



Exploration & Production

## GENERAL SPECIFICATION

### Logistic and Operational Support

#### GS EP LSO 201

#### Towing Floating Unit

|      |         |                                                    |
|------|---------|----------------------------------------------------|
|      |         |                                                    |
|      |         |                                                    |
|      |         |                                                    |
|      |         |                                                    |
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## 1. Scope

This General Specification defines the conditions and methods required by Company for Ocean Towing for Transportation and Towing for Offloading at Terminals. This document defines the minimum requirements for the FLOATING UNIT towing. It covers the design, preparation and performance of FLOATING UNIT towing and marine operations.

## 2. Reference documents

The reference documents listed below form an integral part of this General Specification. Unless otherwise stipulated, the applicable version of these documents, including relevant appendices and supplements, is the latest revision published at the EFFECTIVE DATE of the CONTRACT.

The DGEP rules covering the towing of permanent or semi-permanent installations on the high seas are as follows:

- For towing vessels : they must, as a minimum, be certified under the “Noble Denton Towing Vessel Approvability Scheme”
- For the Management (Towing Company): they must comply with the IMO, ISM and ISPS Code
- For Procedures: The Towing Manual shall be issued 4 months before departure. This manual shall be prepared by the Contractor and approved by head office DGEP LSO Marine experts.

For the Bollard Pull calculation: in addition to the IMO rules for wind and sea values, reference should also be made to the DNV rule covering the current value (1 m/s).

### Standards

| Reference      | Title |
|----------------|-------|
| Not applicable |       |

### Professional Documents

| Reference    | Title                                                                              |
|--------------|------------------------------------------------------------------------------------|
| ABS          | Guide for Building and Classing Floating Production, Storage and Offloading System |
| Noble Denton | General Guidelines for Marine Transportation                                       |

### Regulations

| Reference | Title                                                |
|-----------|------------------------------------------------------|
| BV        | Remorquage en mer de navires ou engins flottants     |
| DNV       | Rules for Planning and Execution of Marine Operation |
| IMO       | Guidelines for safe towing operations DE 39          |



## Codes

| Reference | Title                                      |
|-----------|--------------------------------------------|
| ISM code  | International Safety Management code       |
| ISPS code | International Ships and Port Security code |

## Other documents

| Reference      | Title |
|----------------|-------|
| Not applicable |       |

## Total General Specifications

| Reference      | Title |
|----------------|-------|
| Not applicable |       |

## 3. Towing aspects

This Specification shall apply to all Non-Routine tows, which means ocean towing of Floating Units from Construction site to Production site over the high seas all around the world; and to Routine-tow of non Specialized Tankers mooring at Coastal and Offshore Terminal Facilities.

### 3.1 Towing for Transportation

The Towing dossier shall comprise the following evaluations:

- Towage resistance
- Towing configuration
- Routing, duration of tow
- Environmental aspects, foreseen shelters
- Towing scenario and selection of tugs
- Regulations

### 3.2 Towing for Offloading at Terminals

The Towing dossier shall comprise the following evaluation

- Towage capacity
- Towing configuration
- Approach, hook-up, staying moored
- Contingency



### 3.3 Towing environmental conditions

- The necessary towing force should be estimated based on:
  - The planned towing route and elaboration of the specific Weather Study Towing Route;
  - The environmental aspects.

## 4. Towing vessels

Towing vessels shall be selected to enable:

- effective utilization of bollard pull
- good maneuverability
- simple disconnecting operations
- simple recovery operations

The criteria for selection of Towing vessels are:

### 4.1 Towing Force

#### 4.1.1 Towing force for open sea

The DNV-VMO Rules for Marine Operations for open sea requires that the combined Bollard Pull available shall be sufficient to maintain station keeping zero speed under the following environmental conditions acting in the same direction:

- Sustained Wind Velocity (Vs) 40 knots
- Significant Wave Height (Hs) 5.0 Metres
- Head Current Velocity (Vc) 2.0 knots

#### 4.1.2 Towing force for coastal towing

Towing force for coastal towing and towing in narrow and shallow water representing a danger for grounding, shall be sufficient to maintain a speed over ground, in safe direction, of minimum 2 knots under the defined local environmental conditions.

### 4.2 Bollard Pull

Required tug Bollard Pull shall be estimated based on calculated required towing force (ref § 4.1.1), tug resistance, and tug efficiency in waves. Unless more accurate calculations of tug efficiency are made, depending of the sailing area the continuous bollard pull stated in the bollard pull certificate shall be multiplied with an efficiency factor of:

- 0.80 inshore and coastal
- 0.75 offshore (Ocean Tug design)
- 0.70 offshore (Anchor Handling Tug design)

### 4.3 Contingency

If a breakdown occurs during the Tow, the remained contingency tow must contribute to stay at same level than the initial calculated Tow force.

If the size of the Floating unit Tow is like large FPSO design (i.e DWT 300 KT or more). The design of Tow must include the mobilisation of 3 Tugs.

## 5. Towing Routes and Navigation requirements

### 5.1 Weather Study Towing Route - Environmental aspects

The design sea states for determine towing routes shall comprise

- Route details
- Wind extreme
- Waves extreme
- Tropical Cyclones extreme
- Adjusted design Criteria: Tropical cyclones are generally rare but, when they occur they can be devastating. Where the 10 year extreme are associated with a tropical cyclone there is a risk that the design criteria could be substantially exceeded and adjusted extremes which are justifiable when the worst weather can be avoided, may not be appropriate.
- Wave frequency tables

The towed object should be designed to withstand the loads caused by the following environmental conditions for the season and areas in question:

Duration of towing operation Return period

|             |          |
|-------------|----------|
| < 3 days    | 1 year   |
| 3 – 30 days | 10 years |
| > 30 days   | 15 years |

### 5.2 Adverse Weather towing navigation procedure:

The encounter of adverse weather is a possibility when the transport is rounding specific passages (such as Cape of Good Hope, Cape Finistere, Ushan, Gulf of Biscay, Channel passage). Adverse weather in these specific areas cannot always be avoided, as the possibility of deviation is very limited.

In the event of weather deterioration and increasing sea state, the Tugs normally reduce their output in order to avoid excessive peak loadings in the towline. The towing speed is reduced and the course is maintained in this situation.

The distance between the tugs will be increased as a safe precaution. Should the weather deteriorate further, the tugs may also change their headings in order to achieve the best possible control of the tow and in the same time ensure the least possible chafe damage to the tow wire.

Where the tow wire is in contact with the tug (stern of vessel), the wire shall be protected by sleeves, fitted around the tow wire. During severe weather these sleeves shall be inspected and maintained regularly as long as it is safe to do so; if required, the tow wire is paid out a small distance in order to avoid excessive wear and tear on the tow wire protecting sleeves.