

Heating, ventilation and air conditioning (HVAC) and sanitary systems

This NORSOK standard is developed with broad petroleum industry participation by interested parties in the Norwegian petroleum industry and is owned by the Norwegian petroleum industry represented by The Norwegian Oil Industry Association (OLF) and The Federation of Norwegian Industry. Please note that whilst every effort has been made to ensure the accuracy of this NORSOK standard, neither OLF nor The Federation of Norwegian Industry or any of their members will assume liability for any use thereof. Standards Norway is responsible for the administration and publication of this NORSOK standard.

Standards Norway
Strandveien 18, P.O. Box 242
N-1326 Lysaker
NORWAY

Copyrights reserved

Telephone: + 47 67 83 86 00
Fax: + 47 67 83 86 01
Email: petroleum@standard.no
Website: www.standard.no/petroleum



Documents

Document Sharing Hub

Foreword	4
Introduction	4
1 Scope	5
2 Normative and informative references	5
2.1 Normative references	5
2.2 Informative references	6
3 Terms, definitions and abbreviations	6
3.1 Terms and definitions	6
3.2 Abbreviations	6
4 Heating, ventilation and air conditioning (HVAC)	7
4.1 General	7
4.2 ISO 15138 additions	7
5 Sanitary systems	9
5.1 Design conditions	9
5.2 Line sizing	9
5.3 Hot and cold water supply	9
5.4 System requirements	10
5.5 Layout and arrangement	12
5.6 Installation	12
5.7 Testing	13
6 Heating and cooling systems	13
6.1 General	13
6.2 Design conditions	13
6.3 Line sizing	14
6.4 System requirements	14
6.5 Control and adjustments (balancing)	14
6.6 Layout and arrangement	14
6.7 Installation	15
6.8 Testing	15
7 Equipment	15
Annex A (Normative) Data sheet	17

Foreword

The NORSOK standards are developed by the Norwegian petroleum industry to ensure adequate safety, value adding and cost effectiveness for petroleum industry developments and operations. Furthermore, NORSOK standards are, as far as possible, intended to replace oil company specifications and serve as references in the authorities' regulations.

The NORSOK standards are normally based on recognised international standards, adding the provisions deemed necessary to fill the broad needs of the Norwegian petroleum industry. Where relevant, NORSOK standards will be used to provide the Norwegian industry input to the international standardisation process. Subject to development and publication of international standards, the relevant NORSOK standard will be withdrawn.

The NORSOK standards are developed according to the consensus principle generally applicable for most standards work and according to established procedures defined in NORSOK A-001.

The NORSOK standards are prepared and published with support by The Norwegian Oil Industry Association (OLF), The Federation of Norwegian Industry, Norwegian Shipowners' Association and The Petroleum Safety Authority Norway.

NORSOK standards are administered and published by Standards Norway.

Introduction

This NORSOK Standard replaces the standards H-001 and H-CR-002.

ISO 15138 "Petroleum and natural gas industries - Offshore production installations - Heating, ventilation and air-conditioning" applies in full and replaces NORSOK H-001 with the exceptions herein, whilst NORSOK H-CR-002 have been implemented in this NORSOK standard and updated in line with new standards and requirements.

1 Scope

This NORSOK standard identifies the basic requirements for design, fabrication, testing and installation of

- HVAC,
- hot water heating system,
- potable water system,
- domestic water heaters,
- sewage, gravity and vacuum systems,
- open/roof drain,
- cooling and chilled water system,
- vacuum cleaning system.

2 Normative and informative references

The following standards include provisions and guidelines which, through reference in this text, constitute provisions and guidelines of this NORSOK standard. Latest issue of the references shall be used unless otherwise agreed. Other recognized standards may be used provided it can be shown that they meet the requirements of the referenced standards.

2.1 Normative references

AMCA publication 201,	Fan application manual
AT 444,	Klima og luftkvalitet på arbeidsplassen. (Order no. 516, Climate and air quality in the workplace)
BS 5422,	Method for specifying thermal insulating materials on pipes
BS 5970,	Code of practice for thermal insulation of pipe work and equipment
CIBSE,	Commissioning Codes, series A3.2.2, Air distribution systems
HVCA DW 144,	Specification for sheet metal ductwork
ISO 14694,	Industrial fans – Specifications for balance quality and vibration levels
ISO 15138,	Petroleum and natural gas industries – Offshore production installations – Heating, ventilation and air-conditioning
ISO 15614-1,	Specification and qualification of welding procedures for metallic materials – Welding procedure test – Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys
ISO 15749-2,	Ships and marine technology – Drainage systems on ships and marine structures – Part 2: Sanitary drainage, drain piping for gravity systems
Kommunenes Sentralforbund,	Standard abonnementsvilkår for vann og avløp – Tekniske bestemmelser, tidligere normalreglementet. (Norwegian text only).
Norsk kuldenorm,	Kuldehåndboken. Skarland Press/Norsk Kjøleteknisk Forening. (Norwegian text only).
NORSOK C-001,	Living quarters area
NORSOK C-002,	Architectural components and equipment
NORSOK H-001,	HVAC (Heating, ventilation and air conditioning)
NORSOK H-CR-002,	Piping and plumbing
NORSOK L-001,	Piping and valves
NORSOK L-002,	Piping system layout, design and structural analysis
NORSOK L-004,	Piping fabrication, installation, flushing and testing
NORSOK L-CR-003,	Piping details
NORSOK L-CR-004,	Piping fabrication, installation, flushing and testing
NORSOK M-001,	Materials selection
NORSOK M-630,	Material data sheets for piping
NORSOK P-001,	Process design
NORSOK P-100,	Process systems
NORSOK R-004,	Piping and equipment insulation

NORSOK S-002,	Working environment
NORSOK Z-CR-002,	Component identification system
NS-EN 378 (all parts),	Kuldeanlegg og varmepumper – Sikkerhets- og miljøkrav/ <i>Refrigerating systems and heat pumps – Safety and environmental requirements</i>
NS 3420-U,	Beskrivelsestekster for bygg, anlegg og installasjoner – Del U: Rør- og sanitærinstallasjoner/ <i>Specification texts for building, construction and installations – Part U: Pipe systems and sanitary installations</i>
NS-EN 12284,	Kjølesystemer og varmepumper – Ventiler – Krav, prøving og merking/ <i>Refrigerating systems and heat pumps – Valves – Requirements, testing and marking</i>
NS-EN 14986,	Utforming og konstruksjon av vifter til bruk i eksplosjonsfarlige atmosfærer/ <i>Design of fans working in potentially explosive atmospheres</i>
SMACNA,	Rectangular industrial duct construction standard
SMACNA,	Round industrial duct construction standard
SDH,	FOR 2001-12-04 nr 1372: Forskrift om vannforsyning og drikkevann, ved helse og omsorgsdepartementet. (Norwegian text only).

2.2 Informative references

See Bibliography

3 Terms, definitions and abbreviations

For the purpose of this NORSOK standard, the following terms, definitions and abbreviations apply.

3.1 Terms and definitions

3.1.1

shall

verbal form used to indicate requirements strictly to be followed in order to conform to this NORSOK standard and from which no deviation is permitted, unless accepted by all involved parties

3.1.2

should

verbal form used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that a certain course of action is preferred but not necessarily required

3.1.3

may

verbal form used to indicate a course of action permissible within the limits of this NORSOK standard

3.1.4

can

verbal form used for statements of possibility and capability, whether material, physical or casual

3.2 Abbreviations

AC	alternating current
AMCA	Air Movement and Control Association
API	American Petroleum Institute
AT	Arbeidstilsynet (Directorate of Labour Inspection, Norway)
BS	British Standard
CIBSE	Chartered Institution of Building Services Engineers
DC	direct current
DIN	Deutsches Institut für Normung
EN	European Standard
HVAC	heating, ventilation and air-conditioning
HVCA	The Heating and Ventilating Contractors' Association
ISO	International Organization for Standardization
NMD	Norwegian Maritime Directorate (Sjøfartsdirektoratet)

NS	Norsk Standard (Norwegian Standard)
NVG	Nordic Ventilation Group
P&ID	pipng and instrumentation diagram
SDH	Sosial- og helsedepartementet (Department of Health and Social Security)
SMACNA	The Sheet Metal and Air Conditioning Contractors' National Association
UNS	Unified Numbering System
UPS	uninterruptible power supply
WPS	welding procedure specification

4 Heating, ventilation and air conditioning (HVAC)

4.1 General

ISO 15138 applies in full, unless otherwise specified in this NORSOK standard.

4.2 ISO 15138 additions

The following paragraphs are numbered to match the structure of ISO 15138.

To 5.2.3 Environmental conditions

a) For design of the HVAC systems the following ambient temperatures shall be used:

- Summer: The temperature that in average is not exceeded more than 50 h per year.
- Winter: The medium of the lowest temperatures for three following days over a period of 30 years.

For normal operation reference is made to NORSOK S-002 for internal room temperatures. Specific temperature requirements for equipment shall be met based on manufacturer's requirements.

For occupied areas the minimum and maximum temperatures shall be suitable for the actual areas/rooms, see AT 444.

Humidification shall be avoided. Local humidification may be considered if required for equipment operation.

To 5.2.5 Selection of controls philosophy

For the event of internal fire in a non-hazardous area with low fire risk, the strategy is to keep ventilation system serving area running. The background for this strategy is to provide maximum protection for personnel and equipment by removing smoke from fire area and escape ways.

A room is defined to have low fire risk when generation of combustion gases from a fire and thermal expansion of room air is lower than ventilation air extract and hence the fire will generate no spreading of smoke through ventilation ducts. With fire in such a room, the requirement for gas tightness for ducts penetrating fire-rated partitions will be maintained by operation of ventilation without installation of fire dampers. Actual low risk areas for an installation shall be identified and used for HVAC design.

Typical low risk areas are

- living quarter areas exclusive kitchen and laundry,
- local control room,
- central equipment room,
- transformer room,
- UPS/DC/AC converters,
- instrument room,
- telecommunication room,
- cable voids,
- engine rooms without hydrocarbons,
- workshop/storage without fire potential,
- HVAC rooms.

Non-hazardous areas with high fire risk shall be equipped with fire dampers in ventilation ducts penetrating fire-rated partitions. For the event of internal fire in such areas, strategy is to isolate area by closing of fire