

NORSOK STANDARD

COMMON REQUIREMENTS
TELECOM SYSTEMS

T-CR-001
Rev. 1, December 1994

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1. FOREWORD

This Design Standard is developed by the NORSOK Standardisation Work Group. Annex A and C are normative. Annex B is informative.

2. SCOPE

This standard describes the basis for design and engineering of telecommunication systems on-board a manned offshore installation.

3. NORMATIVE REFERENCES

The latest edition of the following regulations and standards shall be used for the design of telecommunication systems when applicable:

IEC	-	International Electrotechnical Commission
ISO	-	International Standardisation Organisation
ETSI	-	European Telecommunication Standard Institute
ITU	-	International Telecommunication Union.
BS	-	British Standard
DIN	-	Deutsche Industri Normen
CENELEC	-	European Committee for Electrotechnical Standardisation
NEK	-	Norsk Elektrisk Komite, the national committee working with IEC/CENELEC
CCITT	-	International Telegraph and Telephone Consultative Committee
EN 50081-2	-	Electromagnetic compatibility generic emission standard
EN 50082-2	-	Electromagnetic compatibility generic immunity standard

The regulations listed in Annex A shall be applied when relevant.

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.

4.2 Abbreviations

APS	-	Abandon Platform Shut down
CAS	-	Communal Aerial System
CCR	-	Central Control Room
CCTV	-	Closed Circuit Television
DNMI	-	Det Norske Meteorologiske Institutt
ECC	-	Emergency Control Centre
EMS	-	Environmental Monitoring System
ESD	-	Emergency Shut Down
GMDSS	-	Global Maritime Distress and Safety System
ISDN	-	Integrated Services Digital Network
IMO	-	International Maritime Organization
MDF	-	Main Distribution Frame
NMD	-	Norwegian Maritime Directorate
NPD	-	Norwegian Petroleum Directorate
TELENOR	-	Norwegian Telecommunication Administration
NTRA	-	Norwegian Telecommunications Regulatory Authority
PA	-	Public Address and Alarm
PABX	-	Private Automatic Branch Exchange
SOLAS	-	Safety Of Life At Sea
TER	-	Telecommunication Equipment Room
UPS	-	Uninterruptable power supply

5. TECHNICAL REQUIREMENTS

5.1 General

The telecommunication systems shall:

Provide facilities to support safety and efficient operation. This includes internal communication, telemetry systems, telecommunication networks and external communication to the operational centre onshore, to other installations and systems for marine and air activities.

In an emergency situation it is essential that those telecommunication systems required remain active, provided that their continued operation does not create additional hazards.

5.1.1 Operational requirements

As a minimum, there shall be facilities which enable:

- Persons in control during the 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 Safety systems

In an emergency situation, the following telecommunication systems shall be available and in operation:

- Public Address and Alarm
- UHF Mobile Radio
- PABX (Switched telephone system)
- Mandatory and General Radio
- Communication to shore and other installations
- Drillers intercom in the drilling area

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

- The equipment room with the central equipment and batteries shall be located in the safest area on the installation.
- The room shall be provided with isolation facilities. If gas is detected in the air intake to the room, the room shall be isolated to prevent gas from entering the room.
- The systems shall operate independently in critical situations.
- There shall not be any piping for liquids going through the equipment room.
- Risk for fire in the room shall be minimised.

5.1.3 UPS power requirements

Important telecom equipment shall be DC powered directly from dedicated battery supplies.

Voltage variation to the equipment, measured at the equipment, shall be within the nominal voltage +20% and -10%.

Telecommunication systems not made for DC-powering shall be powered from the platform UPS power system.

5.1.4 Muster stations.

At least two different communication facilities shall be available at the muster stations. The main facilities being the UHF handportable radios and telephones.

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

- Telephone (EX)
- PA access unit

5.2 Network

All network connected systems shall comply with the network structure, principles and services for the relevant installation.

5.2.1 Network availability

The external connections shall be designed according to:

- The evaluation of availability based on duration and frequency of interruptions as well as the number of channels and services being affected. The method specified in CCITT rec. G.821 shall be applied.
The total cost of high availability must be balanced with the consequences of service interruptions.
- No single equipment failure shall cause a total interruption in the communication links for important operational and control functions.

5.2.2 Network synchronization

The established company network synchronization plan shall be followed.

5.3 Telemetry and Remote Control Systems

Relaying of important remote control signals shall utilise fail safe signal transmission systems to ensure safe operations in case of malfunctions (i.e. shut down in conjunction with pipelines, offshore loading, well maintenance rigs).

5.4 Shut down of Telecommunication Systems

Some telecommunication systems shall be kept operational in critical situations.

5.4.1 Field equipment.

Non-EX-certified field equipment shall be shut down by the area shut down commands. In all areas, sufficient EX-certified communication equipment shall be in operation for emergency communication.

5.4.2 Central equipment.

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

The timer circuit shall be manually resettable.

5.4.3 Antennas.

Limitation or shut down of the maximum allowed radiated power in flammable atmospheres of radio signals to the antennas shall be according to requirements in BS 6656, Prevention of inadvertent ignition of flammable atmospheres by radio-frequency radiation.

With respect to disconnection of the antennas, all passive antennas shall be considered as a cable and shall as such not be disconnected if gas is detected in the area.

5.5 Antenna Locations

Antennas shall be located to obtain:

- Optimum RF-reception/transmission
- Minimum exposure to damage from heat generated by mudburners, exhaust or flare booms.
- Protection from damage by operational activities. (i.e. cranes)
- Minimum radio interference between different antennas.
- Personnel safety.

The antennas shall be mounted in safe area. An antenna tower shall be used as the primary location for antennas.

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

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

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

5.6 Other Requirements

5.6.1 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.

5.6.2 Temporary Requirements

Temporary telecom requirements for the construction and hook-up phases shall be met (i.e. PABX, PA, data network and radio communication).

5.6.3 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.

6. COMMUNICATION SYSTEMS

6.1 Internal

Systems for internal communications includes:

6.1.1 Public address and alarm system (PA)

The system shall distribute audio alarms, visual alarms and emergency messages, and shall be interfaced to the Fire & Gas system for alarm input.

The PA system shall also be used for general announcements.

No single failure in equipment or cables, nor any single external event, shall cause more than 3 dB reduction of PA sound level in any area.

A separate battery supply shall provide DC power for the PA system.

6.1.2 PABX

The PABX system shall provide internal and external switched telephone services.

The PABX shall be integrated in the telephone network with services and facilities as defined for the network.

Access to the public telecommunication network shall be via the PABX at the onshore operational centre.

6.1.3 Office data network

A Local Area Network (LAN) shall be installed to link all data terminals, personal computers, workstations, servers and computers together. The LAN shall be interfaced and connected to the company Wide Area Network (WAN).

6.1.4 UHF mobile radio and paging system

The UHF mobile radio shall provide internal radio communication between fixed locations and handportable radios.

The system shall have duplex talk through frequency channels and 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 UHF radio system shall include a pager system accessible via the telephone system.

6.1.5 Driller's intercom

On installations with drilling facilities a Driller's Intercom System shall be provided.

The system shall be confined to areas related to the drilling operations, and shall provide means of communication between drilling operation locations.

6.2 External

Systems for external communications includes:

6.2.1 Mandatory and general radio systems

Radio equipment according to mandatory regulations shall be installed.

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.

6.2.2 Main communication to shore/other platforms

Permanent communication links to the onshore operational centre shall be provided, either directly or via other installations. Applicable systems:

- Radio link
- Satellite link
- Fibre optical cables.
- Inmarsat satellite stations may be used for backup.

6.2.3 *Ships radio network*

In areas where ships have limited communication facilities to the onshore public network, one of the following additional facilities should be installed:

- Local installation of coastal VHF and/or mobile telephone base stations connected to the onshore public network.
- A trunked radio base system to give dedicated ships in the area access to the platform PABX.

6.3 *Additional Systems*

Additional systems may include:

6.3.1 *Closed Circuit Television (CCTV)*

A CCTV system can be used for surveillance of selected areas and operations.

6.3.2 *Audio and video entertainment*

The Entertainment System shall provide live broadcast as well as recorded radio and television programmes and distribute them on a communal aerial system (CAS) to relevant areas as; cabins, offices, workshops and public areas in the Living Quarter.

The inputs to the system can be received broadcast from terrestrial networks, satellite and various local sources.

6.3.3 *Multiplexer*

To enable effective and flexible usage of available bandwidth on external connections, a multiplexer system shall be provided.

6.3.4 *Radar*

A Maritime Surveillance Radar shall be installed if required by operations.

6.3.5 *Meteorological observation*

This system shall provide information on current weather and sea conditions for both helicopter and maritime traffic and for operational requirements. The system shall be able to produce and transmit regular reports to The National Meteorological Institute in accordance with authority regulations.

6.3.6 *Real time clock*

The Real time Clock system may be required for uniform timekeeping and for clocking of the telecommunication network system. It shall be based on received radio or satellite signals (i.e. GPS).

6.3.7 *Telecommunication Surveillance System (TSS)*

For telecommunication installations, there shall be a central system for presentation of alarms to operators (i.e. the CCR operator). For installation with no specialists on telecommunication, remote diagnostics shall also be possible.

All telecommunication equipment shall have alarm output via a suitable interface compatible with the central system for alarm collection.

6.3.8 Main distribution frames

Distribution Frames shall be used for cross connection of signal wires between central equipment and field equipment. Knife edge or other quick connection terminal blocks shall be used wherever possible.

6.3.9 Navigation and positioning

Non Directional Beacon (NDB) and Distance Measuring Equipment (DME) may be required for helicopter traffic.

Other positioning systems (i.e. SYLEDIS, Artemis, diff. GPS) will normally be required. Future installation of such equipment shall be prepared for by reservation of locations and by installation of required utilities to those locations (i.e. power, signal cables, instrument air).

7. STANDARDISATION

All interfaces and signalling between telecommunication systems shall comply with current international or industry standards if available.

The following additional standards shall be used:

7.1 Telemetry for Shuttle Tankers

The telemetry and voice communication system for the shuttle tankers shall be according to current standard as used on the shuttle tanker fleet.

7.2 Meteorological Reporting to DNMI or Other Authorities

The reporting of meteorological data shall be according to agreed common standards in content and format as stated by DNMI.

7.3 PA System

The operators panel shall be according to NORSOK design (T-SR-001) in main lay-out and functions. The number of zones may however be different.

7.4 Loudspeakers

Functional parameters and data for loudspeakers shall be measured and provided as stated in Annex A.

8. TELECOMMUNICATION EQUIPMENT LOCATIONS

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

8.1 Telecom Equipment Room

The Telecom Equipment Room should accommodate most of the telecom central equipment.

Doors on the equipment racks shall not be locked by key.

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

8.2 Batteries for Telecommunication

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

Distribution panels shall be installed in the related equipment rooms.

The rectifiers shall have alarm output to a central supervisory system when the battery charging stops unintentionally.

The battery capacity for important safety systems should be:

- Min. 2 hours for the PA system.
- Min 3 hours for the PABX and radio systems (Mandatory radio according to stated requirements).

8.3 Transmitter Room

High power radio transmitters, radar transmitters or other equipment requiring short antenna cables shall be located in a separate room near the antennas (antenna-tower).

8.4 Antenna Tower

An Antenna Tower shall be provided on top of the installation for antennas for VHF and UHF mobile radio systems, Radio Links, Radar, etc.

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

8.5 Helitower

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

Fixed and handportable radios for aeronautical and maritime VHF radio,
Radio or control unit for UHF system,
Access to meteorological observation data (terminal or display),

8.6 Dispatcher's Office

The dispatcher function will require the following equipment:

- PA access unit,
- UHF Radio.

8.7 Central Control Room

The CCR operator shall be able to communicate to operators anywhere on the installation, to ships, to other installations and to shore. The following systems shall be available in the Central Control Room (CCR):

- Mandatory radio (GMDSS) and additional maritime VHF radio if required,
- PA 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),
- Air traffic VHF

8.8 Emergency Control Function

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 for handling personnel evacuation).

8.9 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 in the helitower or in the dispatcher's office.

8.10 Drilling Control Room

In the Drilling Control Room there shall be facilities for communication to drilling related locations and CCR. The room shall have:

- PA access unit,
- UHF Radios and/or control units,
- Driller's intercom unit,
- CCTV control unit and monitor.

8.11 Cranes

The crane operators shall be able to communicate with the CCR, ships and operators on deck.

Maritime VHF and UHF MOBILE RADIO shall be located in the cranes.

ANNEX A
**PARAMETERS FOR QUALIFICATION
OF LOUDSPEAKERS**
(Normative)

ANNEX A PARAMETERS FOR QUALIFICATION OF LOUDSPEAKERS

The frequency dependant data shall be measured and given in one-octave bands where the response in the band is averaged within the band.

All values to be measured 1 m from the loudspeaker on the central axis. Values (except the RASTI measurements) to be given in dB relative to 20 uPA.

All tests shall be done with transformer for 100 V line with the tapping set to max. power.

Pink noise filtered (or sinus wave where specified) within the band shall be used as input signal.

Required Data:

For each octave band centred at 125, 250, 500, 1000, 2000, 4000, 8000 Hz, the following data shall be given:

- 1 Sound Power Level (SPL) with 1 Volt input:
- 2 Max. SPL with 100 Volt
- 3 Input electrical current necessary to produce Max. SPL.

Distortion at max. SPL for a sinus signal at: 500, 1000 and 2000 Hz. (%)

Max. allowed SPL without causing permant damage to the loudspeaker. (This value should be higher than the Max. SPL with 100 Volt input).

Performance test with RASTI values.

Survival test procedures:

The speaker shall survive a test in accordance to DIN 45 573 with modified test signal. The test signal shall be white noise filtered according to the filter design below and applied directly to the loudspeaker coil. The test shall be performed with an intermittent signal, (1 minute on - 2 minutes off) in 100 hours. (The required input signal in current and voltage shall be given.)

Performance test with RASTI:

The loudspeaker's ability to distribute understandable signals shall be tested under free field conditions (anechoic) using a RASTI procedure.

A background noise signal shall be presented from a separate loudspeaker adjacent to the test loudspeaker. The background input signal shall be pink noise, and the noise level measured by the RASTI microphone shall be: 80, 90, 100, (Max. SPL -10) dBA respectively.

For each of the four noise levels three RASTI measurements shall be performed using a RASTI signal level of 0 dB, +3dB, and +10dB relative to the background noise level.

Filter for test signal used for the survival test

Filter for test signal

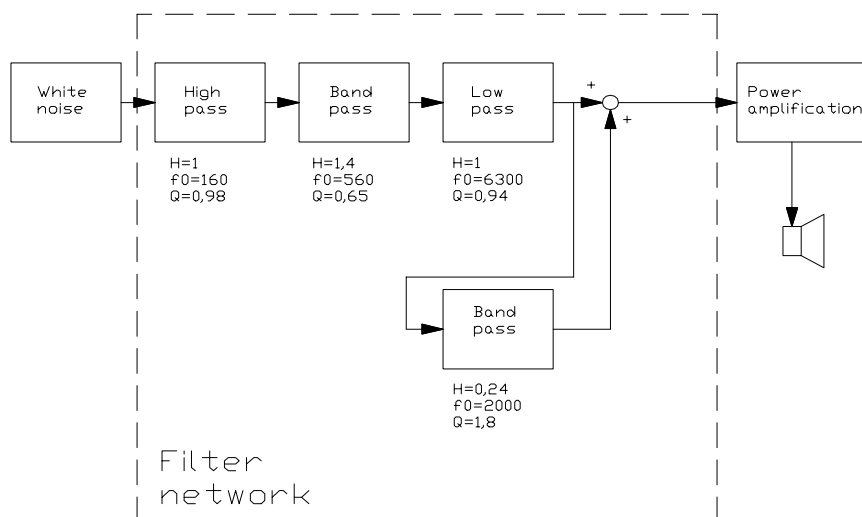
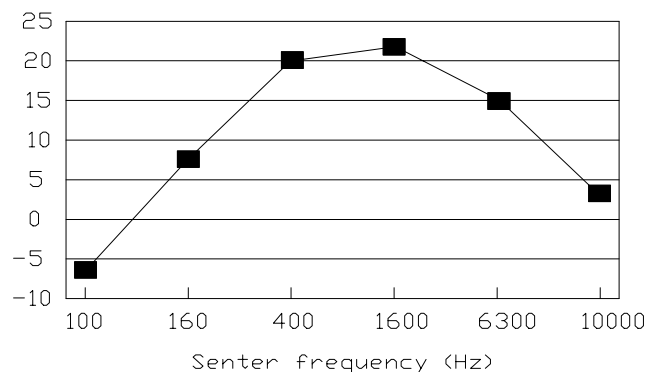


Diagram for filter to be used as standard test signals for the survival test. The amplification "H" at resonance in the band pass filter are referred to a asymptotic break point.

(Not the maximum response)

All filters are of the 2d order.

Standard Test Signal for survival test.
1/3 octave level (dB/1volt rms)

ANNEX B
INFORMATIVE REFERENCES
(Informative)

ANNEX B INFORMATIVE REFERENCES

The latest edition of the following regulations shall be used for the design of telecommunication systems when applicable:

- | | | |
|---------|---|--|
| TELENOR | - | Guidelines for the installation of GMDSS radio equipment on-board ships and offshore units |
| NTRA | - | Regulations for design, construction, and operation of Communal Aerial Systems (CAS) for distribution of broadcasted signals |
| DNMI | - | Meteorological Observations at Oil Fields Offshore |
| ET | - | ("Elektrisitets Tilsynet")
"Forskrifter for elektrisk anlegg, Maritime installasjoner |
| NMD | - | "Forskrift om installasjon og bruk av radioutstyr på flyttbare innretninger" |

ANNEX C
DATA SHEETS FOR FIELD EQUIPMENT
(Normative)

ANNEX C DATA SHEETS FOR FIELD EQUIPMENT

Data sheets:

- 1 EX Telephone
- 2 Office Telephone
- 3 EX Loudspeaker, outdoor
- 4 EX Loudspeaker, indoor and non-EX
- 5 Outdoor telephone hood
- 6 Telephone flashing light
- 7 PA & Alarm flashing light
- 8 Antenna tower
- 9 Equipment consoles

NORSOK T-CR-001 Rev. 1, Dec. 1994	TELECOMMUNICATION EX TELEPHONE DATA SHEET	Made by	
		Checked by	
		Date	
		Data sheet	TDS-T01

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DESCRIPTION: Ex 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: DEGREE OF PROTECTION (IEC 529): MATERIAL: COLOUR: MOUNTING: TERMINATION ENCLOSURE CERT.: CABLE GLAND ENTRY: DIMENSION: WEIGHT: MANUFACTURER: MODEL: P.O. NUMBER: SUPPLIERS DRAWING/DOCUMENT:	Zone 1 IP 54 EXe (M20)		
EQUIPMENT CHARACTERISTICS: EARTHING: CALL SIGNAL TYPE: DIAL TYPE: SIGNAL TYPE: ON-HOOK: VOLTAGE: CURRENT: OFF-HOOK: VOLTAGE: CURRENT: MIN. RINGING VOLTAGE DETECTION: RINGING FREQUENCY: RINGING SIGNAL SPL (at 1m): HANDSET CORD/LENGTH: OPERATION TEMP.: HUMIDITY:	 (Shrill warble tone) (keypad) (DTMF or decadic) (-48) (22) (-48) (min. 20) (40) (2-2.8) (8hz sweep rate) (78) (Coiled cord, 1m) -10 to +40	 Vdc µA Vdc mA Vac KHz dBA °C	
INTERFACE: FLASHLIGHT TRIGGERING: GALVANIC SEPARATION: TRIGG LEVEL OUTPUT:	 yes/no (optocoupler)		

NORSOK T-CR-001 Rev. 1, Dec. 1994	TELECOMMUNICATION OFFICE TELEPHONE DATA SHEET	Made by	
		Checked by	
		Date	
		Data sheet	TDS-T02

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DESCRIPTION: Telephones for indoor use. The telephones shall be approved by NTRA. The telephone shall be desk top and/or wall mounted type. Note: Values in brackets under requirements are recommendations/examples.			
GENERAL:	REQUIREMENTS	UNIT	MANUFACTURER DATA
DEGREE OF PROTECTION (IEC 529):	IP 21		
MATERIAL:			
COLOUR:			
MOUNTING:			
DIMENSION:			
WEIGHT:			
MANUFACTURER:			
MODEL:			
P.O. NUMBER:			
SUPPLIERS 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:	(-48)	Vdc	
CURRENT:	(22)	µA	
OFF-HOOK:			
VOLTAGE:	(-48)	Vdc	
CURRENT:	(min. 20)	mA	
MIN. RINGING VOLTAGE DETECTION:	(40)	Vac	
RINGING FREQUENCY:	(2-2.8) (8hz sweep rate)	KHz	
RINGING SIGNAL SPL (at 1m):	(78)	dBA	
HANDSET CORD/LENGTH:	(Coiled cord, 1m)		
CONNECTION:	ISDN plug, pin 4 and 5 for telephone		
OPERATION TEMP.:	-10 to +40	°C	
HUMIDITY:			

NORSOK T-CR-001 Rev. 1, Dec. 1994	TELECOMMUNICATION OUTDOOR TELEPHONE HOOD DATA SHEET	Made by	
		Checked by	
		Date	
		Data sheet	TDS-T05

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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: SUPPLIERS DRAWING/DOCUMENT:	(Non-corrosive) (Orange) Wallmounted		
EQUIPMENT CHARACTERISTICS MIN. NOISE REDUCTION (0.5-5 kHz): SHELF: MINIMUM INNER SPACE: INSTRUMENT FIXING METHOD:	 10 Yes Height - 0.8 m Width - 0.6 m (Fixing plate)	 dB	

NORSOK T-CR-001 Rev. 1, Dec. 1994	TELECOMMUNICATION EQUIPMENT CONSOLES DATA SHEET	Made by	
		Checked by	
		Date	
		Data sheet	TDS-T09

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DESCRIPTION: Console for the installation of radios and other telecommunication equipment. The layout and location of equipment in the console shall pay attention to the ergometric layout to achieve an efficient operation of the equipment. Note: Values in brackets under requirements are recommendations/examples.			
GENERAL:	REQUIREMENTS	UNIT	MANUFACTURER DATA
DEGREE OF PROTECTION (IEC 529): MATERIAL: COLOUR: MOUNTING: DIMENSION: WEIGHT: MANUFACTURER: MODEL: P.O. NUMBER: SUPPLIERS DRAWING/DOCUMENT:	IP 20		
	Bolted		
EQUIPMENT CHARACTERISTICS			
EARTHING:			
ACCESS:			
BAY/SECTION SIZE:	19	Inches	
CABLE ENTRIES:	(Bottom)		
VENTILATION:	(Natural)		
TRANSPORT:	(Removable lifting lugs)		
EQUIPMENT MOUNTING:	(Sliding brackets)		
HEIGHT OF DESK:	(750)	mm	
LIGHTING:			
POWER OUTLETS:			
BONDING:			