

NORSOK STANDARD

**ELECTRICAL, INSTRUMENTATION
AND TELECOMMUNICATION
INSTALLATION**

Z-010
Rev. 2, December 1997

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FOREWORD

NORSOK (The competitive standing of the Norwegian offshore sector) is the industry initiative to add value, reduce cost and lead time and eliminate 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 supported by OLF (The Norwegian Oil Industry Association) and TBL (Federation of Norwegian Engineering Industries). NORSOK standards are administered and issued by NTS (Norwegian Technology Standards Institution).

The purpose of NORSOK standards is to contribute to meet the NORSOK goals, e.g. by replacing individual oil company specifications and other industry guidelines and documents for use in existing and future petroleum industry developments.

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 Subject to implementation into international standards, the NORSOK standard will be withdrawn.

The annex is informative.

INTRODUCTION

This standard replaces and supersedes previous NORSOK standard Z-CR-010, Installation of electrical, instrument and telecommunication, rev. 1, January 1996. This standard has been given revision 2 as being a continuation from Z-CR-010 rev. 1.

It should be noted that this standard should be read in conjunction with NORSOK standards E-001 “Electrical systems”, I-001 “Field instrumentation” and T-CR-001 “Telecommunication systems” covering allied subjects.

1 SCOPE

This NORSOK standard covers functional and technical requirements related to installation of electrical, instrumentation and telecommunication equipment.

In addition the standard establish basis for engineering of typical areas like cable segregation, cable requirements, Ex-philosophies, equipment enclosures etc.

2 NORMATIVE REFERENCES

The following standards include provisions which, through reference in this text, constitute provisions 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 or exceed the requirements of the standards referenced below.

Eltilsynet	Forskrift om elektrisk utstyr (Regulation on electrical equipment).
Eltilsynet	Retningslinjer for jording i maritime anlegg (Guidelines for earthing in maritime installations).
EN 50081-2	Electromagnetic compatibility generic emission standard.
EN 50082-2	Electromagnetic compatibility generic immunity standard.
IEC 529	Degrees of protection provided by enclosures (IP code)
IFEA	Veiledning for varmekabelanlegg i industri og offshore. Guidelines for heat tracing installation in industry and offshore. (Norwegian text only)
NEK 606	Cables for offshore installations Halogen-free, or mud resistant.
NORSOK S-DP-001	Technical safety (will be renumbered S-001)
NORSOK Z-DP-002	Coding system
NORSOK M-501	Surface Preparation and Protective Coating

Systems of units

The SI system of units shall be applied.

3 DEFINITIONS AND ABBREVIATIONS

3.1 Definitions

All terms and phrases within the scope of this standard shall be regarded as defined in the regulations and international codes and standards referred to in this document.

Normative references	Shall mean normative 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.

3.2 Abbreviations

AISI	American Iron Steel Institute
APS	Abandon Platform Shutdown
ASDS	Adjustable Speed Drive System
CAS	Communal Aerial System
CCR	Central Control Room
CCTV	Closed Circuit Television
Eltilsynet	Produkt- og Elektrisitetsilsynet (Norwegian Directorate for Product and Electrical Safety)
ESD	Emergency shutdown
IE	Instrument Earth
IFEA	Industriens Forening for Elektroteknikk og Automatisering. (The Association for Electrotechnics and Automation in Industry)
IP	International Protection
IS	Intrinsically Safe
LER	Local Equipment Room
MCT	Multi cable Transit
NEK	Norsk Elektroteknisk Komite (The Norwegian national committee of the international electrotechnical commission, IEC, The European committee for electrotechnical standardization CENELEC.)
PA	Public Address and Alarm System
PABX	Telephone System
PE	Protective Earth

4 FUNCTIONAL REQUIREMENTS

4.1 General

Ex-certified equipment shall be selected in accordance with the following requirements:

- Ex i and Ex e should be used.
- Ex n may be used in zone 2.
- Ex d and Ex p should be avoided.
However, if Ex d equipment is used, it should be provided with an Ex e indirect entry.
- Ex s or Ex m solenoid valves are preferred.
- Equipment which shall remain energised after a APS/ESD situation shall follow the requirement specified in NORSOK standard Technical safety, S-DP-001.

4.2 International protection (IP)

Minimum degree of protection shall be:

For outdoor, in naturally ventilated areas and wash down areas	IP 56 (note 1)
Dry indoor areas	IP 20
Other areas	IP 44

Above represents minimum requirements. It should be noted that regulations may contain more stringent requirements and must be consulted.

Note 1: IP 56 is required where equipment is placed in open deck exposed to water from heavy seas or in areas exposed to water projected jets, elsewhere IP 55 is required.

4.3 Spare requirements for future modifications

The requirements are related to spare at the time of plant start-up.

The installation should be prepared for:

- Relevant area interface cabinets, junction boxes, cabling etc. to meet a 10 % increase.
- Main cable ladders to meet a 10 % increase.

4.4 Equipment location

Equipment should be located in accordance with the following requirements :

- Protected against damage.
- Protected against vibration.
- Operability and serviceability.
- Display instruments and flashing lights to be legible and visible from main access areas.
- Accessibility for maintenance without scaffolding.

Electrical equipment shall, unless unavoidable due to the functionality or necessity, be installed indoor and away from hazardous areas.

Instruments which have to be installed in exposed areas should be sheltered by use of enclosure.

Final location shall be selected to avoid interference with escape routings, walkways, other equipment, pipes etc. and obstruction against activities related to transport and lifting operations.

Equipment should not be supported on pipe work, handrails, access ladders or cable ladders. Lighting fixtures may however be mounted underneath cable ladders or as integrated part of handrail support arrangement

Equipment such as PA flashing lights, loudspeakers, splitters and tap-offs may be located on the support for cable ladders and trays or cable ladder's side rail.

Equipment shall not be mounted on blastwalls/explosion relieves.

Equipment located in areas which do not allow for maintenance accessibility as required, should as shown on typical drawing be installed such that the equipment can be rotated, raised or lowered into areas where maintenance can take place without the need for scaffolding.

4.5 Electromagnetic compatibility (EMC)

All equipment and installations shall comply with Eltilsynet : Forskrift om elektrisk utstyr (Regulation on electrical equipment) Chapter IV, regarding electromagnetic compatibility requirements with respect to both emission and immunity.

5 LIGHTING AND SMALL POWER

5.1 Lighting

Cables shall be looped between lighting fixtures, independent of the sequence numbers used for fixture identification.

The use of junction boxes should be avoided.

If junction boxes have to be used, they shall be installed easily accessible.

5.2 Control stations (Push buttons)

Control stations shall be located approximately 1500 mm above deck, adjacent to the equipment which it controls without obstructing removal of the equipment.

5.3 Sockets outlets

Special considerations should be made to the use, when finalizing the location of socket outlets in offices and similar areas like control rooms, laboratories, workshops. As a guideline the location should be approximately 300 mm above fixed floor level or in cable channels at desk height.

In other areas, outdoor, process etc., the socket outlets shall be located approximately 1500 mm above deck level measured to center of socket outlet.

6 HEAT TRACING

6.1 General

The installation shall comply with "Veiledning for varmekabelanlegg i industri og offshore", published by IFEA. Supplier installation requirements shall be adhered to.

6.2 Installation of heat tracing cables

Heat tracing cables shall be strapped to equipment and pipes using glass fibre tape, spaced approximately at 300 mm intervals along pipes and as required elsewhere. Stainless steel straps, AISI 316, shall be used on high temperature cables.

Heat tracing cables should be installed along the lower semi-circle of the pipes.

Cables shall pass through thermal insulation from below or side on vertical pipes.

Heat tracing cables shall be installed in such a way that it allows dismantling of joints, valves, instruments etc. without cutting or damaging the cable.

Where the heat tracing cables are crossing flanges, thermal insulation covers or other sharp edges, protectors of stainless steel AISI 316 shall be used.

Heat tracing cables should not be spliced.

Purpose made flexible stainless steel conduit shall be used for protection of the heat tracing cable between stand alone junction boxes and insulation entry kit.

Flexible conduits protecting heat tracing cables shall be fixed to support approximately every 200 mm.

Heat tracing cables shall be 100 % covered. Exceptions may be in instrument enclosures.

The heat tracing cable should be protected against damage by applying an aluminium tape/foil on top of the cable when cellular glass is used as insulation material.

6.3 Heat tracing junction boxes

Junction boxes should be installed directly to pipes or on steel supports adjacent to the pipe or instrument.

7 INSTRUMENT AND TUBING

7.1 In-line instruments

All in-line instruments shall be installed in accordance with supplier recommendations.

Prior to final installation of control valve and other in-line instruments, process lines shall be properly flushed.

7.2 Off-line instruments

Each instrument shall be available for maintenance and disconnection without interfering with the process.

The installation shall be arranged so that it can be heat traced and thermal insulation applied.

All indicating instruments to be located between 1-1,8 m above grating.

Direct mounted instruments shall be used whenever applicable.

Impulse tubing shall be as short as possible and be installed so that gas/liquid pockets are avoided. Instruments should be installed below tapping point for liquid service and above tapping point for gas service.

For some installations use of direct flange mounted capillary tubing may be considered.

Impulse tubing shall have minimum 1:12 slope.

7.3 Tubing installation

Instrument tubing shall be supported to field trays with tubing clamp approximately every 600 mm for tubing sizes less than 25 mm outside diameter.

Tubing sizes above 25 mm outside diameter shall as a minimum have support every 1.5 m.