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Marine structures — Crude oil offloading system — Hose reels

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Foreword

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee 8, *Ships and marine technology*, Subcommittee 4, *Outfitting and deck machinery*.

Marine structures — Crude oil offloading system — Hose reels

1 Scope

This document specifies the design, operation and acceptance test of hose reels for the crude oil offloading system.

This document is applicable to the design, manufacture and acceptance of hose reels for the crude oil offloading system used on marine structures such as FPSO and mobile platform.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3828, *Shipbuilding and marine structures — Deck machinery — Vocabulary and symbols*

ISO 3730, *Shipbuilding and marine structures — Mooring winches*

ISO 7825, *Shipbuilding — Deck machinery — General requirements*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 3828 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at http://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
rated load
when the drum is wound at a rated speed (see 3.4), the drum can withstand the maximum pulling force of the hose when the drum is wrapped around a single layer of hose

3.2
maximum sustained load
the maximum pull of the first layer of hose the drum can withstand when the reel is in a braking state

3.3
emergency release load
pull acted on the hose upon the release of the emergency rescue device, which installed to prevent drum from breaking due to excessive hose pull in the offloading process

3.4
rated speed
the maximum retrieval speed the reel can maintain when the hose reel is subjected to the rated load (see 3.1)

3.5
working pressure
Maximum working pressure of crude oil medium in the hose reel's piping.

3.6
reel capacity
capacity of hose reel drum to store the offloading hose, indicating the total length of the offloading hose with a certain outside diameter it can store.

4 Types

4.1 Basic functions

Hose reel shall have the following basic functions (but not limited to such functions):

1) The reel shall have the capacity to store, retrieval and launching the hose.

2) The reel shall allow flow of fluid medium with certain pressure during the offloading operation.

3) In case of emergency, hose reel shall have the capacity to release the offloading hose and emergency shutdown of the flow pipe.

4.2 Strength

4.2.1 When the hose reel is droved by drive unit with the rated load to calculate the stress of transmission and other affected parts, the stress shall not exceed 66 % of the yield limit of the material.

4.2.2 When the reel is under maximum sustained load, the stress of the affected parts shall not exceed 90 % of the yield limit of the material.

4.3 Design and structure

4.3.1 General requirement

Hose reel is mainly composed of a drum, through-flow unit, frames, drive units, a brake device, an emergency release device, operating devices, and auxiliary equipments

4.3.2 Drum design

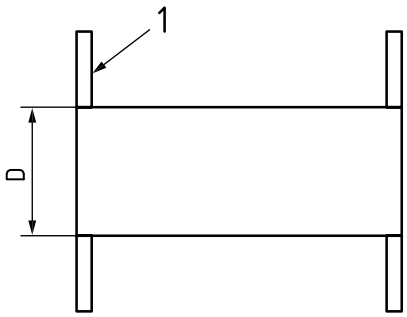
4.3.2.1 The minimum bottom diameter D of the drum (see Figure 1) shall not be less than 2 times the minimum bending radius of the selected the offloading hose.

4.3.2.2 The size of the drum shall be such that the offloading hose is fully stored. The outer surface of the drum shall not have sharp edges or other protruding structures that can squeeze or damage the outer surface of the hose.

4.3.2.3 The crane neck structure connected with the first section of the offloading hose protruding from the surface of the cylinder barrel shall be provided with a safety guardrail around to guide hose retrieval to avoid hose damage described in 4.3.2.2.

4.3.2.4 The reel shall be designed to store the hose in no more than two layers. When the number of layers wound is one, last section hoses shall not be squeezed with the flange structure (see 4.3.2.5).

4.3.2.5 Roller edges should be provided with a flange structure. When the entire hose is wrapped around the drum, the height of the outermost hose beyond the flange shall be less than the hose radius.



Key

1 flange

Figure 1 — Drum structure diagram

4.3.3 Through-flow unit

In order to satisfy the function of the flow, a crude oil swivel joint shall be provided between the rotating drum and the stationary steel pipeline. Meanwhile, a through-flow piping system shall be arranged inside the drum. The components should meet the following requirements:

a) The part of the structure in direct contact with through-flow medium shall take into account the choice of material.

b) The size of the inner diameter of piping system in through-flow parts shall be consistent with the selected inner diameter of the offloading hose.

c) Swivel joints shall be able to work properly if the moving and stationary rings have a certain eccentricity.

d) Swivel joints shall maintain a good dynamic sealing at the highest working pressure.

4.3.4 Frame design

4.3.4.1 The strength of frames shall meet the strength requirements specified in 4.2.

4.3.4.2 In order to facilitate the installation, transportation, and adjustment, frames should be designed into a split structure. Besides, the corresponding lifting ears shall be arranged on the frame to enable integral hoisting of the hose reel.

4.3.5 Drive unit

4.3.5.1 The drive unit of each reel shall provide the capability to receive and launch the reel at rated speed and load.

4.3.5.2 To enhance the reliability, redundancy design of drive unit shall be incorporated to respond to emergencies.

4.3.6 Brake device

4.3.6.1 Hose reel shall be equipped with drum brakes which shall be capable of withstanding the maximum sustained load specified in 3.2.

4.3.6.2 Hydraulically controlled brakes shall be integrated on the drive unit and used for static braking.

4.3.6.3 In addition to the one set of brakes specified in 4.3.6.2, hose reel can also be equipped with a mechanical brake device. In case of hydraulic drive failure, the drum can be locked manually.

4.3.7 Emergency release equipment

Emergency release equipment should meet the following requirements:

a) Emergency release equipment shall be able to bear the emergency release load as specified in 3.3.

b) Measures shall be provided to close the shut-off valves at both ends of the releasing point before release to prevent the outflow of media from polluting the environment.

c) Measures shall be provided to prevent accidental release.

4.3.8 Operating device

4.3.8.1 Permanent signs must be fixed or marked in the direction of movement of the operating device. When the handwheel or the crank cranks the clockwise rotation or the handle moves towards the operator, the hose reel shall recovery the hose.

4.3.8.2 Unless agreed between the manufacturer and the purchaser, no matter what kind of power source is used, the operating device shall be designed to automatically return to the stop position when the operator releases the controller.

4.3.8.3 To make recovery and launching operation easier, a remote control device can be equipped.

4.3.9 Auxiliary equipment

4.3.9.1 Maintenance and inspection platforms can be provided on both sides of the drum, and the height of the platform shall comply with the relevant requirements. Operating room can be installed on the maintenance and inspection platform if required by order owner. The layout of the operating room shall allow the operator in the operating room to have a good operating perspective.

4.3.9.2 Hose reel can be equipped with automatic or manual pipe layer. The pipe layer shall be able to assist reel drum to better receive and launch the offloading hose. The pipe layer shall not squeeze or damage the outer surface of the hose.

5 Acceptance tests

5.1 General requirement

Before hose reel delivery, the following factory acceptance tests as specified in 5.2~5.5 shall be conducted.

NOTE These factory acceptance tests can be conducted in factory or onboard.

5.2 No-load test

5.2.1 Operate the hose reel in the forward and reverse directions each for 15 minutes continuously with no-load.

5.2.2 Inspect the following items during the test as specified in 5.2.1.

a) oil seal.

b) bearing temperature rise.

c) reel speed.

d) abnormal noise and vibration.

5.3 Load test

5.3.1 Operate the hose reel lifting and lowering within the effective height range with the rated load for no less than 30 minutes.

5.3.2 Inspect the following items during the test:

a) reel speed.

b) hydraulic system pressure.

c) oil seal.

d) bear temperature rise.

e) abnormal noise and vibration.

5.4 Braking test

5.4.1 Apply the maximum sustained load to the drum and lock the brakes. Maintain the state for not less than 5 minutes.

5.4.2 Inspect the following items:

a) obvious slip of brakes.

b) permanent deformation of the main force parts after test.

5.5 Pressure test

Pressure test shall be conducted for hose through-flow unit (including swivel joints) with maximum working pressure for at least 30 minutes. There shall be no leakage.