

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

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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 Subject to development and publication of international standards, the relevant NORSOK standard will be withdrawn.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	piping 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

dampers. These areas are normally protected by dedicated fire fighting systems. Actual high risk areas for an installation shall be identified and used for HVAC design.

Typical high risk areas are

- diesel engine rooms with fuel storage tanks,
- diesel treatment/separation rooms,
- hydraulic power unit (HPU) rooms,
- kitchen areas,
- laundry.

Based upon above strategies for operation of ventilation systems, fire-rating for ventilation ducting and partition penetrations shall be evaluated and designed to meet the following requirements:

- ducting penetrating fire-rated partitions shall normally not be equipped with fire dampers when involving areas with low fire loads as defined above. Fire insulation of penetration sleeves shall meet classification requirements;
- for operation of ventilation with fire in an area, it is required that the integrity of ventilation ducting must be maintained so that all areas will be continued served by ventilation. A duct passing through a fire area shall retain its integrity during the fire with consequence that ventilation to areas served by the duct is shut down. Ductwork fire-rating shall be evaluated based upon above functional requirement;
- ducting penetrating A60 rated partitions shall be equipped with fire dampers or ducting shall be fire-rated through area. Fire insulation of ducts, penetration sleeves and fire dampers shall meet classification requirements. A60 partitions are normally used for high risk areas. For deletion of a fire damper in a duct penetrating an A60 partition, a safety risk evaluation shall be performed;
- H-rated partitions shall normally not be penetrated by ducts. If done this shall be based on a safety risk evaluation.

To 5.3.1 Natural ventilation

Natural ventilation in hazardous module areas is from a safety point of view considered sufficient when an average ventilation rate of 12 AC/h in areas is met for minimum 95 % of the year.

Potential stagnant zones shall be evaluated and precautions taken where considered necessary from safety risk analysis.

If required by project specific risk analysis or to optimise working environment conditions, adequate ventilation requirements in a hazardous area can be calculated for dilution of estimated fugitive emissions. The quantity of air can be calculated from data in [2] using the methodology given in [1].

To 5.4.2.3.4 Galley systems

Frying equipment shall have an air curtain to improve the working environment for the kitchen personnel.

To Annex A.7 Fans

Fans shall be designed to NS-EN 14986.

Fans shall be direct driven. However, belt driven fans can be evaluated if shown to be technically attractive. To secure the availability of stand-by fans, both fans shall have approximately the same running hours.

In order to increase safety of fans ISO 14694 shall apply.

To A.13 Refrigeration packages

In addition to the requirements ISO 15138, NS-EN 378 (all parts) and "Norsk kuldenorm" shall be complied with.

Requirements for testing and marking of valves shall comply with NS-EN 12284.

To A.16 Ducts

Clearance and accessibility

All equipment and ducting shall be arranged to provide required headroom and clearances for installations, operation, inspection, maintenance and dismantling with the minimum interference or removal of ducting and equipment, see NORSOK S-002, Annex B.

Ducting

Circular ducts shall be preferred.

All duct elements shall be of aerodynamic design.

Special attention shall be paid to ductwork connections to fan inlets and outlets in order to maximise the fan performance, see AMCA publication 201 or equal.

Air flow measuring devices shall be installed in all main ducts/duct branches.

Inspection doors/access

Inspection doors shall be located such that the system can be cleaned. The maximum distance between doors should not exceed 20 m. For mud and kitchen extract the distance shall be maximum 6 m. In addition fire-dampers, heaters and shut-off dampers shall have inspection doors if inspection is not possible otherwise.

All inspection doors in heavy gauge ductwork (duct class A and D) shall be hinged.

Ductwork design

Stiffening of light gauge ductwork shall be according to HVCA DW144, while stiffening of heavy gauge ductwork shall be according to SMACNA.

Welding

All welding shall be carried out in accordance with a WPS established in accordance with ISO 15614-1 or equivalent.

The throat thickness of the weld shall be defined on WPS, drawing or equivalent. All welds shall be visually examined and show evidence of good workmanship.

To B.2 Commissioning

The balancing of system(s) shall be carried out in accordance with the proportional method as described in CIBSE .

5 Sanitary systems**5.1 Design conditions****5.1.1 General**

Design conditions for sanitary systems shall be in accordance with Kommunenes Sentralforbund "Standard abonnementsvilkår for vann og avløp. Tekniske bestemmelser".

5.1.2 Legionella

Legionella bacterias can be a problem in hot potable water systems. The following shall apply in order to prevent legionella bacterias:

- hot water heaters shall be designed to deliver hot water at a temperature of minimum 75 °C;
- hot water shall be distributed via mixing valves at a temperature of 65 °C;
- the hot water temperature at all tapping points shall be at least 55 °C after 1 min of consumption.

5.2 Line sizing

All line sizing for potable water, sewage and drain systems shall be in accordance with Kommunenes Sentralforbund "Standard abonnementsvilkår for vann og avløp. Tekniske bestemmelser".

5.3 Hot and cold water supply

Hot and cold water capacity shall be calculated from the Kommunenes Sentralforbund "Standard abonnementsvilkår for vann og avløp. Tekniske bestemmelser" and actual figures for main consumers such as kitchen and laundry equipment.

5.4 System requirements

5.4.1 General

For the design and installation of piping and plumbing systems, the following are considered to be of prime importance:

- the use of standard equipment;
- accessibility for maintenance and inspection;
- weight of components and equipment;
- design of systems due to dynamic load and heeling angles;
- water filled equipment and pipes exposed to frost conditions shall be insulated and/or heat traced if necessary.

5.4.2 Potable-water-systems

Potable water systems are regulated through SDH "FOR 2001-12-04 nr 1372.

"Water Report 113 Safe, Sufficient and Good Potable Water Offshore" [6] give guidelines to the design and operation of offshore potable water systems.

For mobile offshore units [5] shall apply.

Hot water systems for living quarters shall include necessary mixing arrangement for supply of 55 °C water for general use. Equipment which requires higher water temperature shall be provided with facilities to raise the temperature to the required level.

Domestic water heaters operated by hot water heating systems shall have back-up of electric immersion heaters.

Hot water risers and main distribution pipes in corridors shall be heat-traced with self regulating electric cables, unless a circulation system is provided.

All mixing taps shall in general be with ceramic seals and for one hand operation with single lever.

Material selection of pipes, valves and fittings shall be compatible with the water quality.

All consuming points shall be provided with an isolation valve.

Requirements for vents shall be according to Kommunenes Sentralforbund "Standard abonnementsvilkår for vann og avløp. Tekniske bestemmelser".

5.4.3 Sewage, gravity system

The design of sewage gravity systems shall be in accordance with ISO 15749-2.

The following shall apply:

- a maximum of 135 °C change in direction between each rodding point;
- no bends in horizontal lines to be more than 45 °C;
- every discharge point to be provided with water trap;
- to avoid clogging drain from kitchen waste macerators shall be routed separately as long as required depending on the drain arrangement;
- drainage from drip trays and similar equipment should be lead to floor gullies.

5.4.4 Sewage, vacuum system

Sewage vacuum systems shall be designed in accordance ISO 15749-3.

5.4.5 Vacuum cleaning systems

Vacuum cleaning systems shall designed in accordance with NORSOK C-001, 7.23.

5.4.6 Open drain/roof drain

Open drain includes drain from helideck, roof drain and drain from test lines.

Drain from the helideck shall be designed with sufficient capacity to handle fire fighting in the event of helideck related fires.

5.4.7 Instrumentation and controls

5.4.7.1 Potable water

Temperature indicators shall be provided in the hot potable water supply.

Safety relief valves shall be provided on domestic water heaters. The relief line downstream the valve shall equal to or larger than the valve outlet size. Relief valves outlet shall be routed to deck drain separately from each valve and shall be located in a safe location to prevent human injuries from hot water/steam.

5.4.7.2 Material selection

The materials listed in Table 1 should be used for the different systems.

If other materials are chosen in order to reduce weight or cost, a proven quality to a recognized standard shall be used.

For water systems the materials in transport systems, domestic distribution systems and treatment plants, etc., that come into direct or indirect contact with water in the water supply system shall not release substances into the water that can result in a risk of harm to human health or lead to an unacceptable alteration in the composition of the water, including a deterioration of the water's sensory characteristics.

Table 1 Material qualities

Systems	Material	Comments
Potable water system	Copper	Inside module: Press fitting, see NOTE
	Type 316, UNS S31600	Inside module: Press fitting, see NOTE [3] and [4]
	NORSOK M-001 and M-630 MDS S01	Outside module: NORSOK L-001 Piping Class AS20
	Composite	Press fitting system
Sewage	Polyethylene (PE) (high density)	Inside module: Welded (socket allowed)
	Polypropylene (PP)	Welded (socket allowed)
	Type 316, UNS S31600 Europipe or similar	Inside/outside module: Socket pipe, [3]
Open drain	NORSOK M-001 and NORSOK M-630	Piping and valves, NORSOK L-001
	Type 316, UNS S31600	Inside/outside module:
	Europipe or similar	Socket pipe, [3]
NOTE Material selection in potable water systems shall be evaluated with respect to chloride content and water temperature on the installation. Titanium or other suitable material may be selected. Alternative materials shall conform to a recognized industry standard and shall be subject to approval in each case.		

5.5 Layout and arrangement

5.5.1 Pipe routing

Requirements to plumbing shall be in accordance with NORSOK C-002, 17.9.

All piping shall be routed to provide a simple, neat and economical layout allowing for easy supporting and adequate flexibility.

The minimum distance between pipes in shall be in accordance with NS 3420-U.

Piping and plumbing systems shall, where feasible, be installed behind wall-panels, in shafts or above suspended ceiling.

Visible penetrations in light duty partitions and liner walls shall have cover plates.

Flanged or screwed joints shall not be used on any concealed piping.

5.5.2 Clearance and accessibility

All piping shall be arranged to provide required headroom and clearances for installations, operation, inspection, maintenance and dismantling with the minimum interference or removal of piping and/or equipment. Inspection and maintenance doors shall be installed in shafts, walls and ceiling for access to valves and rodding points.

Requirements to clearance and accessibility shall be in accordance with NORSOK L-002.

Horizontal and vertical clearances shall conform to NORSOK S-002.

5.5.3 Material handling

Material handling principles shall follow the requirements in NORSOK L-002.

5.6 Installation

5.6.1 Hangers and supports

Pipe supports shall be arranged to prevent any movement and shall be adequately sized for mechanical loads and to accommodate the shipment and tow-out of the platform.

The requirements given in NS 3420-U shall apply taking into consideration the foregoing.

5.6.2 Piping insulation

Selection and installation of piping insulation shall be in accordance with BS 5422 and BS 5970.

Indoor pipe work for potable water and similar may be insulated with flexible elastomeric foam (FEF) as for instrument tubing in accordance with NORSOK R-004, 5.4.

5.6.3 System colour coding of piping

The piping should be marked in accordance with NORSOK L-004 and NORSOK Z-CR-002.

On existing installations the marking should follow the platforms current system.

In addition to requirements specified in NORSOK L-004 and NORSOK Z-CR-002, identification symbols shall be placed on all piping behind access/inspection points.

5.6.4 Cleaning and protection

All pipes shall be internally cleaned before installation.

All open ends on piping and equipment shall immediately after and during installation be supplied with dust blinds. The dust blinds shall remain in place until the system is operable.

All protective covers on equipment shall be left in place as long as possible during erection. Pipes shall be supplied with plugs in both ends. Surfaces and equipment shall be adequately protected during construction.

When the pipe system is finally installed and mechanically complete, the system shall be flushed and internally cleaned in accordance with NORSOK L-004, Annex B.

5.7 Testing

5.7.1 General requirements

In general, all sanitary piping shall be pressure tested and function tested after installation. Requirements for testing shall be in accordance with Kommunenes Sentralforbund "Standard abonnementsvilkår for vann og avløp, clause 2.2".

The test shall be performed prior to application of any thermal insulation.

All tests shall be documented with marking of test lines on test P&IDs together with other relevant test documentation.

5.7.2 Sewage

5.7.2.1 Gravity systems

Sufficient blinding of the sanitary equipment shall be completed prior to the test.

The sewage system shall be pressure tested with a pressure equal to the highest obtainable static head pressure within the system.

5.7.2.2 Vacuum systems

Sewage vacuum systems shall be tested in accordance with ISO 15749.

5.7.3 Potable water

The domestic potable water system, including the domestic water heaters, shall be pressure tested in accordance with Kommunenes Sentralforbund "Standard abonnementsvilkår for vann og avløp, clause 2.2".

6 Heating and cooling systems

6.1 General

Heating and cooling systems can be categorized into the following:

1. Primary systems; systems directly supplied from the platforms heating or cooling systems.
2. Secondary systems; systems that exchanges heating or cooling from primary systems including chilled water systems.

6.2 Design conditions

6.2.1 General

Design of heating and cooling systems shall follow design principles as required in NORSOK L-001, NORSOK L-002, NORSOK L-CR-003 and NORSOK L-CR-004.

Design of refrigeration system, kitchen provision stores and freezer room shall follow the trade standard for such systems. Materials and design shall be qualified for each project depending on design condition.

Rotating equipment such as pumps and refrigeration compressors (chillers) to be isolated to minimize noise and vibrations through piping and/or construction as walls and decks. Noisy machinery to be isolated by flexible joints constructed specially for vibrating equipment.

Limits for noise and vibration shall conform to requirements in NORSOK S-002.

6.2.2 Primary systems

Systems directly supplied with heating or cooling medium from the platform systems shall comply with the relevant Piping Class for the platforms existing utility system, and/or NORSOK L-001.

6.2.3 Secondary systems

Secondary systems shall comply with requirements in NORSOK L-001.

If other materials or pressure classes are to be used these shall conform to a recognized industry standard and be subject to client approval.

6.3 Line sizing

All line sizing shall be in accordance with NORSOK P-001.

6.4 System requirements

6.4.1 General

For the design and installation of heating and cooling systems, the following are considered to be of importance:

- the use of standard equipment;
- accessibility for maintenance and inspection;
- weight of components and equipment;
- design of systems due to dynamic load and environmental exposure;
- balancing valves shall be installed on both cooling and heating systems. The valves with measuring probes shall be installed on return lines from all consumers or group of consumers. The balancing valve shall have locking device for the balanced position and the possibility to be closed and reopened to the "balanced" position;
- maximum differential pressure across a group of consumers must not exceeds the limit of the balancing valve or the closing/operating pressure for flow control valves;
- open expansion tanks shall not be used;
- automatic re-filling of systems shall be avoided;
- heating and cooling systems shall not be directly connected to potable water systems;
- all heating and cooling systems should be equipped with air removal equipment/deareators. Dearators shall be mounted where the system has highest temperature and lowest pressure;
- all HVAC consumers with variable duty shall be controlled by three-port valve;
- cooling and heating systems shall have drains installed at all high and low points.

6.4.2 Cooling systems

The process design of cooling medium systems shall follow the requirements in NORSOK P-100, clause 13.

As a flow quantity controller a three-port directional valve to be installed in the pipeline leading to cooling battery.

6.4.3 Heating systems

The process design of heating medium systems shall follow the requirements in NORSOK P-100, clause 14.

Heating system shall as a minimum be equipped with a filtration unit (separation rate 80 % to 90 % of particles greater or equal to 2 micron to 5 micron).

As a flow quantity controller a three-port directional valve to be installed in the pipeline leading to heat exchanger/battery.

6.5 Control and adjustments (balancing)

Quantity of water for heating- and cooling system shall be adjusted according to a compensation principle (developed from method of proportionality), within a tolerance of +/- 10 % for heat- and cool gain components. Tolerances shall be in relationship with design values including measuring fault.

6.6 Layout and arrangement

6.6.1 Pipe routing

All piping shall be routed to provide a simple, neat and economical layout allowing for easy supporting and adequate flexibility.

Piping shall not be routed through transformer rooms, telecommunication or computer rooms, archives or similar rooms.

Piping penetrations in walls and decks to be applied with corrosion protection and shall be designed to obtain flexibility due to thermal variations.

All piping covered by panels to be pressure tested before building in, if necessary, section by section.

6.6.2 Clearance and accessibility

All piping shall be arranged to provide required headroom and clearances for installation, operation, inspection, maintenance and dismantling, with minimum interference or removal of piping and/or equipment.

Requirements to clearance and accessibility shall be in accordance with NORSOK L-002.

Horizontal and vertical clearances shall conform to NORSOK S-002.

6.6.3 Material handling

Material handling principles shall follow the requirements in NORSOK L-002.

6.7 Installation

6.7.1 Hangers and supports

Pipe supports shall be arranged to prevent any movement and shall be adequately sized for mechanical loads and to accommodate the shipment and tow-out of the platform.

6.7.2 Piping insulation

Heating and cooling system shall be insulated in accordance with in NORSOK R-004.

6.7.3 System colour and coding of piping

The piping should be marked in accordance with NORSOK L-004 and NORSOK Z-CR-002.

On existing installations the marking should follow the platforms current system.

In addition to requirements specified in NORSOK L-004 and NORSOK Z-CR-002, identification symbols shall be placed on all piping behind access/inspection points.

6.7.4 Cleaning an protection

All pipes shall be internally cleaned before installation.

All open ends on piping and equipment shall immediately after and during installation be supplied with dust blinds. The dust blinds shall remain in place until the system is operable.

All protective covers on equipment shall be left in place as long as possible during erection. Pipes shall be supplied with plugs in both ends. Surfaces and equipment shall be adequately protected during construction.

When the pipe system is finally installed and mechanically complete, the system shall be flushed and internally cleaned in accordance with NORSOK L-004, Annex B.

6.8 Testing

Piping systems shall be pressure tested in accordance with NORSOK L-CR-004.

The tests shall be performed prior to application of any insulation.

All tests shall be documented with marking of test lines on test P&IDs and isometrics together with other relevant test documentation.

7 Equipment

Annex A includes a data sheet for the domestic water heater.

For HVAC equipment data sheets in ISO 15138 shall be used.

Annex A (Normative) Data sheet

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Package No.	Doc. No.	Rev.														
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 60%;">Tag No.</td> <td style="width: 40%;">Location/Module</td> </tr> <tr> <td>Unit</td> <td>No. Req'd</td> </tr> <tr> <td>Service</td> <td>Inquiry No.</td> </tr> <tr> <td>Size & Type</td> <td>Quote No.</td> </tr> <tr> <td>Supplier</td> <td>P.O. No.</td> </tr> <tr> <td>Manufacturer</td> <td>Job No.</td> </tr> <tr> <td>Model</td> <td>Serial No.</td> </tr> </table>			Tag No.	Location/Module	Unit	No. Req'd	Service	Inquiry No.	Size & Type	Quote No.	Supplier	P.O. No.	Manufacturer	Job No.	Model	Serial No.
Tag No.	Location/Module															
Unit	No. Req'd															
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Manufacturer	Job No.															
Model	Serial No.															
1 Technical Data																
2	Volume water jacket (primary)	l														
3	Volume storage tank (secondary)	l														
4	Heating capacity (water Dt= °C) Note 1	kW														
5	Electrical immersion heater	kW														
6	Power supply	V/Hz														
7	Design pressure primary	barg														
8	Design pressure secondary	barg														
9	Test pressure primay	barg														
10	Test pressure secondary	barg														
11	Design temperature	°C														
12	Unit height	mm														
13	Unit diameter	mm														
14	Weight Dry	kg														
15	Operational	kg														
16	Connection sizes Supply, primary side	mm														
17	Return, primary side	mm														
18	Supply, secondary side	mm														
19	Return, secondary side	mm														
20	Connection sizes mixing valve Cold water	mm														
21	Hot water +55°C	mm														
22	Hot water +85°C	mm														
23																
24 Materials																
25	Vessel Material															
26	Vessel Thickness mm															
27	Lining Material															
28	Lining Thickness mm															
29	Jacket Material															
30	Jacket Thickness mm															
31	Insulation Material															
32	Insulation Thickness mm															
33	Foundation Ring Material															
34	Safety Relief Valve Material															
35	Mixing Valve Material															
36	Expansion Tank Material															
37 Notes																
38	1. Temperature difference between mean temperature primary side and mean temperature secondary side															
39																
40																
41																
42																

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- [1] API RP 505, Recommended Practice for Classification of Locations for Electrical Installations at Petroleum Facilities Classified as Class I, Zone 0, Zone 1, and Zone 2
- [2] API 4589, Fugitive Hydrocarbon Emissions from Oil and Gas Production Operations (Quality in the workplace)
- [3] DIN 2463, Stainless steel tubes; tolerances and conventional masses per unit length
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