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Marine structures — Crude oil offloading systems — Hose reels

Structures maritimes — Systèmes de déchargement de pétrole brut — Dévidoirs

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Marine structures — Crude oil offloading systems — Hose reels

1 Scope

This document specifies requirements for the design, operation and acceptance tests of hose reels for crude oil offloading systems.

It is applicable to the design, manufacture and acceptance of hose reels for crude oil offloading systems used on marine structures such as floating production storage & offloading (FPSO) and mobile platforms.

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*

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:

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

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

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

3.2
maximum sustained load
maximum pull of the first layer of hose that 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 is installed to prevent the drum from breaking due to excessive hose pull in the offloading process

3.4
rated speed
maximum retrieval speed that the reel can maintain when the hose reel is subjected to the *rated load* (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 the 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 reels shall have (but not be limited to) the following basic functions:

1) The reel shall have the capacity to store, retrieve and launch the hose.

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

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

4.2 Material stress

4.2.1 When the hose reel is droved by the 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 the 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

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

4.3.2 Drum design

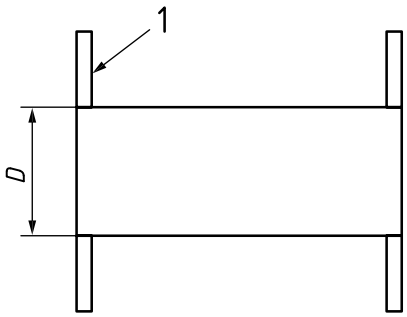
4.3.2.1 The minimum bottom diameter, *D*, of the drum (see Figure 1) shall not be less than 2 times the minimum bending radius of the selected offloading hose.

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 it to guide the hose retrieval to avoid hose damages as 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, the 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. 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 the 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, the 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 the drive unit shall be incorporated to respond to emergencies.

4.3.6 Brake device

4.3.6.1 Hose reels 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 reels 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 defined 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 shall be fixed or marked in the direction of movement of the operating device. When the handwheel or the crank cranks the clockwise rotation, or when the handle moves towards the operator, the hose reel shall recover 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. An operating room can be installed on the maintenance and inspection platform, if required by the 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 reels can be equipped with an automatic or manual pipe layer. The pipe layer shall be able to assist the 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 factory acceptance tests specified in 5.2 to 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 min 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 min.

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 min.

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

A pressure test shall be conducted for hose through-flow units (including swivel joints), applying the maximum working pressure for at least 30 min. There shall be no leakage.

6 Designation system

6.1 Designation of product models

The designation shall be as shown in the example in Figure 2.

EXAMPLE Hose reel with hydraulic drive, bore size of DN400, rated load of 250 kN and rated speed of 18 m/min are marked with: **Hose reel ISO 24043-H-400-250/18**