written in the Portuguese language (Brazil); and
 - be legible.
- 4.2.20 The markings shall clearly indicate the risk and the part of the machine and equipment to which they refer.
- 4.2.21 Machinery and equipment shall have in a visible place the indelible information, containing at least:
- Company name, CNPJ (if manufactured in Brazil) and address of the manufacturer or importer;
 - type, model and capacity information;
 - serial number or identification, and year of manufacture;
 - CREA manufacturer (if manufactured in Brazil) or importer registration number;
 - Weight.
- 4.2.22 Operation and maintenance manuals shall be written in Portuguese language (Brazil);
- 4.2.23 Machines and equipment used for hoist and transportation must be in accord with NR-37 standard, NR-12 standard and technical standards, in comply with the NR-37 item 37.20.1.
- 4.2.24 Machines end equipment for galley and cold storage chamber must be in accord with NR-12 and NR-37. The cold storage chamber must have horn and emergency shutdown button in its interior and allow opening internally.
- 4.2.25 The minimum distance between machinery, in accordance with their characteristics and applications, shall safeguard workers' safety during operation, maintenance, adjustment, cleaning and inspection, and to permit the movement of body segments, due to the nature of the task.
- 4.2.26 The floor of the workplace where machinery and equipment are installed and circulation areas must be resistant to the loads to which they are subjected and must not pose any risk of accidents.
- 4.2.27 For work on machinery and equipment, the provisions contained in Regulatory Standard no. 17 - Ergonomics must be respected.
- 4.2.28 The design of the machinery or equipment shall foreseen safe means for the installation, removal, dismantling or transportation activities, even in parts and not allow errors in assembly or reassembly.

5. ANNEXES
ANNEX I – PRELIMINARY LIST OF MACHINES AND EQUIPMENT TYPE UNDER NR-12 SCOPE

MACHINES AND EQUIPMENT		
Kitchen waste shredder	Rail car	Lathe
Washer	Pump	Ship fender
Dryer	Hydraulic power unit	Lifting winches
Stove	Quick release hook	Nitrogen generation package
Oven	Lifeboat	Flare ignition system
Kneading machine	Lifeboat davit systems	Chemical injection package
Industrial Slicer	Rescue boat	Measurement package
Industrial Food mixer	Rescue boat davit systems	Monorail
Cold room meat	Offloading station	Industrial vacuum cleaner
Vegetable cold room	Offloading hose reel	Hydraulic jack
Main cold room	Hawser reel	Hydraulic press
Dairy cold room	Cranes	Ultrasonic-action cleaning tank
Kitchen hood	Fans	Washing tank
Kitchen fan	Electric hoist	Automatic sawing machine
Turbines	Pneumatic hoist	Grinding machine
Engines	Engine hoist (hydraulic)	Milling machine
Powered generators	Seawater desalination unit	Inductive heater for bearings
Powered generators package	Batteries for industrial power generation systems	Column-mounted drilling machine
HVAC System	Overhead crane	Hydraulic hose crimping
Evaporator	Fire damper	Portable hydrostatic test kit
Trucks/trolleys	Pressurisation fan	Tirfor
Emergency panel	Unit outdoor laboratory	Pneumatic oil drive pump
	Ac unit indoor laboratory	Joint cutting machine
Compressors	Air conditioning unit	Pneumatic grease drive pump
Dampers	Air handling unit	Electric threading chaser
	Hypochlorite generating unit	Portable hydraulic fluid filtration unit
		Device for testing diesel engine injection nozzle



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ANNEX II- NR-12 Reference List for all machines and equipment

List model for all machines and equipment of the unit that are within the scope of the NR-12.



ANNEX II- NR-12
Reference List for all r



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ANNEX III– NR-12 Drawing model for machines and equipment positioning

Drawing model for localization of machines and equipment that are within the NR-12 list of equipment.



ANNEX III– NR-12
Drawing model for m: