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Ships and marine technology — Marine environment protection — Tanks and piping systems for facilitating 5 ppm oil-water separation

Navires et technologie maritime — Protection de l'environnement marin — Réservoirs et systèmes de systèmes de tuyauterie utilisés pour faciliter la séparation entre le pétrole et l'eau à 5 ppm

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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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For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 8, *Ships and marine technology*, Subcommittee SC 2, *Marine environment protection*.

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.

Introduction

Marine environment protection is required by national, regional and international regulations.

The *International Convention for the Prevention of Pollution by Ships* (MARPOL) was adopted in 1973 and it has been regularly updated by amendments made by the Marine Environment Protection Committee (MEPC) of the International Maritime Organization (IMO). MARPOL is the legal basis for the prevention of marine pollution. MARPOL requires the installation of oil-water separation systems to treat fluids consisting of mixtures of oil and water generated on board ships.

On fixed offshore marine structures (e.g. converter stations and transformer substations of offshore wind turbines), oil-in-water emulsions, oily mixtures of surface water, fuel and lubrication oil, and many other substances covered by regulations might spill or otherwise cause hazards. Hence there is a need to separate these mixtures to an oil concentration of less than what is currently required by MARPOL.

Ships and marine technology — Marine environment protection — Tanks and piping systems for facilitating 5 ppm oil-water separation

1 Scope

This document provides requirements and test methods for tanks, piping and separation systems facilitating the separation of contaminated fluids of oil and water on fixed offshore marine structures and ships, where treatment is performed by separation systems that optimize oil-water separation to a concentration equal to or less than 5 ppm.

It is applicable to fixed offshore marine structures and to ships operating in designated sea areas determined by the relevant authorities.

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 8217, *Petroleum products — Fuels (class F) — Specifications of marine fuels*

ISO 9377-2, *Water quality — Determination of hydrocarbon oil index — Part 2: Method using solvent extraction and gas chromatography*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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
parts per million
ppm
number of parts of oil per one million parts of water, expressed by volume

Note 1 to entry: 1 ppm equals to 1 µl of oil per 1 l of water.

3.2
ppm display
numerical scale display of the *parts per million* (3.1)

4 Technical specifications

4.1 Oil-water separation equipment (OWSE)

Oil-water separation equipment (OWSE) installed on fixed offshore marine structures shall be constructed suitable for offshore use.

The OWSE shall comprise:

— an oil-water separator (5 ppm OWS);

— a 5 ppm oil content meter (5 ppm OCM); and

— an automatic discharge stopping device (ADSD).

If intended to be fitted in locations where flammable atmospheres can be present, OWSE are expected to comply with the relevant safety regulations for such spaces. Any electrical or electronic equipment which is part of the 5 ppm oil-water separation equipment shall be either intended and designated for use in non-hazardous areas, or, if intended to be used in hazardous areas, it shall be type-approved by the Administrations or recognized organizations on their behalf as safe for use in hazardous areas.

Figure 1 shows an example of the functional layout of an OWSE.

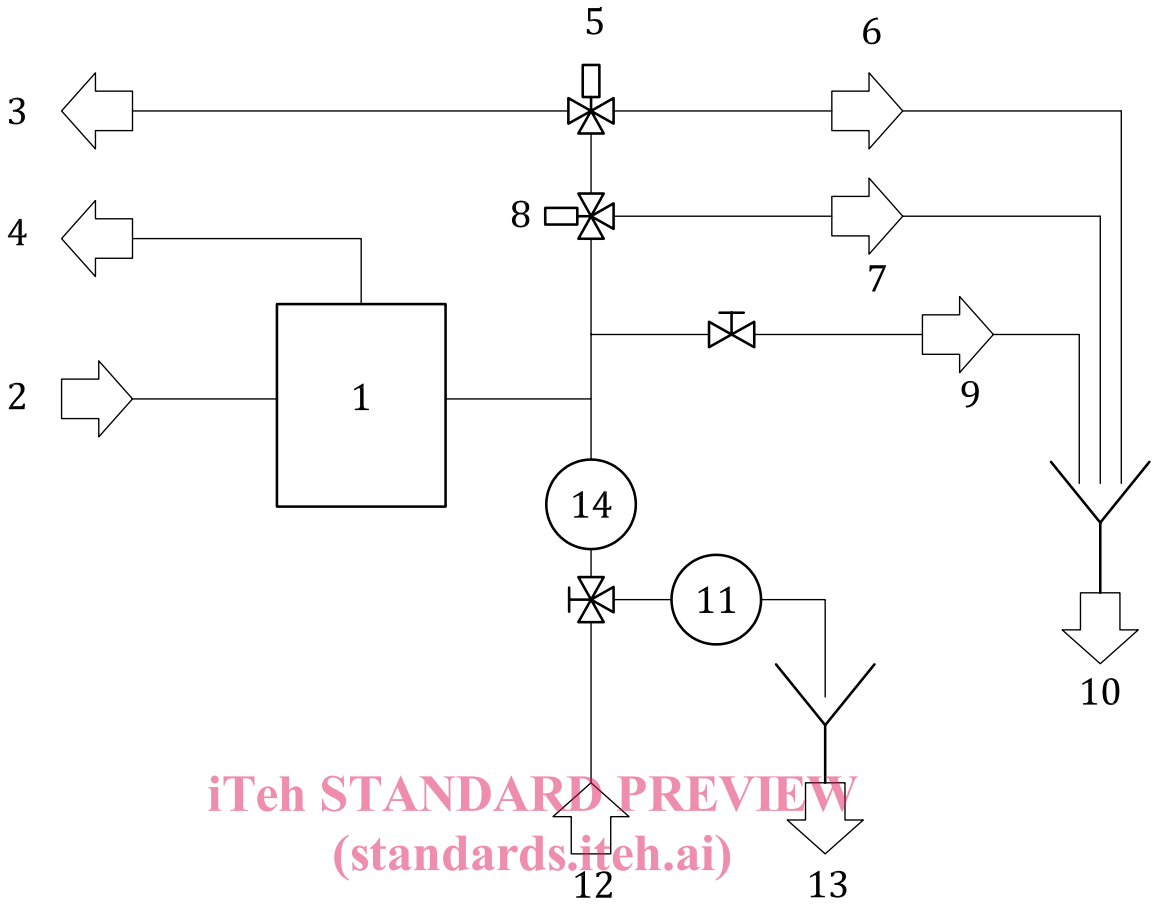
The OWSE shall be resistant to corrosion and to other conditions of the marine environment where it is in use.

The OCM may include an oil content alarm.

An example of a schematic plan for the management of oil-in-water effluents in fixed marine offshore structures is shown in Figure A.1.

An example of a schematic diagram for the management of the separation and treatment of oil-in-water effluents on fixed marine structures is shown in Figure A.2.

Fixed offshore marine structures or ships fitted with an OWSE shall, at all times, have a copy of the operating and maintenance manuals available.



Key

1 5 ppm OWS
2 mixture inlet, filling and rinsing (oil-free water)
3 discharge treated water, oil <5 ppm into the sea
4 discharge separated media into waste oil tank
5 manual recirculation facility or valve for testing (inherently safe)
6 discharge for testing
7 recirculation water, oil >5 ppm
8 ADSD
9 sampling location
10 back to bilge water holding tank or bilge
11 OCM
12 flushing water inlet
13 back to bilge water holding tank or bilge
14 flow switch controller

Figure 1 — Example of functional layout of an OWSE

4.2 5 ppm OWS

The 5 ppm OWS shall be designed to reduce the oil content in an oil-in-water mixture to a volume concentration equal to or less than 5 ppm.

The 5 ppm OWS shall be so designed that it functions automatically. However, fail-safe arrangements to avoid any discharge in case of malfunction shall be provided.

The 5 ppm OWS may include any combination of a separator utilizing gravity separation, filtration, and coalescence to produce an effluent with an oil content not exceeding 5 ppm by volume.

The 5 ppm OWS shall utilize a continuous automatic process and shall indicate when it is in operation. It shall be capable of continuous operation for at least 24 h or normal duty without attention.

All parts of the 5 ppm OWS which are subject to wear and tear shall be easily accessible for maintenance.

4.3 Oil content meter (OCM)

The OCM shall be able to measure the oil content in the water mixture with a resolution of 1 ppm and shall provide a ppm display. The ppm reading shall not be affected by emulsions and/or the type of oil.

The OCM shall give an alarm signal if the oil content exceeds 5 ppm in the effluent. The response time of the OCM, that is the duration between a deviation in the sample being supplied to the OCM and the display showing the current oil content (ppm), shall not exceed 5 s.

If the OCM is flushed with water for more than 5 s, the system shall create an alarm.

The accuracy of the OCM shall be checked at least every 5 years according to the manufacturer's instructions. Alternatively, the unit may be replaced by a calibrated OCM. The calibration certificate for the OCM, certifying the date of the last calibration check, shall be retained on the fixed offshore marine installation for inspection purposes. The accuracy checks can only be done by the manufacturer or duly authorized entity.

The bilge alarm shall record date, time and alarm status, and operating status of the OWS. The recording device shall also store data for at least eighteen months and shall be able to display or print a protocol for official inspections as required. In the event the bilge alarm is replaced, means shall be provided to ensure the data recorded remains available on board for 18 months.

To avoid willful manipulation of the bilge alarms, every access of the bilge alarm requires the breaking of a seal.

The alarm is always activated even when clean water is used for cleaning or zeroing purposes.

The Administration shall require the type approval of the 5 ppm OCM[2].

4.4 Automatic discharge stopping device (ADSD)

The ADSD shall stop automatically any discharge overboard of the oily mixture if the content of the effluent exceeds 5 ppm measured by the OCM, or when failure of the OCM occurs.

The ADSD shall consist of a valve arrangement, installed in the effluent outlet line of the 5 ppm OWS, which diverts the effluent mixture from being discharged overboard back to the source or other tank if the free oil content of the effluent exceeds the pre-set value.

4.5 Electric and electronic systems

The switchboard of the OWSE shall be type-approved by the Administration or recognized organization on their behalf in accordance with Annex C of this document.

4.6 Heating facilities

If the OWSE is fitted with heating facilities to retain the oil in it to a maximum of 40 °C by any process, the certificate of type approval shall be endorsed with the following statement:

> "The 5 ppm OWSE is fitted with heating facility"

5 Installation requirements

5.1 5 ppm OWS

For inspection purposes, a sampling point shall be provided at a position in a vertical section of the water effluent piping as close as is practicable to the 5 ppm OWS outlet. Recirculation facilities shall be provided, after and adjacent to the overboard outlet of the stopping device, to enable the OWSE system to be tested with the overboard discharge closed (see Figure 1).

The recirculating facility shall be so configured as to prevent, under all operating conditions, any by-pass of the OWS.

The capacity of the supply pump shall not exceed 90 % of the rated capacity of the 5 ppm OWS.

The OWS shall be fitted with a permanently attached nameplate giving any operational or installation limits considered necessary by the manufacturer.

5.2 Oil content meter (OCM)

The arrangement for the monitoring of the OWS discharge line to the OCM shall give a representative sample of the effluent with an adequate pressure and flow.

5.3 Automatic discharge stopping device (ADSD)

The layout of the installation shall be arranged so that the overall response time, including the response time of the OCM between an effluent discharge from the OWS exceeding 5 ppm and the operation of the ADSD preventing overboard discharge, shall be as short as possible and in any case not more than 20 s.

6 Testing of the 5 ppm OWS

The OWS shall be tested in accordance with Annex B.