SLOVENSKI STANDARD
SIST EN ISO 15138:2018

01-oktober-2018

Nadomešča:
SIST EN ISO 15138:2008

Industrija nafte in zemeljskega plina - Plavajoči proizvodni objekti - Ogrevanje, prezračevanje in klimatizacija (ISO 15138:2018)

Petroleum and natural gas industries - Offshore production installations - Heating, ventilation and air-conditioning (ISO 15138:2018)

Erdöl- und Erdgasindustrie - Offshore-Produktionsanlagen - Heizung, Lüftung und Klimatisierung (ISO 15138:2018)

Industries du pétrole et du gaz naturel - Plates-formes de production en mer - Chauffage, ventilation et climatisation (ISO 15138:2018)

Ta slovenski standard je istoveten z: **EN ISO 15138:2018**

ICS:

75.180.10	Oprema za raziskovanje, vrtanje in odkopavanje	Exploratory, drilling and extraction equipment

SIST EN ISO 15138:2018 **en,fr,de**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN ISO 15138

July 2018

ICS 75.180.10

Supersedes EN ISO 15138:2007

English Version

Petroleum and natural gas industries - Offshore production installations - Heating, ventilation and air-conditioning (ISO 15138:2018)

Industries du pétrole et du gaz naturel - Plates-formes de production en mer - Chauffage, ventilation et climatisation (ISO 15138:2018)

Erdöl- und Erdgasindustrie - Offshore-Produktionsanlagen - Heizung, Lüftung und Klimatisierung (ISO 15138:2018)

This European Standard was approved by CEN on 23 May 2018.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Ref. No. EN ISO 15138:2018 E

Contents

Page

European foreword **3**

European foreword

This document (EN ISO 15138:2018) has been prepared by Technical Committee ISO/TC 67 "Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries" in collaboration with Technical Committee CEN/TC 12 “Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries” the secretariat of which is held by NEN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by January 2019, and conflicting national standards shall be withdrawn at the latest by January 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 15138:2007.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 15138:2018 has been approved by CEN as EN ISO 15138:2018 without any modification.

INTERNATIONAL STANDARD

ISO 15138

Third edition
2018-06

Petroleum and natural gas industries — Offshore production installations — Heating, ventilation and air-conditioning

Industries du pétrole et du gaz naturel — Plates-formes de production en mer — Chauffage, ventilation et climatisation

Reference number
ISO 15138:2018(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **2**

4 Abbreviated terms ... **3**

5 Design ... **4**

5.1 General ... 4
5.2 Development of design basis ... 6
5.2.1 Orientation and layout ... 6
5.2.2 Hazardous area classification and the role of HVAC ... 8
5.2.3 Environmental conditions ... 9
5.2.4 Natural/mechanical ventilation ... 12
5.2.5 Selection of controls philosophy ... 14
5.2.6 Operating and maintenance philosophy ... 17
5.2.7 Materials and corrosion ... 19
5.2.8 Design margins and calculations ... 20
5.2.9 Wind-tunnel and computational fluid dynamics modelling ... 21
5.2.10 Performance standards ... 26
5.3 System design — General ... 27
5.3.1 Natural ventilation ... 27
5.3.2 Mechanical ventilation ... 28
5.3.3 Secondary ventilation systems ... 30
5.3.4 Black start ... 31
5.4 Area-specific system design ... 31
5.4.1 Process and utility areas ... 31
5.4.2 Living quarters ... 32
5.4.3 Temporary refuge ... 35
5.4.4 Drilling and drilling utility areas ... 35
5.4.5 Gas turbine ... 37
5.4.6 Emergency plant ventilation ... 38
5.4.7 Battery and charger rooms ... 39
5.4.8 Laboratories ... 39
5.4.9 Purge air systems ... 40
5.4.10 Rooms protected by gaseous extinguishing agents ... 40
5.4.11 Engine-room ventilation ... 40
5.4.12 Watertight compartments ... 41
5.4.13 Air locks ... 41
5.4.14 Stairs and escape routes ... 41
5.5 Equipment and bulk selection ... 42
5.6 Installation and commissioning ... 42
5.7 Operation and maintenance ... 42

Annex A (normative) **Equipment and bulk selection** ... **43**

Annex B (normative) **Installation and commissioning** ... **64**

Annex C (informative) **Operation and maintenance** ... **69**

Annex D (informative) **Datasheets** ... **72**

Annex E (normative) **Standard data for flanges** ... **136**

Bibliography ... **139**

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 ISO/TC 67, *Materials, equipment and offshore structures for petroleum, petrochemical and natural gas industries*, SC 6, *Processing equipment and systems*.

This third edition cancels and replaces the second edition (ISO 15138:2007), which has been technically revised.

The main changes compared to the previous edition are as follows:

— minimum and maximum temperatures have been added to 5.2.3.3.4 below Table 2 for clarification;

— a requirement for black start has been added to 5.3;

— requirements for the specific areas stairways/escape routes and air locks have been added to 5.4;

— phase-down and phase-out of high and medium global warming potential (GWP) refrigerants are addressed in 5.4;

— a reference to new filtration standard and note for chemical filtration have been added to Table A.1;

— fail safe criteria for fire damper for safety critical areas have been added to Clause A.9;

— requirements for duct earthing have been added to B.1.1;

— the datasheet for DX cooling coil has been updated with electronic expansion valve;

— the datasheet for heating coils has been updated with data for self-generated noise.

Petroleum and natural gas industries — Offshore production installations — Heating, ventilation and air-conditioning

1 Scope

This document specifies requirements and provides guidance for the design, testing, installation and commissioning of heating, ventilation, air-conditioning and pressurization systems, and equipment on all offshore production installations for the petroleum and natural gas industries that are

— new or existing,

— normally occupied by personnel or not normally occupied by personnel, and

— fixed or floating but registered as an offshore production installation.

This document is normally applicable to the overall facilities. For installations that can be subject to "Class" or "IMO/MODU Codes & Resolutions", the user is referred to HVAC requirements under these rules and resolutions. When these requirements are less stringent than those being considered for a fixed installation, then it is necessary that this document, i.e. requirements for fixed installations, be utilized.

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 7235, *Acoustics — Laboratory measurement procedures for ducted silencers and air-terminal units — Insertion loss, flow noise and total pressure loss*

ISO 8861, *Shipbuilding — Engine-room ventilation in diesel-engined ships — Design requirements and basis of calculations*

ISO 12241, *Thermal insulation for building equipment and industrial installations — Calculation rules*

ISO 12499, *Industrial fans — Mechanical safety of fans — Guarding*

ISO 14694:2003, *Industrial fans — Specifications for balance quality and vibration levels*

ISO 21789, *Gas turbine applications — Safety*

IEC 60079-0, *Electrical apparatus for explosive gas atmospheres — Part 0: General requirements*

IEC 60079-10, *Electrical apparatus for explosive gas atmospheres — Part 10: Classification of hazardous areas*

IEC 60079-13, *Electrical apparatus for explosive gas atmospheres — Part 13: Construction and use of rooms or buildings protected by pressurization*

IEC 61892-7, *Mobile and fixed offshore units — Electrical installations — Part 7: Hazardous Areas*

EN 1751, *Ventilation for buildings — Air terminal devices — Aerodynamic testing of dampers and valves*

EN 1886, *Ventilation for buildings — Air handling units — Mechanical performance*

EN 50272-2, *Safety requirements for secondary batteries and battery installations — Part 2: Stationary batteries*

API RP 505, *Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class 1, Zone 0, Zone 1 and Zone 2*

IMO Resolution MSC 61(67): Annex 1, *Part 5 — Test for Surface Flammability*

IMO Resolution MSC 61(67): Annex 1, *Part 2 — Smoke and Toxicity Test*

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 https://www.electropedia.org/

3.1
active system
system that relies on energized components

3.2
air-displacement unit
supply device to achieve movement of air within a space in piston- or plug-type motion

Note 1 to entry: No mixing of room air occurs in ideal displacement flow, which is desirable for removing pollutants generated within a space.

3.3
fugitive emission
continuous emission on a molecular scale from all potential leak sources in a plant under normal operating conditions

Note 1 to entry: As a practical interpretation, a fugitive emission is one which cannot be detected by sight, hearing or touch but can be detected using bubble-test techniques or tests of a similar sensitivity.

3.4
open area
area in an open-air situation where vapours are readily dispersed by wind

Note 1 to entry: Typical air velocities in such areas are rarely less than 0,5 m/s and frequently above 2 m/s.

3.5
passive system
system that does not rely on energized components

3.6
temporary refuge
TR
place where personnel can take refuge for a predetermined period while investigations, emergency response and evacuation pre-planning are undertaken

3.7
stagnant area
area where the ventilation rate is less than adequate

4 Abbreviated terms

AC/h	air changes per hour
AHU	air-handling unit
AMCA	Air Movement and Control Association Inc.
API	American Petroleum Institute
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
BS	British Standard
CCR	central control room
CFD	computational fluid dynamics
CIBSE	Chartered Institution of Building Services Engineers
CVU	constant-volume unit
D&ID	duct and instrumentation diagram
DX	direct expansion
EN	European Standard
ESD	emergency shutdown
F&G	fire and gas
GWP	global warming potential
HSE	health, safety and environment
HVAC	heating, ventilation and air conditioning
HVCA	Heating and Ventilating Contractors' Association
IACS	International Association of Classification Societies
IEC	International Electrotechnical Commission
IMO	International Maritime Organization
IP	Institute of Petroleum
LQ	living quarters
MODU	mobile offshore drilling unit
NFPA	National Fire Protection Association
NS	Norsk Standard (Norwegian Standard)
TR	temporary refuge

5 Design

5.1 General

This clause provides requirements on all aspects of the design of heating, ventilation and air-conditioning (HVAC) systems for offshore installations for the petroleum and natural gas industries.

For requirements and guidance on air change rates and pressurization requirements, reference is made to classification codes for the specific project.

The HVAC systems form part of the safety services of the installation. The key functional requirements for HVAC systems applicable to all areas of the installation are as follows:

a) sufficient ventilation, heating and cooling capacity in all adverse weather conditions;

b) acceptable air quality in all adverse weather conditions;

c) reliable performance through concept selection, the design having the following features in decreasing order of importance:

   1) simplicity, with a preference for passive systems;

   2) inherent robustness by providing design margins for systems and equipment;

   3) fault/status indication and self diagnostics;

   4) sparing of systems and equipment;

   5) maintainability through testability, inspectability and ease of access.

The following additional requirements apply to specific areas in the installation to ensure their safety goals are met:

— maintain survivability in the TR by preventing ingress of potentially flammable gas-air mixtures through appropriate siting, isolation, pressurization, provision of multiple air-intake locations, sufficient number of air changes, gas detection and emergency power supply;

— prevent the formation of potentially hazardous concentrations of flammable gaseous mixtures in hazardous areas by the provision of sufficient ventilation and air distribution for the dilution, dispersion and removal of such mixtures, and contain such mixtures, once formed, through maintaining relative pressures, avoiding cross-contamination and providing dedicated systems for hazardous areas;

— prevent, through pressurization, the ingress of potentially flammable gas-air mixtures into all designated non-hazardous areas;

— maintain ventilation to all equipment and areas/rooms that are required to be operational during an emergency when the main source of power is unavailable;

— provide a humidity- and temperature-controlled environment as required in which personnel, plant and systems can operate effectively, free from odours, dust and contaminants, including smoke control.

These high-level goals are supported by the lower-level functional requirements that are stated later in the appropriate subclauses of this document.

Functional requirements for the development of a design basis for either a new project or major modification to an existing installation are the focus of 5.2. These requirements are related to the following:

— platform orientation and layout (5.2.1);

— hazard identification and hazardous-area classification (5.2.2);

— environmental conditions (5.2.3);

— choice of natural or mechanical ventilation systems (5.2.4);

— development of the controls philosophy (5.2.5);

— operating and maintenance philosophy (5.2.6);

— materials selection (5.2.7);

— design margins and calculations (5.2.8);

— design development and validation using wind-tunnel testing or computational fluid dynamics (CFD) (5.2.9).

Ventilation may be natural (i.e. the wind) or mechanical or a combination of both. Throughout this document, the use of the term "ventilation" should be taken to include either natural or mechanical ventilation, as appropriate.

Natural ventilation is preferred over mechanical ventilation, where practical, since it is available throughout gas emergencies, does not rely on active equipment and reduces effort required for HVAC maintenance.

For new designs, the development of a design basis shall be progressed using the practices that are identified in this document, though it should be recognized that the design involves a process of iteration as it matures and does not happen as a sequential series of steps as is presented in this document for simplicity. The processes outlined here are equally applicable to major redevelopments of existing installations, but it can be necessary to make some compromise as a result of historical decisions regarding layout, equipment selection and the prevailing level of knowledge at the time. The challenge of providing cost-effective solutions in redevelopment can be significantly greater than for a new design.

The finalized basis of design may be recorded on datasheets such as those provided in Annex D.

The completed design shall be subject to hazard-assessment review. The hazard and operability (HAZOP) study technique may be used for this.

In 5.2, objectives are identified which establish the goals. Detailed requirements that enable the objectives to be achieved are outlined.

In 5.3, the fundamental choice in system design, i.e. between natural and mechanical methods of ventilation, is addressed.

In 5.4, the functional requirements associated with the design of HVAC systems for different areas of a typical offshore installation that require particular technical considerations due to their location and/or their function are given.

Figure 1 is intended to illustrate the processes undertaken at various stages of the installation life cycle and to identify reference documents and the appropriate subclauses of this document that provide the necessary requirements.