Amendments to the "Rules for the Classification of Floating Offshore Units at Fixed Locations and Mobile Offshore Drilling Units"

Effective from 1/1/2024

List of the amendments:

Part/Chapter/Section/Paragraph amended	Reason
Pt E, Ch 3, Sec 5, [4.2.2](new) Pt E, Ch 5, Sec 5, [4.2.2](new)	to introduce **IACS UR G5** (New - Dec 2022) "Fail-close action of Emergency Shut Down (ESD) valve"

SECTION 5 REGASIFICATION SYSTEMS, PROCESS PRESSURE VESSELS AND LIQUID, VAPOUR AND PRESSURE PIPING SYSTEMS

1 Regasification systems

1.1 General

1.1.1 These are systems where the cargo is regasified from a liquid to a vapour and then sent ashore via a pipeline for use as a gaseous fuel. The vapour may or may not be treated on board the installation dependent on the requirements of the end user.

The vaporisers are to be selected to satisfy the heaviest demand of the end user and should be able to function during all motions of the installation.

Selection of the vaporisers has to consider environmental impact in terms of air emissions, use of biocides or changes in seawater temperature.

The availability of auxiliary systems serving the process system and on which the process system may depend has also to be considered in selection of design code and specification of such systems.

The design has to ensure that cross contamination of auxiliary systems with hydrocarbons will be adequately protected against.

1.2 Design and construction

1.2.1 The design and construction of regasification systems are to be in accordance with a recognized Standard and with the requirement of this section. The standards are to be adhered to in their entirety.

Use of other standards is subject to the approval by the Society.

2 Process pressure vessels

2.1

2.1.1

IGC CODE REFERENCE : Ch 5, 5.1.2

Process pressure vessels handling cargo are to be considered at least as class 2 pressure vessels, in accordance with Pt C, Ch 1, Sec 3, [1.4.1] of the Rules for the Classification of Ships.

2.1.2 Temperature of steam and heating media within the cargo area

IGC CODE REFERENCE : Ch 5, 5.1

The maximum temperature of steam and heating media within the cargo area is to be adjusted to take into account the temperature class of the cargoes.

3 Cargo and process piping

3.1 General

3.1.1 Cargo import and export system

Provisions for cargo import and export systems are given in Part C, Chapter 5 too.

3.1.2 Provisions for protection of piping against thermal stress

IGC CODE REFERENCE : Ch 5, 5.2.1.2

Expansion joints are to be protected from extensions and compressions greater than the limits fixed for them and the connected piping is to be suitably supported and anchored. Bellow expansion joints are to be protected from mechanical damage.

3.1.3 Segregation of high temperature piping

IGC CODE REFERENCE : Ch 5, 5.2.1.3

High temperature pipes are to be thermally isolated from the adjacent structures. In particular, the temperature of pipelines is not to exceed 220 °C in gas-dangerous zones.

3.1.4 Pressure relief valve setting

IGC CODE REFERENCE : Ch 5, 5.2.1.6

Pressure relief valves are to be set to discharge at a pressure not greater than the design pressure such that the overpressure during discharge does not exceed 110% of the design pressure.

3.1.5 Protection against leakage

IGC CODE REFERENCE : Ch 5, 5.2.1

Where the piping system is intended for liquids having a boiling point lower than - 30 °C, permanent means to avoid possibility of contact between leaks and hull structures are to be provided in all those locations where leakage might be expected, such as shore connections, pump seals, flanges subject to frequent dismantling, etc.

3.1.6 Means for detecting the presence of liquid cargo

IGC CODE REFERENCE : Ch 5, 5.2.1

The means to detect the presence of liquid cargo may be constituted by electrical level switches whose circuit is intrinsically safe. The alarm signals given by the level switches are to be transmitted to the wheelhouse and to the cargo control station, if provided.

contraction in the corresponding piping is not required. It is, however, to be checked that the stress intensity corresponding to the primary stresses does not exceed the limits given in [3.4.6].

3.4.8 Flexibility coefficient

IGC CODE REFERENCE : Ch 5, 5.2.5

The flexibility coefficient of elbows is to be determined from the formulae given in Pt C, Ch 1, Sec 13, [2.3.2] of the Rules for the Classification of Ships for pipes intended for high temperatures.

3.4.9 Local stresses

IGC CODE REFERENCE : Ch 5, 5.2.5

Particular attention is to be paid to the calculation of local stresses in the assemblies subjected to axial forces and bending moments. The Society reserves the right to request additional justifications or local strengthening where considered necessary.

3.5 Aluminised pipes

3.5.1

IGC CODE REFERENCE : Ch 5, 5.2.6

Aluminised pipes may be fitted in ballast tanks, in inerted cargo tanks and, provided the pipes are protected from accidental impact, in hazardous areas on open deck.

4 Cargo system valving requirements

4.1 Cargo tank connections for gauging

4.1.1 Exemption

IGC CODE REFERENCE : Ch 5, 5.6.2

The requirements in paragraph 5.6.2 of the IGC Code relevant to cargo tank connections for pressure gauges and measuring devices do not apply to tanks with an MARVS not exceeding 0,07 MPa.

4.2 Emergency shutdown

4.2.1 Clarification on location of fusible elements

IGC CODE REFERENCE : Ch 5, 5.6.4

The cargo stations in way of which the fusible elements mentioned in paragraph 5.6.4 of the IGC Code are to be fitted are to be intended as the loading and unloading manifolds.

The system may be integrated into the fire and gas systems and appropriate level of redundancy based on risk analysis in these locations.

The reliability of the system and risk to process shutdowns may institute the use of different technologies for this system or the use of voting duplicated systems.

4.2.2 Fail-close action of Emergency Shut Down (ESD) valve *(1/1/2024)*

IGC CODE REFERENCE : Ch 5, 5.6.4

The following requirements specify the arrangements for emergency shut down valve (hereinafter referred to as ESD valve) installed in cargo piping of ships engaged in the carriage of liquefied gases to stop cargo flow in the event of an emergency, either internally within the ship, or during cargo transfer to other ships or shore facilities.

When ESD valve is actuated by hydraulic or pneumatic system, the following are to be complied with:

a) audible and visible alarm is to be given in the event of loss of pressure that causes activation of fail-close action. The alarm is to be provided in a normally manned control station (e.g. Cargo Control Room and/or the navigation bridge, etc.).

b) the following conditions are also to be complied to ensure the fail-close action:

   1) failure of hydraulic or pneumatic system is not to lead to loss of fail-close functionality (i.e. activated by spring or weight); or

   2) hydraulic or pneumatic system for fail-close action is to be arranged with stored power and separated from normal valve operation.

5 Cargo transfer methods

5.1 Discharge into common header

5.1.1

IGC CODE REFERENCE : Ch 5, 5.8

When two or more pumps located in different cargo tanks are operating at the same time discharging into a common header, the stopping of the pumps is to activate an alarm at the centralised cargo control location.

6 Bonding

6.1 Static electricity

6.1.1 Acceptable resistance

IGC CODE REFERENCE : Ch 10, 10.3

To avoid the hazard of an incentive discharge due to the build-up of static electricity resulting from the flow of the liquid/gases/vapours, the resistance between any point on the surface of the cargo and slop tanks, piping systems and equipment, and the hull of the unit is not to be greater than 10^6 Ω.

6.1.2 Bonding straps

IGC CODE REFERENCE : Ch 10, 10.3

Bonding straps are required for cargo and slop tanks, piping systems and equipment which are not permanently connected to the hull of the unit, for example:

a) independent cargo tanks

b) cargo tank piping systems which are electrically separated from the hull of the unit

c) pipe connections arranged for the removal of the spool pieces.

SECTION 5 LIQUEFACTION PROCESS SYSTEMS, PROCESS PRESSURE VESSELS AND LIQUID, VAPOUR AND PRESSURE PIPING SYSTEMS

1 Liquefaction process systems

1.1 General

1.1.1

Hydrocarbon process systems and associated equipment are to be designed to minimise the associated risks, in particular by:

- Preventing the escalation of an undesired event.
- Preventing an undesired event from causing a release of hydrocarbons.
- Safely dispersing or eliminating hydrocarbon gasses and vapours released.
- Safely collecting and containing hydrocarbon liquids released.
- Preventing formation of explosive mixtures.
- Preventing ignition of flammable liquids or gasses and vapours released.
- Limiting the exposure of personnel to fire hazards.

The following is a non-exhaustive list of design requirements.

a) The design is to be single-failure-tolerant, i.e. a single failure or operator error is not to result in a major hazard, or damage to the unit or installation.

b) Appropriate measures are to be provided to enable timely detection, control and mitigation of hazards.

c) Escalation to plant and areas that are not affected by the initiating event is to be avoided.

d) Cross-contamination of the refrigerants with cargo is to be avoided, by ensuring that the pressure on the refrigeration side of the cargo heat exchanger is higher than on the cargo side. For FLNG units this is particularly important if hydrocarbon based refrigerants are used within the liquefaction process.

e) Proper containment systems are to be provided for equipment with potential for significant leakage, to be constructed of materials suitable for sustaining low temperatures. Care is to be taken to ensure that evaporating cryogenic gases do not contaminate lower modules.

f) The availability of auxiliary systems serving the process system and on which the process system may depend is also to be considered in selection of design code and specification of such systems as stated in Section 17. The process and support systems are to be in accordance with Pt C, Ch 6, Sec 2.

g) It is to be ensured that the gas fed to the liquefaction plant does not contain such a concentration of substances liable to solidify as to create process problems, fouling or plugging.

h) The issue of thermal effects on piping, fittings and equipment is to be taken into account.

The processes involved in the liquefaction of Natural Gas offshore aboard an FLNG plant are based on those processes used to perform the same function on a shore based unit. However, the novel aspects due to the marinisation of these processes and the management of the interfaces of the topsides with the hull require ad-hoc considerations, based on Risk Analysis (Pt C, Ch 7), engineering studies, tests or other activities as needed, which are to be class approved.

1.1.2 Gas processing

The gas processing facilities are to be considered to include all systems and components for the reception of raw feed gas from wells for such processes as acid gas removal, dehydration and mercury removal. Their design and construction for offshore use are to be in accordance with internationally recognised standards as specified in Section 17.

1.1.3 Acid Gas (CO_2) Removal

In general, the process involves passing the feed gas through tall contactor towers where the acid gas is absorbed by contact with an amine solution. The process is well proven in shore based liquefaction plants and the design of the onboard system is to be based on the standards used for the onshore plant. Consideration of the FLNG unit's motions and the volume of fluids involved is to be taken into account when stability calculations are performed according to Pt B, Ch 3, Sec 2.

1.1.4 Dehydration

Shore based techniques of removing moisture by molecular sieves are to be constructed to internationally recognised standards as specified in Sec 17 and the design and use of this equipment offshore are to follow these standards and also be deemed suitable for use in the offshore environment. The static nature of this equipment offers less stability risk than fluid based moisture removal systems. Like acid gas, moisture within the feed gas can pose considerable solid formation risks within the liquefaction process and is to be eliminated as far as possible.

1.1.5 Mercury removal

Mercury in the feed gas has been proven to have a detrimental effect on aluminium based heat exchangers. Since aluminium offers a lightweight alternative offshore, mercury removal is essential for continued safe and productive operation of the liquefaction process.

3.5 Aluminised pipes

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a) independent cargo tanks

b) cargo tank piping systems which are electrically separated from the hull of the unit

c) pipe connections arranged for the removal of the spool pieces

d) all process vessels and piping supported on insulated shock mountings

e) all process equipment mounted on non-conducting ant-vibration chocks

f) all electric motors associated with hydrocarbon production and handling located external to the cargo tanks.

Where bonding straps are required, they are to be:

a) clearly visible so that any shortcoming can be easily detected

b) designed and sited so that they are protected against mechanical damage and are not affected by high resistivity contamination, e.g. corrosive products or paint

c) easy to install and replace.

7 Integrated cargo and ballast system

7.1 General

7.1.1

The requirements for integrated cargo and ballast systems are given in Part C, Chapter 5.