



REPUBLIC OF CROATIA  
**Ministry of the Sea, Transport  
and Infrastructure**  
Maritime Safety Directorat



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**Title: Safety, security and environmental protection provisions to Croatian flagged FSRUs and non-Croatian flagged FSRUs while operating in waters under jurisdiction of the Republic of Croatia**

**Effective as of: 23 October 2017**

**Reference: IMO documents as stated in the text below**

## **1. General**

The purpose of this Circular is to inform all interested parties about Croatian provisions for Floating Storage and Regasification Units (hereinafter referred to as: FSRU) flying the flag of the Republic of Croatia as well as the foreign flagged FSRUs operating in Croatian waters.

It is to be noted that currently there are no IMO guidelines developed for FSRUs and therefore the Ministry of the Sea, Transport and Infrastructure (hereinafter referred as: MSTI) based this Circular on best practices followed by other Maritime Administrations, IACS Member's Rules and industry practices, as well as the IMO Circular MSC-MEPC.2/Circ.9: "Guidance for the application of safety, security and environmental protection provisions to FPSO and FSU". Taking into account that FSRU is considered as floating object (Art.5, 13 of the Maritime Code) in accordance with Art.103(2) of the Code, determination of eligibility for the use of FSRU in Croatian waters is the responsibility of the Croatian Register of Shipping (hereinafter referred as: CRS) which is reflected in paragraph 7 of this Circular.

CRS shall act on behalf of MSTI and the national Recognized Organization (RO), following the provisions of the Croatian Maritime Code (Off. Gazette 181/2004, as amended).

MSTI and CRS shall perform verification of the FSRU with a purpose to establish its overall safety with particular attention to the safety against loss of human lives, property at sea, considerable physical damage or unacceptable environmental pollution.

Production and utility systems and equipment will be verified with the aim primarily to cover safety and pollution prevention aspects. Reliability and operational aspects of

storage and regasification equipment and utility systems and equipment will not be covered, except where considered significant for safety or pollution prevention.

MSTI and CRS shall issue/endorse appropriate safety certificates, as stipulated by this Circular, after initial/annual verification of compliance of the FSRU with the requirements of this Circular has been satisfactorily completed.

## **2. Definitions**

**2.1 Floating Storage and Regasification Unit (FSRU)** is a floating object not intended for navigation (hereinafter referred as: the vessel) adequately moored/anchored at the operating location approved by MSTI and that has LNG storage and regasification equipment for LNG vaporising, holding valid certificate of registry issued either by MSTI or some other Flag Administration and not being in contradiction with the requirements stipulated for in the Croatian national legislation (i.e. Maritime Code, Off. Gazette 181/2004, as amended).

With regard to type it may comprise non-self-propelled vessels (including the case of converted ships unable to perform non-assisted voyages) and self-propelled vessels having a propulsion system and steering appliances.

**2.2 Non-disconnectable FSRU** is a vessel designed to be permanently moored and has no mechanical means for transit under its own propulsion.

**2.3 Disconnectable FSRU** is a vessel with or without permanently mooring system (i.e. which is designed to be either self-propelled or non-propelled).

**2.4 Class** is a classification society member of the International Association of Classification Societies (IACS).

**2.5 Class Certificate** is a certificate issued by the Class confirming compliance with the classification rules and regulations of the Class, applicable to FSRUs.

**2.6 Off-location** denotes the following abnormal and rare cases when FSRU is to be re-located from its operating location:

- FSRU's voyages for dry-docking, repair of maintenance work, or
- disconnection of the FSRU in extreme environmental or emergency conditions, during which FSRU is disconnected from shore and its storage and/or regasification equipment is not in use.

## **3. Applicable international instruments**

### **3.1 International instruments applicable while FSRU is on location (fixed)**

#### **3.1.1 SOLAS 74 and codes adopted under this convention**

##### **.1 Chapter IX, ISM Code**

An approved Safety Management System, including a maintenance programme particularly for essential marine systems and equipment shall be effective at all times. Competence of on-board personnel, both marine and production shall be maintained to an adequate level.

As a proof of compliance with the above-stated, Document of Compliance (DoC) and Safety Management Certificate (SMC) are to be provided at initial verification.

## **.2 Chapter XI-2, ISPS Code**

In order to facilitate the interaction between FSRU and LNG carrier, FSRU shall comply with Chapter XI-2 and ISPS Code taking into account recommendations contained in MSC/Circ.1111.

As a proof of compliance with the above-stated, International Ship Security Certificate (ISSC) is to be provided at initial verification.

## **.3 Chapter VII, IGC Code**

In general FSRU is to be in compliance with the International Gas Carrier Code (IGC Code) either Code adopted by resolution MSC.5(49) and last amended by the resolution MSC.220(82) or new IGC Code adopted by the resolution MSC.370(93). All deviations of FSRU design in respect to a.m. codes are to be recorded and approved by the Flag Administration.

As a proof of compliance with the above-stated, International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk is to be provided at initial verification.

### **3.1.2 MARPOL 73/78**

#### **.1 Annex I**

The FSRU is to be in compliance with the requirements of the Annex I as prescribed by the resolution MEPC.139(53), as amended by the resolution MEPC.142(54).

As a proof of compliance with the above-stated, International Oil Pollution Prevention Certificate (IOPP) is to be provided at initial verification.

#### **.2 Annex IV, V and VI**

The FSRU is to be in compliance with the requirements of the Annex IV, V and VI.

As a proof of compliance with the above-stated, International Sewage Pollution Prevention Certificate (ISPP) is to be provided at initial verification.

As a proof of compliance with the above-stated, Garbage Pollution Prevention Certificate (if available) and Garbage Management Plan are to be provided at initial verification.

As a proof of compliance with the above-stated, International Air Pollution Prevention Certificate (IAPP) is to be provided at initial verification.

As a proof of compliance with the above-stated, International Energy Efficiency Certificate (IEEC) is to be provided at initial verification.

### **3.1.3 International Convention on Tonnage Measurement of Ships (TMC 69)**

As a proof of compliance with the above-stated, International Tonnage Measurement Certificate, 1969, is to be provided at initial verification.

### **3.1.4 International Convention on the Control of Harmful Anti-Fouling Systems (AFS Convention)**

As a proof of compliance with the above-stated, International Anti-Fouling System Certificate is to be provided at initial verification.

### **3.1.5 Maritime Labour Convention 2006 (MLC 2006)**

- Title 3: provisions with respect to crew accommodations,
- Title 4: Regulation 4.3: Health and safety protection and accident prevention.

As a proof of compliance with the above-stated, DMLC (for vessel not in navigation) is to be provided at initial verification.

### **3.1.6 International Load Line Convention (LLC 66)**

For both disconnectable and non-disconnectable FSRUs when operating on location requirements of the Load Line Convention do not apply as FSRU is neither underway, nor engaged in an international voyage.

To ensure that disconnectable self-propelled FSRU can be readily and efficiently disconnected in the event of severe weather conditions, it is recommended that it should possess a level of safety equivalent to that afforded by the Load Line Convention.

In the case when FSRU is operating "off-location" and is to undertake international voyage under its own propulsion it is therefore subjected to the requirements of the Load Line Convention and International Load Line Certificate, 1966, is to be provided at initial verification.

### **3.1.7 ILO Convention No. 152**

As a proof of compliance with the above-stated, Statement of Compliance with ILO No. 152 is to be provided at initial verification.

## **3.2 International instrumental applicable while FSRU is "off-location"**

When it is accessory to disconnect and FSRU undertakes an international voyage under its own propulsion it will be fully subjected to the SOLAS 74 and Load Line Convention in addition to MARPOL 73/78.

## **3.3 Class Certificate**

The FSRU will be maintained in class for its intended purpose and service with an appropriate class notation, by the Class, as defined in 2.4 of this Circular.

As a proof of compliance with the above-stated, Certificate of Class is to be provided at initial and all subsequent verifications.

### **3.3.1 Survey of outer bottom of the FSRU**

- .1 Due to the special nature of the operations of the FSRUs, in-water survey of outer bottom in lieu of dry-docking will be accepted for those FSRUs which possess a valid class notation for extended dry-docking or is otherwise approved by the Class for such extended dry-docking, provided that at least two satisfactory in-water surveys are carried out in any five-year period with the interval between the surveys not exceeding 36 months.

Such acceptance is based on the provisions of the Rules for statutory certification of sea-going ships, Part 1, Ch. 5, para. 4.15.2 (Croatian Off. Gazette, No. 2011/27), periodicity of surveys of underwater part of the hull of floating units in dry-dock is allowed to be agreed on the case-by-case basis, taking into account type of the unit, size of the unit, its age and position.

- .2 The extent and scope of such in-water surveys shall be in accordance with the plans/documents approved by the Class at the design stage of construction/conversion of the FSRU. The documentation related to class certificate shall clearly indicate the maximum duration up to which the vessel is designed to undergo in-water surveys in lieu of docking.

The conditions for allowing an in-water survey in lieu of extended docking survey are given in the Annex to this Circular.

- .3 The safety management system on board shall contain necessary procedures for regular monitoring and reporting of the condition of the hull and underwater fittings/equipment of the FSRU. The owner/operator shall establish a scheme of inspections, duly approved by the Class, for undertaking the in-water survey in lieu of the dry-docking and the conformity of compliance to the scheme shall be verified by the Class.
- .4 The owner/operator of the FSRU shall maintain the approval records from the Class of the satisfactory completion of underwater hull inspection, clearly indicating the validity and the recommendations, if any. In case of any adverse finding during the "In-Water Survey" which reveals damage or deterioration that requires early attention, the Class must require that the unit be dry-docked forthwith in order that a more detailed survey/necessary rectification can be undertaken.
- .5 The owner/operator of the FSRU shall maintain a satisfactory review of the FSRU's history with particular attention to previous findings with respect to damage, repair or watertight integrity of the underwater hull structure and fittings.

### **3.4 Safe manning**

Minimum safe manning levels shall address the number of seafarers required to ensure that FSRU is sufficiently, effectively, and efficiently manned in accordance with the requirements of the Flag State, taking into consideration the guidelines contained in Resolution A.1047(27).

As a proof of compliance with the above-stated, Minimum Safe Manning Certificate (for vessels not in navigation) is to be provided.

### **3.5 Other international standards**

It is expected that FSRU complies with international standards laid down by the following organisations, as far as applicable:

- Oil Companies International Marine Forum (OCIMF),
- International Group of Liquefied Natural gas Importers (GIIGNL),
- Society of International Gas Carriers and Terminal Operators (SIGTTO) (or any successor body of the name),

and any other internationally recognised agency or organisation with whose standards and practices it is customary for international operators of FSRUs to comply with. Additionally, it is expected that FSRU holds a valid operational OCIMF Ship Inspection Reporting (SIRE) system certificate.

Compliance with appropriate API and ISO Standards is also expected, but not compulsory.

A full list of such standards is to be provided to CRS for review during initial verification.

#### **4. Risk Assessment**

A risk assessment analysis is to be approved by the Class and verified by the CRS on behalf of MSTI.

##### **4.1 Assessment Criteria**

A risk assessment is to be carried out to identify significant hazards and accident scenarios that may affect the FSRU or any part thereof, and consider the benefit of existing or potential risk control options.

The objective of the risk assessment is to identify areas of the design that may require the implementation of risk control measures to reduce identified risk(s) to an acceptable level.

The risk assessment is to be conducted by using recognised techniques such as the HAZARD Identification (HAZID), Failure Mode Effect and Criticality Analysis (FMCEA) or similar. The identified risk control options (prevention and mitigation measures) deemed necessary to be implemented is to be considered part of the design basis of the vessel.

The results shall also include, but not be limited to, the following as evidence of effectiveness:

- description of methodology and standards applied,
- potential variation in scenario interpretation or sources of error in the study,
- validation of the risk assessment process by an independent and suitable third party,
- quality system under which the risk assessment was developed,
- the source, suitability and validity of data used within the assessment,
- the knowledge base of persons involved within the assessment,
- system of distribution of results to relevant parties, and
- validation of results by an independent and suitable third party.

The overall criteria is that systems and equipment be designed to minimise the risk of hazards to personnel, property and environment. Implementation of this criteria is intended to:

- prevent an abnormal condition from causing an upset condition,
- prevent an upset condition from causing a release of hydrocarbons or cryogenic fluids,
- safely collect and dispose of hydrocarbon or cryogenic fluids released,
- prevent formation of explosive mixtures,
- prevent ignition of flammable liquids or gases and vapours released, and
- limit exposure of personnel to fire and cryogenic hazards.

##### **4.2 Significant hazards and accident scenarios**

Hazards to be addressed in the risk assessment are to include at least:

- fire and explosion,
- evacuation (escape routes also),
- extension of hazardous areas,

- pressurised gas discharge to shore,
- high-pressure gas venting,
- process upset conditions,
- storage and handling of flammable refrigerants,
- continuous presence of liquid and vapour cargo outside the cargo containment system,
- tank over-pressure and under-pressure,
- LNG carrier-to-FSRU transfer of liquid cargo,
- collision risk during berthing manoeuvres,
- loss of ability to offload liquefied gas or discharge gas ashore,
- loss of any one critical component in the process system, and
- loss of electrical power.

## 5. Operating Manual

Detailed instruction manuals are to be provided on-board, covering the operations, safety and maintenance requirements, personal protective equipment and occupational health hazards relevant to the use of the regasification plant.

The operational parameters of all systems and components for removing liquefied gas from the storage tanks, pressurising, heating and vaporising liquefied gas and in some cases odorising the liquefied gas vapour and discharge ashore of vaporised gas through an off-loading system are to be addressed in the manual.

The content of the manuals is to include, but not be limited to:

- procedures for cargo tank cooldown and warm-up, transfer (including LNG carrier-to-FSRU transfer), cargo sampling, gas-freeing, ballasting, tank cleaning and changing cargoes,
- cargo temperature and pressure control systems,
- cargo system limitations, including minimum temperatures (cargo system and inner hull), maximum pressures, transfer rates, filling limits and sloshing limitations,
- nitrogen and inert gas systems,
- firefighting procedures: operation and maintenance of firefighting systems and use of extinguishing agents,
- special equipment needed for the safe handling of the particular cargo,
- fixed and portable gas detection,
- control, alarm and safety systems,
- emergency shutdown systems,
- procedures to change cargo tank pressure relief valve set pressures,
- emergency procedures, including cargo tank relief valve isolation, single tank gas-freeing and entry and emergency ship-to-ship transfer operations,
- information regarding the cargo system and associated systems applicable to the regasification plants,
- system limitations, including minimum temperatures, maximum pressures, transfer rates; details of depressurisation and high pressure blow-down philosophy and arrangements; gas piping systems including details of pipes and associated components, design pressures and temperatures,
- descriptions and schematic diagrams for control and monitoring system including set points for abnormal conditions,
- details of all electrical equipment in the regasification plant compartment,
- emergency shutdown arrangements, cause and effects,
- mooring arrangement and philosophy, and
- environmental limitation and operating restrictions as associated with sloshing (if applicable).

## **6. Positioning and mooring**

The FSRU is positioned at the location approved by MSTI. Such location is to be protected with calm clear water providing good underwater visibility and being appropriate with regard to FSRU scantlings (especially with regard to clearance between water depth and FSRU' bottom for the purpose of underwater surveys).

Mooring plan is to be developed and approved by the Class showing:

- berthing arrangements,
- mooring location,
- mooring configuration.

Mooring system and fender loads are to be included when specifying limitations of cargo transfer operations. For jetty mooring, details of the site-specific design of FSRU mooring system and components are to be included.

## **7. Surveys and Certification of FSRU**

### **7.1 Croatian flagged FSRU**

#### **7.1.1 Initial survey**

Prior commencing initial survey review of the certificates, as listed in para. 3 of this Circular, is to be performed jointly by MSTI and CRS.

Following authorisation, as stated in para. 1 of this Circular, CRS is responsible for performing the following activities:

- review of the Class certificate and Survey status issued by Class,
- review of possible recommendations and/or conditions of class as imposed by Class,
- verification of the Risk Assessment Analysis, as stated in 4,
- verification of the Operating Manual, as stated in 5,
- review of the stability file,
- review of the mooring plan,
- review of in-water in lieu of dry-docking survey scheme,
- review of the safety and fire plan,
- review of the plan of hazardous zones,
- issuing of the Attestation on technical acceptance and Attestation on technical particulars for the purpose of registration of FSRU in the Croatian registry of floating objects,
- on-board survey of the FSRU,
- issuing of the Safety certificate for floating object,
- issuing of the certificates required by SOLAS 74, Ch. IX, Ch. XI-2,
- issuing of the certificates required by MARPOL 73/78, Annex I, Annex IV, Annex V and Annex VI,
- issuing of the certificates required by TMC 69,
- issuing of the certificates required by AFS Convention,
- issuing of the certificates required by MLC 2006.

Requirements for minimum safe manning are to be complied with.

#### **7.1.2 Annual survey**

Annual survey should consist of:



- review of the Class certificate and Survey status issued by Class,
- review of possible recommendations and conditions of class as imposed by Class,
- on-board survey of FSRU within the scope required by the certificates issued under 7.1.1,
- checking for alterations/modifications,
- endorsement of the certificates issued under 7.1.1.

## **7.2 Foreign flagged FSRU**

### **7.2.1 First issuing of Permit to Operate (PtO)**

Prior commencing survey on-board review of the certificates, as listed in para. 3 of this Circular, is to be performed jointly by MSTI and CRS.

For the purpose of the first issuing of PtO for the foreign flagged FSRU, CRS will be responsible for performing the following activities:

- review of class certificates and Survey status issued by Class,
- review of possible recommendations and conditions of class as imposed by Class,
- verification of the Risk Assessment Analysis, as stated in 4,
- verification of the Operating Manual, as stated in 5,
- review of the stability file,
- review of the mooring plan,
- review of in-water in lieu of dry-docking survey scheme,
- review of the safety and fire plan,
- review of the plan of hazardous zones,
- on-board survey of the FSRU,
- issuing of PtO having one year validity.

Safe manning is to be checked by MSTI.

### **7.2.2 Annual issuing of PtO**

For the purpose of the annual survey of the foreign flagged FSRU, CRS will be responsible for performing the following activities:

- review of class certificates and Survey status issued by Class,
- review of possible recommendations and conditions of class as imposed by Class,
- review of certificates, as stated in 3.1, 3.2 and 3.3,
- review of the following documents, but only in the case of amendments:
  - Risk Assessment Analysis;
  - Operating Manual,
  - stability file,
  - mooring plan,
  - in-water in lieu of dry-docking survey scheme,
  - safety and fire plan,
  - plan of hazardous zones,
  - on-board survey of FSRU,
- issuing of PtO having one year validity.

## ANNEX

### Conditions for allowing an in-water survey in lieu of dry-docking survey

(Refer to para 3.3.1.2 of this Circular also)

1. Before entering in-to service, a satisfactory review of plans/documents shall be done by the Class, including the following aspects, as applicable:
  - a) Markings on the underwater hull to identify location of bulkheads, watertight floors, tanks and sea suction/discharges.
  - b) Details and arrangements for inspecting and servicing sea chests, sea inlet/discharge valves, other appendages and the underwater hull.
  - c) Details for servicing and maintenance programme for essential equipment and underwater fittings like echo-sounder, speed log, sea water temperature gauges, electronic draft gauges, shaft seals, CP propeller blade seals, sea chests, sea inlet discharge valves, etc.
  - d) Means for blanking off all the openings likely to affect the watertight integrity, including those for side thruster.
  - e) Provisions for maintaining outer bottom hull markings including load line markings,
  - f) Corrosion protection: Details of increased scantling, cathodic protection, protective coating, etc., provided to account for the longer period of service without docking. Corrosion prevention system for the bottom has to fulfil dry film thickness of coating of minimum of 250 µm.  
Anodes are to be prepared for the duration of appropriate time period.  
If installed, an impressed current system is to be documented.  
The extended period so approved by the Class should be specified in the design documents and class certificates/records.
  - g) Details of protective coating applied to double bottom, wing tanks, ballast tanks, void spaces and spaces adjacent to shell and the maintenance scheme to keep these coatings in "Good" condition.
  - h) Details of hull protection system adequate for the extended period (cathodic protection or other equivalent arrangement) and procedures for maintenance/renewal in afloat condition.
  - i) Arrangements for underwater inspection and maintenance of propellers, thrusters and rudders; provision of efficient sealing/glands for stern tube and rudder including their renewal where required; arrangements for the measurement of wear in the stern tube bearings and rudder bush/bearings.
  - j) TBT free paints are to be applied.
  - k) Provisions for surveys and maintenance of thrusters/stabilisers including maintenance plan.
  - l) Any other condition, as stipulated by the Class.
2. Extended dry-docking scheme can be applied starting from the latest dry-docking.

3. The FSRU should have a clear history of hull damages and grounding.
4. In the case that the FSRU will be moored for prolonged period without navigation the Class may propose reduced scope of tail shaft and rudder surveys.
5. Survey site should be in a protected location having appropriate depth (depth clearance) and with calm clear water providing good underwater visibility (at least 2 meters).

