

NORSOK STANDARD

COMMON REQUIREMENTS
PIPING DESIGN, LAYOUT AND STRESS ANALYSIS

L-CR-002
Rev. 1, January 1996

Please note that every effort has been made to ensure the accuracy of the NORSOK standards neither OLF nor TBL or any of their members will assume liability for any use thereof.

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1 FOREWORD

NORSOK (The competitive standing of the Norwegian offshore sector) is the industry initiative to add value, reduce cost and lead time and remove unnecessary activities in offshore field developments and operations.

The NORSOK standards are developed by the Norwegian petroleum industry as a part of the NORSOK initiative and are jointly issued by OLF (The Norwegian Oil Industry Association) and TBL (The Federation of Norwegian Engineering Industries). NORSOK standards are administered by NTS (Norwegian Technology Standards Institution).

The purpose of this industry standard is to replace the individual oil company specifications for use in existing and future petroleum industry developments, subject to the individual company's review and application.

The NORSOK standards make extensive references to international standards. Where relevant, the contents of this standard will be used to provide input to the international standardisation process. Subject to implementation into international standards, this NORSOK standard will be withdrawn.

2 SCOPE

This standard covers the basis for design and layout of process, drilling and utility piping for offshore oil and/or gas production facilities. Relevant parts of this specification may also be used for control room, laboratory, helideck and other facilities around the platform.

The standard does not cover the following:

1. All instrument control piping downstream of the last piping block valve.
2. Risers and sub-sea pipework.
3. Flexible hoses.
4. Sanitary piping systems.
5. GRP piping. (See Norsok standard M-CR-621)

3 NORMATIVE REFERENCES

The design of all systems shall be in accordance with all applicable sections of the latest edition of the regulations, codes and standards listed below.

Norsok standards:

L-CR-001	Piping and valves
L-CR-003	Piping detail
P-CR-001	Process design
R-CR-001	Mechanical equipment
S-DP-001	Technical safety
S-DP-002	Working environment
Z-DP-002	Cooling system

National and international codes and standards:

ASME B31.3
ISO 5167Chemical Plant and Petroleum Refinery Piping.
Measurement of fluid flow.

4 DEFINITIONS AND ABBREVIATIONS

4.1 Definitions

Normative references	Shall mean normative in the application of NORSOK standards.
Informative references	Shall mean informative in the application of NORSOK standards.
Shall	Shall is an absolute requirement which shall be followed strictly in order to conform with the standard.
Should	Should is a recommendation. Alternative solutions having the same functionality and quality are acceptable.
May	May indicates a course of action that is permissible within the limits of the standard (a permission).
Can	Can requirements are conditional and indicates a possibility open to the user of the standard.
Insulation Valve	An insulation valve is defined as a valve that is used to shut off a piece of equipment or system for maintenance purpose only.

4.2 Abbreviations

The following abbreviations are given for terms used in this specification:

ANSI	American National Standards Institute
API	American Petroleum Institute
ASME	The American Society of Mechanical Engineers
BS	British Standard
D	Diameter
DIN	Deutsches Institut für Normung (German standard)
DNV	Det Norske Veritas
EDS	Element Data Sheet
ISO	International Organization for Standardization
MSS	Manufacturers Standardization Society (USA)
NEMA	National Electrical Manufacturers Association (USA)
NGS	Nordic Group for Steel Regulations.
NPS	Nominal Pipe Size
NPSH	Net Positive Suction Head
NS	Norwegian Standard

5 DESIGN AND LAYOUT

5.1 General

Design conditions shall be in accordance with the ASME B31.3. except where the requirements of this standard are more stringent.

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

5.2 Numbering systems

Numbering systems for piping, piping items and valves shall be in accordance with Z-DP-002.

5.3 Safety and work environment

Ergonomic consideration shall be taken in design regarding:

- Tools, valves and control devices, including emergency controls devices shall be accessible.
- Provision for cleaning, maintenance and repair shall be taken into consideration.

Requirements related to safety and working environment shall conform with S-DP-002.

No potential source of hazard (release of hydrocarbons), e.g. flange joints, shall be located outside hazardous areas as defined in the Area Classification drawings or specification.

Where applicable, provision shall be made to protect piping and equipment from falling objects.

5.4 Clearance and accessibility

All piping shall be arranged so as to provide specified headroom and clearances for technical safety, easy operation, inspection, maintenance and dismantling.

Particular attention shall be paid to clearances required for the removal of pump, compressor and turbine casings and shafts, pump and fan drivers, exchanger bundles, compressor and engine pistons. Piping shall be kept clear of manholes, access openings, inspection points, hatches, davits, overhead cranes, runway beams, clearance areas for instrument removal, tower dropout areas, access ways and emergency escape routes.

A vertical clearance of 40mm is recommended between bottom of skid and deck/floor to facilitate cleaning/maintenance.

Pipe, fittings, valve controls, access panels or other equipment shall not extend into escape areas.

5.5 Pipe routing

5.5.1 Arrangement

Piping shall be arranged on horizontal racks at specific elevations. Transverse pipework shall be run at a different elevation than longitudinal pipework. When changing direction (from longitudinal to transverse or vice versa) the piping shall change elevation, but care shall be taken to avoid pockets. No piping shall be located inside instrument, electrical or telecommunication control/switchgear rooms, except fire fighting piping serving these rooms. Bridge piping shall be designed with expansion loops capable of handling relative movement of platforms in design storm conditions.

5.5.2 Grouping

Cold and hot piping should be grouped separately with hot, non insulated, lines at a higher elevation than cold lines. Uninsulated lines with possibility for ice build-up, shall not be run above walk ways.

When expansion loops are required, lines should be grouped together and located on the outside of the rack.

Small pipes should be grouped together to simplify support design.