

GENERAL SPECIFICATION

STRUCTURAL

GS EP STR 104

**Design and fabrication of technical cubicles
for offshore and onshore oil installations**

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1. Scope

To define rules governing the design of transportable prefabricated technical cubicles of less than 150 T for offshore oil installations. This specification applies to onshore technical cubicles only to the extent to which the requirements are relevant.

To define the specifications applicable to the studies, supply, construction, fitting out and installation of transportable, prefabricated technical cubicles for offshore oil installations.

These specifications may be applied in full or in part for premises incorporated in the structure of an offshore oil installation.

Special provisions, specific to each project (layout, climatic conditions, programme, function, equipment, etc.), shall be covered by appropriate job specifications.

2. Reference documents

The reference documents listed below form an integral part of this General Specification.

Where there are local regulations, their instructions and those of the standards or codes to which they refer shall always be applied, in addition to or in place of the instructions in this document.

External Documents

Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the effective date of this document.

Reference	Title
AISC 360	Specification for Structural Steel Buildings
API RP 500	Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Division 1 and Division 2
AWS D1.1/D1.1M	Structural Welding Code - Steel
BS 4727-3	Glossary of electrotechnical, power, telecommunication, electronics, lighting and colour terms. Terms particular to telecommunications and electronics. Acoustics and electroacoustics
BS EN 61260	Electroacoustics. Octave-band and fractional-octave-band filters
EN 60079-14	Explosive atmospheres - Part 14: Electrical installations design, selection and erection
IEC 60034-9	Rotating electrical machines - Part 9 : Noise limits
IEC 60079-13	Explosive atmospheres - Part 13: Equipment - protected by pressurized rooms 'p'
IMO FTP Code	International Code for Application of Fire Test Procedures

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Reference	Title
IMO MODU Code	Code for the Construction and Equipment of Mobile Offshore Drilling Units - Chapter 9
IMO Resolution A.414	Code for the Construction and Equipment of Mobile Offshore Drilling Units - Chapter 9
IMO Resolution A.468	Code on noise levels on board ships
IMO Resolution A.649	Code for the Construction and Equipment of Mobile Offshore Drilling Units
IMO Resolution A.757	Standards for the calculation of the width of stairways forming means of escape on passenger ships
IMO Resolution A 754	Recommendation on Fire Resistance Tests for "a", "B" and "F" Class Divisions
ISO 1182	Reaction to fire tests for building products - Non-combustibility test
ISO 15614-1	Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys
ISO 3008	Fire resistance tests - Door and shutter assemblies
ISO 3009	Fire-resistance tests - Elements of building construction - Glazed elements
ISO 5657	Reaction to Fire Tests - Ignitability of building products using a radiant heat source
ISO 834-1	Fire resistance tests - Elements of building construction - Part 1: General requirements
ISO 9606-1	Qualification testing of welders - Fusion welding - Part 1: Steels

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Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published in the applicable yearly collection.

Reference	Title
GS EP COR 350	External protection of offshore and coastal structures and equipment by painting
GS EP ELE 001	Electrical design criteria
GS EP ELE 031	Design of earthing and bonding systems for Offshore Installations
GS EP ELE 081	Lighting
GS EP ELE 161	Electrical cables

Reference	Title
GS EP SAF 216	Area classification
GS EP SAF 253	Impacted area, restricted area and fire zones
GS EP SAF 337	Passive Fire Protection: basis of design
GS EP STR 001	Weight monitoring and weighing offshore and onshore units
GS EP STR 102	Design of offshore topside structure

3. Functions

A technical cubicle is a closed and covered construction, with openings, cable entries and/or conduits, containing technical equipment, big enough to accommodate people needing to work or remain inside.

The transportable and entirely prefabricated cubicles are factory fitted, ready for installation or insertion on a fixed or floating offshore platform. They can also be built into the main framework of a structure.

The term technical cubicle covers the following spaces (non-exhaustive list):

- Electrical, instrumentation, communication and air conditioning plant rooms
- Offices, stores, workshops
- Kitchens, refectories, toilets, watch rooms
- Radio rooms, control rooms, modular accommodation premises, temporary shelters
- Laboratories (subject to studies specific to this type of activity).

These areas can be “inhabited” or “uninhabited” and provide “vital functions” or “secondary functions”, according to the definitions below.

- **Inhabited areas**

Accommodation - Shelter pending evacuation.

Areas regularly and continuously occupied: offices, workshops, laboratories, watch rooms and radio rooms, control rooms, kitchens, refectories, modular accommodation rooms.

- **Uninhabited areas**

Personnel are present in these areas only occasionally and for short periods.

- **Vital functions**

Safety: protection of personnel, shelter pending evacuation, process control and installation safety functions, communications, emergency power supply, fire-fighting.

Production: determined by the risks: pollution, aggravation of an accidental situation, loss of production (importance of the function to production and time/cost of replacement).

- **Secondary functions**

All others not included in the above.

The structure is defined by contractual documents. In the event of contradiction between documents, the following order of precedence shall apply:

- Job specification
- Basic drawings
- Specifications.

If necessary, account must be taken of additional or planned future equipment in the job specification.

The life of a structure is normally 20 years.

4. Design methods

4.1 Fire resistance

The level of fire resistance for each segregated area should be defined in the **general safety design**. It is important to assess the level of risk and the consequences of damage caused by fire in the cubicle. The **decision flow diagrams** in the appendix are based on the “inhabited” or “uninhabited” nature of the areas and whether the functions provided are “vital” or “secondary”.

In the absence of a general safety design or job specifications, passive fire protection shall be provided in accordance with Chapter 9, sections 9.2 and 9.3 of [IMO MODU Code](#) (Rules governing the construction and equipment of mobile offshore drilling unit equipment) and [IMO FTP Code](#). Fire protection system shall comply with [GS EP SAF 337](#).

The required resistance values are as specified below. The tests establishing these values shall adhere to the specifications laid down in the following standards:

- [ISO 834-1](#)
- [ISO 3008](#)
- SOLAS and [IMO MODU Code](#)
- N.M.D Regulations Part VI p.358
- N.P.D acts-regulations and provisions for the Petroleum Activities Vol 2, 01/06/98
- [IMO FTP Code](#).

Active fire protection, if required, shall be the subject of a job specification.

4.1.1 Fire resistance of walls and floors

The fire resistance of the walls and elements of construction shall be established, if required, according to the following criteria:

- Load-bearing capacity
- Thermal insulation
- Imperviousness to smoke and flames.

The fire resistance tests on the elements of construction shall be performed in accordance with the conditions described in [ISO 834-1](#) and [IMO FTP Code](#).

The design of the structure shall pay attention to the connection between real fire exposure and the heating conditions of the standard fire resistance test ([ISO 834-1](#)).

The normalized temperature-time curve governs the "class A" tests.

The "hydrocarbon (HC) fire curve" temperature-time curve - "NPD" - governs the "class H" tests.

Doors and closures are tested in accordance with [ISO 3008](#).

Any glass elements (bulls-eye windows, port holes) shall be tested in accordance with [ISO 3009](#).

4.1.2 Reaction and resistance to fire of equipment and materials

All equipment and materials shall be compliant with the following standard tests:

- Non-combustibility: [ISO 1182](#) - criteria according to Appendix A of this standard
- Ignitability/Combustibility: [ISO 5657](#) - combustion time less than or equal to 5 seconds
- Toxic gases (pending the publication of an ISO standard, the following paragraph shall apply).

The materials used must not, in case of fire, release gases such as hydrocyanic acid or hydrochloric acid in quantities greater than those indicated below: the total mass of materials shall be such that for every m³ of volume in the room, the total quantity of nitrogen and chlorine contained and liable to be released in hydrocyanic acid or hydrochloric acid form cannot exceed 5 grams and 25 grams respectively.

Material performance should be in accordance with DOE-HSE Section 24.

Materials must be tested in accordance with the requirements of [IMO FTP Code](#).

A standard fire test may be the test in [IMO FTP Code](#).

Hydrocarbon fire test means a test conducted in accordance with the Department of Energy Hydrocarbon Fire Test Standard and Procedure.

4.1.3 Passages through classified walls

These passages or entries shall conform to the specifications and tests of [IMO Resolution A 754](#) (18) of the International Maritime Organization (IMO) and the systems employed should comply with the requirements of ISO/TC 92/SC 2/WG 6.

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4.2 Dropped object and Fire & Blast resistance

For Dropped object and Fire & Blast resistance see [GS EP STR 102](#).

4.3 Installation conditions

4.3.1 Installation in classified areas

The area classification plan is given in the project-specific documentation.

The areas classification shall comply with [GS EP SAF 216](#) and [GS EP SAF 253](#).

Classification of areas of the Installation into hazardous and non-hazardous should be carried out in accordance with a recognised international standard or code for protection of electrical apparatus and conductors, both inside and outside of enclosed areas. These include:

- [EN 60079-14](#)
- I.P. Model Code of Safe Practice Parts 1 and 8
- [IMO MODU Code](#)
- [API RP 500](#).

4.3.1.1 Consequences on cubicle design

Normally, cubicles installed in zone 1 or 2 areas are pressurized. They are fitted with air locks with automatically closing doors. The interior of such an air lock is classified as a zone 2 area and all electrical equipment must be safe.

The area and air lock are pressurized by the air conditioning/pressurizing system to a pressure of 50 Pa relative to the outside environment. Because of this, all entries and exits must be air tight.

If pressurization is not required (toilets, storage, etc.), all electrical equipment must be safe.

With air conditioning/pressurizing installations, it is important to specify the importance and degree of redundancy for the function in the general safety design.

Lighting and electrical equipment installed in the cubicles shall conform to the requirements of [IEC 60079-13](#).

The lighting equipment shall comply with [GS EP ELE 081](#). And electrical equipment shall be in accordance with [GS EP ELE 001](#), [GS EP ELE 161](#) and [GS EP ELE 031](#).

4.3.2 Installation in non-classified areas

Cubicles installed in non-classified areas do not need to be pressurized relative to the outside environment.

However, when installed in geographic areas where climatic conditions may affect the operation of the equipment inside, air conditioning and/or pressurization may be required.

4.3.3 Normal conditions of service

The climatic conditions of the site are defined in the project's job specification.

If necessary, the cubicle is kept pressurized, with the air intake in an unclassified area.

The following internal conditions are maintained in normal operation:

4.3.3.1 Inhabited rooms with vital and/or secondary functions

- Inside temperature: temperature difference of 8°C relative to the outside temperature with a minimum temperature of between 20°C and 23°C
- Relative humidity: 50% $\pm$ 10%
- Pressure: 5 mm column of water minimum (50 Pa), if required.

4.3.3.2 Uninhabited rooms with personnel present occasionally or for short periods

- T min.: 19°C
- Tmax.: 30°C or outside temperature less 8°C
- Relative humidity: 50% $\pm$ 10% or 70% max
- Pressure: 5 mm column of water minimum (50 Pa), if required.

The temperatures given above represent average conditions. Contractual values for each project may be defined in the job specification.

4.3.4 Means of escape

These shall comply with section 9.4.1 of the [IMO MODU Code](#).

Arrangement of means of escape routes includes the provisions of [IMO Resolution A.757](#) (18) and SOLAS.

At least two different main evacuation routes shall be provided. These routes shall be adequately dimensioned for use of standard stretchers (2200 x 650 mm).

In general, all internal corridors shall have a clear width of not less than 1400 mm for two way traffic. One way traffic corridors, corridors which do not make part of main transport routes, shall have a minimum width of 1000 mm. All corridors shall provide sufficient space for stretcher transport. Every evacuation route shall be readily accessible, un-obstructed, well marked by painted tram lines (if possible), illuminated and have a non-slip surface.

All internal doors on escape routes shall have a clear width of at least 800 mm and shall open in the direction of evacuation. And all external door on escape route shall have a clear width of at least 900 mm.

4.4 Main structure

This section concerns:

- All frameworks, main and secondary
- All panels contributing to the strength of the structure (hull structure, floors, etc).