

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 Subject to development and publication of international standards, the relevant NORSOK standard will be withdrawn.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

Annex A is normative and Annex B is informative.

Introduction

Editon 4 of this NORSOK standard replaces edition 3 of December 2003. The standard has been restructured compared to the previous version.

Telecommunication installation has been included as a new clause in this NORSOK standard. This clause replaces the NORSOK Z-010 regarding telecommunication installation.

1 Scope

This NORSOK standard describes the basis for design, engineering and installation of telecommunication systems for an offshore installation.

The subsystems given revision status in the table below are specified in NORSOK T-100.

Subsystem	Title	Revision status
86-00	General	Edition 4 of February 2010
86-11	Public address and general alarm (PAGA)	Edition 4 of February 2010
86-12	Driller's intercom	Edition 4 of February 2010
86-21	Telephone system (PABX)	
86-22	Multiplexer	
86-23	Office data network equipment	
86-24	Office data and telephone cabling network	Edition 4 of February 2010
86-31	Radio links	
86-35	Satellite links	
86-36	Wireless broadband access network	
86-37	Vessel network (coastal VHF and mobile telephone base stations)	
86-39	Fibre optic cable links	
86-41	General radio	Edition 4 of February 2010
86-42	UHF radio and paging	Edition 4 of February 2010
86-43	Audio and video entertainment	Edition 4 of February 2010
86-45	Personnel tracking	
86-51	Closed circuit television (CCTV)	Edition 4 of February 2010
86-52	Meteorological observation	Edition 4 of February 2010
86-53	Marine radar and automatic identification system (AIS)	Edition 4 of February 2010
86-54	Aviation radar	
86-55	Communication recorder	
86-61	Shuttle tanker loading telemetry	
86-62	Work over telemetry	
86-63	Pipeline telemetry	
86-70	Navigational aids	
86-71	Distance measuring instrument	
86-72	ATIS/AFTN for aviation	
86-73	Positioning	
86-81	Main distribution frame	Edition 4 of February 2010
86-82	Telecom power supply	Edition 4 of February 2010
86-83	Real time clock (RTC)	Edition 4 of February 2010
86-84	Telecommunication management system	Edition 4 of February 2010

NOTE The telecommunication subsystems given subsystem number, but no revision status, are normally specified by Company.

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

CENELEC CLC/TR 50427,	Assessment of inadvertent ignition of flammable atmospheres by radio-frequency – Guide
FOR 2004-02-16 nr 401,	Forskrift om elektronisk kommunikasjonsnett og elektronisk kommunikasjonstjenest ("ekomforskriften") (in Norwegian)
FOR 2005-03-04 nr 200,	Forskrift om autorisasjon for installatør av elektronisk kommunikasjonsnett og radioutstyr ("autorisasjonsforskriften") (in Norwegian)
IEC 61000,	Electromagnetical compatibility (EMC) – several parts
LOV-2003-07-04-83,	"Lov om elektronisk kommunikasjon (ekomloven)", including applicable regulations (in Norwegian)
NEK TS 606,	Cables for offshore installations halogen-free and/or mud resistant Technical specification
NORSOK E-001,	Electrical systems
NORSOK M-501,	Surface preparation and protective coating
NORSOK S-001,	Technical safety
NORSOK T-100,	Telecom subsystems

2.2 Informative references

None.

3 Terms, definitions and abbreviations

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

3.1 Terms and definitions

3.1.1

Company

contractual responsible company

3.1.2

can

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

3.1.3

may

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

3.1.4

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

3.1.5

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

3.2 Abbreviations

AC	alternating current
AFTN	aeronautical fixed telecommunications network
AIS	automatic identification system
AISI	American Iron Steel Institute
ATEX	atmosphères explosibles (French)
ATIS	automatic terminal information service
APS	abandon platform shut down
CCR	central control room
CCTV	closed circuit television
CENELEC	European Committee for Electrotechnical Standardisation
DC	direct current

DARPS	differential absolute and relative positioning sensor
DME	distance measuring equipment
ECC	emergency control centre
Ex	explosion proof
GPS	global positioning system
IE	instrument earth
IEC	International Electrotechnical Commission
IP	degree of protection of enclosures
IS	intrinsically safe
LAN	local area network
MDF	main distribution frame
NEK	Norsk Elektroteknisk Komité
PAGA	public address and general alarm
PABX	private automatic branch exchange
PE	protective earth
RTC	real time clock
SPL	sound pressure level
STP	shielded twisted pair
TMS	telecommunication management system
TS	technical standard
UHF	ultra high frequency
UTP	unshielded twisted pair
VHF	very high frequency
V _{RMS}	volt root mean square
WAN	wide area network

4 Requirements for telecommunication systems

4.1 General

The telecommunication systems shall provide facilities to support safe and efficient operation. This includes systems for

- internal communication onboard the installation,
- external communication with onshore operational centre, and other installations,
- communication for marine and air activities.

During a hazardous or emergency situation it is essential that those telecommunication systems required remain active, and that they are designed not to create additional hazards.

4.2 Telecommunication subsystems

4.2.1 Public address and general alarm (PAGA)

A PAGA system according to specifications in NORSOK T-100 shall be installed. The system shall distribute audio alarms, visual alarms and emergency messages, and shall be interfaced to the fire and gas system for alarm input.

The PAGA system shall also be used for general announcements.

No single failure in equipment or cables, nor any single external event, shall cause significant reduction of PAGA sound level in any area.

Function parameters and data for loudspeakers and flashing lights shall be measured and provided as stated in Annex A.

4.2.2 Driller's intercom

On installations with drilling facilities a driller's intercom function according to specifications in NORSOK T-100 shall be installed.

The function may be provided either by a drilling intercom system or by a UHF radio system.

4.2.3 Telephone system

A telephone system according to Company requirements shall be installed. The system shall provide internal and external switched telephone services including emergency communication. The system shall include Ex telephones as well as office type telephones, and have interface to other systems as specified in NORSOK T-100. The system shall be integrated as a part of the Company telephone/voice communication network, but shall be able to operate locally on the installation independent of the Company network.

Function parameters and data for Ex telephones shall be provided as stated in Annex A.

NOTE The term PABX is used for the central part of the telephone communication system, although several technologies may be used.

4.2.4 Data network

A data network shall be installed to link personal computers/workstations, servers, network connected equipment etc. The data network may be separated in several networks (e.g. office data network, technical network etc.) and shall be integrated as a part of the Company LAN/WAN infrastructure, according to Company requirements.

The data network includes

- office data and telephone network cabling according to specifications in NORSOK T-100,
- network equipment (e.g. switches, routers, firewalls etc.) according to Company requirements for LAN/WAN,
- wireless network equipment for wireless local area network (if applicable) according to Company requirements.

4.2.5 UHF radio and paging system

A UHF radio system according to specifications in NORSOK T-100 shall be installed. The system shall provide internal radio communication between fixed locations and hand portable radios.

The UHF radio system shall have dual frequency ("duplex") talk through channels and single frequency ("simplex") channels.

Access from fixed locations shall be via fixed operator control units or radios. In addition, access via the PABX can be used.

The system shall handle emergency communication and shall be designed with high availability.

The paging system should be interfaced to and utilize the same antenna combiner and antenna system as the UHF radio system.

4.2.6 Mandatory and general radio system

A general radio system according to specifications in NORSOK T-100 shall be installed. This includes mandatory systems for maritime and aeronautical communication.

Additional equipment shall be included to achieve an efficient and reliable operational radio communication to ships, helicopters, and other platforms. This includes radios in ECC, helitower, cranes and dedicated offices.

4.2.7 Main communication to shore/other platforms

As a minimum two independent permanent communication links to the onshore operation centre shall be provided, either directly or via other installations.

The communication links shall be designed for high reliability and high capacity to allow for emergency communication, daily operation and integrated operations.

Applicable systems are

- fibre optical cable according to Company requirements,
- radio link according to Company requirements,
- satellite link according to Company requirements.

To enable effective and flexible usage of available bandwidth, a multiplexer system according to Company requirements may be installed.

The established Company network synchronization plan shall be followed.

In addition to the permanent communication links, switched satellite services may be used for backup.

If a fibre cable system is installed, the fibre cable system should be

- integrated with existing fibre cable systems in the area (if any),
- prepared for future extension of the fibre cable system, preferably by a blind subsea tail.

4.2.8 Telemetry and remote control systems

Telemetry systems shall be installed, if required, for relaying of remote control signals to ensure safe operations in case of malfunctions, like shut down in conjunction with pipelines, offshore loading, well maintenance rigs etc.

Telemetry systems shall utilise fail safe signal transmission systems according to Company requirements.

The telemetry and voice communication system for shuttle tankers shall be according to the standard used by the actual shuttle tanker fleet.

4.2.9 Vessel network and wireless broadband access network

In areas where ships have limited communication facilities to the onshore public network, local installation of coastal VHF and/or mobile telephone base stations connected to the onshore public network, should be installed.

A wireless broadband access network may be installed. If installed, the implementation shall be coordinated with other wireless broadband access networks in the area (if any).

4.2.10 Closed circuit television (CCTV)

A CCTV system according to specifications in NORSOK T-100 shall be installed. The system shall be used for surveillance of selected areas and operations.

4.2.11 Audio and video entertainment

An entertainment system according to specifications in NORSOK T-100 shall be installed on manned installations. The system shall distribute live broadcast as well as recorded audio/video to relevant areas such as cabins, offices, workshops and public areas in the living quarter. Interactive services according to Company requirements may be included.

4.2.12 Marine radar and automatic identification system (AIS)

The area around the platform shall be covered by maritime surveillance radar and AIS according to specifications in NORSOK T-100. The radar and AIS equipment may be installed on neighbouring platforms.

4.2.13 Meteorological observation

A system for meteorological observation according to specifications in NORSOK T-100 shall be installed. The system shall provide information on current weather and sea conditions for both helicopter and maritime traffic as well as for operational needs.

4.2.14 Real time clock

A real time clock according to specifications in NORSOK T-100 shall be installed if required for uniform timekeeping and for clocking of the telecommunication network system.

4.2.15 Telecommunication management system (TMS)

A TMS according to specifications in NORSOK T-100 shall be installed. The system may be locally installed on the platform or integrated as part of the Company TMS according to Company requirements. Major alarms shall be presented in the CCR. For installation with normally no telecommunication specialists on board, facilities for remote diagnostics shall be available.

All telecommunication subsystems shall have alarm outputs via a standard interface, compatible with the TMS.

4.2.16 Main distribution frame/distribution frames

Distribution frames according to specifications in NORSOK T-100 shall be used for cross connection of signal wires between central equipment and field equipment.

4.2.17 Navigation and positioning

Non directional beacon according to specifications in NORSOK T-100 shall be installed for helicopter traffic.

DME may be required for helicopter traffic.

NOTE DME on one installation will normally cover the installation within a geographical area.

Short range/relative positioning system(s) (e.g. DARPS, Artemis, RADIUS) according to Company requirements shall be installed.

Absolute/global positioning system(s) (e.g. GPS) according to Company requirements shall be installed on floating installations. GPS for positioning should be combined with GPS for RTC.

4.2.18 Personnel tracking system

A personnel tracking system according to Company requirements may be installed.

4.2.19 Environmental surveillance

An environmental surveillance system according to Company requirements may be installed. The system may interface to or be integrated with the radar and/or the meteorological observation system.

4.2.20 Voice and closed circuit television (CCTV) recording

Systems for recording of emergency voice communication, CCTV etc. according to Company requirements may be installed.

5 System design

5.1 Emergency communication

5.1.1 Functional requirements

There shall be facilities which enable

- persons in charge during a hazardous or emergency situation to alert all personnel and give instructions,
- persons in charge of safety related actions, work teams, and persons trapped by the incident to communicate with each other and with the ECC,
- the ECC to communicate with onshore emergency control centre, nearby offshore installations, helicopters, ships and locations on the platform.

5.1.2 Emergency communication systems

During a hazardous or emergency situation, the following telecommunication systems shall be available and in operation according to NORSOK S-001:

- PAGA;
- UHF radio;
- PABX;
- mandatory and general radio;
- communication to shore and other installations.

These systems shall be designed and installed with high degree of protection against influence from external events (e.g. fires, gas and fluid leaks, explosions, power failure etc.) as well as failures in the equipment, to ensure continuous operations. To achieve this, the following requirements shall apply:

- the central equipment shall be located to the telecommunication equipment room or rooms with equivalent functionality in the safest area on the installation;
- the systems shall operate independently in critical situations;
- the systems shall have a modular design for high reliability as specified in NORSOK T-100.

5.1.3 Support systems

The following systems shall be designed to be in operation during a hazardous or emergency situation to support personnel in charge:

- the part of the data network that will be used by the personnel in charge;
- CCTV;
- radar and AIS (if installed);
- wind observations as part of the meteorological observation system;
- personnel tracking system (if installed);
- voice and CCTV recording (if installed).

5.1.4 Muster stations

At least two different communication facilities shall be available at the muster stations. The main facilities shall be hand portable radios and telephones.

Required telecommunication units at the muster station where the APS switch is located:

- telephone (Ex);
- PAGA microphone station (Ex).

5.1.5 Uninterruptable power supply requirements

Emergency communication systems shall be DC powered from the telecommunication battery supply. Systems not made for DC-powering shall be powered from the platform uninterruptible power supply system.

All the support systems designed to be in operation during a hazardous or emergency situation should be powered from the platform uninterruptible power supply system.

5.2 Telecommunication equipment location

5.2.1 General

Equipment room(s), rectifier room and battery room, if needed, shall not have suspended ceilings.

5.2.2 Telecommunication equipment room

A dedicated telecommunication equipment room shall accommodate most of the telecommunication central equipment as follows:

- the telecommunication equipment room(s) with the central equipment and batteries shall be located in the safest area on the installation;
- the room(s) shall be provided with isolation facilities. If gas is detected in the air intake to a room, the room shall be isolated to prevent gas from entering the room;
- there shall not be any piping for liquids going through the equipment room(s);
- risk for fire in the room(s) shall be minimized;
- doors to the telecommunication equipment room(s) shall be equipped with a lock to lock the room(s) for unauthorized personnel;
- doors on the equipment racks shall not be locked by key;
- racks for telecommunication equipment should be located for front and rear access. Location along a wall shall only be allowed if racks and equipment is designed for front access only.

A secondary equipment room should be used for the PAGA B-system.

5.2.3 Telecommunication workshop

A workshop suitable for handling sensitive equipment and instruments shall be established near the main telecommunication equipment room. The telecommunication workshop may be combined with other suitable workshops for electronic equipment.

5.2.4 Battery systems/banks for telecommunication

To keep the voltage drop on the low voltage supply lines as low as possible, the batteries for the telecommunication DC power supply shall be located near the telecommunication equipment. Rectifiers and shutdown facilities shall be included.

Distribution panels shall be installed in the related equipment rooms.

5.2.5 Transmitter room

High power radio transmitters, radar transmitters or other equipment requiring short antenna cables should be located in a separate equipment room near the antennas (antenna tower). Radio frequency equipment may also be installed in Ex certified out-door units to minimize feeder loss.

5.2.6 Antenna tower and antennas

An antenna tower shall be installed on top of the installation for antennas for VHF and UHF mobile radio systems, radio links, radar, etc.

The tower shall be of sufficient height to obtain necessary vertical separation between antennas and to avoid obstruction from other modules or crane activities.

Antennas shall be located to obtain

- optimum radio frequency reception/transmission,
- minimum exposure to damage from heat generated by mud burners, exhaust or flare booms,
- protection from damage by operational activities, i.e. cranes,
- minimum radio interference between different antennas,
- personnel safety.

The antennas shall, as far as possible regarding coverage, be mounted in safe area. The antenna tower shall be used as the primary location of antennas.

Satellite antennas, if used, shall be located with an unobstructed view towards the actual satellite positions.

Redundant antennas for emergency communication systems shall be separated from the main antennas to avoid simultaneous obstruction or mechanical damage resulting in a total loss of communication.

5.2.7 Helitower

The helitower shall have equipment for communication with helicopters, ships, CCR and the ECC. The room shall be equipped with

- fixed and hand portable radios for aeronautical and maritime VHF radio,
- access to meteorological observation data (terminal or display).

5.2.8 Reception

The reception function shall in addition to installations for normal offices have a PAGA access unit installed.

5.2.9 Central control room (CCR)

The CCR operator shall be able to communicate with personnel anywhere on the installation, ships, other installations in the area, and to shore. The following systems shall be available in the CCR:

- mandatory radio (global maritime distress and safety system) and additional maritime VHF radio;
- PAGA access unit;
- UHF radios and/or control units;
- telephones, ordinary and with priority access and hot-line functions;
- CCTV control unit and monitors;

- radar display (if applicable);
- access to the meteorological observation system (terminal or display);
- aeronautical VHF.

5.2.10 Emergency control function

Communication equipment for use during a hazardous or emergency situation shall be available. The ECC communication functions should be combined with the CCR communication equipment, where possible.

Important functions for emergency control located elsewhere shall have the required communication facilities available, i.e. dispatcher's office/reception for handling personnel evacuation.

5.2.11 Mandatory radio equipment

The operational units for mandatory radio equipment should be located according to the operational organisation, i.e. in the CCR. Equipment for the required backup can be located to the helitower or the reception according to what is practical for operation.

5.2.12 Drilling control room

In the drilling control room there shall be facilities for communication with drilling related locations and the CCR. The room shall have

- PAGA access unit,
- fixed UHF radios,
- driller's intercom function,
- CCTV control unit and monitor.

5.2.13 Cranes

The crane operators shall be able to communicate with the CCR, ships and operators on deck. Maritime VHF, UHF radio, PAGA loudspeakers and telephone shall be located in the cranes.

5.3 Ignition source control for telecommunication systems

5.3.1 General

Telecommunication systems required to remain active in an emergency situation shall not create additional hazards.

The emergency communication systems shall be in accordance with requirements for ignition source control, i.e. only equipment subject to special considerations or Ex-certified communication equipment, shall be in operation in situations where a flammable gas mixture can be present according to NORSOK S-001.

5.3.2 Ex protection

With the following additions, all methods of Ex protection may be used:

- Ex n equipment may be used in zone 2 according to Company approval;
- Ex d equipment should be provided with an Ex e cable entry;
- Ex p equipment may be used according to Company approval.

5.3.3 Field equipment

Non-Ex-certified field equipment shall be shut down by the area shut down commands according to the installations shut-down philosophy.

In all areas, sufficient Ex-certified communication equipment shall be in operation during a hazardous or emergency situation.

Telecommunication equipment installed in non-hazardous naturally ventilated areas shall as a minimum be suitable for operation in Zone 2.

All loudspeakers and flashing lights shall comply with ATEX requirements for Zone 1 or Zone 2.

Zone 1 loudspeakers and flashing lights shall be used in Zone 1, Zone 2 and non-hazardous naturally ventilated areas.

Zone 2 loudspeakers and flashing lights may be used in non-hazardous mechanically ventilated areas.

5.3.4 Central equipment

The central equipment that shall be kept operational in a hazardous or emergency situation shall only be shut down after operation of an APS switch or by hazardous conditions in the actual equipment room. The APS shut down action shall be delayed by 30 min.

It shall be possible to manually reset the timer circuit.

5.3.5 Antennas

Ex-certified antennas according to area classification shall be used in classified areas.

Antennas (active and passive) installed in non-hazardous areas shall be considered as field equipment. Passive antennas may be subject to special considerations as an alternative to Ex-certification and shall as such not be disconnected if gas is detected in the area.

Radio frequency radiation from antennas shall be in compliance with the recommendations in CENELEC CLC/TR 50427.

5.4 Common requirements for system design

5.4.1 Equipment standardisation

Field equipment, telecommunication outlets etc. shall be standardised on the installation independent of contractor for the different modules. Different models of equipment to serve different functional requirements may be used, but equipment according to the same functional requirement shall be standardised (manufacturer and model).

5.4.2 Radio frequency analysis

The combination of radio frequencies used shall not cause disturbing interference. A frequency interference analysis for the installation including the relevant frequencies in that area shall be used as basis for the selection and implementation of radio frequencies.

5.4.3 Antennas and antenna cables

Antennas shall be of a design suitable for the environmental conditions on the Norwegian continental shelf. Antenna cables shall be of a design protected from water intrusion.

For coaxial cables should antenna connectors be of N type. Antenna cables should be 50 ohm low loss coaxial.

There shall be a protected cable route between the antenna tower and the telecommunication equipment room. The route should be optimised to have no sharp bends and be as short and direct as possible.

5.4.4 Degree of protection (IP code)

Minimum degree of protection provided by enclosure shall be as follows:

- Outdoor, in naturally ventilated and wash down areas:
 - General IP 56
 - PAGA loudspeakers IP 66
 - PAGA flashing lights IP 66
- Indoor dry areas:
 - General IP 20
 - PAGA loudspeakers IP 56
 - PAGA flashing lights IP 56
- Other areas:
 - General IP 44
 - PAGA loudspeakers IP 66
 - PAGA flashing lights IP 66

5.4.5 Electromagnetic compatibility (EMC)

All equipment and installations shall comply with IEC 61000 regarding EMC requirements with respect to emission and immunity.

5.4.6 Spare capacity

Spare capacity and space shall be included in all parts of the telecommunication system to enable "easy to implement" and cost effective modifications and expansions being relevant in the operation period.

The telecommunication equipment room(s) including transmitter room, battery room(s) etc. shall have 25 % spare floor capacity for installation of new cabinets etc. at the end of the project, i.e. at handover to Company for operation.

Cabinets, distribution frames, junction boxes, cable trays, cables, antenna tower etc. shall have 25 % spare capacity for installation of additional equipment at the end of the project, i.e. at handover to Company for operation.

5.4.7 Requirements for temporary use of telecommunication systems

Requirements for temporary use of telecommunication systems during the construction and hook-up phases shall be met, i.e. temporary use of the telephone system, PAGA, data network and radio communication.

6 Telecommunication cable requirements

The following cable types shall be used:

- telecommunication cables according to NEK TS 606 ("S" type cables);
- optical fibre cables according to NEK TS 606 ("F" type cables).

In addition there will be requirements for special cable types not specified in NEK TS 606:

- radio frequency cables, e.g. coaxial cables, leaky feeders, waveguides etc.;
- UTP/STP for "Office data and telephone cabling network" as specified in NORSOK T-100;
- special purpose made cables may be used according to Company approval;
- cross connect wires/fibres etc.

All cables and cross connect wires/fibres shall confirm with requirements in NEK TS 606 regarding flame retardance, content of halogen and smoke emission. All cables shall confirm with requirements in NEK TS 606 regarding sheath marking and other applicable requirements.

Fire resistant telecommunication cables and optical fibre cables according to NEK TS 606 shall be used for emergency communication systems.

NOTE Not applicable for special cable types listed above.

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

The cable sheath colour for cables used in intrinsically safe circuits shall be grey, but each cable shall be clearly marked (e.g. with blue heat shrink) at both ends for functional identification. These cables shall also be marked on both sides of multi cable transits.

Multicore telecommunication cables with collective screen should be used, see below:

- telecommunication cables (except indoor cables) should be 1, 2, 4, 8, 16 or 24 pairs 0,75 mm² + screen;
- indoor telecommunication cables (type S9 or equivalent) should be 4, 10, 20, 30 or 50 pairs 0,5 mm diameter + screen.

Individual screens shall only be used when this is required for the technical performance.

7 Telecommunication installation

7.1 General

Telecommunication installation shall conform with requirements in LOV 2003-07-04 nr 83 ("ekomloven"), FOR 2004-02-16 nr 401 ("ekomforskriften") and FOR 2005-03-04 nr 200 ("autorisasjonsforskriften"), where applicable.

7.2 Equipment location

7.2.1 General

Equipment should be located and installed according to the following requirements:

- protection against damage;
- protection against vibration;
- protection against weather and water jets;
- to prevent the equipment from falling down;
- good operability and serviceability;
- accessibility for maintenance without scaffolding, ladder, etc.

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

7.2.2 Field equipment locations

7.2.2.1 Public address and alarm system

Public address and alarm system equipment should be located above deck/floor level as follows:

- loudspeakers: 2 m to 3 m;
- PAGA flashing lights: maximum 3 m.

Loudspeakers shall not be located behind obstructions that will hinder sound distribution.

If loudspeakers are mounted in ceilings, recessed installation should be used.

Except for ceiling mounted loudspeakers, loudspeakers shall be installed to allow for future adjustments as follows:

- at the horizontal plane: 90 degrees;
- downwards: 60 degrees from the vertical plane.

7.2.2.2 Telephone system (PABX)

Telephone system equipment shall be located above deck/floor level as follows:

- flashing lights, maximum 3 m;
- telephones (Ex) approximately 1,4 m;
- accoustic hoods approximately 2 m to the inside top of the hood.

7.2.2.3 Closed circuit television (CCTV) equipment

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

7.2.2.4 Wind sensors

Wind sensors shall be installed to minimize the influence from the platform construction regarding turbulence.

7.2.2.5 Junction boxes and telecommunication utility stands

Junction boxes shall be located between 1,2 m and 1,6 m above deck/floor level.

7.3 Telecommunication cable installation requirements

7.3.1 Installation of fibre optical cables

Special requirements apply to installation of fibre optical cables in addition to or in stead of the general cable installation requirements in this NORSOK standard.

Fibre optical cables shall be installed in accordance with manufacturer specifications/guidelines. Focus shall be put on bending radius, strapping and mechanical load/strain. Termination and splicing of fibre optical cables shall be performed by specially trained personnel with the required competence.

Fusion welding should be used for splicing operations.

Fibre optical cables shall be tested and documented by the use of suitable test equipment.

7.3.2 Installation of radio frequency cables

Special requirements apply to installation of radio frequency cables in addition to or in stead of the general cable installation requirements in this NORSOK standard.

Radio frequency cables shall be installed in accordance with manufacturer specifications/guidelines. Focus shall be put on bending radius, strapping/mounting clamps and mechanical load/strain. Protection shields shall be used whenever necessary to protect the cables from mechanical damage. All connection work shall be performed by specially trained personnel with the required competence.

Leaky feeders should be installed maximum 4,0 m above the floor.

Radio frequency cables shall be tested and documented by the use of suitable test equipment.

7.3.3 Installation of unshielded-/shielded twisted pair (UTP/STP) cables

Special requirements apply to installation of UTP/STP cables in addition to or in stead of the general cable installation requirements in this standard.

UTP/STP cables shall be installed in accordance with manufacturer specifications/guidelines. Focus shall be put on bending radius, strapping and mechanical load/strain. All connection work shall be performed by specially trained personnel with the required competence.

Each termination point (outlet) shall be tested and documented by the use of suitable test equipment.

7.4 General cable installation requirements

7.4.1 General

Reference is made to NORSOK E-001 for general cable installation requirements, with requirements that are applicable to telecommunication cables.

7.4.2 Cable segregation

See NORSOK E-001, 9.2.2.

Additional requirements: DC/AC cables for telecommunication 24 V or 48 V should be routed on system 3 cable trays.

7.4.3 Cable routing

See NORSOK E-001, 9.2.3.

7.4.4 Cable installation

See NORSOK E-001, 9.2.4.

7.4.5 Cable cleating and strapping

See NORSOK E-001, 9.2.5.

7.4.6 Temporary cables

See NORSOK E-001, 9.2.6.

7.4.7 Cable gland selection

See NORSOK E-001, 9.2.7.

Additional requirements:

Glands shall have metric (1,5 mm) threads. Items with threaded entries other than metric should be fitted with adaptors/reducers giving the correct entry for metric glands.

For direct cable entry into Ex d enclosures, compound type cable glands shall be used.

7.4.8 Cable termination

See NORSOK E-001, 9.2.8.

7.4.9 Spare conductors

See NORSOK E-001, 9.2.9.

7.4.10 Support system (cable ladders and trays)

See NORSOK E-001, 9.2.10.

7.5 Equipment earthing and bonding**7.5.1 General**

See NORSOK E-001, 9.1.1.

7.5.2 Earthing of exposed conductive parts

See NORSOK E-001, 9.1.2.

7.5.3 Equipotential bonding

See NORSOK E-001, 9.1.3.

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

7.5.4 Telecommunication earth (i.e. instrument earth)

See NORSOK E-001, 9.1.4.

7.5.5 Earth bar and earth boss

See NORSOK E-001, 9.1.5.

Additional requirements: Special focus shall be made on radio frequency cabling, radio transmitters and antenna tuning units to ensure a stable earth connection.

7.6 Marking and labelling**7.6.1 General**

See NORSOK E-001, 9.12.1.

7.6.2 Cable ladders

See NORSOK E-001, 9.12.2.

7.6.3 Equipment

See NORSOK E-001, 9.12.3.

Additional requirements:

Telephones shall be marked with emergency call number and other important telephone numbers.

Data/telecommunication outlet tag labels shall be fixed to the outlets, and label size must be adapted to the space available.

7.6.4 Cables

See NORSOK E-001, 9.12.4.

7.6.5 Identification of bus bars, conductors and wires

See NORSOK E-001, 9.12.5.

Additional requirements:

- Telecommunication cable pairs shall generally be identified by pair numbers.
- For telecommunication cables type S9 (0,5 mm²) connected to knife type blocks (insulation displacement connection) pair marking will not be required, and the colour coding of the cable pairs will be sufficient.
- Marking of cross connection conductors is not required.

7.6.6 Colour coding of earth conductors, earth bars and cable screens

7.6.6.1 Protective earth (PE)

See NORSOK E-001, 9.12.6.1.

7.6.6.2 Instrument earth (IE)

The IE screen shall be covered with sleeves coloured yellow/green:

- IE bars shall be marked yellow/green and with a red mark for bars which are containing non-IS cables only;
- a blue mark for bars containing only IS cables;
- both red and blue marks for bars containing non-IS and IS cables.

7.6.6.3 Bonding

See NORSOK E-001, 9.12.6.2.

7.7 Bulk materials

7.7.1 Equipment materials

All equipment and materials shall as a minimum be flame retardant with low halogen content.

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 according to NORSOK M-501.

Panels shall be made of metal except Ex d or Ex e distribution boards, where glass fibre reinforced polyester (GRP) enclosures are acceptable.

7.7.2 Junction boxes

See NORSOK E-001, 9.13.1.

Additional requirements:

- Junction boxes located outdoor, in naturally ventilated and in wash down areas shall be made of stainless steel AISI 316.
- Junction boxes made from impact resistant, flame retardant cast resin may be used when located in dry areas.
- Junction boxes shall be standardized to Ex e types.
- Vertically mounted terminal rail(s) shall be installed minimum 120 mm above the cable entry into multicore boxes.

- Distance between terminal rail and side wall shall be minimum 80 mm for easy cable termination and core identification.
- Distance between parallel terminal rows shall be minimum 80 mm.
- Junction boxes greater than 300 mm x 250 mm (width x height), or junction boxes located in inaccessible areas (e.g. derrick), shall have hinged doors.
- Junction box mounting flanges shall be bending outwards.

7.7.3 Equipment brackets and supports

See NORSOK E-001, 9.13.5.

7.7.4 Fixing materials

See NORSOK E-001, 9.13.8.

Additional requirements:

- Lock washers or equivalent shall be used on all fixings to prevent loosening by vibration.
- Special lock nuts and shock absorbers shall be used where heavy and/or constant vibration may occur.

Annex A

(Normative)

Data sheets for field equipment

Data sheets:

1. Telephone (Ex and office)
2. Loudspeakers (Ex loudspeakers indoor/outdoor, living quarter and offices)
3. Outdoor telephone hood
4. Flashing lights (PAGA and telephone flashing lights)

NORSOK T-001 Rev. 3, Dec. 2003	TELECOMMUNICATION TELEPHONE DATA SHEET	Made by	
		Checked by	
		Date	
		Data sheet	TDS-T01

Package no.	Doc. no.	Rev. 3	Page 1 of 1
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DESCRIPTION: EEx telephones for both indoor and outdoor use.

Note: Values in brackets under requirements are recommendation/examples.

GENERAL:	REQUIREMENTS	UNIT	MANUFACTURER DATA
GAS GROUP AND TEMP.CLASS:			
ZONE CERTIFICATION:	Zone 1		
DEGREE OF PROTECTION:	IP 56		
MATERIAL:			
COLOUR:			
MOUNTING:			
TERMINATION ENCLOSURE CERT.:	EEx e		
CABLE GLAND ENTRY:	(M20)		
DIMENSION:			
WEIGHT:			
MANUFACTURER:			
MODEL:			
P.O. NUMBER:			
SUPPLIER'S DRAWING/DOCUMENT:			
EQUIPMENT CHARACTERISTICS:			
EARTHING:			
CALL SIGNAL TYPE:	(Shrill warble tone)		
DIAL TYPE:	(Keypad)		
SIGNAL TYPE:	(DTMF or decadic)		
RECALL :	Controlled break		
ON-HOOK:			
VOLTAGE:	(to 48)	VDC	
CURRENT:	(22)	μA	
OFF-HOOK:			
VOLTAGE:	(to 48)	VDC	
CURRENT:	(min. 20)	mA	
MIN. RINGING VOLTAGE DETECTION:	(40)	VAC	
RINGING FREQUENCY:	(2 to 2,8) (8Hz sweep rate)	kHz	
RINGING SIGNAL SPL (at 1m):	(78)	dBA	
HANDSET CORD/LENGTH:	(Coiled cord, 1m)		
CONNECTION :			
OPERATION TEMP.:	-10 to +40	°C	
HUMIDITY:			
INTERFACE:			
FLASHLIGHT TRIGGERING:			
GALVANIC SEPARATION:	(Optocoupler) Yes/No		
TRIGG LEVEL OUTPUT:			

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INSTRUCTIONS FOR TDS-T02

Sound pressure level (SPL) at different inputs/frequencies:

SPL shall be measured on the main beam axis 1 m from the loudspeaker, either in an anechoic chamber or free field. A sinus signal at 100 V_{RMS} shall be applied to the loudspeaker.

The SPL values shall be measured for each of the following tappings:

- maximum rated power of loudspeaker;
- $\frac{1}{2}$ " " " " " "
- $\frac{1}{4}$ " " " " " "
- + lowest tapping of loudspeaker (power to be stated).

SPL shall be presented on an SPL diagram as a function of frequencies from 125 Hz to 8 000 Hz with a sinus signal.

A typical SPL curve is enclosed to the data sheet, see Figure B.1.

Dispersion:

The polar diagram for the loudspeaker shall be enclosed with the datasheet in order to give information about the directivity of the loudspeaker.

The polar diagram shall present the dispersion for the following frequencies: 125 Hz, 250 Hz, 500 Hz, 1 000 Hz, 2 000 Hz, 4 000 Hz and 8 000 Hz.

A typical dispersion diagram is enclosed to the data sheet, see Figure B.2a and B.2b.

Distortion:

Distortion shall be presented over the complete frequency range (125 Hz to 8 000 Hz) when a sinus signal of 100 V_{RMS} is applied to the maximum tapping of the loudspeaker.

A typical distortion curve is enclosed to the data sheet, see Figure B.2.

Overload test:

With a 150 V_{RMS} at 1 000 Hz one octave pink noise signal applied to the maximum power tapping of the loudspeaker, present the elapsed time which the loudspeaker survives if less than 12 h.

All above tests/measurements to be done with the loudspeaker line transformer included.

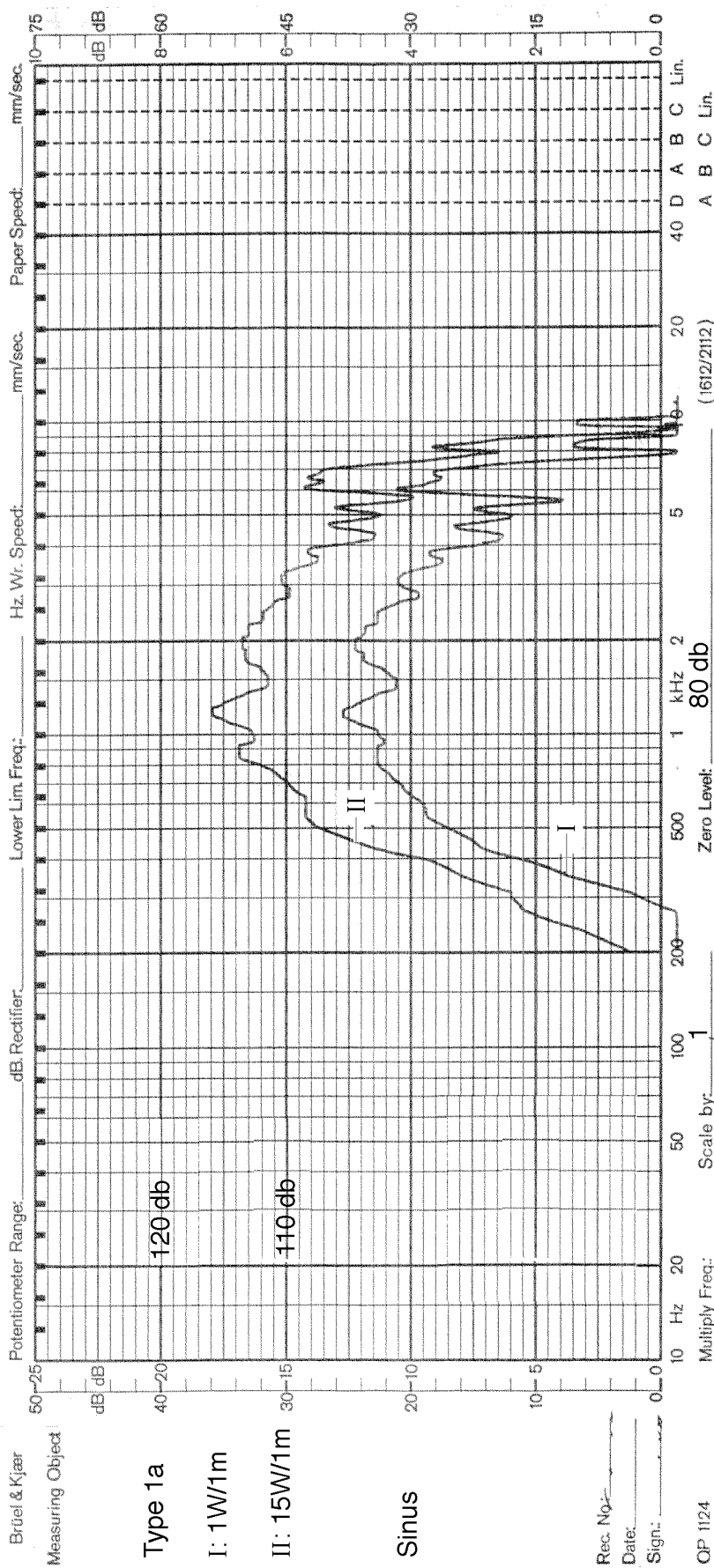


Figure A.1 – A typical SPL curve

Frequency [Hz]	Distortion
125	51,4 %
250	48,1 %
400	17,6 %
450	10,0 %
500	6,9 %
800	10,0 %
1 000	15,7 %
1 500	11,7 %
2 000	5,9 %
4 000	1,9 %
8 000	1,5 %

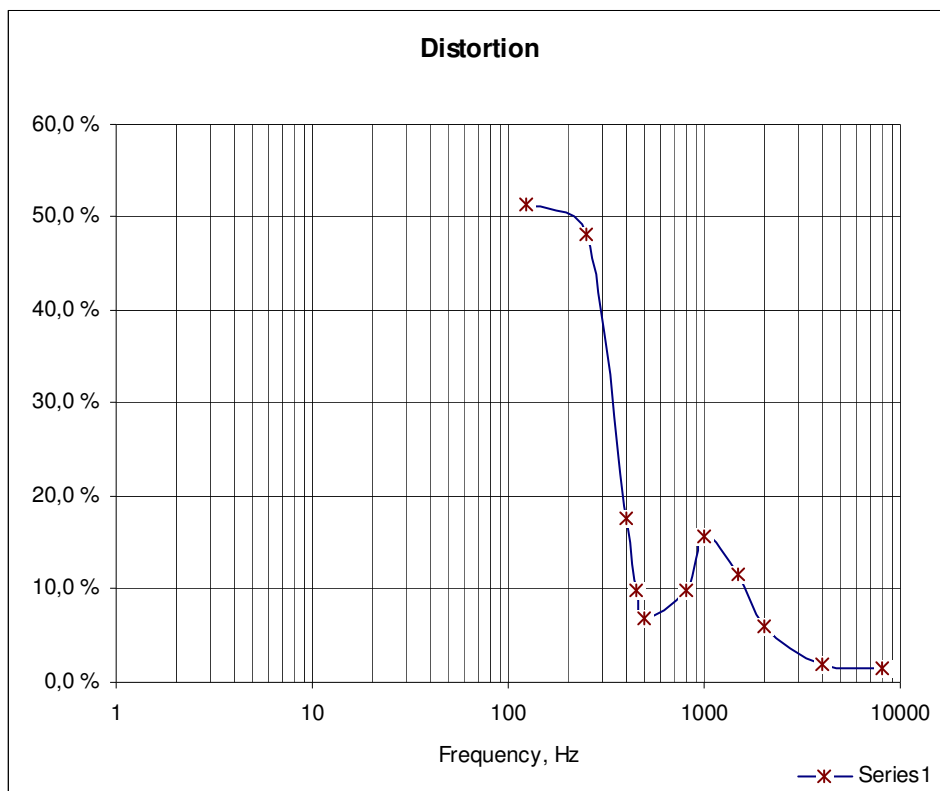


Figure A.2 – Characteristics for measuring object in Figure A.1.

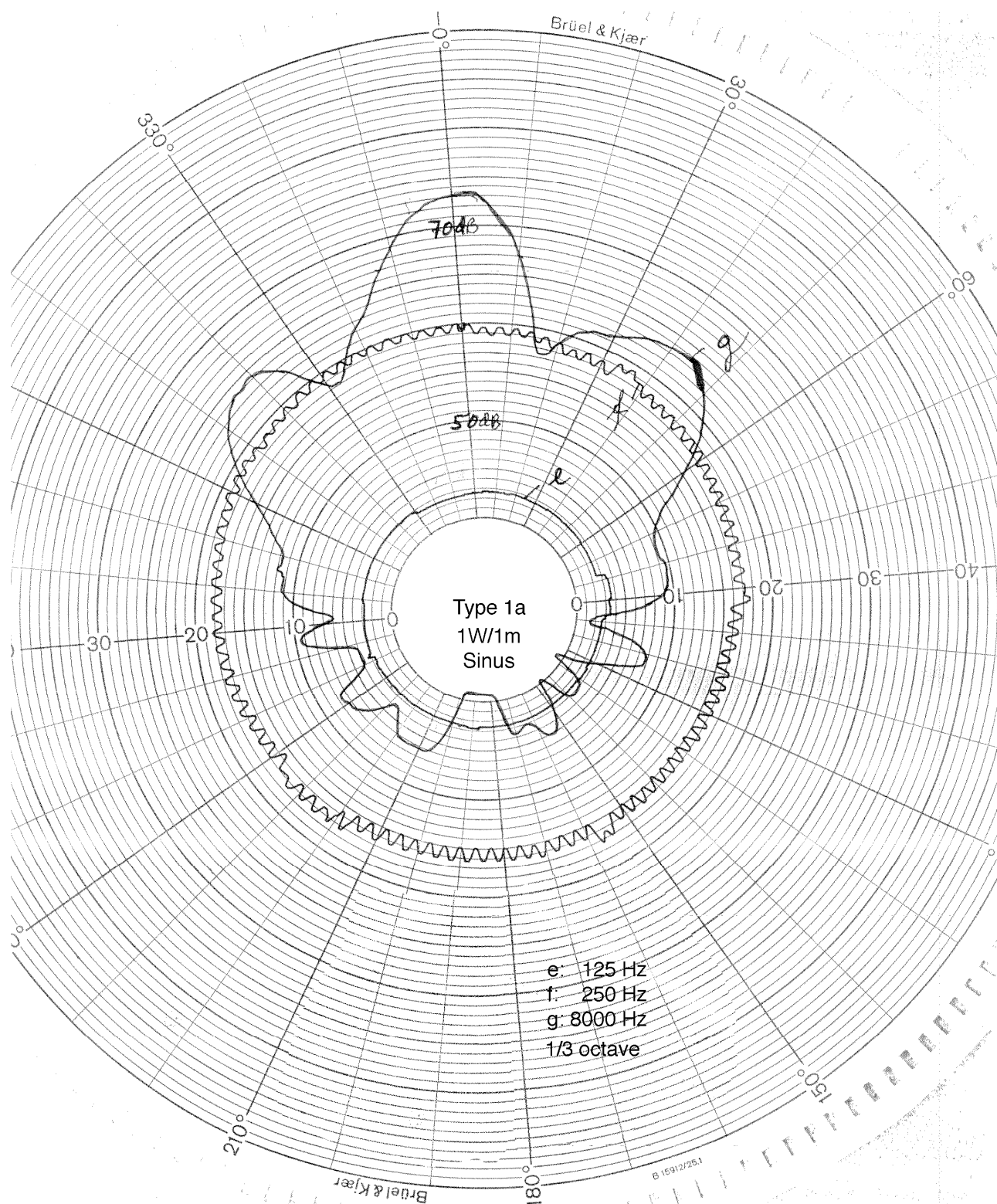


Figure A.3a – Typical polar diagram for 125 Hz, 250 Hz and 8 000 Hz

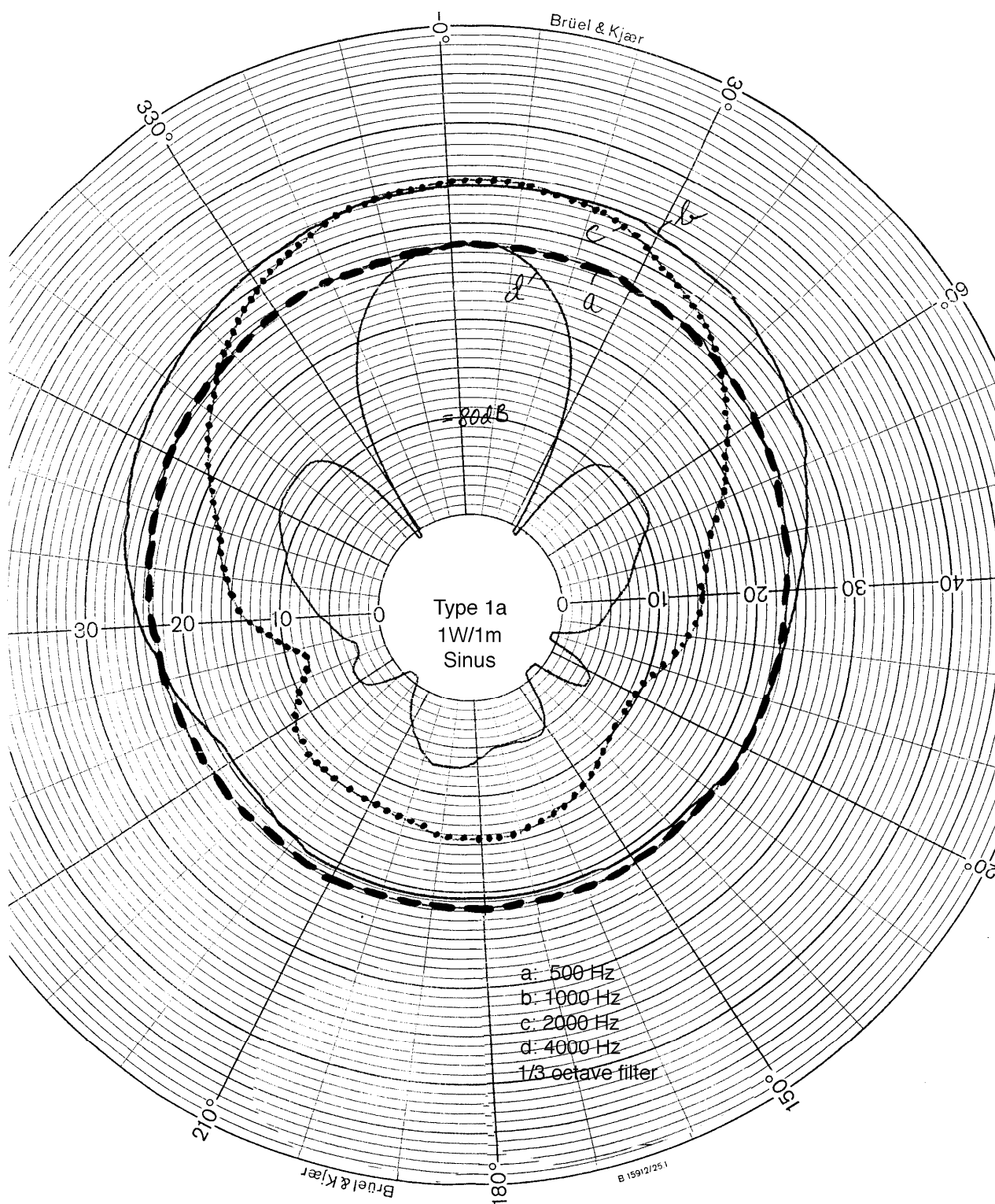


Figure A.3b – Typical polar diagram for (500 Hz, 1 000 Hz, 2 000 Hz and 4 000 Hz)

Figure A.3 – Typical polar diagrams

NORSOK T-001 Rev. 3, Dec. 2003	TELECOMMUNICATION OUTDOOR TELEPHONE HOOD DATA SHEET	Made by	
		Checked by	
		Date	
		Data sheet	TDS-T03

Package no.	Doc. no.	Rev. 3	Page 1 of 1
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DESCRIPTION: Telephone hood for outdoor use in corrosive environment. The sound absorbent material shall be non flammable. Note: Values in brackets under requirements are recommendations/examples.			
GENERAL:	REQUIREMENTS	UNIT	MANUFACTURER DATA
MATERIAL: OUTER CASTING: INNER LINNING: SOUND ABSORBANT: PAINTING: COLOUR: MOUNTING: DIMENSION: WEIGHT: MANUFACTURER: MODEL: P.O. NUMBER: SUPPLIER'S DRAWING/DOCUMENT:	(Non-corrosive) (Orange) Wallmounted		
EQUIPMENT CHARACTERISTICS			
MIN. NOISE REDUCTION (0,5 to 5 kHz):	10	dB	
SHELF:	Yes		
MINIMUM INNER SPACE:	Height - 0,8 m Width - 0,6 m		
INSTRUMENT FIXING METHOD:	(Fixing plate)		

NORSOK T-001 Rev. 3, Dec. 2003	TELECOMMUNICATION FLASHING LIGHT DATA SHEET	Made by	
		Checked by	
		Date	
		Data sheet	TDS-T04
Package no.	Doc. no.	Rev. 3	Page 1 of 1
DESCRIPTION: Flashing light for PA and Telephone Note: Values in brackets under requirements are recommendation/examples.			
GENERAL: GAS GROUP AND TEMP.CLASS: ZONE CERTIFICATION: DEGREE OF PROTECTION: MATERIAL: PAINTING: COLOUR: MOUNTING: TERMINATION ENCLOSURE CERT.: NUMBER OF CABLE ENTRIES: - TELEPHONE: - PA: CABLE GLAND ENTRY: DIMENSION: WEIGHT: MANUFACTURER: MODEL: P.O. NUMBER: SUPPLIER'S DRAWING/DOCUMENT:	REQUIREMENTS Zone 1 IP 66 EEx e 3 EEx e 3 GREEN YELLOW 56665 360 x 180 hemispherical -10 to +40 (40 to 60) (185 to 265) 40 (50 to 80) YES/NO	UNIT Joule Hz degree °C VDC VAC VDC VAC	MANUFACTURER DATA
EQUIPMENT CHARACTERISTICS: EARTHING: FLASHING ENERGY: FLASHING RATE: COLOUR: - TELEPHONE: - PA: VISUAL COVERAGE: OPERATION TEMP.: HUMIDITY: INTERFACE: POWER CONSUMPTION: - TELEPHONE: - PA: OPERATION VOLTAGE: TRIGGER VOLTAGE: - PA (AT OPER. VOLT. 230 VAC): - TELEPHONE: TRIGGER CURRENT: - TELEPHONE: - PA: START UP CURRENT: NOMINAL CURRENT: GALVANIC SEPARATION			

Annex B
(Informative)
Typical installation drawings

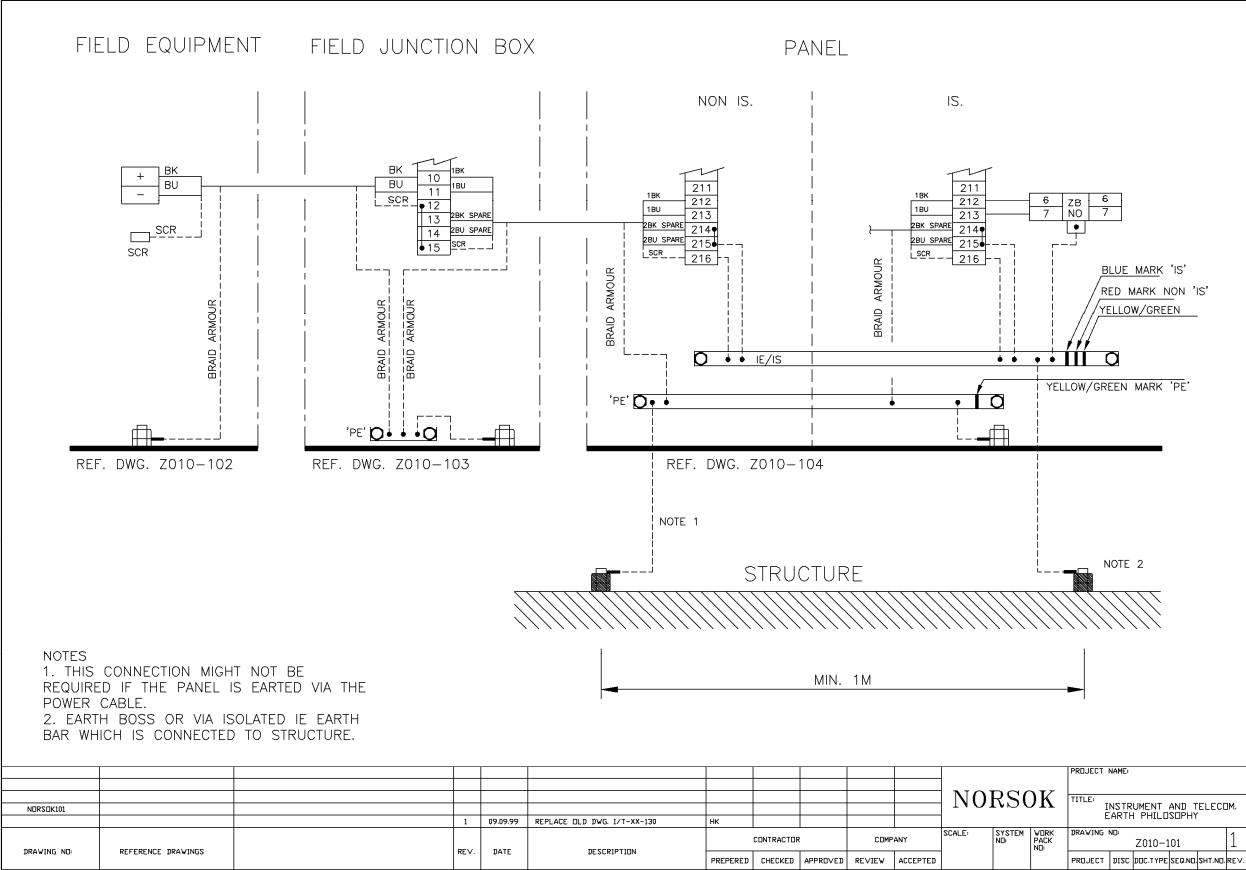


Figure B.1 – Instrument and telecommunication earth







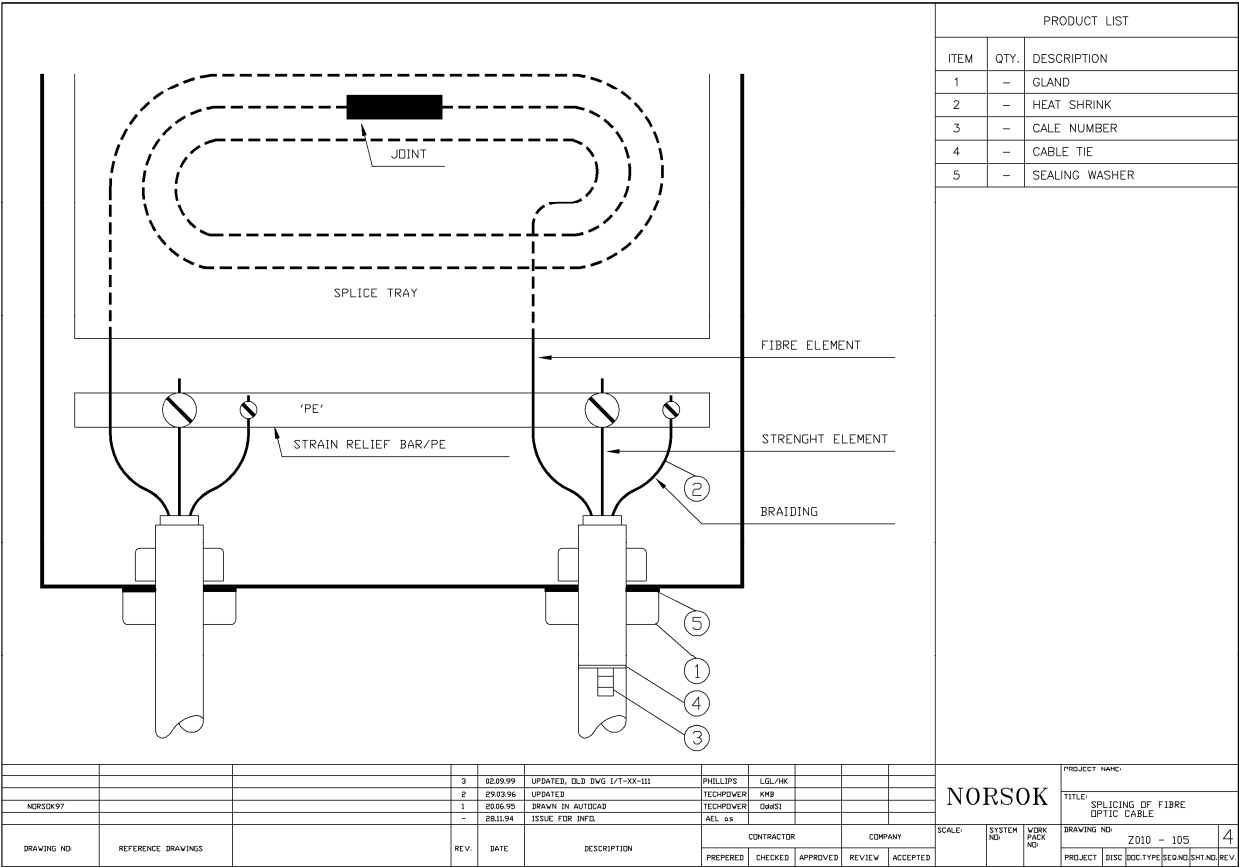


Figure B.5 – Splicing of fiber optic cable

