

# **Safety Code for Floating Production, Storage and Offloading Systems (FPSO)**

**June, 2010**

# Chapter 1 General

## 1.1 Purposes

This *Safety Code for Floating Production, Storage and Offloading Systems* (hereinafter referred to as "the Code") is formulated to ensure personnel health and life safety on an offshore floating production, storage and offloading systems (hereinafter referred to as floating systems or FPSO), and to prevent property damage and environment pollution in accordance with the *Provision of Safe Operations or Offshore Petroleum Industry, Rules of Management of Offshore Oil Safety, and the Provisions for Inspection of Offshore Petroleum and Natural Gas Production Facilities*.

## 1.2. Scope of application

**1.2.1** The Code applies to the floating systems within the inland waters, territorial sea, contiguous zone, exclusive economic zone, and continental shelf in the People's Republic of China and within the other sea areas governed by the People's Republic of China.

**1.2.2** Upon the Code takes effect, the newly built FPSO shall meet the requirements herein. The major maintenance, renovation, or conversion for existing FPSO shall meet the requirements herein to a reasonable extent, that is, the existing FPSO shall continue to be in compliance with the requirements the applicable laws and regulations, and codes of existing design and build.

**1.2.3** The special requirements for structure, stability, sub-division, and freeboard of deep draft spar platform and tension leg platform (TLP) shall be formulated separately

**1.2.4** The requirements for FPSO pollution prevention shall respect national relevant laws and regulations, and Standards for offshore pollution prevention.

**1.2.5** For the floating drilling production, storage and offloading (FDPSO) systems and the similar offshore petroleum production facilities designed with the other functions, the production and oil storage functions shall be designed and built by reference to the Code accordingly.

## 1.3 Basic principles

### 1.3.1 Basic principles of design

During design, the difference between an FPSO and a fixed platform, adverse influences of floating conditions on personnel, oil-gas separator, rotating mechanical equipment, and take-off and landing of helicopter etc, the difference between an FPSO and a navigational ship, and influence of mooring on buoy shall be considered.

### 1.3.2 Risk analysis principles

**1.3.2.1** The FPSO design institute, builder, responsible party, and certification and inspection body shall follow the risk analysis principles, using mature and effective method to fully and systematically analyze the possible risks during design, building, installation, production, and abandonment of FPSO to reduce the risks to a reasonable and practical level.

**1.3.2.2** On the basis of advanced safety theories, methods, and new technologies, based on safety rules of international offshore petroleum facilities, it is allowed that the responsible party should adopt safety countermeasures different from the Code, but the safety degree of them shall reach or be higher than the level herein.

**1.3.2.3** When the responsible party intends to adopt the safety countermeasures different from the Code, the reliability, reached degree of safety of countermeasures shall be systematically analyzed in advance. After the safety analysis documents are approved by the certificate inspection body, they shall be submitted to the Offshore Petroleum Operation Safety Office (hereinafter referred to as OPOSO) of the State Administration of Quality and Technical Supervision for file and the safety analysis documents shall be attached.

## **1.4 Explanation**

The OPOSO shall be in charge of explanation of the Code.

## **1.5 Terms and definitions**

(1) FPSO is offshore petroleum production facilities which are floating and mooring at sea, with main functions for handling, storage, and loading/unloading of petroleum and natural gas, or designed with partial these functions.

(2) Ship-shaped FPSO is FPSO which is designed with structural type of hull form.

(3) Semi-submersible (column-stabilized type) FPSO is FPSO that the main deck is connected to the underwater shell or spud can via column or buoy.

(4) Other FPSO is FPSO which is designed with the other characteristics, for example, cylindrical FPSO, deep draft spar platform, and tension leg platform etc.

(5) The responsible party is all persons, operators or workers involved in design, building, commissioning, and production of FPSO.

(6) The certification and inspection body is an intermediary agency which engages in certification and inspection of offshore petroleum production facilities and of which qualification is granted by OPOSO.

(7) Applicable codes and standards are the codes and standards which are adopted by the responsible party and the certification and inspection body in design, building, installation, production, and implementing certification and inspection of FPSO in accordance with the *Provisions for Inspection of Offshore Petroleum and Natural Gas Production Facilities*.

(8) SOLAS Convention is the International Convention for Safety of Life at Sea in 1974 and its sequent protocols and amendments.

(9) MODU Code is the Code for the Construction and Equipment Self-propelled Mobile Offshore Drilling Units in 2009 and its sequent protocols and amendments.

## **Chapter 2 General arrangement**

### **2.1 Principles of general arrangement**

2.1.1 The danger areas shall be kept away from the areas and modules with the igniting sources of fire and explosion as far as possible in order to prevent fire and explosion from occurring and fire from spreading. If it is impossible to be kept far away from them, the hermetically tight guard wall or fire wall shall be employed for isolation.

2.1.2 For general arrangement of FPSO, wind direction shall be so considered to

(1) minimize the possibility that the combustible gas escaped from the hazardous area flows into the area with sources of explosion;

(2) make the exhaust gas generated from combustion of flare and the combustible gas from venting keep away from the FPSO;

(3) minimize the possibility that the smoke generated from fire and explosion flows into accommodation space, temporary refuge and shelter, and evacuation location.

### **2.2 Arrangement of areas and modules**

2.2.1 Machinery spaces under the bulkhead deck

2.2.1.1 The machinery spaces under the bulkhead deck may be provided on the bow or astern, but not on the middle, of the FPSO.

2.2.1.2 The machinery spaces under the bulkhead deck shall be isolated from the crude oil tank, slop tank, and production water tank with cofferdam, ballast tank, fuel oil tank, or crude oil pump rooms. The pipelines of this machinery space shall pass through neither the crude oil tanks, slop tanks, and production water tanks, nor the spaces immediately next to the crude oil tanks, slop tanks, and production water tanks.

2.2.2 Crude oil pump rooms

2.2.2.1 If the crude oil pump rooms is adjacent to the machinery spaces under the bulkhead deck, it is allowed that the lower portion of the pump room may be properly concave into the machinery spaces for the purpose of pump installation, but the top plate height of the concave portion shall not exceed the 1/3 moulded depth above the keel in general.

**2.2.2.2** The ballast pump for the ballast tank adjacent to the crude oil tank or slop tank shall be provided in the crude oil pump tank or in similar spaces without any source of explosion within the crude oil area.

### **2.2.3** Crude oil tanks, slop tanks, and production water tanks

The wing tank protection of the crude oil tanks, slop tanks, and production water tanks shall be in accordance with Sub-clause 3.5.3 in the Code.

### **2.2.4** Fuel oil tanks

**2.2.4.1** A fuel oil tank should not take the side portion which is prone to be collided as the boundary.

**2.2.4.2** The double bottom within the crude oil area shall not be filled with fuel oil.

**2.2.4.3** The FPT shall not be filled with fuel oil. When the crude oil is transferred to the oil tanker and it is necessary that the oil tanker is moored on the astern or side, the APT shall not be filled with fuel oil either.

### **2.2.5** Accommodation module and control room

**2.2.5.1** The accommodation module shall be located above the non-hazardous area and should be up wind.

**2.2.5.2** The access, air inlet, and the other openings on the accommodation module shall not toward the crude oil area. It shall be located end bulkhead, the side of the superstructure deck or deck house and at least 3 m from the end wall toward the crude oil area.

**2.2.5.3** The central control room should be provided within the accommodation module; the other control rooms (stations) shall be provided within the accommodation module or within the non-hazardous area near the accommodation module.

### **2.2.6** Temporary refuge

**2.2.6.1** An FPSO should be equipped with temporary refuge which shall be located within in safe area and closed to the evacuation location.

**2.2.6.2** The temporary refuge shall be provided with measures for fire protection, heat insulation and to prevent smoke and harmful gases from entering into it. Inside the refuge, functions for monitoring and control of accident expansion, for example, communication, switch on/off the fire-fighting system.

### **2.2.7** Helicopter deck module

**2.2.7.1** The helicopter deck module shall be located above the accommodation module or the other non-hazardous areas and have at least 1.8 m gap from the lower supporting

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