

	TECHNICAL SPECIFICATION		Nº: I-ET-3010.00-1352-130-P4X-001							
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PRELIMINARY

1 OBJECTIVE

1.1. The objective of this standard is to establish requirements for floor gratings, tray systems, and guardrails made of composite materials molded by the pultrusion process for use in offshore facilities.

1.2. The composite material shall comply with ABNT NBR 15708 requirements, in addition to the requirements indicated in this specification.

1.3. This Standard is not applicable to molding processes other than pultrusion. Items obtained by other processes shall be previously evaluated by Petrobras before being applied.

1.4. ANNEX B defines where composite material may be applied. The definition of areas where composite material can be used shall consider the maximum allowed exposure temperature as defined by manufacturer and the results from Fire Propagation Study. All analysis shall be approved by PETROBRAS.

1.5. This Standard contains only Technical Requirements.

2 SUPPLEMENTARY DOCUMENTS

The documents listed below contain valid requirements for the present Standard:

2.1. ABNT NBR 15708 – Indústria de petróleo e gás natural – Perfis pultrudados

2.2. ASTM A 193 - Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High Temperature or High Pressure Service and Other Special Purpose Applications

2.3. ASTM B 841 - Standard Specification for Electrodeposited Coatings of Zinc Nickel Alloy Deposits

2.4. DR-ENGP-I-1.15 – COLOR CODING

2.5. I-ET-3010.00-5140-700-P4X-002 – SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS

2.6. IMO RESOLUTION A.653 (16) - Recommendation on Improved Fire Test Procedures for Surface Flammability of Bulkhead, Ceiling and Deck Finish Materials

2.7. NR-30 – Anexo II - PLATAFORMAS E INSTALAÇÕES DE APOIO (Brazilian Regulation).

3 ADDITIONAL CRITERIA

3.1. Floor Grating

3.1.1 The criteria for use of grating panels in offshore facilities belonging to PETROBRAS and the precautions to be considered before, during, and after installation are found in ANNEX A.

3.1.2 Floor grating made of fiberglass shall not be installed in closed areas.

3.1.3 The clips for attaching the grating panel to the supporting structure shall be made of UNS S31600 stainless steel.

3.1.4 The color as defined in document DR-ENGP-I-1.15 – COLOR CODING and NR-30 – Anexo II – PLATAFORMAS E INSTALAÇÕES DE APOIO shall be adopted for floor gratings. In case of conflict between NR-30 – Anexo II - PLATAFORMAS E INSTALAÇÕES DE APOIO (Brazilian Regulation) and COLOR CODING, PETROBRAS shall be consulted for approval.

3.2. Tray System

3.2.1 See the I-ET-3010.00-5140-700-P4X-002 – SPECIFICATION FOR ELECTRICAL MATERIAL AND EQUIPMENT FOR OFFSHORE UNITS for specification of tray system.

3.2.2 The color as defined in document DR-ENGP-I-1.15 – COLOR CODING and NR-30 – Anexo II – PLATAFORMAS E INSTALAÇÕES DE APOIO shall be adopted for tray system. In case of conflict between NR-30 – Anexo II - PLATAFORMAS E INSTALAÇÕES DE APOIO (Brazilian Regulation) and COLOR CODING, PETROBRAS shall be consulted for approval.

3.3. Guardrail

3.3.1. The criteria for use of guardrails in offshore facilities and the precautions to be considered before, during, and after installation are found in ANNEX A.

3.3.2. The anchoring system of the guardrail shall be made of carbon steel painted or with anticorrosive coating suitable for the installation site according to PETROBRAS standards.

3.3.3. The handrail shall comprise 50.8 mm profile having a square section and 6.35 mm thickness, and shall be 1100 mm \pm 3 mm above the floor level. Leveling flaws after erection shall not be accepted.

3.3.4. There shall be at least one crossbar having a square section of up to 50.8 mm and 6.35 mm thickness, at an equivalent distance from the handrail and toe board. There may not be more than three crossbars, which shall keep the same distance between each other and between the handrail and the toe board.



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3.3.5. There shall be a toe board with 200 mm in height (as minimum) and assembled in such a manner that its distance from the floor is 10 mm. The toe board may be fixed to the structure through bolts securing the guardrail panels to the floor.

3.3.6. The guardrail shall be fixed to the floor by means of 1/2" bolts and nuts and 25 mm washers made of AISI 316 stainless steel or ASTM A193 Grade B7 carbon steel with Zn-Ni coating according to ASTM standard B 841 Class 1 Type B/E. Bolts shall have a partial thread and be sized so that the thread is not in contact with the composite material of any of the profiles or inserts, thereby avoiding wear on the holes of these profiles and inserts.

3.3.7. The color as defined in document DR-ENGP-I-1.15 – COLOR CODING and NR-30 – Anexo II – PLATAFORMAS E INSTALAÇÕES DE APOIO shall be adopted for guardrails. In case of conflict between NR-30 – Anexo II - PLATAFORMAS E INSTALAÇÕES DE APOIO (Brazilian Regulation) and COLOR CODING, PETROBRAS shall be consulted for approval.

PRELIMINARY

**ANNEX A - USE OF FLOOR GRATINGS, TRAY SYSTEMS, AND GUARDRAILS IN
OFFSHORE FACILITIES BELONGING TO PETROBRAS**

A-1 The use of floor gratings, tray systems, and guardrails made of composite material in offshore facilities belonging to PETROBRAS shall consider the maximum allowed exposure temperature as defined by manufacturer and the results from Fire Propagation Study. All analysis shall be approved by PETROBRAS.

A-2 The use of floor gratings, tray systems, and guardrails made of composite material shall satisfy the temperature ranges defined in the Fire Propagation Study, considering at least the following criteria:

Floor gratings, tray systems, and guardrails made of composite material shall not be used in areas which, according to the Fire Propagation Study, may reach a temperature higher than their maximum temperature of use.

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**ANNEX B - CRITERIA OF APPLICATION FOR FLOOR GRATINGS, TRAY SYSTEMS,
AND GUARDRAILS IN FIXED AND FPSO PLATFORMS BELONGING TO
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CRITERIA OF APPLICATION FOR FLOOR GRATINGS, TRAY SYSTEMS, AND GUARDRAILS IN FPSO PLATFORMS

Criteria ABNT 15708-3 - Annex A			Petrobras Concept for FPSO				
	Local	Service	Fire Integrity Level	Local	pultruded grating L2 1.1/2	injected grating L2 2.1/2	guardrails L2
1	Machinery Spaces	Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue. If the machinery space does not contain any internal combustion machinery, other oil-burning, oil-heating, or oil-pumping units, fuel oil filling stations, or other potential hydrocarbon fire sources, and has not more than 2.5 kg/m ² of combustible storage, gratings of integrity level 2 may be used in lieu of level 1.	1	turbogenerators and turbocompressors hoods, motogenerators and motocompressors rooms, boilers and furnaces	C	C	P
		Personnel walkways, catwalks, ladders, platforms or access areas other than described above.	2		P	P	P
2	Cargo Pump Rooms	All personnel walkways, catwalks, ladders, platforms or access areas.	1	Engine room (cargo pump areas)	NP	NP	NP
3	Cargo Holds	Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue.	1	Chain lockers	NP	NP	P
		Personnel walkways, catwalks, ladders, platforms or access areas other than those described above, observing that for these applications, it's necessary doing the other tests required by ABNT 15708.	2		P	P	P
4	Cargo Tanks	All personnel walkways, catwalks, ladders, platforms or access areas. If these spaces are normally entered when underway, gratings of L1 integrity shall be required. It shall be observed that for these applications, it's necessary doing the other tests required by ABNT 15708.	2	Tanks for oil storage	P	P	P
5	Fuel Oil Tanks	All personnel walkways, catwalks, ladders, platforms or access areas. If these spaces are normally entered when underway, gratings of L1 integrity shall be required. It shall be observed that for these applications, it's necessary doing the other tests required by ABNT 15708.	2	Inside fuel oil tanks	P	P	P
6	Ballast Water Tanks	All personnel walkways, catwalks, ladders, platforms or access areas. If these spaces are normally entered when underway, gratings of L1 integrity shall be required. It shall be observed that for these applications, it's necessary doing the other tests required by ABNT 15708.	2	Ballast Water Tanks	P	P	P
7	Cofferdams, void spaces, double bottoms, pipe tunnels, etc.	All personnel walkways, catwalks, ladders, platforms or access areas. If these spaces are normally entered when underway, gratings of L1 integrity shall be required. It shall be observed that for these applications, it's necessary doing the other tests required by ABNT 15708.	2	Cofferdams, void spaces, double bottoms, pipe tunnels, etc.	P	P	P
8	Accommodation, service, and control spaces	All personnel walkways, catwalks, ladders, platforms or access areas	1	Control spaces, inside accommodation, offices	NP	NP	NP



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CRITERIA OF APPLICATION FOR FLOOR GRATINGS, TRAY SYSTEMS, AND GUARDRAILS IN FPSO PLATFORMS							
Criteria ABNT 15708-3 - Annex A				Petrobras Concept for FPSO			
	Local	Service	Fire Integrity Level	Local	pultruded grating L2 1.1/2	injected grating L2 2.1/2	guardrails L2
9	Lifeboat embarkation or temporary safe refuge stations in open deck areas	All personnel walkways, catwalks, ladders, platforms or access areas	2	Embarkation stations on inflatable liferafts, lifeboats, rescue boats, muster stations at open-deck area	P	P	P
10	Open Decks or semi-enclosed areas	Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue. Vessels fitted with deck foam firefighting systems require gratings of L1 integrity for foam system operational areas and access routes.	2	Decks between process modules, access catwalks, access ladders, skids of equipment, process plant and utilities, flare access, riser balcony.	P	P	P
		Personnel walkways, catwalks, ladders, platforms or access areas other than described above, observing that for these applications, it's necessary doing the other tests required by ABNT 15708.	2		P	P	P
12	Other Open Areas or Semi-enclosed areas	Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue. Vessels fitted with deck foam firefighting systems require gratings of L1 integrity for foam system operational areas and access routes.	2	Decks between process modules, access catwalks, access ladders, skids of equipment, process plant and utilities, turret's (including pull in deck), flare access, riser balcony.	P	P	P
		Personnel walkways, catwalks, ladders, platforms or access areas other than those described above, observing that for these applications, it's necessary doing the other tests required by ABNT 15708.	2		P	P	P
13	Other Closed Areas, not described above	Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue.	1	Other Closed Areas, not described above	NP	NP	P

C Permitted, with the authorization of the classification society

P Permitted

NP Non-permitted



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CRITERIA OF APPLICATION FOR FLOOR GRATINGS, TRAY SYSTEMS, AND GUARDRAILS IN FIXED PLATFORMS

Criteria ABNT 15708-3 - Annex A				Petrobras Concept for Fixed Platform			
	Local	Service	Fire Integrity Level	Local	pultruded grating L2 1.1/2	injected grating L2 2.1/2	guardrails L2
1	Machinery Spaces	Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue. If the machinery space does not contain any internal combustion machinery, other oil-burning, oil-heating, or oil-pumping units, fuel oil filling stations, or other potential hydrocarbon fire sources, and has not more than 2.5 kg/m ² of combustible storage, gratings of integrity level 2 may be used in lieu of level 1.	1	turbogenerators and turbocompressors hoods, motogenerators and motocompressors rooms, boilers and furnaces	P	P	P
		Personnel walkways, catwalks, ladders, platforms or access areas other than described above.	2		P	P	P
2	Cargo Pump Rooms	All personnel walkways, catwalks, ladders, platforms or access areas.	1	NA	NA	NA	NA
3	Cargo Holds	Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue.	1	NA	NA	NA	NA
		Personnel walkways, catwalks, ladders, platforms or access areas other than those described above. It shall be observed that for these applications, it's necessary doing the other tests required by ABNT 15708.	2		NA	NA	NA
4	Cargo Tanks	All personnel walkways, catwalks, ladders, platforms or access areas. If these spaces are normally entered when underway, gratings of L1 integrity shall be required. It shall be observed that for these applications, it's necessary doing the other tests required by ABNT 15708.	2	NA	NA	NA	NA
5	Fuel Oil Tanks	All personnel walkways, catwalks, ladders, platforms or access areas. If these spaces are normally entered when underway, gratings of L1 integrity shall be required. It shall be observed that for these applications, it's necessary doing the other tests required by ABNT 15708.	2	areas outside diesel, alcohol and fuel tanks in general	P	P	P
6	Ballast Water Tanks	All personnel walkways, catwalks, ladders, platforms or access areas. If these spaces are normally entered when underway, gratings of L3 integrity shall be required. It shall be observed that for these applications, it's necessary doing the other tests required by ABNT 15708.	2	NA	NA	NA	NA
7	Cofferdams, void spaces, double bottoms, pipe tunnels, etc.	All personnel walkways, catwalks, ladders, platforms or access areas. If these spaces are normally entered when underway, gratings of L2 integrity shall be required. It shall be observed that for these applications, it's necessary doing the other tests required by ABNT 15708.	2	NA	NA	NA	NA
8	Accommodation, service, and control spaces	All personnel walkways, catwalks, ladders, platforms or access areas	1	Control spaces, inside accommodation, offices	NP	NP	NP



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CRITERIA OF APPLICATION FOR FLOOR GRATINGS, TRAY SYSTEMS, AND GUARDRAILS IN FIXED PLATFORMS

Criteria ABNT 15708-3 - Annex A		Petrobras Concept for Fixed Platform					
Local	Service	Fire Integrity Level	Local	pultruded grating L2 1.1/2	injected grating L2 2.1/2	guardrails L2	
9	Lifeboat embarkation or temporary safe refuge stations in open deck areas	All personnel walkways, catwalks, ladders, platforms or access areas	2	Embarkation stations on inflatable liferafts, lifeboats, rescue boats, muster stations at open-deck area	P	P	P
10	Open Decks or semi-enclosed areas	Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue. Vessels fitted with deck foam firefighting systems require gratings of L1 integrity for foam system operational areas and access routes.	2	Decks between process modules, access catwalks, access ladders, skids of equipment, process plant and utilities, flare access, transference pumps areas, spider deck, cellar deck, drilling deck, derricks, wellhead.	P	P	P
		Personnel walkways, catwalks, ladders, platforms or access areas other than described above, observing that for these applications, it's necessary doing the other tests required by ABNT 15708.	2		P	P	P
11	Other Open Areas or Semi-enclosed areas	Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue. Vessels fitted with deck foam firefighting systems require gratings of L1 integrity for foam system operational areas and access routes.	2	Decks between process modules, access catwalks, access ladders, skids of equipment, process plant and utilities, flare access, transference pumps areas, spider deck, cellar deck, drilling deck, derricks, wellhead.	P	P	P
		Personnel walkways, catwalks, ladders, platforms or access areas other than those described above, observing that for these applications, it's necessary doing the other tests required by ABNT 15708.	2		P	P	P
12	Other Closed Areas, not described above	Walkways or areas which may be used for escape, or access for firefighting, emergency operation or rescue.	1	Firefighting pump room	NP	NP	NP

C Permitted, with the authorization of the classification society

P Permitted

NP Non-permitted

NA Not applicable