

NORSOK STANDARD

COMMON REQUIREMENTS
**INSTALLATION OF ELECTRICAL, INSTRUMENT &
TELECOMMUNICATION**

Z-CR-010
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Please note that whilst 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 Subject to implementation into international standards, this NORSOK standard will be withdrawn.

The annex is informative.

2 SCOPE

This 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.

3 NORMATIVE REFERENCES

Applicable international standards from CENELEC/IEC to be applied to the relevant part of this standard.

EN 50081-2	Electromagnetic compatibility generic emission standard.
EN 50082-2	Electromagnetic compatibility generic immunity standard.
ET	Retningslinjer for jording i maritime anlegg.
IFEA	Industrielle varmekabelanlegg.
NEK 606	Cable for offshore installation
NORSOK S-DP-001	Technical safety

Systems of units

The SI system of units shall be applied.

4 DEFINITIONS AND ABBREVIATIONS

4.1 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.
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.

4.2 Abbreviations

AISI	American Iron Steel Institute
APS	Abandon Platform Shutdown
CAS	Communal Aerial System
CCR	Central Control Room
CCTV	Closed Circuit Television
ESD	Emergency shutdown
ET	Elektrisitetsstilsynet
IE	Instrument Earth
IFEA	Industriens Forening for Elektroteknikk og Automatisering. (The Association for Electrotechnics and Automation in Industry)
IP	Ingress Protection
IS	Intrinsically Safe
LER	Local Equipment Room
MCT	Multi cable Transit
NEK	Norsk Elektroteknisk Komite
NORSOK	Norsk Søkkel Konkurransesepisjon
PA	Public Address and Alarm System
PABX	Telephone System
PE	Protective Earth

5 FUNCTIONAL REQUIREMENTS

5.1 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.
- Motors rated above 3.0 kV in zone 1 and 2, shall be Ex p or Ex d.

- 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.

5.2 Ingress 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

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.

5.3 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.

5.4 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 should not be located in open deck areas.

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

When junction boxes are installed in exposed areas, drain plugs shall be installed.

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.

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

6 LIGHTING AND SMALL POWER

6.1 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.

6.2 Control stations (Push buttons)

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

6.3 Sockets outlets

Socket outlets located outdoors, in process areas, etc. shall be located approximately 1500mm above deck level.

In offices and control rooms socket outlets shall be located approximately 100mm above fixed floor level. In laboratories between 900mm and 1350mm above fixed floor level.

Welding socket outlets shall be installed so that any point within the area can be reached by welding cable not exceeding 40m length without passing through doors, barriers, etc.

7 HEAT TRACING

7.1 General

Heat tracing cables shall be of the self limiting type.

The installation shall comply with "Industrielle Varmekabelanlegg", published by IFEA.

Supplier installation requirements shall be adhered to.

7.2 Installation of heat tracing cables

Heat tracing cables shall be strapped to equipment and pipes using glass fibre tape, spaced approximately at 300mm intervals along pipes and as required elsewhere.

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

Cables shall pass through thermal insulation from below.

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.

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

Heat tracing cables shall be 100% covered.

7.3 Junction boxes

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

8 INSTRUMENT AND TUBING

8.1 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.

8.2 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 insulated applied.

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.

8.3 Tubing installation

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

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

Tubing clamps shall be made of non-corrosive material, stainless steel AISI 316 or flame retardant plastic.

Galvanic corrosion between tubing and tubing support system shall be avoided. The tubing clamp shall, when installed, not allow for water/sea water to be accumulated between tubing clamp and tubing, this is to avoid crevice corrosion.

Parallel runs of tubing on the same support shall be arranged such that it is possible to have access to every connection point.

Installation into or through panels shall be by use of bulkhead unions or multi cable transits.

Instrument tubing and cables may be installed on the same field tray for shorter distances (appr. 5m).

All tubing, fittings which are not directly connected shall be sealed by use of end-plug / cap.

All tubing shall be blown through with clean, dry air before final installation.

All tubing in hydraulic systems shall be flushed and cleaned

The following sealing compounds shall be used as specified by supplier :

For process services	Loctite 577 or equivalent
For instrument air service	Loctite 577 or equivalent
For hydraulic-oil services	Loctite 542 or equivalent

9 TELECOMMUNICATION

9.1 Public address and alarm system (PA)

Public Address and Alarm System equipment should be located above deck level as follows:

- Loudspeakers, 2000-3000mm.
- PA-flashing lights, maximum 3000mm.

Loudspeakers shall not be located above suspended ceilings or behind obstructions which will hinder free space sound distribution.

Loudspeakers shall be installed on brackets which allow for future adjustments as follows:

- At the horizontal plane, 180°C.
- Downwards 90°C from the vertical plane.

9.2 Telephone system (PABX)

Telephone system equipment shall be located above deck level as following:

- Flashing lights, maximum 3000mm.
- Telephones, approximately 1400mm.
- Acoustic hoods, minimum 1900mm to top of hood.

9.3 CCTV equipment

To prevent vibrations, camera brackets shall be made sufficiently rigid to provide appropriate stability in all directions.

9.4 Entertainment network equipment, (CAS)

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

10 CABLING

10.1 Cable requirements

Cables should comply with NEK 606 Cable for offshore installation.

Flame retardant cables shall be used, fire resistant cables only when required.

Mud resistant cables shall only be used where cables are routed into or through areas exposed to mud.

Multi core cables with collective screen shall be standard, individual screens shall be used only when required.

10.2 Cable segregation

Instrument and telecommunication cables shall be separated from low voltage power cables and high voltage cables by minimum 300mm.

When separation of the cable systems specified above is not possible or practical, a metal segregation barrier shall be installed.

However, crossing at right angles is acceptable without further segregation.

Non IS and IS instrument-cables should be routed on the same cable ladder/trays, no segregation is required.

Separate cables shall be provided for:

- Instrument process control.
- Fire and gas.
- ESD.
- Telecommunication.

Redundant cable systems shall be routed separately as shown on fig.1.

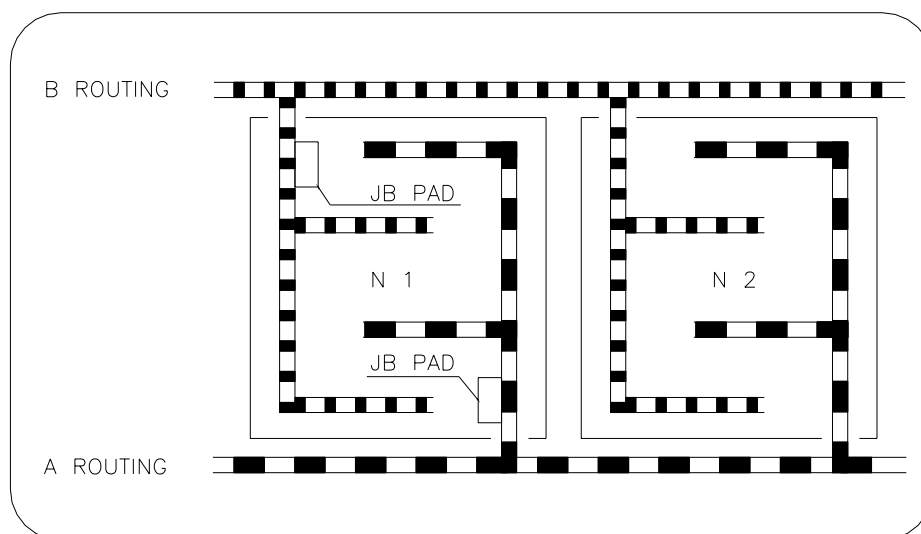


Fig. 1 Redundant cable routing.

The cable network shall be separated into:

System 1	High voltage systems (1000V and above).
System 2	Low voltage power supply and control cables for electrical systems. (below 1000V).
System 3	Instrumentation and Telecommunication systems.

Where the cable support systems are installed horizontally one above the other, the cable network shall be arranged from top to bottom, system 1, system 2 and system 3.

Instrumentation and telecommunication cables may be routed on system 2 cable support systems when the defined distance between the individual systems can be kept.

10.3 Cable installation

All cables should be routed on cable ladders and trays.

The filling of cables laid on cable ladders, should not exceed the height of the ladders side rail.

Field cables may be routed into main cable support systems.

Where main cable support systems are used, all cable ladder segment references and multi cable transits tag number shall be listed in the cable routing system.

Once a cable has been cut, a protective cap/sealing shall be applied on the end.

All cable entries to equipment located outdoors and in wash down areas should be from below. Top entry is not allowed and side entry shall be provided with drip nose.

Sufficient cable spare length (e.g. by suitable routing) shall be provided for equipment which needs future adjustments (floodlights, loudspeakers, etc.) or where equipment have to be dismantled for maintenance and calibration without disconnecting the cable.

Single core cables for three-phase AC shall run in trefoil formation.

Single core cables shall not be installed separately through openings surrounded by magnetic materials. Non-magnetic stainless steel separation walls and stay plates shall be used in multi cable transits utilised for single core cables.

10.4 Cable bending radius

The minimum permissible bending radius specified by supplier shall be adhered to.

10.5 Cable cleating and strapping

10.5.1 General

Ultra violet resistant plastic straps may be used for horizontal runs when cables are placed on the upper side of ladders and trays.

Stainless steel AISI 316 straps shall be used for vertical runs and for horizontal runs in the vertical plane.

For strapping of fibre-optical and coaxial cables, supplier guidelines shall be adhered to.

The distance between cable straps shall not exceed :

- 600mm for horizontal runs.
- 300mm for vertical runs and for horizontal runs in the vertical plane.
- Ten times the cable outer diameter from cable entry to the first strap.

10.5.2 Single core cables

Cable cleats for single core cables shall be made by stainless steel AISI 316 and approved for potential short circuit stress.

The distance between cleats for single core cables shall be as specified by the cable manufacturer based on the calculated short circuit level.

10.6 Cable splicing

Cable splicing should be avoided.

Cable splicing in classified shall be avoided.

10.7 Temporary cables

Temporary cables routed on permanent cable support system shall be fixed to the underside of the cable support system.

Temporary cables should not be pulled through permanent multi cable transits.

10.8 Cable glands selection

Cable glands should be selected as follows :

Plastic enclosures (relevant for field cables)	plastic
Plastic enclosures, reinforced with a metal gland plate for support of large supply- and multi core cables	brass
Metal enclosures (except aluminium)	brass / stainless steel (AISI 316)
Aluminium enclosures	stainless steel /nickel plated brass

Blanking- and drain plugs should be of the same material as the junction box/cable gland.

Ex d gland shall have clamping of braid armour and sealing of inner and outer sheath. Only to be used on Ex d direct entry equipment.

Ex d gland shall be selected so that dissimilar metal contact is avoided.

Certified glands shall be used only when required.

10.9 Cable termination

10.9.1 Cable make-off

Cables with braid armour shall have outer heat shrink sleeve which is fitted over the complete cable make-off.

Instrument and telecommunication cables with both braid armour and screen shall have inner and outer heat shrink sleeves:

- The inner sleeve shall be drawn over the inner bedding, i.e. passed under the braiding providing insulation between braiding and screen.
- The outer sleeve shall be fitted over the complete cable make-off.
- The inner sleeve may be excluded at termination's providing a minimum of 50mm inner bedding.

To minimise the extent of hot work, sleeves of type self vulcanising-tape may be used on units in operation.

10.9.2 Termination

High voltage cables should be fitted with insulated connectors at transformers and consumers end and voltage stress cones or similar stress relieving device at feeders end.

All cable conductors shall be terminated by use of compression lugs or pin dependent upon the type of termination. The compression pin should be the type where the conductor strands are inserted through the whole pin and reach the bottom of the terminal.

In switchboards and distribution boards adequate space shall be provided for the use of a clip-on amperemeter without causing undue stress on the cable conductors or connections.

The braid armour and the screen shall be separated from the conductors, twisted and fitted as required. This shall be done without any reduction of the cross sectional area.

Where the screen shall be left disconnected (applicable for field instrument), it shall be sealed and isolated with an isolating cap which allows for insulation testing without any disconnecting.

Only one conductor in each terminal for field cables.

10.10 Spare conductors

Spare conductors shall be left sealed on the field side.

In cabinets all spare conductors shall be marked with terminal number and connected to terminals linked together by solid terminal links, which shall be connected to the relevant earth bar.

If there are no spare terminals left in the cabinet, all spare conductors shall be covered with yellow / green sleeves and marked with relevant cable number and connected directly to the relevant earth bar.

11 EARTHING

11.1 General

The installation shall comply with "Retningslinjer for, jording i maritime anlegg" published by Elektrisitetstilsynet (ET)

Exception: Field equipment shall be earthed through the supply cable.

11.2 Main earth reference

The Main earth reference for all earthing systems shall be the main structure.

If aluminium is used for any part of the main structure attention shall be given to ensure that continuity in the structural earth is maintained at aluminium/steel interface points.

The Main earth reference points shall be earth bosses welded to the structure as close as possible to the cabinet / equipment. Alternatively, earth bars mounted on earth bosses welded to structure may be used.

There shall be a separate Main earth reference point for PE and IE.

The distance between the PE and IE Reference points shall be minimum 1000mm.

11.3 Protective earth

Field equipment should be connected to the PE system through the cable. The braid armour shall be the earth conductor and it shall be electrically continuous from the field to the central equipment PE bar.

For power cables where the braid armour does not have sufficient cross section, the equipment should be earthed through a separate earthing conductor in the cable.

Equipment supplied by single core cables should be connected to PE by a separate earth conductor. The copper braid shall be earthed at one end, isolated in the other end.

Ex d electrical equipment with direct entry, shall be connected to the PE system by a separate earth conductor in the cable.

11.4 Instrumentation and telecommunication earth

The IE shall be the earth reference for non intrinsically safe, intrinsically safe instrumentation and telecommunication 0 volt references etc.

The IE shall be left floating in the field end. It shall be electrically continuous from the field equipment and be connected to IE bar in the central cabinet.

The screen shall be connected to one IE bar only for signal cables between two control cabinets.

11.5 Bonding

Exposed conductive parts located in hazardous- and mechanical ventilated areas shall be bonded to the main structure.

Bonding shall be provided between the platform structure and all preassemblies, modules and decks which are not welded or bolted together.

Separate bonding shall only be applied for equipment which is isolated from main structure.

Enclosures of high voltage equipment located in hazardous areas shall be connected to PE and bonded to the main structure.

11.6 Earth bar and earth boss

11.6.1 Earth bar

Earth bars shall be fabricated from copper and provided to suit number and size of connections.

PE bars shall be connected to the nearest convenient main structure point through an insulated earth conductor or through the supply/feeder cable.

IE Bars shall be isolated from the enclosure and connected to the nearest convenient main structure point through an insulated earth conductor.

11.6.2 Earth boss

Earth bosses shall be provided for connection of one earth conductor only.

After connection, the whole assembly shall be sealed in accordance with the relevant NORSOK painting standard.

12 SUPPORT SYSTEM

12.1 Cable support system

Maximum distance between the supports shall be as specified by supplier.

Cable ladders installed horizontally shall have sufficient space to facilitate cable pulling and fixing, minimum 250mm.

All surfaces shall be cleaned prior to bolting together.

Cable support systems shall not be located closer than 50mm to the structure.

Trunking or conduits may be used for support of single field routed cables for short distances only. Where conduits are used, they shall be installed with open ends.

In offices and living quarters where multidiscipline socket outlets are grouped together, multipurpose cable channels designed for recessed installed outlets should be used.

12.2 Kick plate / protection shield

Kick plate shall be fitted around penetrations in floor where cables/tubing are exposed to mechanical damages.

Protection shield shall be installed where cables can be exposed to physical damages, minimum 500mm above the floor.

12.3 Equipment brackets and supports

Equipment brackets and supports should not be installed directly on removable deck, grating, panels, handrails, pipes or other removable equipment.

13 MARKING AND LABELLING

13.1 General

All marking shall be in accordance with the NORSOK standard, Coding system, Z-DP-002.

13.2 Cable ladders

Cable ladder segments and MCT's shall be marked with system and segment number.

High voltage cable ladders, shall be marked with warning labels in accordance with the national regulations.

13.3 Equipment

All labels shall be fabricated and installed in accordance with the following requirements:

- Labels shall be located close to the equipment and be easily visible.
- Labels should not be mounted on removable parts.
- Labels should be fixed by 316 SS screws, rivets or suitable glue (only in dry areas).
- Separate label brackets shall be made of 316SS.

- Labels shall be of engraved traffolyte, marked as follows:
 - Black letters on white background, letter size 10-20mm.
 - Electrical, instrumentation and telecommunication systems.
(service description in local language)
White letters on red background, letter size 10-20mm.
 - Instrument ESD systems, Fire & Gas systems and warning labels.
(service description in local and English language)

All emergency lighting fixtures with integral batteries shall be marked.

Warning labels shall be in accordance with national regulations.

13.4 Tubing / air supply

Air supply tubing shall be marked with consumer tag-number at the air distribution manifold.

All tubing shall be marked with consumer tag-number on one side of penetrations.

13.5 Cabling

13.5.1 Cables

Each cable shall be marked with indelible and non-corrosive cable markers indicating the cable number. The cable markers shall be clearly visible after cleating and strapping. In exposed- and wash down areas the cable markers shall be of stainless steel markers.

Each cable shall have a cable marker located:

- At one side of multi cable transits.
- At both ends.
- Outside cabinets with gland / MCT entries.
- Inside cabinets with open entries.

Heat tracing cables shall be marked:

- On the cable loop inside the junction box.
- Warning labels indicating the legend "Heat Tracing Cable" shall be fitted to the thermal insulation covers as required, at maximum distance 5 metres.
- Warning labels indicating "Heat tracing splice" and "Heat tracing end seal" shall be fitted to the thermal insulation covers above splices and end seals.

13.5.2 Identification of conductors and wires

Individual conductors and wires shall be identified with a closed, slip-on type plastic cable identification ferrule, carrying a number identical to the terminal. This is also applicable to the single conductors for cross-wiring between the terminal blocks in panels.

Conductors and earth wires shall be coded as following:

AC systems:

Phase 1	L1
Phase 2	L2
Phase 3	L3
Neutral	N
Protective Earth	PE
Protective Earth / Neutral	PEN

DC systems:

Positive pole	(+)
Negative pole	(-)

13.5.3 Colour coding of earth conductors, earth bars and cables screen.

13.5.3.1 Protective earth (PE)

Earth conductors shall be coloured yellow / green.

The braid armour shall be covered with heat shrink sheath, coloured yellow / green.

PE bars shall be marked yellow / green.

13.5.3.2 Instrument earth (IE)

The IE screen shall be covered with heat shrink sheath, coloured yellow / green and with:

- A red mark for non-IS cables.
- A blue mark for IS cables.

IE bars shall be marked yellow / green and with:

- A red mark for bars containing non-IS cables only.

- A blue mark for bars containing IS cables only.
- Both red and blue mark containing non-IS and IS cables.

13.5.3.3 Bonding

Static earth conductors shall be coloured yellow / green.

14 MATERIALS

14.1 Equipment materials

Equipment enclosures located outdoor, in naturally ventilated areas and wash down areas, shall be made of proven sea water resistant material or protected by a coating system.

14.2 Junction boxes

Junction boxes should be made of glassfibre reinforced plastic with polyester resin. In outdoor areas exposed to changing environmental conditions stainless steel AISI 316 may be used.

14.3 Cable support systems

Cable support systems located outdoors, in natural ventilated areas and wash down areas shall be made of stainless steel AISI 316 L. For indoor ventilated areas cable support systems made of galvanised carbon steel may be used.

Aluminium cable support system may be used in special selected areas.

Cable protection shields shall be made in the same material as the cable support system in the area.

14.4 Equipment brackets and supports

Equipment brackets and supports should be fabricated from hot-dip galvanised carbon steel in accordance with the relevant NORSOK painting standard.

Junction box stands shall be fabricated from the same material as the cable support system in the area.

14.5 Multi cable transits (MCT)

According to cable configuration, the material shall be selected to avoid eddy current.

14.6 Earth bosses

Earth bosses shall be made of stainless steel AISI 316 L.

14.7 Fixing materials

Screws, bolts, nuts and washers shall be made of stainless steel AISI 316 .

14.8 Precautions against galvanic corrosion

On bolted connections between dissimilar materials, precautions against galvanic corrosion shall be taken.

ANNEX A TYPICAL HOOK-UP DRAWINGS

A1 Instrument and telecommunication Electrical hook-up drawings

Field equipment Ex i, Ex e, Ex d	I/T-XX-101	Rev. 2, 29.03.96
Field junction boxes	I/T-XX-110	Rev. A, 20.06.95
Fibre optic junction boxes	I/T-XX-111	Rev. 2, 29.03.96
Instrument and telecom. panel	I/T-XX-120	Rev. A, 20.06.95
Fibre optic panel	I/T-XX-121	Rev. A, 20.06.95
Earthing of high frequency radio transmitter	I/T-XX-122	Rev. A, 20.06.95
Instrument and telecom. earth philosophy	I/T-XX-130	Rev. 2, 29.03.96

A2 Process hook-up drawings

Remote mounted transmitters/Pressure gauges	I-XX-201	Rev. A, 20.06.95
Direct mounted pressure gauges/Transmitters	I-XX-202	Rev. A, 20.06.95
DP level transmitter	I-XX-203	Rev. 2, 29.03.96

A3 Pneumatic hook-up drawings

Piston operated on/off valve with solenoid	I-XX-301	Rev. 2, 29.03.96
Control valve	I-XX-302	Rev. 2, 29.03.96

A4 Supply hook-up drawings

Instrument air supply header	I-XX-401	Rev. 2, 29.03.96
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A5 Hydraulic hook-up drawings

On/Off Valve and panel	I-XX-501	Rev. 2, 29.03.96
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A6 Typical arrangements

Typical equipment brackets and supports located outside walk ways etc.	E/T-XX-601	Rev. A, 20.06.95
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