Cargo Guidelines for F(P)SOs versus ISGOTT

First Edition 2018

Cargo Guidelines for F(P)SOs

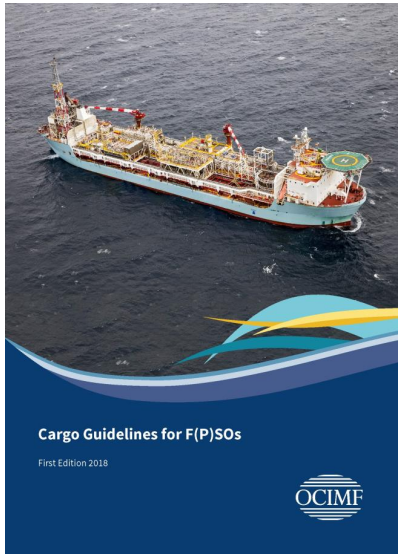
The Cargo Guidelines for F(P)SOs is a new OCIMF publication.

This publication makes recommendations on the safety of cargo handling and associated operations on board Floating (Production) Storage and Offloading (F(P)SO) facilities.

It supplements guidance in the *International Safety Guide for Oil Tankers and Terminals (ISGOTT)* by addressing activities and procedures that are either outside the scope of *ISGOTT* or are conducted differently on F(P)SOs.

The guidance is for F(P)SO operators, but will also be of interest to anyone involved in the design and management of F(P)SOs.

Scheduled for publication: late 2nd quarter of 2018.



Why a new Guideline?

The latest edition of ISGOTT contains a note that:

"The Guide is not intended to encompass offshore facilities including Floating Production Storage and Offloading Units (FPSOs) and Floating Storage Units (FSUs); operators of such units may, however, wish to consider the guidance given to the extent that good tanker practice is equally applicable to their operations."

Fundamental differences exist between the operation of an F(P)SO and a tanker:

Tanker	F(P)SO
Dry-docks every 5 years	Remains on station for several years
Loads cargo and discharges cargo sequentially; can use ballast voyages for in-tank maintenance activities.	May be required to concurrently undertake oil and gas processing, loading, water management, discharging and in-tank maintenance activities.

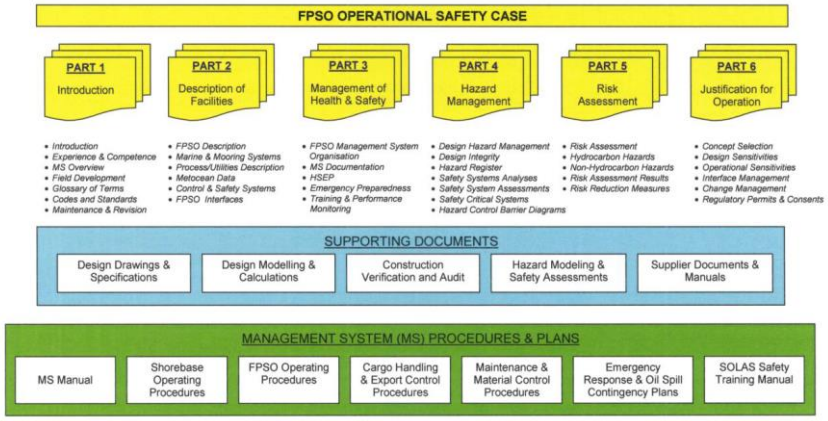
Existing industry guidance for conventional tankers is not always suitable for F(P)SOs because it does not address the safe management of the concurrent activities

General Contents Overview

Section 1

Safety Management

- Trading tankers of 500 gross tonnes and above are required to comply with the International Safety Management (ISM) Code. The Code provides an international standard for the safe management and operation of ships and for pollution prevention.
- ISM does not typically apply to F(P)SOs and there is no equivalent international standard addressing their operation.
- In cases where ISM is not applicable, operators should develop and implement a safety management system (SMS) that demonstrates that risks are mitigated to a level that is as low as reasonably practicable.



General Contents Overview

Section 2

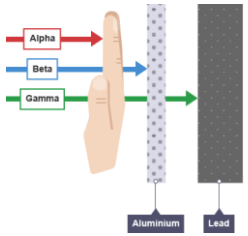
Hazardous Materials Associated with F(P)SO Operations

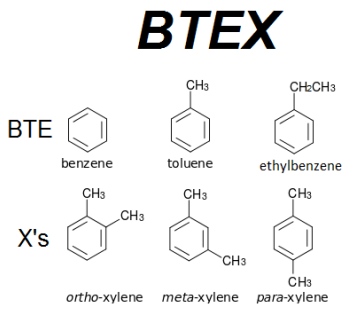
F(P)SO's continuously receive and manage hydrocarbons and associated hazardous materials.

Over time, the composition of the incoming stream may change with increased concentrations of hazardous elements such as:

- Hydrogen sulphide (H2S)
- Naturally occurring radioactive materials (NORMs)
- Mercury
- VOCs and BTEX

  Benzene, toluene, ethyl benzene and xylene (BTEX) found in crude oils are all considered 'volatile organic compound's (VOCs).
- Methanol
- Biocide chemicals





General Contents Overview

Section 3

General Hazards Associated with F(P)SO Operations

Many of activities, conducted in the process, or topsides areas of an F(P)SO can introduce hazards to the operation not typically experienced on tankers or offshore platforms.

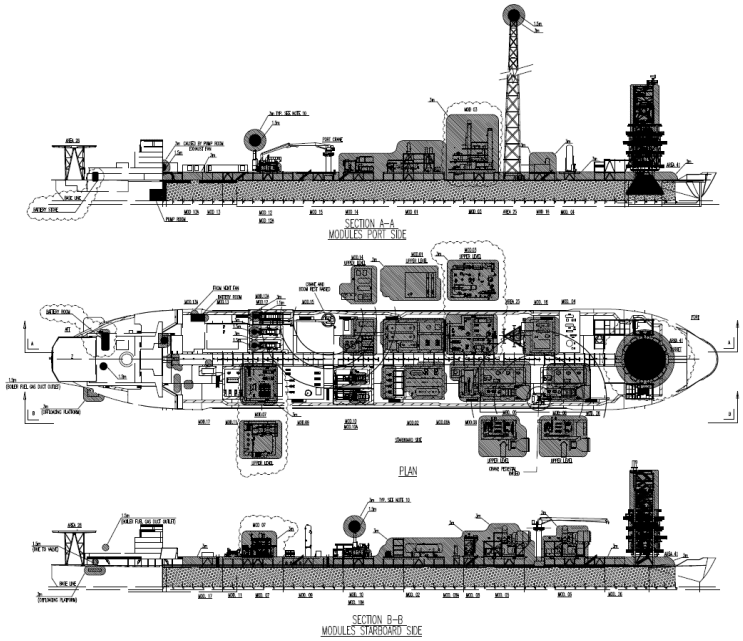
Identification of these hazards during design and offshore in the field, supported by appropriate risk analysis, should result in the development of appropriate prevention and mitigation measures.

Hazardous zones which have the potential to contain an explosive atmosphere should be identified and documented.

Zone 0 - In which ignitable concentrations of flammable gases or vapours:
- Are present continuously.
- Are present for long periods of time.

Zone 1 - In which ignitable concentrations of flammable gases or vapours:
- Are likely to be present under normal operating conditions.
- May be present frequently because of repair, maintenance operations or leakage.

Zone 2 - In which ignitable concentrations of flammable gases or vapours:
- Are not likely to be present in normal operating conditions.
- Are present for only a short period of time.
- Become hazardous only in case of an accident or an unusual operating condition.



General Contents Overview

Section 3

General Hazards Associated with F(P)SO Operations

- Control of potential ignition sources
  - *Naked flames*
  - *Power generators and other deck mounted machinery*
- Communications equipment
  - *F(P)SO radio equipment*
  - *Radar equipment*
  - *Mobile telephones and tablets*
  - *Telemetry systems for Emergency Shutdown Systems*
- Use of tools
  - *Grit blasting and mechanically powered tools*
  - *Pressure washing equipment*
- Electrical power tools and equipment
  - Non-intrinsically safe portable electrical equipment (e.g. cameras, boroscope)
- Lifting equipment
  - *A control process for portable lifting equipment should be developed. It should contain a means of tracking the issue and location of the lifting gear in order to quickly locate lifting gear for inspection.*

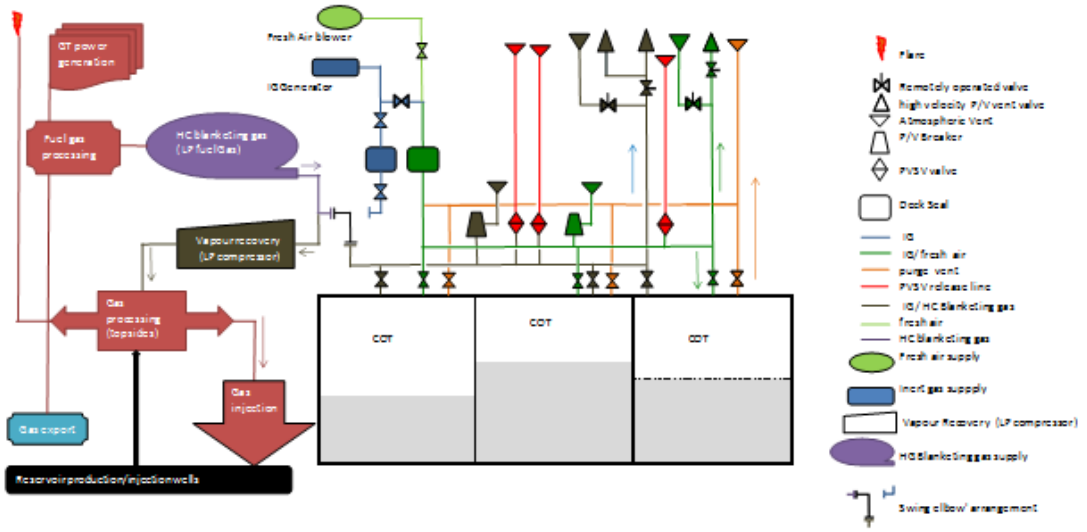
General Contents Overview

Section 4

Storage Tank Atmosphere Control and Venting Arrangements

Storage tank atmosphere control

- Nitrogen
- Inert gas
- Hydrocarbon gas used for the gas blanketing of storage tanks
    - *Vapour recovery systems on F(P)SOs typically accompany the hydrocarbon blanketing gas systems and are part of the original design.*



General Contents Overview

Section 4

Storage Tank Atmosphere Control and Venting Arrangements

Venting arrangements

- *An F(P)SO continually loads crude oil to the storage tanks resulting in the inert gas blanket within the tanks being compressed.*
- *When the atmosphere within the tanks reaches a certain pressure, below that which could cause damage to the vessel structure, the mixture of inert gas and hydrocarbons will be safely vented to atmosphere, unless a vapour recovery system is fitted.*

Subjects that have to be looked at during the design phase:

- Vent capacity
- Vent location
- H2S considerations
- Gas monitoring
- Pyrophoric iron sulphide

General Contents Overview

Section 5

F(P)SO Cargo Operations

Since an F(P)SO may typically be on station and in continuous service for the life of the oil field, often in remote locations, consideration should be given to the following:

- *In-tank integrity inspections.*
- *Computer based integrity predictive and monitoring tools.*
- *Underwater Inspection in Lieu of Drydocking (UWILD).*
- *Stress and stability considerations caused by cyclical loading.*
- *In-tank corrosion prevention, including cathodic protection and coatings.*

Storage tank alarms and overfill protection

- *Process shutdown*
- *Designated “crash tank”*

Simultaneous operations

- *The development of a SIMOPS matrix and the incorporation of it into the F(P)SO’s work management system will help safely manage routine and non-routine SIMOPS*

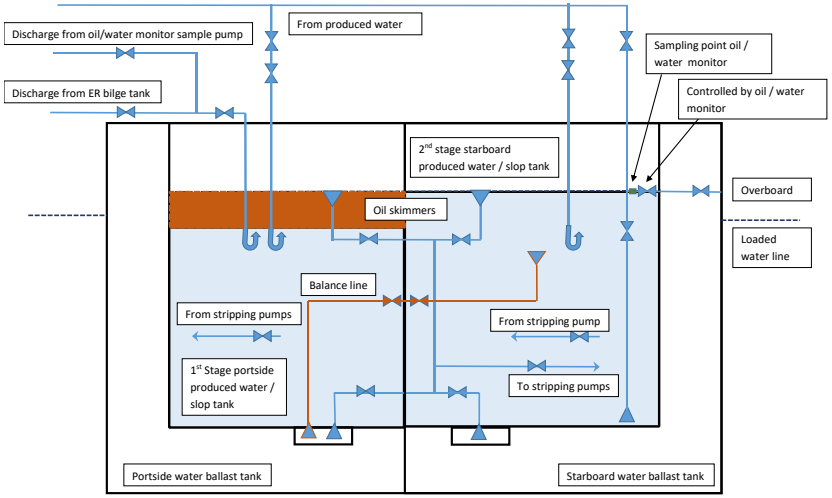
General Contents Overview

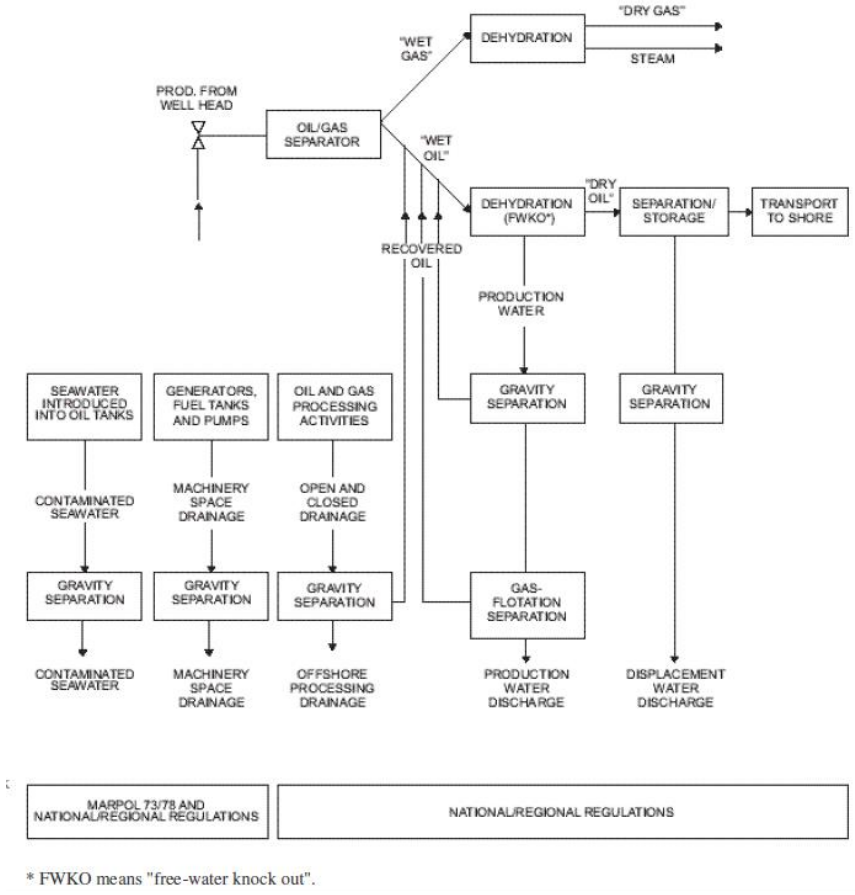
Section 6

Water Management

Compared with trading tankers, F(P)SOs have to deal with considerably more types of oil and water mixtures as part of the tank management of the facility.

- Processed well stream fluids
  - Off-spec crude oil
  - Off-spec produced water
- Water washing of storage tanks
- Open and closed drain systems
- Machinery space bilge water





* FWKO means "free-water knock out".

General Contents Overview

Section 7
Crude Oil Washing (COW)

The reason for COW on F(P)SOs is not different from that of trading tankers.

What is different is . . .

- *Isolation philosophy*
- *Preventative maintenance measures*
- *Removal of tank cleaning machines*

General Contents Overview

Section 8

Tank Cleaning and Gas Freeing for Entry

Water washing and gas freeing onboard F(P)SOs should always be undertaken in accordance with the guidance contained in ISGOTT.

So, where do we differ from tanker operations?

- *There may be a build-up of 'muck' within storage tanks as a result of the continuous introduction of sediments originating from well fluids, sand, NORMs, completion fluids and tank corrosion.*
- *At the conclusion of the washing operations, the wash water can be processed in the produced water stream or via the F(P)SO's oil/water separator,*
- *Residual oil can be reintroduced into a storage tank stream.*
- *On F(P)SOs, it is best practice to use fixed devices to gas free storage tanks. However, portable units may be employed to maintain the gas free environment and these will typically be electrically driven.*

General Contents Overview

Section 9

Control of Work in Storage and Ballast Tanks

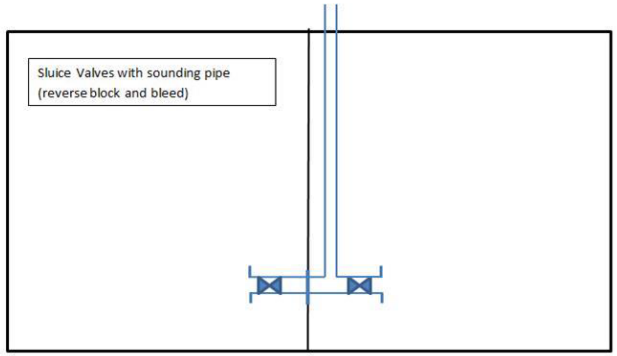
Preparation of tanks for entry

Enclosed spaces on F(P)SO's should be prepared in accordance with ISGOTT guidance and Sections 7 and 8.

Tank entry procedures

ISGOTT provides guidance for confined space entry and should be used as the base guidance for preparing and entering tanks on F(P)SOs.

Isolation practices that are used on tankers may not provide the same level of protection aboard an F(P)SO and wherever practicable, positive isolations should be used.



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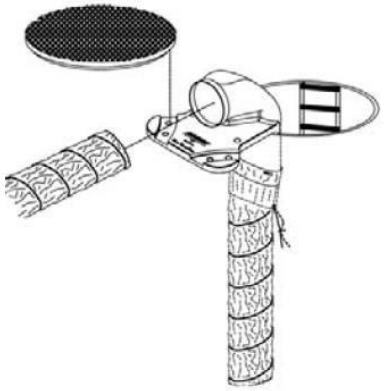
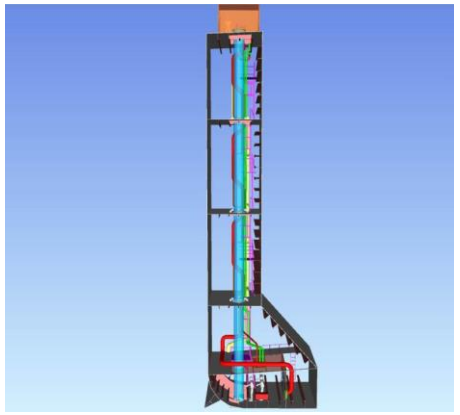
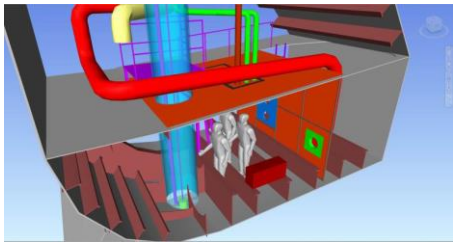
Section 9
Control of Work in Storage and Ballast Tanks





Tank entry procedures

- *Ventilation arrangements*
- *Lighting*
- *Access arrangements*
- *Emergency evacuation (3D modelling)*



Hot work inside tanks

- *By cleaning the complete tank*
- *By cleaning the area above, below and on either side of the work space, utilising fire blankets to contain weld or burn spatter and molten material*
- *By working in a habitat with a positive pressure*

General Contents Overview

Section 9

Control of Work in Storage and Ballast Tanks

Tank inspections

- *Inspection of tanks by man entry*
- *Inspection of tanks with mini ROVs and drones*

De-mucking of tanks

- *Typical sediments found are:*
  - *Wax*
  - *Sand*
  - *Oilfield Scale*
  - *NORMs*
  - *Heavy metals*
  - *Sulphur*
  - *Calcium Naphtenate*
  - *Other solidified/calcified deposits*
- *Removal of sediments by:*
  - *Air vacuum eduction system*
  - *Slurry pumping system*
  - *Portable winch and sludge baskets/bags*

General Contents Overview

Appendix A Example of a SIMOPS decision making matrix

SIMOPS Decision Matrix for Storage tank Management Normal Producing Operations Assumed		Tank Cleaning/Gas Freeing	Maintenance COW	Confined Space Entry	Vertical Tank Entries	Producing	Night Ops	Internal Hydrocarbon Transfers	Helo Operations	Flare Boom - Cold Venting	Hot Work (Classed Area) [1]	Abrasive Blasting/Coating [1]	Fire System Inoperable	Safety Device Testing	Engine Driven Equipment & Vehicles [1]	Work over water/Work at Heights	Hydrocarbon Source (Break containment) [1]	Rigging [1]	Routine Crane Activities	Heavy/Critical Crane Activities [1]	Heavy lift over wellbay [1]	Major construction activities	Drilling completions - Workover, Wireline [1]	Rig Skid	BOP Movement	Coiled Tubing Unit [1]	Electrically Fired Explosives Operations [2]	Well Testing/Pressurizing(other than test separator)	Well Stimulation [1]	Diving Operations	ROV Operations	Ballast Operations	Derrick Barge Lift	Life Boat/FRC Testing	Tanker Loading (Buoy)	Tanker Loading (Tandem)	Load/Unload Supply Vessel
OPERATIONS	Tank Cleaning/Gas Freeing	-	A																																	
	Maintenance COW	1	A	B																																
	Confined Space Entry	2	A	R1	C																															
	Vertical Tank Entries [1]	3	R2	R1	R2	D																														
	Producing	4	R1	A	R1	A	E																													
	Night Ops	5	A	A	R1	A	A	F																												
	Internal Hydrocarbon Transfers	6	A	A	R2	R1	A	A	G																											
	Helo Operations	7	A	A	A	A	A	R2	A	H																										
	Flare Boom - Cold Venting	8	A	A	R2	R2	A	A	A	R2	I																									
	Hot Work (Classed Area) [1]	9	P	P	R2	R2	R1	A	R2	A	p	J																								
	Abrasive Blasting/Coating [1]	10	R1	A	R1	R1	R1	A	R1	A	p	A	K																							
	Fire System Inoperable	11	P	P	R2	R2	P	A	P	R2	p	p	P	L																						
	Safety Device Testing	12	P	A	R1	R1	A	R2	A	A	R1	R1	R1	A	M																					
	Engine Driven Equipment & Vehicles [1]	13	R3	A	R1	R1	R1	A	R1	A	R1	A	A	R2	R1	N																				
	Work over water/Work at Heights	14	A	A	A	A	A	R2	A	A	A	A	A	A	A	A	O																			
	Hydrocarbon Source (Break containment) [1]	15	A	A	R2	R2	A	R1	A	A	A	R1	R1	P	P	R1	A	P																			
	Pigging [1]	16	A	A	R2	A	A	A	A	A	A	R1	R1	R2	R1	R1	A	A	Q																	
	Routine Crane Activities	17	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	R																
	Heavy/Critical Crane Activities [1]	18	A	A	R1	A	A	R2	R1	R1	R1	A	A	R2	A	A	R1	R1	A	R1	S															
	Heavy lift over wellbay [1]	19	R1	A	R1	A	A	R2	A	A	A	A	A	P	A	R1	R1	R1	R1	R1	R2	T														
	Major construction activities	20	R2	A	A	A	A	R1	A	A	R1	A	A	A	A	A	A	R2	A	A	A	A	U													
	Drilling completions - Workover, Wireline [1]	21	A	A	R2	A	A	A	A	R1	A	R1	R1	P	R1	R1	A	R1	P	R2	R2	P	R2	V												
	Rig Skid	22	R2	A	P	A	A	R1	R1	A	A	A	A	A	A	A	A	A	A	R1	P	P	R1	P	W											
	BOP Movement	23	R1	A	R1	A	A	R1	R1	A	A	A	A	P	A	A	A	A	A	R1	R1	R1	R1	P	P	X										
	Coiled Tubing Unit [1]	24	R1	A	R2	A	A	A	A	A	A	R2	R1	P	R2	R1	A	R1	P	R2	P	P	R2	R2	P	A	Y									
	Electrically Fired Explosives Operations [2]	25	P	P	P	P	R1	R1	P	P	P	R1	A	p	R1	A	P	A	P	P	P	P	P	R2	P	P	R2	Z								
	Well Testing/Pressurizing(other than test separator)	26	R2	A	R2	A	A	A	A	A	A	A	A	p	R1	R1	A	R1	P	R1	R1	R1	R1	R1	A	A	A	R2	AA							
	Well Stimulation [1]	27	A	A	R2	A	A	A	A	A	A	R2	A	p	R2	R1	A	R1	R1	A	A	R2	A	R1	A	R2	R1	P	A	BB						
MARINE	Diving Operations	28	R2	A	R2	A	A	R2	A	A	p	A	A	A	A	A	R1	A	A	R1	R2	R1	R1	R1	A	A	A	P	A	A	CC					
	ROV Operations	29	R2	A	R2	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	R1	DD				
	Ballast Operations	30	R1	A	R1	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	P	R1	A	A	A	A	P	A	A	A	A	EE			
	Derrick Barge Lift	31	R2	A	A	A	A	R1	A	R1	R2	A	A	A	A	A	R1	A	A	R1	R2	R1	A	A	A	A	A	P	A	A	R2	R1	A	FF			
	Life Boat/FRC Testing	32	A	A	R2	R2	A	P	A	R1	P	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	P	A	A	R1	A	A	A	GG		
	Tanker Loading (Buoy)	33	A	A	R1	A	A	A	A	A	A	A	A	p	A	A	A	A	A	A	R1	R1	A	P	A	A	A	P	A	A	A	A	A	A	A	HH	
	Tanker Loading (Tandem)	34	A	A	R1	P	A	A	A	A	P	P	A	p	A	A	R1	A	A	A	P	R2	R1	P	A	A	A	P	A	A	P	R1	A	R2	R1	P	II
	Load/Unload Supply Vessel	35	A	A	R1	R1	A	A	A	A	R2	A	A	A	A	A	R1	A	A	A	R1	A	R1	A	A	A	A	P	A	A	R1	A	A	R1	A	A	R1	JJ
	Flammable Liquid Transfer - Supply Vessel	36	A	A	R1	A	A	R1	A	A	R2	P	P	p	R1	R1	R1	A	A	A	R1	A	R1	A	A	A	A	P	A	A	R1	A	A	R1	A	A	R2	R1

[1] within 85 feet (26 m)

[2] Radio silence required

P	SIMOPS Prohibited	R1	OIM/PIC Approval
R	SIMOPS Restricted	R2	Ops Supt. Approval
A	SIMOPS Allowed		

Publications schedules

The Cargo Guidelines for F(P)SOs is scheduled for publication:

Late 2nd Quarter of 2018

Other publications scheduled for publication:

Guidelines for Offshore Tanker Operations (GOTO)

Late 2nd Quarter of 2018

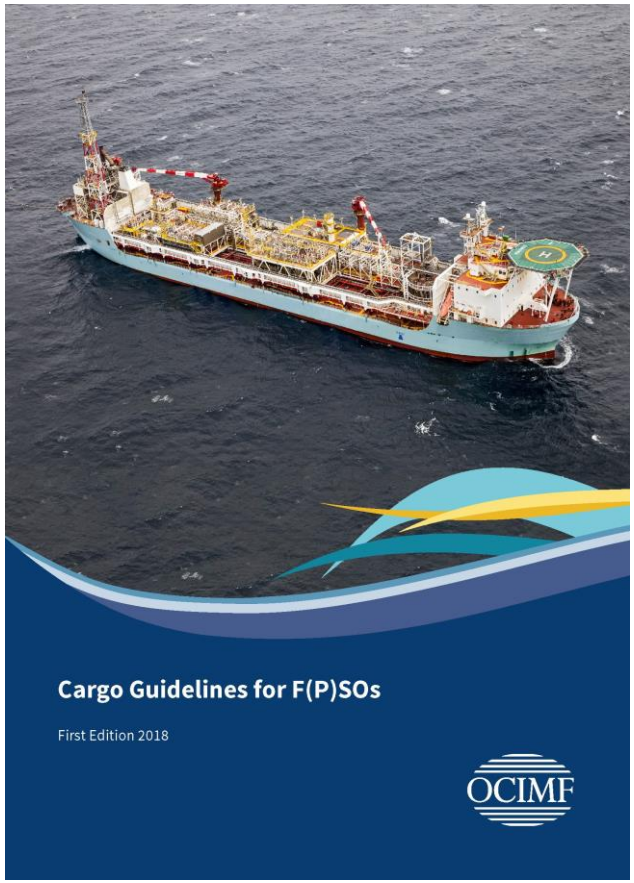
New publications related to GOTO information:

Mooring Equipment Guidelines (MEG) 4th Edition

Due 2nd/3rd Quarter 2018

Effective Mooring

Due late 3rd Quarter 2018.



OCIMF

A Voice for Safety

OCIMF.org

Oil Companies International Marine Forum
29 Queen Anne's Gate, London, SW1H 9BU

Tel: +44 (0) 20 7654 1200
Fax: +44 (0) 20 7654 1205