

Telecom subsystems

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Foreword	4
Introduction	4
1 Scope	5
2 Normative and informative references	5
3 Terms, definitions and abbreviations	6
3.1 Definitions	6
3.2 Abbreviations	7
4 General functional requirements	8
4.1 General	8
4.2 Products/services	8
4.3 Equipment/schematic	8
4.4 Performance	8
4.5 Reliability	8
4.6 Process/ambient conditions	8
4.7 Operational requirements	8
4.8 Maintenance requirements	9
4.9 Isolation and sectioning	9
4.10 Layout requirements	9
4.11 Interface requirements	9
4.12 Commissioning requirements	9
5 SYSTEM 11 - Public address and alarm (PA)	9
5.1 General	9
5.2 Equipment/schematic	10
5.3 Performance	10
5.4 Regularity	11
5.5 Operational requirements	11
5.6 Maintenance requirements	12
5.7 Isolation and sectioning	13
5.8 Layout requirements	13
5.9 Interface requirements	13
5.10 Commissioning requirements	13
6 SYSTEM 12 - Driller's intercom	14
6.1 General	14
6.2 Equipment/schematic	14
6.3 Performance	14
6.4 Availability	14
6.5 Operational requirements	14
6.6 Maintenance requirements	15
6.7 Isolation and sectioning	15
6.8 Layout requirements	15
7 SYSTEM 24 - Office data and telephone cabling network	15
7.1 General	15
7.2 Product and services	15
7.3 Equipment/schematic	16
7.4 Performance	16
7.5 Reliability	17
7.6 Operational requirements	17
7.7 Isolation and sectioning	17
7.8 Layout requirements	17
8 SYSTEM 41 - General radio system	17
8.1 General	17
8.2 Equipment/schematic	18
8.3 Type approval	19
8.4 Reliability	19
8.5 Process/ambient conditions	19
8.6 Operational requirements	19

8.7	Maintenance requirements	19
8.8	Layout requirements	19
8.9	Interface requirements	20
8.10	Commissioning requirements	20
9	SYSTEM 42 - UHF radio and paging	20
9.1	General	20
9.2	Equipment/schematic	21
9.3	Performance	21
9.4	Reliability for the central equipment	22
9.5	Operational requirements	22
9.6	Maintenance requirements	23
9.7	Layout requirements	23
9.8	Interface requirements	23
9.9	Commissioning requirements	24
10	SYSTEM 43 - Audio and video entertainment	24
10.1	General	24
10.2	Products and services	24
10.3	Equipment/schematic	24
10.4	Performance	25
10.5	Interface requirements	25
11	SYSTEM 51 - Closed circuit television (CCTV)	25
11.1	General	25
11.2	Equipment/schematic	26
11.3	Performance	26
11.4	Regularity	27
11.5	Operational requirements	27
11.6	Maintenance requirements	27
11.7	Isolation and sectioning	27
11.8	Interface requirements	27
11.9	Commissioning requirements	28
12	SYSTEM 52 - Meteorological observation	28
12.1	General	28
12.2	Products/services	28
12.3	Equipment/schematic	29
12.4	Performance	29
12.5	Reliability	29
12.6	Process/ambient conditions	29
12.7	Operational requirements	29
12.8	Maintenance requirements	30
12.9	Isolation and sectioning	30
12.10	Layout requirements	30
12.11	Interface requirements	31
12.12	Commissioning requirements	31
13	SYSTEM 53 - Marine radar	31
13.1	General	31
13.2	Products/services	31
13.3	Equipment/schematic	32
13.4	Performance	32
13.5	Availability	32
13.6	Process/ambient conditions	32
13.7	Operational requirements	33
13.8	Maintenance requirements	33
13.9	Interface requirements	33
13.10	Commissioning requirements	33
14	SYSTEM 81 - Main distribution frame (MDF)	33
14.1	General	33
14.2	Equipment/schematic	34
14.3	Performance	34
14.4	Operational requirements for alarms	35

14.5	Layout requirements	35
14.6	Interface requirement	35
15	SYSTEM 82 - Telecom power supply	35
15.1	General	35
15.2	Products/services	35
15.3	Equipment/schematic	36
15.4	Performance	36
15.5	Availability	37
15.6	Process/ambient conditions	37
15.7	Operational requirements	38
15.8	Maintenance requirements	38
15.9	Interface requirements	38
15.10	Commissioning requirements	38
16	SYSTEM 83 - Real time clock (RTC)	38
16.1	General	38
16.2	Equipment/schematic	39
16.3	Performance	39
16.4	Reliability	39
16.5	Process/ambient conditions	39
16.6	Operational requirements	39
16.7	Maintenance requirements	40
16.8	Interface requirements	40
16.9	Commissioning requirements	40
17	SYSTEM 84 – Telecommunication monitoring system (TMS)	40
17.1	General	40
17.2	System overview	40
17.3	Equipment/schematic	41
17.4	Reliability	41
17.5	Process/ambient conditions	41
17.6	Operational requirements	41
17.7	Maintenance requirements	42
17.8	Interface requirements	43
17.9	Telecommunication monitoring system (TMS) workstation requirements	43
17.10	Telecommunication interface unit (TIU) requirements	43
18	Commissioning requirements	43
	Annex A (normative) Detailed operation of the public address alarm (PA) system	44
	Annex B (informative) Typical layout of public address and alarm (PA) system operator's panels	46
	Annex C (informative) System 24 – Office data and telephone cabling network	47
	Annex D (normative) System 41 - Mandatory radio (GMDSS) and general radio	48

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 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) and Federation of Norwegian Manufacturing Industries (TBL).

NORSOK standards are administered and published by Standards Norway.

Annex A forms a normative part of this NORSOK standard. Annex B, Annex C and Annex D are for information only.

Introduction

The main objective of this NORSOK standard is to contribute to an optimum and cost effective design of telecommunication subsystem based on experience and general practice in the industry.

Revision 3 of this NORSOK standard has undergone an editorial change from revision 2, to make it consistent with the general requirements of NORSOK standards. Further the most significant changes are that international standards (e.g. European Standards) are the base for many of the system standards.

The telecommunication subsystems given subsystem number, but no revision status, are usually specified by company.

System 24 - Office data and telephone cabling network conforms to NEK EN 50173-1.

System 41 – General radio is updated and an informative equipment list is included in Annex D.

System 43 – Audio and video entertainment has been changed to conform to NEK EN 50083-7.

System 51 – Closed circuit television has been changed to cater for digital systems, e.g. MPEG-2, see 11.3.2.

System 52 - Meteorological system has been upgraded and brought in conformance with NORSOK N-002.

System 53 – Marine radar has been revised and shortened.

System 83 – RTC interface is upgraded and the interface changed to NMEA standard.

1 Scope

This NORSOK standard covers the systems given revision status in the table below.

Subsystem	Title	Revision status
86-00	General	Rev 03 of June 2003
86-11	PA	Rev 03 of June 2003
86-12	Driller's intercom	Rev 03 of June 2003
86-21	PABX	
86-22	Multiplexer	
86-24	Office data and telephone cabling network	Rev 03 of June 2003
86-25	Platform intercom	
86-31	Radio links	
86-35	Satellite links	
86-37	Private radio networks	
86-38	Cable links	
86-39	Fibre optic links	
86-41	General radio	Rev 03 of June 2003
86-42	UHF radio and paging	Rev 03 of June 2003
86-43	Audio and video entertainment	Rev 03 of June 2003
86-51	CCTV	Rev 03 of June 2003
86-52	Meteorological observation	Rev 03 of June 2003
86-53	Marine radar	Rev 03 of June 2003
86-54	Aviation radar	
86-55	Communication recorder	
86-56	Loudspeaker surveillance	Rev 03 of June 2003
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	MDF	Rev 03 of June 2003
86-82	Telecom power supply	Rev 03 of June 2003
86-83	RTC	Rev 03 of June 2003
86-84	Telecommunication monitoring system	Rev 03 of June 2003

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 or exceed the requirements and guidelines of the standards referenced below.

IEEE 802,	<i>Information technology - Telecommunication & Information Exchange Between Systems – LAN/MAN – Specific Requirements – (all parts).</i>
IEEE 802.3,	<i>Information technology - Telecommunication & Information Exchange Between Systems – LAN/MAN – Specific Requirements – Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications.</i>
NORSOK N-002,	<i>Collection of metocean data.</i>

NORSOK T-001,	<i>Telecom systems.</i>
NEK EN 50173-1,	<i>Information Technology - Generic cabling systems.</i>
NEK EN 55022,	<i>Limits and methods of measurement of radio disturbance characteristics of information technology equipment.</i>
NEK EN 50083-7,	<i>Cable distribution systems for television and sound signals – Part 7: System functionality.</i>
NS-ISO 8877,	<i>Information technology - Telecommunications and information exchange between systems interface connector and contact assignments for ISDN Basic Access Interface located at reference points S and T.</i>
ETSI TR 101 154,	<i>ITC Community Digital Standard and Rules of Operation for Digital Terrestrial Television.</i>
ANSI S 3.5:1969,	<i>Methods for the calculation of the articulation index.</i>
ISO/TR 3352:1974,	<i>Acoustics – Assessment of noise with respect to its effect on the intelligibility of speech.</i>
NEK 606,	<i>Cables for offshore installations, halogen-free or mud resistant.</i>
RS 232,	<i>Interface Between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange.</i>
RS 422,	<i>Electrical Characteristics of Balanced Voltage Digital Interface Circuits.</i>
RS 423,	<i>Electrical Characteristics of Unbalanced Voltage Digital Interface Circuits.</i>
RS 485,	<i>Electrical Characteristics of Generators or Receivers.</i>

3 Terms, definitions and abbreviations

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

3.1 Definitions

3.1.1

can

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

3.1.2

category

specification for cables defined in NEK EN 50173-1

3.1.3

duplex channel

dual frequency talk-through channel

3.1.4

link class

link classification defined in NEK EN 50173-1

3.1.5

may

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

3.1.6

shall

verbal form used to indicate requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted, unless accepted by all involved parties

3.1.7

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

3.1.8

simplex channel

single frequency direct channel

3.1.9**company**

contractual responsible company

3.2 Abbreviations

AFTN	aeronautical fixed telecommunications network
AGC	automatic gain control
ALC	automatic level control
AM	amplitude modulation
ANSI	American National standards Institute
ATIS	automatic terminal information service
CCITT	Consultative Committee on International Telephone & Telegraph
CCR	central control room
CCTV	closed circuit television
CENELEC	European Committee for Electrotechnical Standardisation
DC	direct current
DNMI	Det Norske Meteorologiske Institutt
DSC	digital selective calling
E&M	telephone channel signaling interface
EN	European Standard
ETSI	European Telecommunication Standard Institute
ESD	emergency shut down
F&G	fire and gas
FM	frequency modulation
GMDSS	global maritime distress and safety system
HF	high frequency
IEC	International Electrotechnical Commission
IEEE	Institute for Electrical and Electronic Engineers
IDC	insulation displacement contact
IRE	Institute of Radio Engineers
ISO	International Organization for Standardization
LAN	local area network
MDF	main distribution frame
MF	medium frequency
MTBF	mean time between failure
MTTR	mean time to repair
MPEG	moving picture expert group
MRU	motion reference unit
NATAM	Norwegian Air Traffic and Airport Management (Luftfartsverket)
NAVTEX	Navigational and Meteorological Warning Broadcasting Service
NCAA	Norwegian Civil Aviation Authority
NDB	non-directional beacon
NEK	Norsk Elektroteknisk Komite
NMEA	National Marine Electronics Association
NPD	Norwegian Petroleum Directorate
OLF	Oljeindustriens Landsforbund
PA	public address and alarm
PABX	private automatic branch exchange
PAL	phase alternating line
PC	personal computer
PMS	platform monitoring system
PTT	push to talk
RASTI	rapid speech transmission index
RMS	root mean square
RTC	real time clock
RF	radio frequency
RS	recommended standard
SINAD	signal-plus-noise-plus-distortion to noise-plus-distortion ratio
SOLAS	safety of life at sea
STI	speech transmission index

TBL	Teknologibedriftenes Landsforening
TCP/IP	transmission control protocol/internet protocol
TIU	telecommunication interface unit
TMS	telecommunication monitoring system
TV	television
UHF	ultra high frequency
UPS	uninterruptable power supply
UTC	coordinated universal time
VAC	volt alternating current
VDC	volt direct current
VHF	very high frequency
VU	volume unit
WAN	wide area network

4 General functional requirements

4.1 General

The functional requirements in this clause are common to all subsystems, in addition to what is described for each subsystem.

4.2 Products/services

See individual subsystems.

4.3 Equipment/schematic

See individual subsystems.

4.4 Performance

See individual subsystems.

4.5 Reliability

Reliability values stated below in this section are generally valid but are overruled by reliability values stated for individual subsystems. If 'availability' is stated for a subsystem, that value replaces the MTBF and MTTR values stated in this clause.

Figures for MTBF and MTTR are minimum and maximum values respectively.

Central equipment:

MTBF	20 000 h	(minimum value)
MTTR	1 h	(maximum value)

Field equipment:

MTBF	40 000 h	(minimum value)
MTTR	2 h	(maximum value)

4.6 Process/ambient conditions

Equipment shall be designed to operate at environmental conditions according to project requirements.

4.7 Operational requirements

4.7.1 General

The equipment forming these subsystems shall be arranged for easy, safe and reliable operation. Equipment control panels should have text in the operator's national language, or unambiguous symbolic marking, explaining the operation of all controls.

4.7.2 Subsystems

See individual subsystems.

4.8 Maintenance requirements

Design shall allow for maintenance of equipment, or parts of equipment, quickly and with minimum disruption of service.

4.9 Isolation and sectioning

Some subsystems will lose mains power or DC power in a shutdown situation. Other subsystems may need the inclusion of shutdown relays or contactors. See clauses for individual subsystems for details.

4.10 Layout requirements

See individual subsystems.

4.11 Interface requirements

4.11.1 General

Standard interfaces should be used between equipment and between sub-systems and systems.

Preferred data standards:

V.11 (RS 422)

V.24/V.28 (RS 232) for short distances, i.e. in the same room.

V.35

G.703

4.11.2 Alarms

Major subsystem alarms ON/OFF outputs.

Voltage and earth free changeover relay contacts in equipment

Comprehensive alarms If used, comprehensive alarms shall comply with this NORSOK standard,.

4.12 Commissioning requirements

Design shall allow for testing and commissioning of subsystems and individual equipment with minimum disruption of normal operation.

5 SYSTEM 11 - Public address and alarm (PA)

5.1 General

This clause defines the requirements for the PA system on offshore production installations.

The PA system shall distribute alarm tones, emergency messages and routine messages to all or selected areas of the installation. In areas with a high acoustical noise level alarm tones and emergency messages shall be complemented by yellow flashing lights.

5.2 Equipment/schematic

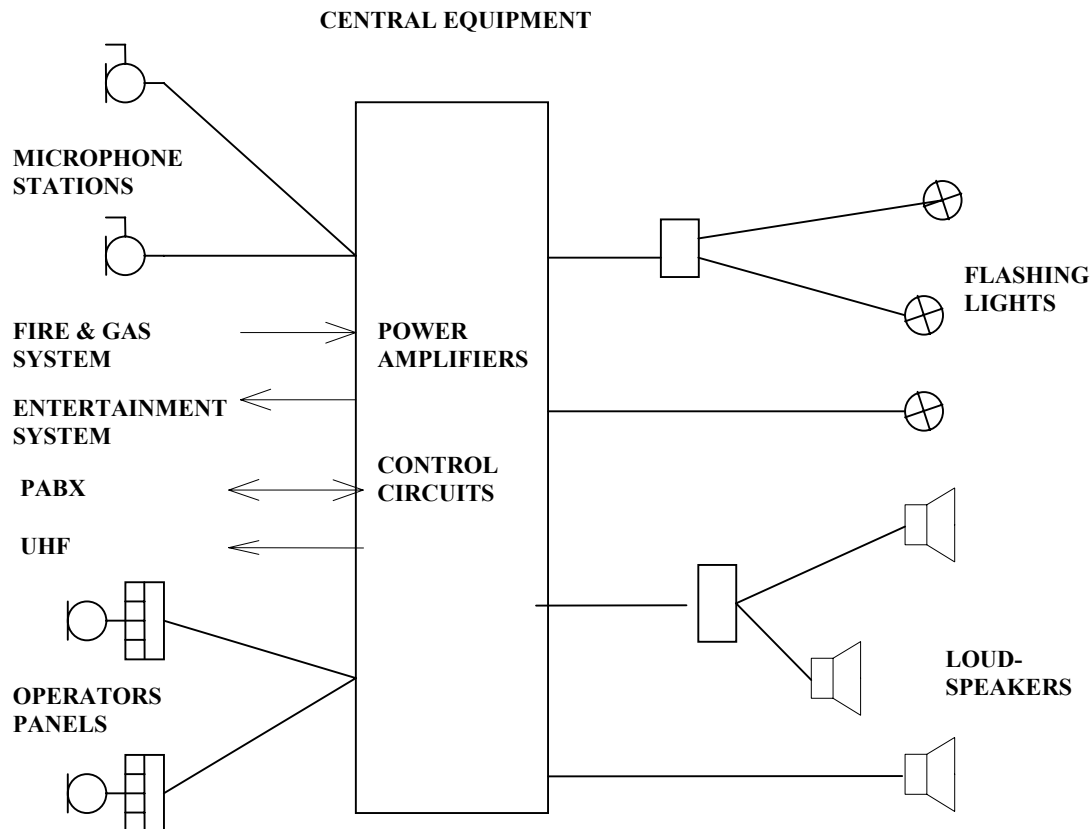


Figure 1 - PA system

5.3 Performance

5.3.1 Speech signal conditions

Frequency response: 300 Hz to 7 000 Hz with adjustable frequency shaping.

ALC: Slow time constant, adjustable threshold level.

Dynamic range compression: Quick time constant syllabic compressor, adjustable threshold level, to boost average speech power to at least 50 % of peak speech power.

5.3.2 Alarm tone signals

'Muster alarm': Uninterrupted tone with sweeping sinusoidal frequency from 1200 Hz to 500 Hz with sweep period 1 s.

'General alarm': Sinusoidal tone 1 000 Hz, 1 s on, 1 s off.

'Toxic gas alarm': (Only if this alarm is applicable): Sinusoidal tone 1 000 Hz, 0,1 s on, 0,1 s off, in bursts of duration 1 second, alternating with 1 s silence.

5.3.3 Attention signals

Emergency message: Combined signal of 450 Hz and 1 000 Hz unfiltered square wave tones of 1 s duration (gong) to precede speech messages.

Normal message: Sequenced signal of 554 Hz and 440 Hz sinusoidal tones of 1 s duration (ding-dong) to precede speech messages.

5.3.4 Loudspeaker test signal

Test tone: Low level audio signal for testing of loudspeakers.

5.3.5 Amplifier output

Output voltage limit: The output voltage shall not exceed a level that may cause short term or long term damage to loudspeakers.

Output idle noise: At standby the A-weighted noise voltage across any loudspeaker shall be at least 70 dB below the nominal line voltage.

5.3.6 Audio coverage with the system in normal operation

Method of calculation: Predicted articulation index for speech according to ANSI S 3.5:1969 and ISO/TR 3352:1974.

Speech in low noise areas: RASTI/STI=0,7, applicable in recreation areas, offices, and similar.

Speech in high noise areas: RASTI/STI=0,35, applicable in noisy areas with up to 85dBA noise level. Speech in very high noise areas. For areas with noise level of 86 dBA or more, the system design shall be as if the main noise sources are shut off.

Alarm tones: The input level from the tone generator shall be adjusted such that full power is used for the alarm tones (near 100 V to the loudspeakers). Audio levels in cabins should be approximately 75 dB

5.3.7 Flashing lights

Actual areas: In areas with background noise level of 86 dBA or more, alarm signals and emergency messages shall be complemented by flashing yellow lights.

5.4 Regularity

5.4.1 Overall design

Design shall be such that no single failure in systems, equipment or cabling networks nor any single external event shall cause significant reduction of audio coverage in any area (see 5.3.6). A failure in a microphone station, an operator's panel, or an interface for the PABX may leave that particular part of the system inoperable.

5.4.2 System reliability

MTBF for central equipment at normal supply voltage, temperature and humidity: 25 000 h with 5 % full power output and 95 % standby.

5.5 Operational requirements

5.5.1 Acoustical feedback

Microphones: Means shall be provided to counteract acoustical feedback from operator's microphones and microphone stations.

Telephones: A record/replay facility shall be included to avoid acoustical feedback when telephones are used to access the system.

5.5.2 Muting

Alarm tones: Alarm tones shall be fully muted for the duration of speech messages.

Entertainment system: When alarms and 'Emergency Message' voice messages are broadcast, the PA system shall transfer a muting signal to the entertainment system (to silence all entertainment audio).

5.5.3 Priorities

Priority programming:	The relative priority for the following items shall be easily programmable with full flexibility: • Alarm types (input sources). • Speech modes (alarm and message types).
Cancelling:	Cancelling of a set alarm shall be possible from any alarm access panel, regardless of where the alarm was initiated. This also applies to alarms set by the F&G system.

5.5.4 Private automatic branch exchange (PABX) interface

Acknowledge:	When calling into the PA system via the PABX the user shall receive an acknowledge signal before the speech path is made available. • F&G interface The PA zone and alarm will be activated with its active signal from the F&G system and will be deactivated when the F&G system is back to normal.
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5.5.5 Operator's panel

Microphone:	Goose neck, near field, noise cancelling, insensitive to electromagnetic fields (see electromagnetic compatibility requirements). Optional: Socket for hand-held microphone with PTT button.
Push buttons:	Alarm buttons. • Emergency message button. • Cancel alarm button. • Talk button. • Zone buttons. • Lamp test button.
Push button operation:	Mechanically non-latching.
Visual indication:	Integrated in each push button or by light emitting diodes clearly related to each button.
Other facilities:	Speech level indicator (VU meter).

5.5.6 Operator's panel for speech only

Items included:	Microphone, as described above • Talk button • Zone buttons • Speech level indicator (VU meter) • Lamp test button
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5.5.7 Microphone stations

Microphone:	Handheld, near field, noise cancelling, fitted with PTT button.
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5.5.8 Detailed operation of the system

See Annex A.

5.6 Maintenance requirements

Supervision:	Audio circuits for alarm tones and speech shall be supervised up to and including power amplifiers. The loudspeaker and flashlights distribution system shall be supervised for short circuit and earth fault.
Test facilities:	Internally generated test tone signal addressable to loudspeaker zones. External audio auxiliary input addressable to loudspeaker zones. External audio test signal input to each amplifier unit.

5.7 Isolation and sectioning

None.

5.8 Layout requirements

Typical layout of operator's panels. See Annex A.

5.9 Interface requirements

From the PABX: 4 W E&M
2 W E&M

From a test generator etc: Balanced audio input, 600 ohm

To the UHF mobile radio: 2 W balanced, 600 ohm, and transmitter key system ON/OFF

From the F&G system: 'Toxic Gas Alarm' (if applicable): PA zones ON/OFF, alarm ON/OFF
'General Alarm': PA zones ON/OFF, alarm ON/OFF

To the entertainment system: Muting ON/OFF

ON/OFF signals: Source shall provide a voltage free relay contact - open when OFF (normal state) - closed when ON (active state)

5.10 Commissioning requirements

Early use: Design shall be prepared for early use of the central equipment and all or part of the loudspeaker distribution system during platform commissioning.

Temporary use: Design shall be prepared for the use of temporary operator panels.

6 SYSTEM 12 - Driller's intercom

6.1 General

This clause defines the requirements for the driller's intercom subsystem on offshore production installations.

The system shall provide two way voice communication in drilling related areas, between the driller and drilling personnel.

6.2 Equipment/schematic

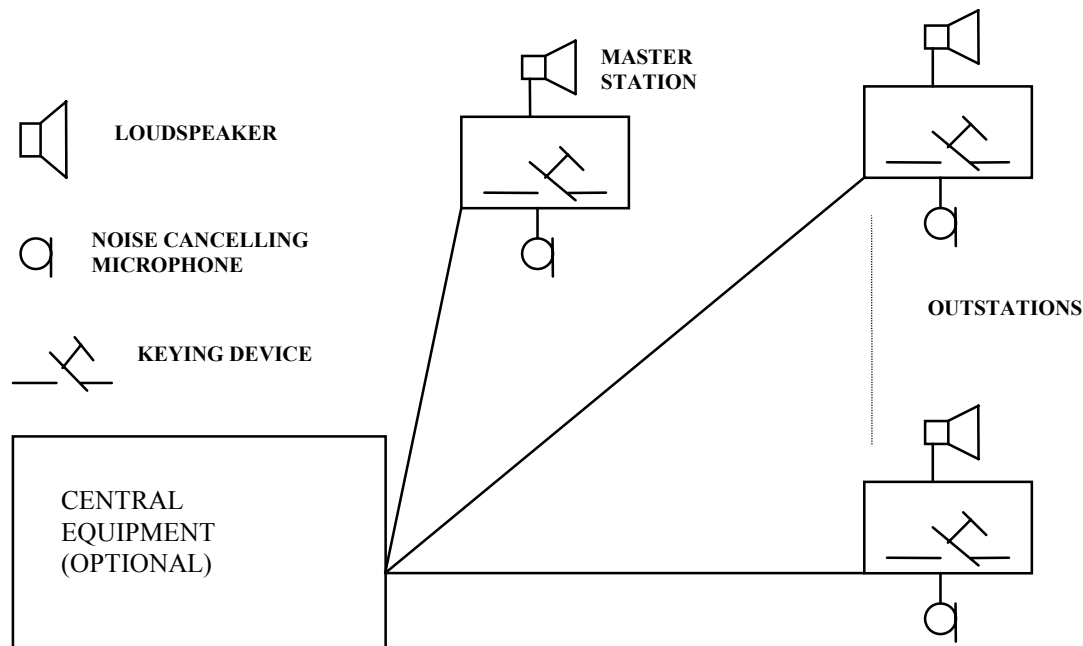


Figure 2 - Drillers intercom system

6.3 Performance

6.3.1 System

Number of speech paths: One.

6.3.2 Speech signal conditioning

Frequency response: 300 Hz to 7 000 Hz with adjustable frequency shaping.

ALC: Slow time constant, adjustable threshold level.

Dynamic range compression: Quick time constant syllabic compressor, adjustable threshold level to boost average speech power to at least 50 % of peak speech power.

6.4 Availability

Availability shall be better than 99 %.

6.5 Operational requirements

The operational mode shall be free access, PTT, one-to-all broadcast in a single network that includes a master station and a number of outstations. All stations shall operate in the same way, the only functional difference between the master station and the outstations being that the master station shall have access priority. Microphones shall be noise cancelling near field type.

6.6 Maintenance requirements

It shall be possible to operate the system in a normal way even if an outstation is temporarily removed.

6.7 Isolation and sectioning

It shall be easy to isolate an outstation and its loudspeaker, microphone, and keying device, in order to fault trace the system.

6.8 Layout requirements

The outstations shall be wall mounted in a hazardous and environmentally extreme environment that includes drilling mud.

The master station shall be wall mounted or flush mounted in a console.

7 SYSTEM 24 - Office data and telephone cabling network

7.1 General

This clause defines the requirements for the data and telephone distribution network on offshore production installations. Telephone connections to process areas are not included.

The network shall provide cabling for data and voice transmission between the central equipment and office/working areas.

7.2 Product and services

The cabling system consist of (with reference to terms used in NEK EN 50173-1):

- Telecommunications outlets .
- Distributor (NEK EN 50173-1: Floor distributor).
- Central distributor or MDF (NEK EN 50173-1: Building distributor).
- Horizontal cabling (from telecommunications outlet at the work area to the distributor).
- Backbone cabling (NEK EN 50173-1: Building backbone cabling) (from the MDF to the floor distributor).

7.3 Equipment/schematic

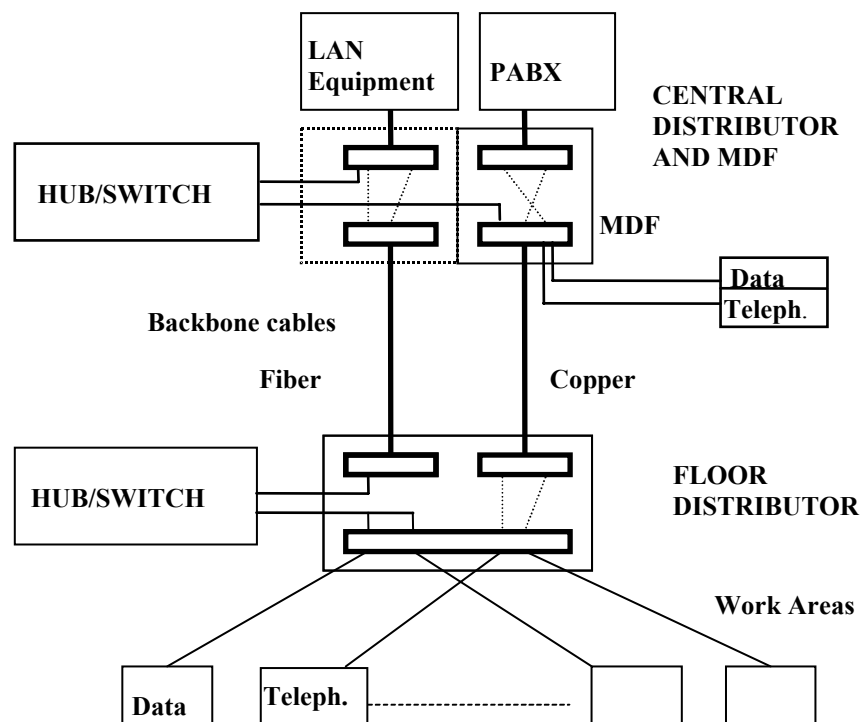


Figure 3 - Central distributor and MDF

7.4 Performance

7.4.1 Horizontal cabling

The horizontal cabling shall be used for voice (telephone) and data:

- Link classification: Link class D (or better).
- Cable type: 4-pair category 5 (or better) 100 ohm balanced cable.
- For offices and normal work areas: 2 cables per work station.
- For cabins and other locations: 1 cable.

7.4.2 Outlets

Telecommunication outlets in work area:

- NS-ISO 8877 (RJ 45)

7.4.3 Copper backbone cabling

Copper backbone cabling shall be used for voice (telephone):

- Link classification: Link class B (or better).
- Cable type: 100 ohm balanced cable.
- The cable shall be terminated in blocks with IDCs.

7.4.4 Fibre backbone cabling

Fibre backbone cabling shall be used for data:

- Link classification: Optical link class.
- Cable type: 62,5/125 μ multimode optical fibre.
- For outdoor cable 12 and 24 core cables only should be used.
- Fibre cables type according to NEK 606 (2003 revision) should be used.

7.4.5 Distributors

Decentralised distributors shall be used where the distance from work area to the telecom. equipment room exceeds 90 m, or where local shut down and isolation may be required:

- The unit shall have: Termination for horizontal cabling, termination for backbone telephone cables, termination for backbone fibre cables and hub electronics for LAN.
- The cables from each office or work location shall be terminated adjacent to each other. Connectors (NS-ISO 8877) or standard IDC termination blocks may be used.
- There shall be patching facilities to establish connection from the horizontal cable termination to the hub/switch for data, and to the backbone copper cables for voice.
- The hub/switch unit shall be connected to the backbone fibre cables.

7.5 Reliability

See 4.5.

7.6 Operational requirements

It shall be easy to re-route/reconfigure data or telephone channels without interrupting other traffic in the network.

7.7 Isolation and sectioning

It shall be easy to isolate a data or telephone connection, in order to trace the system.

7.8 Layout requirements

Layout requirements are:

- Patch panels and IDC blocks shall be mounted in 19 inches modules.
- All racks shall have sufficient spare room for active components.
- The central distributor for data and voice should be located adjacent to, or integrated with, the MDF.

8 SYSTEM 41 - General radio system

8.1 General

This clause defines the requirements for the general radio subsystem on offshore production installations. The general radio system shall provide maritime and aeromobile communication for normal and distress situations.

The following equipment is covered by this NORSOK standard:

- Equipment for GMDSS radio requirements.
- Equipment for additional maritime communication.
- Equipment for aeromobile communication.
- Equipment for aeromobile navigation aids – NDB.
- Equipment for crane communication.

For application for installations other than fixed and normally manned installations, it is important to obtain a decision from the relevant body as to which sea area shall apply for the installation, i.e. A1, A2, A3 or A4. The classification of the installation and the regulations for distress radio communication shall be according to the Norwegian Maritime Directorate (NMD) "Regulations of 16 December 1993 concerning the installation and use of radio equipment on mobile offshore units". This will also define the extent of GMDSS equipment on the installation.

SOLAS:

Consolidated Edition Chapter IV (1974)

NPD:

Regulations relating to design and outfitting of facilities etc in the petroleum activities (the facilities regulations).

Radio inspection:

Guidelines for the installation of GMDSS radio equipment on board ships and offshore units.

8.2 Equipment/schematic

8.2.1 Block diagram

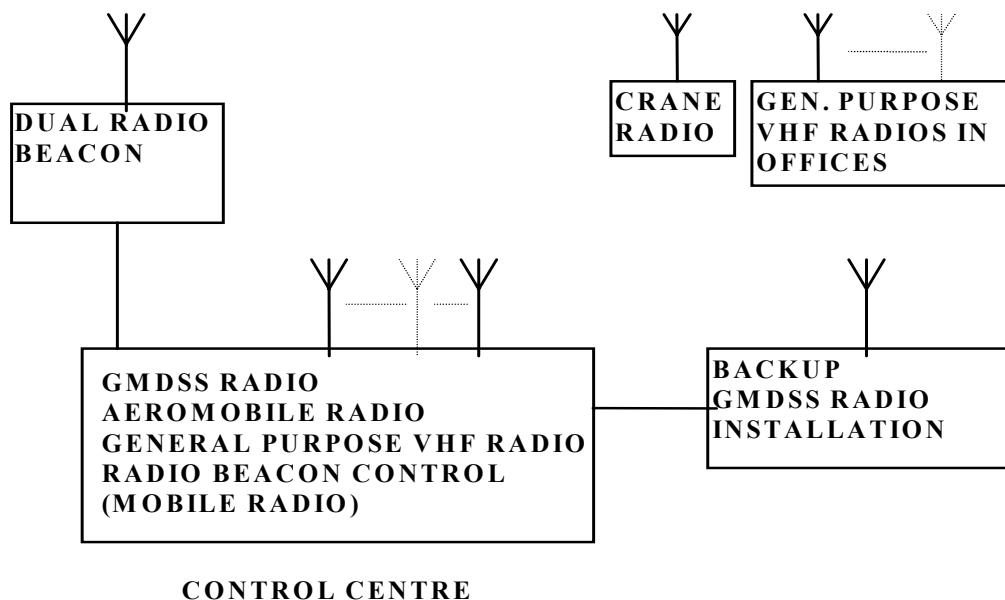


Figure 4 - Overall block diagram

8.2.2 Equipment

8.2.2.1 GMDSS radio equipment:

Requirement for equipment are listed in SOLAS and "Guidelines for the installation of GMDSS radio equipment on board ships and offshore units".

8.2.2.2 Power supply:

The radio systems shall be powered from an UPS system or separate battery supply and the 230 VAC UPS system of the installation via suitable converters, if necessary. The supply system shall fulfil SOLAS and "Guidelines for the installation of GMDSS radio equipment on board ships and offshore units".

8.2.2.3 Aeromobile beacon:

- Duplicated transmitters.
- Single antenna with antenna tuning unit.
- Automatic NDB switch-off after 10 min is recommended.

8.2.2.4 Marine VHF/FM radios (non GMDSS):

- Fixed mounted for crane(s).
- Portables.
- Fixed mounted.

8.2.2.5 Mobile telephone (if applicable with respect to coverage):

- Fixed mounted.
- Choice of system will depend on the available coverage in the area.

8.3 Type approval

All radio equipment shall be type approved for SOLAS use in the North Sea area (European Union approval). All required SOLAS frequencies shall be implemented. In addition the equipment shall be able to accommodate all project specific requirements.

8.4 Reliability

See 4.5.

8.5 Process/ambient conditions

Equipment shall be designed to operate at environmental conditions according to project requirements.

8.6 Operational requirements

8.6.1 NDB:

- ON/OFF of transmitter remotely controlled from the CCR.
- Duplicated transmitter with automatic changeover.

8.6.2 MF/HF transceiver (if applicable):

- Remotely controlled radio unit.

8.6.3 Mobile radio:

- Locally or remotely controlled.

8.6.4 Portable radios:

- Monophone, headphone, and carrying harness.

8.7 Maintenance requirements

Design shall allow for maintenance of equipment, or parts of equipment, quickly and with minimum disruption of service.

8.8 Layout requirements

8.8.1 General

Locations will be dictated by installation specific requirements, but will encompass the following:

8.8.2 Main operational location

Console or desk mounted:

- GMDSS equipment and/or remote controls for GMDSS equipment, including one marine VHF/FM/DSC radio.
- One maritime VHF/FM radio for general purpose operation.
- Two aeromobile transceivers.
- ON/OFF remote control for NDB.
- Mobile radio or remote control for mobile radio (if applicable).

8.8.3 Backup operation location

Wall, console, or desk mounted:

- One GMDSS maritime VHF/FM/DSC radio.
- Optional aeromobile VHF/AM radios.
- Helitower.

8.8.4 Additional radios

Wall or desk mounted, powered from local mains:

- Maritime VHF/FM radio(s) for miscellaneous use.
- Mobile radio(s).

8.8.5 Crane cabin(s)

Wall or console mounted, powered from local battery supply:

- Maritime VHF/FM radio operationally co-ordinated with the crane UHF radio.

8.8.6 Antennas

Antennas for the different radios shall be of a design suited for the environmental conditions encountered in the North Sea. Antenna connectors shall preferably be of N type. Antenna cables shall be 50 ohm low loss coaxial cable.

NDB antenna shall preferably be of long wire type along the perimeter of the helideck or located in an other suitable position. Where dictated by space constraints, a whip antenna may be used.

For all antenna arrangements, installations and antenna cable routing, it is required that no single event shall disrupt all mandatory radio communication

8.9 Interface requirements

Equipment with alarm outputs shall have interfaces suitable for connection to the TMS system as specified in clause 17. Interface types as specified in clause 4 shall be used.

8.10 Commissioning requirements

See clause 4.12.

9 SYSTEM 42 - UHF radio and paging**9.1 General**

This clause defines the requirements for the UHF radio and paging subsystem on offshore production installations.

The UHF mobile radio and paging system shall provide two way voice communication and one way paging in all areas of the installation.

9.2 Equipment/schematic

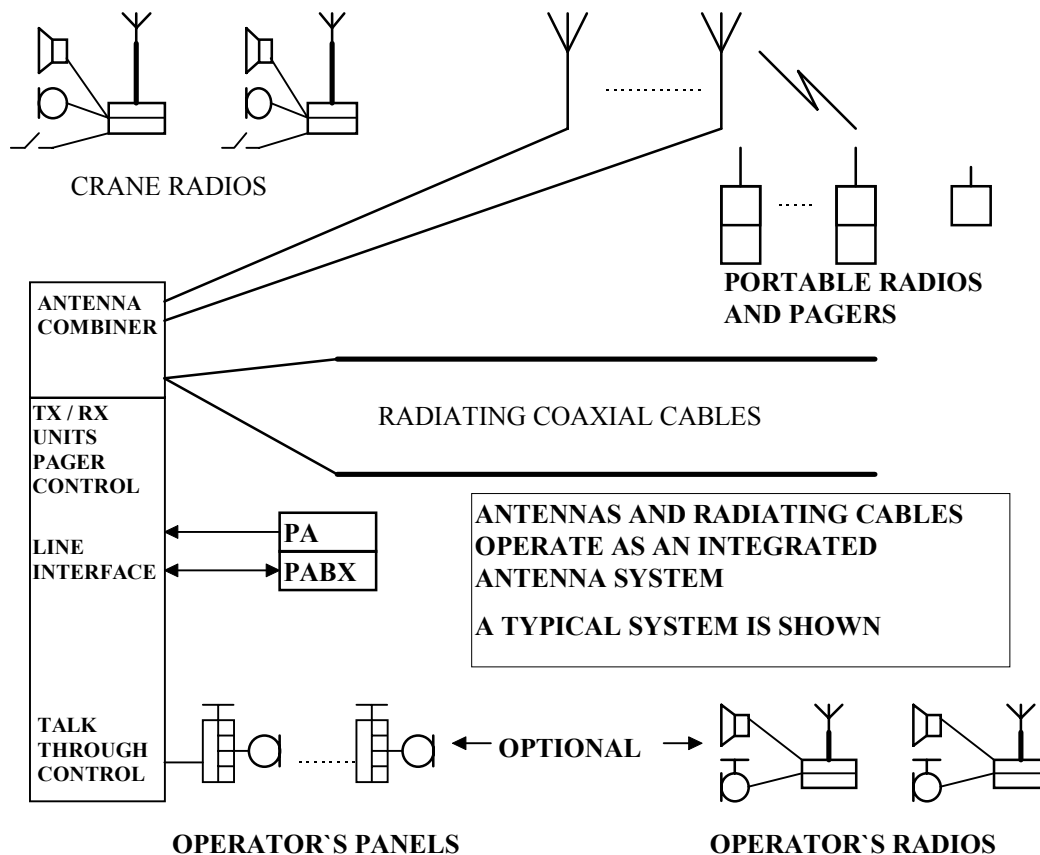


Figure 5 - Overall block diagram.

9.3 Performance

9.3.1 General

Frequency band: UHF.

Bandwidth: All areas shall be covered by all channels including pager through the same antenna system.

9.3.2 Coverage

Signal strength: For all areas the average RF signal level shall be sufficient to produce an audio signal at the receiving end with at least 20 dB SINAD. (Receiving sensitivity measured as 20 dB SINAD, CCITT psophometrically weighed, with 1 kHz tone at 60 % deviation).

9.3.3 Portable radios

Hazardous area certification: Intrinsically safe.

Channels: Duplex talk-through channels and simplex direct channels.

Battery operation time: Minimum 12 h with 90 % receive and 10 % transmit.

9.3.4 Operator's panels

Channels: The same duplex channels as for portable radios.
Optional: At least 2 channels shall be selectable for simultaneous listening.

9.3.5 Operator's radios

Channels: The same duplex and simplex channels as for portable radios.

9.3.6 Crane radios

Channels: The same duplex and simplex channels as for portable radios.

9.3.7 Pagers

Hazardous area certification: Intrinsically safe.

Channel: One single frequency channel.

Message display: Minimum 8 characters.

Signalling protocol: Industry standard.

9.3.8 Base stations

Talk through activation: Industry standard non-audible code with no access delay.

Talk through release: Delayed, to avoid squelch noise burst in radios.

9.4 Reliability for the central equipment

MTBF 25 000 h for 50 % transmitter/100 % receiver duty cycle.

9.5 Operational requirements**9.5.1 General**

Operator access:

Alternative 1 Through operator's fixed mounted radios with local (indoor) antenna.

Alternative 2 Through wired operator's control panels.

Alternative 3 A combination of alternatives 1 and 2.

9.5.2 Portable radios

Use: With carrying harness and monophone or headset/bloom microphone combination.

Battery: The Ex classification shall allow for replacement of battery in hazardous areas.

9.5.3 Operator's radio

Microphone: Handset with PTT button.

Handset cradle: The loudspeaker shall operate also when the handset is out of its cradle and be muted when PTT button is operated.

Operation and functions: Like a portable radio.

9.5.4 Crane radio

Microphone: Goose neck or similar.

Keying: Mechanical keying device for hands free operation.

Shared ancillaries: The microphone and keying device shall be used with the UHF crane radio as well as with a marine VHF radio.

Operation and functions: Like a portable radio.

9.5.5 Driller's radio

When UHF radio is used for driller's talkback, the radio sets in the driller's cabin should be:

Microphone:	Goose neck or similar.
Keying:	Mechanical keying device for hands free operation.

9.5.6 Operators' panels

Controls:	Channel selector, audio volume for loudspeaker.
Microphone:	In handset with PTT button.
Handset cradle:	The loudspeaker shall operate even if the handset is out of its cradle and be muted when PTT button is operated.
Operation and functions:	Like a portable radio.

9.6 Maintenance requirements**9.6.1 Central equipment**

Test facilities:	Test panel for check of major parameters and functions.
Handset with PTT button:	For listening and talking on any dual frequency channel.

9.6.2 Portable radios

Channel programming:	From PC and by cloning.
Maintenance charger:	Charger with discharging and reconditioning facilities for rechargeable batteries for portable radios.

9.6.3 Radiating coaxial cables

Connectors:	All connectors and end terminators shall be easily accessible for disconnection for testing purposes.
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9.7 Layout requirements**9.7.1 Crane radios**

Typical mounting:	Control unit, loudspeaker, microphone, keying device, and UHF/VHF selector switch shall be suited for integration with crane operator's chair.
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9.7.2 Antennas and radiating coaxial cables

Distributed antenna system:	Design shall maximize radiation outside and inside of the installation and minimize radiation away from the installation. Radiating coaxial cables shall provide coverage in all areas not covered by antennas.
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9.8 Interface requirements**9.8.1 Central equipment, antennas**

Connector type:	N-type female, 50 ohm.
Lightning protection:	Included.

9.8.2 Central equipment, to other systems

PA and PABX interface:	2/4 wire E&M, 600 ohm audio.
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9.8.3 Crane radios

Marine VHF radio interface: Output from microphone and keying device for use with a marine VHF radio in cranes.

9.9 Commissioning requirements

The system shall be prepared for early use of the central equipment and all or part of the antenna distribution system during platform commissioning.

10 SYSTEM 43 - Audio and video entertainment

10.1 General

This section defines the requirements for the audio and video entertainment subsystem on offshore production installations.

The system shall provide facilities for audio and video entertainment and information in cabins and common rooms.

10.2 Products and services

The system shall include:

- Antennas and receivers/converters for satellite television, satellite radio and terrestrial VHF FM radio and television if applicable.
- Local audio and video sources.
- Modulators for radio and television.
- A community antenna system (communal aerial system).
- Automatic television recording/playback facility.
- Standard consumer type television receivers and radio receivers for cabins and common rooms.

10.3 Equipment/schematic

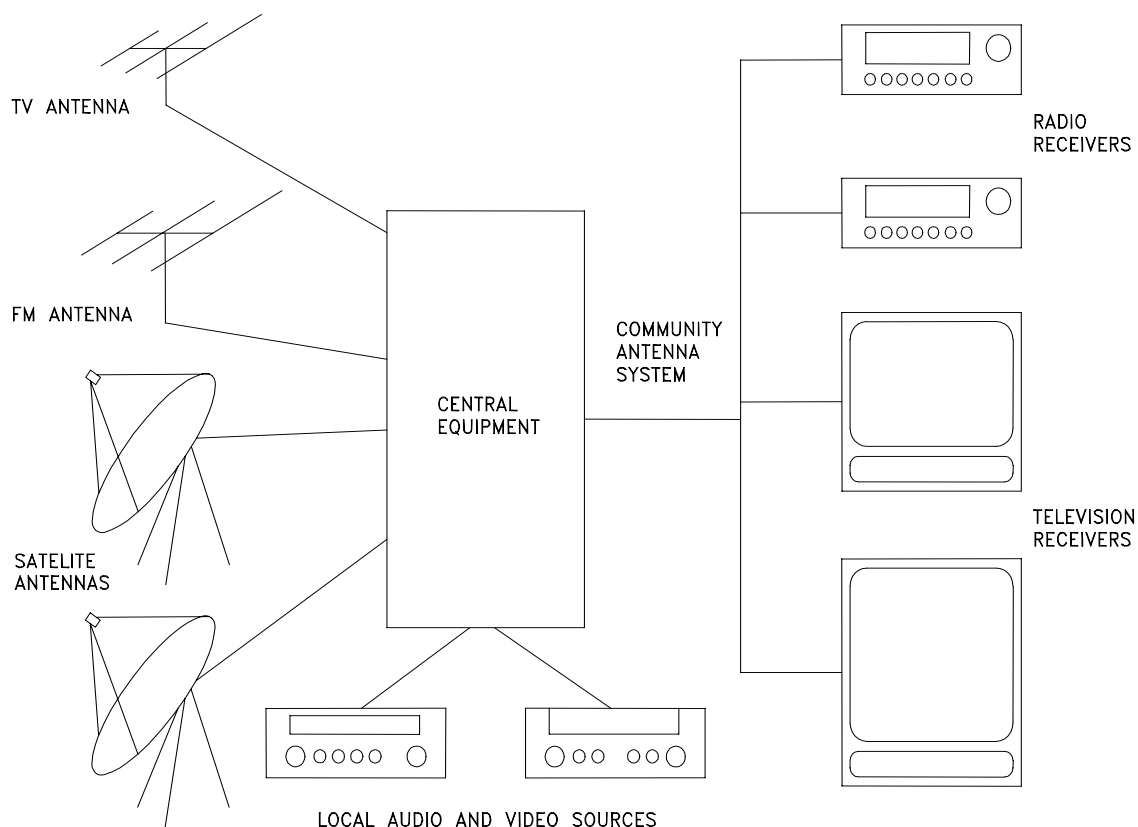


Figure 6 - Equipment/schematic diagram

10.4 Performance

10.4.1 Signal reception

Satellite antenna: Feeder loss shall be compensated for all frequencies to keep the RF signal level of all channels within the range required by the receiver.

Radio and TV antenna: Feeder loss shall be compensated by low noise preamplifier near the antenna.

10.4.2 Local signal sources

Audio playback: Compact disk (CD) multiple disc player.

Video recording/playback: Standard VHS with high fidelity (Hi-Fi) stereo audio and digital video disk (DVD) player.

Timed video recording: Automatic recording of TV program at pre-set time.

Timed video playback: Automatic playback at pre-set time.

10.4.3 Technical performance

The entertainment system shall be according to NEK EN 50083-7. A description of this in norwegian is given by Norwegian Post and Telecommunications Authority in "Veiledning kabel -TV nett".

10.5 Interface requirements

From the PA and alarm system Entertainment audio shall be muted when a voltage free contact in the PA and alarm system is closed.

11 SYSTEM 51 - Closed circuit television (CCTV)

11.1 General

This clause defines the requirements for the closed circuit television subsystem on offshore production installations. Both analogue (PAL) or digital (MPEG) systems may be used. The MPEG family consists (at the moment) of MPEG-1, MPEG-2 and MPEG-4. Four levels of MPEG-2 are defined: low, main, high and high-1440. The level defined for NORSOK use is "main profile at main level (MP@ML)". Due to the quick technical evolution of digital systems, no specific digital system is recommended to be mandatory. The user is advised to use an international recognised system, e.g. from the MPEG family.

The system shall provide real time visual surveillance in selected areas.

11.2 Equipment/schematic

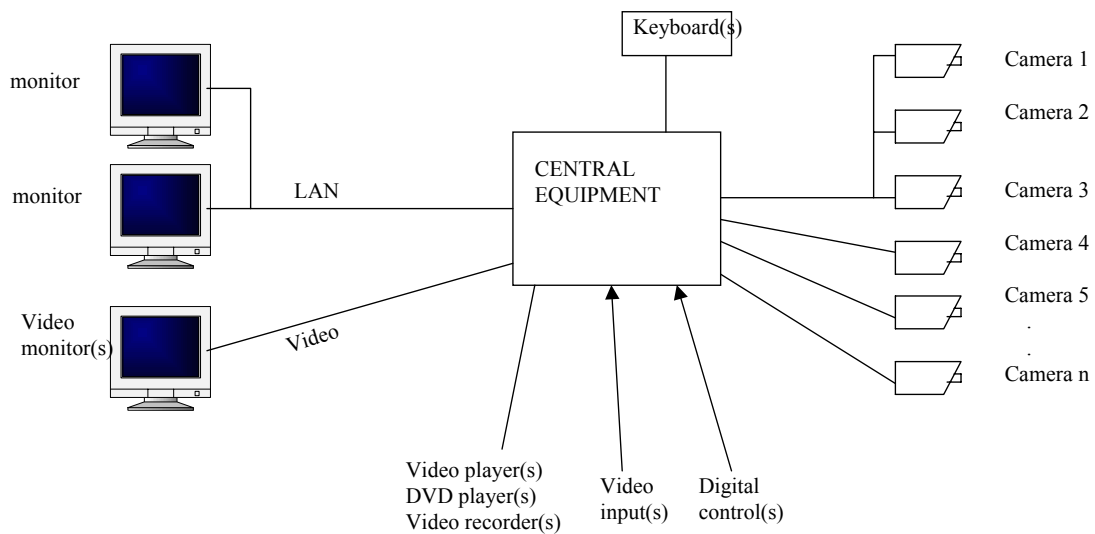


Figure 7 - Equipment/schematic diagram

11.3 Performance

11.3.1 Analogue system performance

Television system: PAL colour.

Composite video level: 1V peak to peak at 75 ohm.

Signal/noise ratio: >45dB for each system element.

Crosstalk: >48dB measured on the central equipment.

Resolution (horizontal and vertical): 470 lines at daylight conditions. 260 lines at 3 lux. The system resolution shall be measured at 3 lux reflected light from a standard test picture located 1,5 m in front of the camera lens.

Picture stabilisation: When changing between cameras, monitor picture should not lose synchronisation.

11.3.2 Digital system performance

Video system should be MPEG-2 according to ETSI TR 101 154 Para. 5.1

Luminance resolution: 720 x 576 (for 4:3 monitors)

Frame rate: 25 Hz

All components in the CCTV system shall meet the system performance specification. Some applications (e.g. LAN PC monitor picture) may require lower quality and/or lower frame rate.

11.3.3 Camera

Test of camera may be performed using standard TV camera test card.

Light sensitivity: Min. 30 IRE at 3 lux reflected light measured at lens (f.1.2, AGC ON) . Minimum 30 IRE at 3 lux. Minimum 60 IRE at 10 lux. The video level measurement system is expressed in IRE units. IRE is a unit of measurement used to standardize video and broadcast signals. For measurement purposes, the video signal is split into 140 units, with 40 units of sync and 100 units of video.

AGC: Linear operation.

Video level/contrast variation: Means shall be provided to minimise change at variable light conditions.

Lens zoom range
(if applicable): From 41 degrees wide to 7 degrees tele.

Iris/focus control (if applicable): Automatic with manual override of setpoint. Iris shall be stable in normal operation

11.3.4 Camera pan angular travel

Pan and tilt (if applicable): Minimum visual range 175 degrees (vertical/tilt) and 355 degrees (horizontal/pan).

Pre-set accuracy: -/+ 1 degrees or better.

Backlash: Less than 0,01 degrees.

Speed: Variable from very slow to a maximum consistent with quick positioning when used with pre-set remote control.

11.4 Regularity

MTBF for camera:	30 000 h
MTBF for monitor:	70 000 h
MTBF for pan and tilt:	70 000 h
MTBF for mechanical enclosure:	170 000 h

11.5 Operational requirements

As a minimum the system shall include the following facilities:

- All cameras switchable to all monitors.
- All controls necessary for remote operation located in the control panel(s).
- Internal programming protected against accidental changes.
- Alphanumeric information (min. 10 strings of 20 characters) shown on the monitors, related to camera in use or event shown, including, but not limited to: time, date, camera number, sequence information and descriptive text. Edit of camera related text shall be reprogrammable by the operator.
- Pre-set sequence (if applicable) for camera, including pointing direction, zoom, and time between changes programmable; all preset functions to be reprogrammable by the operator.
- Monitoring and all controls necessary for remote operation from LAN/WAN network shall be possible in one display picture.

11.6 Maintenance requirements

See 11.7.

11.7 Isolation and sectioning

Means shall be provided to switch off all electrical signals for each camera and pan/tilt mechanism individually. The switch shall be in safe area.

While work is being performed on cameras it shall be impossible to accidentally switch on electrical power and electrical signals.

11.8 Interface requirements

Video signal output/input: Composite video level 1V peak to peak at 75 ohm (for connection to external system).
Optional digital according to digital system used.

Remote control: RS 232, RS 422, RS 423, RS 485 or IEEE 802.

11.9 Commissioning requirements

Design shall allow for testing and commissioning of subsystems and individual equipment with minimum disruption of normal operation.

12 SYSTEM 52 - Meteorological observation

12.1 General

This clause defines the requirements for meteorological observations, collection and presentation of environmental and oceanographic data on offshore installations (MetOcean).

The MetOcean system shall provide information on the weather conditions at the platform, for use by platform personnel and helicopter pilots. If required, the system shall perform automatic reporting to DNMI , NATAM , NCAA or other authorities as defined by NPD.

12.2 Products/services

The MetOcean system comprises a number of sensors, central equipment (a data collection, processing and storage unit), various displays and interfaces.

Main services are weather observation and reporting for:

- Helicopter operations.
- Weather forecasting services.
- Climatological recording.
- Weather observation and reporting for operational needs.

Applications and services for MetOcean data are listed in NORSOK N-002.

Based on the services to be provided, platform or vessel characteristics and physical constraints, various sensors shall be included:

Minimum instrumentation:

- Wind speed (minimum two Ex-certified sensors).
- Wind direction (minimum two Ex-certified sensors).
- Atmospheric pressure.
- Air temperature.
- Air humidity/dew point.

Optional instrumentation (when required):

- Wave height, period and direction.
- Sea surface temperature.
- Cloud base altitude, cloud cover.
- Visibility (maximum optical range and optionally runway visual range).
- Present weather.
- Sea current, magnitude and direction.
- Platform motion, in particular helideck motion.
- Air gap.
- Gyro (heading).

Some measurements may be combined into one sensor.

12.3 Equipment/schematic

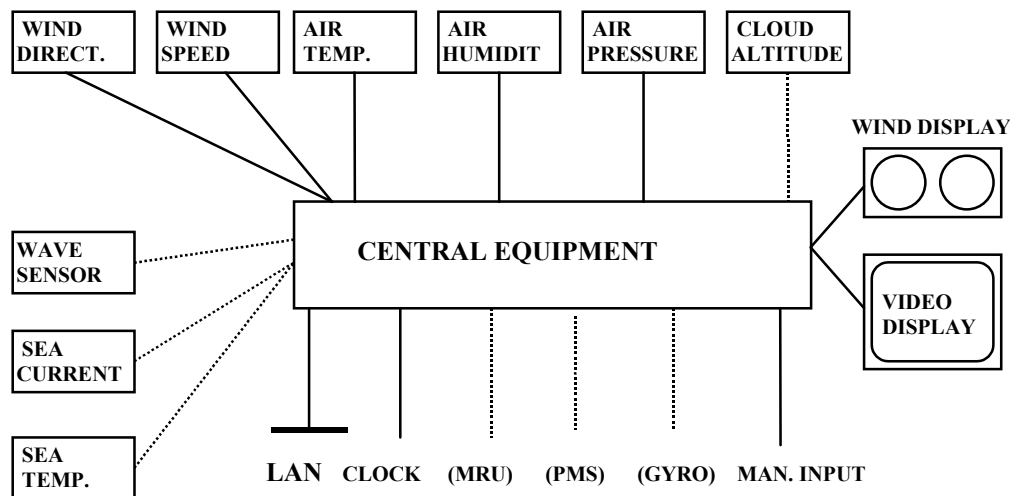


Figure 8 - Equipment/schematic diagram.

In addition to the wind sensors, also other sensors may be duplicated to ensure high availability.

12.4 Performance

See NORSOK N-002, Annex A, for general performance requirements.

Systems onboard non-fixed platforms shall also include heading information in order to provide directional data related to true north.

Location of certain sensors and measurements will be project specific.

The platform shall be equipped with a helideck monitoring system where relevant meteorological data, such as wind speed, wind direction, barometric pressure and air temperature close to helideck, is recorded.

Floating installations and production/drilling/storage vessels shall be equipped with an additional monitoring system providing information regarding the helideck motion characteristics with respect to roll, pitch and average heave rate.

All information shall be numerically visible on a screen in both the CCR and helitower for easy communication to the relevant helicopter land base and any helicopter in flight. It shall be possible to transfer relevant data electronically to the helicopter land base operational centre.

The monitoring system shall be checked and calibrated for correctness on the relevant field location, in strict compliance with procedures of the manufacturer. A ready-for-use certificate shall be issued.

12.5 Reliability

See 4.5.

12.6 Process/ambient conditions

Equipment shall be designed to operate at environmental conditions according to project requirements.

12.7 Operational requirements

12.7.1 General

Time tagging is automatic by internal clock according to CUT. The internal clock to be updated by the time reference system of the platform.

12.7.2 Backup sensors

Mounted or ready for mounting:

- Third wind speed sensor.
- Third wind direction sensor.

12.7.3 Local presentation of observations

Local presentation of observations shall be available on the office LAN.

User display software shall include:

a) Typical functionality:

- Heli-met display (including motion and heading where applicable).
- General met-ocean data.
- Historical data.
- Manual input (see NORSOK N-002).

b) Typical locations:

- Heli-met in helitower and CCR.
- General data in CCR.

c) Dedicated wind displays:

- CCR.
- Helitower.

12.7.4 Reporting to DNMI, NATAM and/or NCAA (where required)

According to NORSOK N-002, 5.3 and 5.4, the data to be included are automatically collected and manually entered to make up a complete message. The data are normally transmitted via internet/secure oil information link.

12.8 Maintenance requirements

For calibration check (minimum requirements):

- Air pressure portable sensor (once every day).
- Air temperature portable sensor (once every month).
- Humidity portable sensor (once every month).

Maintenance:

- Design shall allow for maintenance of equipment, or parts of equipment, quickly and with minimum disruption of service.
- Regular maintenance and/or calibration is required for most of the sensors.
- For the wind sensors, components like bearings and potentiometers should, as a minimum, be replaced yearly.

12.9 Isolation and sectioning

It is required to use wind speed and direction sensors with dedicated displays that are able to supply wind data also during shutdown situations.

These sensors and displays should be powered separately from the rest of the MetOcean (see 12.1) system and shall not be affected by ordinary shutdowns.

12.10 Layout requirements

Location of sensors:

- Sensors shall be located to avoid distortion of observations by air turbulence, high temperature, exhaust fumes etc.
- The measured and calculated data shall be representative for the platform area.
- Wind speed, wind direction, air pressure and air temperature that are representative for the helicopter landing zone shall also be available.

- As a minimum, two wind sensors shall be located for measuring area wind (typically in top of the derrick or a crane). Another sensor may be located in the vicinity of the helideck area to measure the wind being representative for the helideck.

12.11 Interface requirements

RTC:

Interface to RTC (System 83) preferably by using NMEA-083, sentence ZDA.

Other external interfaces:

- To the platform information management system.
- Required data to be specified in each case.
- For the maritime weather forecasting service.
- Typically file transfer to DNMI. File format(s) according to NORSOK N-002.
- For the aeronautical weather forecasting service. Typically file transfer to NCAA.
- For climatological data recording.

Typically file transfer of data to an agency providing quality control. Reports issued to DMNI and NPD, with file format(s) according to NORSOK N-002.

Interfaces should preferably be via office LAN or serial link RS 422. See also 4.11.

Alarms: See 4.11.2.

12.12 Commissioning requirements

See 4.12.

13 SYSTEM 53 - Marine radar

13.1 General

This clause defines the requirements for a marine radar surveillance system with remote presentation of radar video and tracking information, and also remote radar control or remote surveillance.

This NORSOK standard is not applicable for a normal ship radar installation with integrated automatic radar plotting aid functionality.

The overall system shall:

- Present information concerning vessel movements to a remote control centre and to PCs connected to the operators network.
- Transfer control and command signals from a remote control centre to the radar processor.
- Use existing LAN/WAN for distribution and presentation of radar information.

The radar processor shall:

- Present radar video and track information in a format that can be distributed on existing data networks and displayed on a PC having appropriate software installed.
- Handle control signals and system information signals between a remote operation centre and the radar head(s).

Option:

If required, a traffic operator's station utilising a DX90/S57 chart base, operating either stand-alone or in parallel with the remote control centre.

Optional remote environment:

Integrated multi-radar surveillance control centre.

13.2 Products/services

Included in the system:

- Radar system.

- Signal processor.
- Software.

13.3 Equipment/schematic

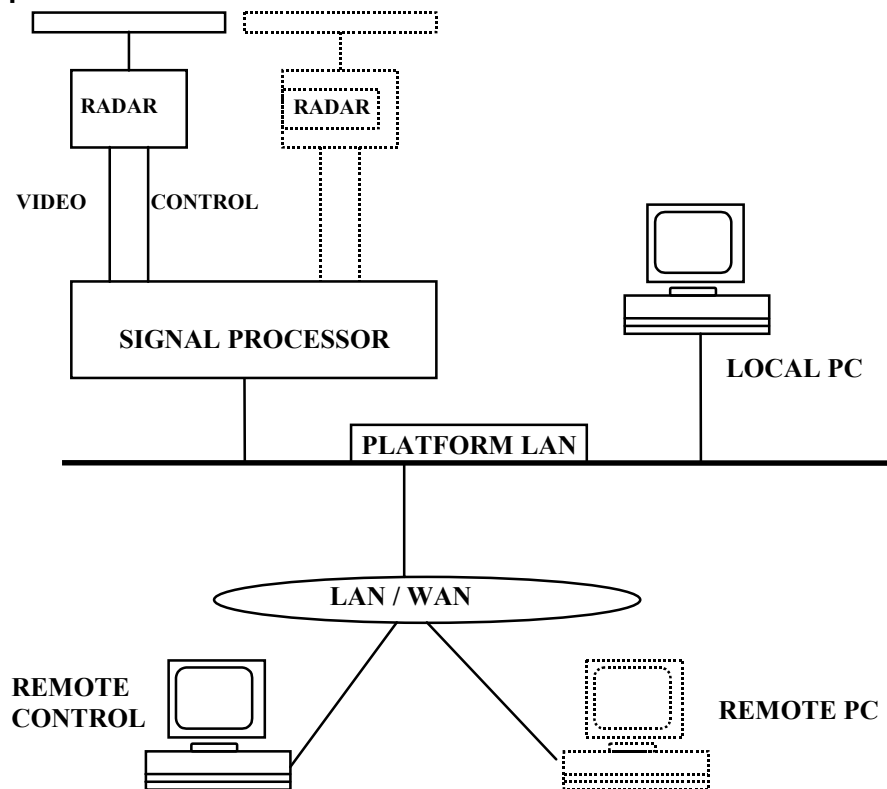


Figure 9 - Equipment/schematic diagram.

13.4 Performance

Area coverage:

360 degrees from less than 300 m measured from the outer points of the installation and up to a radius of 8 nautical miles for vessels with a radar cross section of 25 m² and 12 nautical miles for vessels with radar cross section of 100 m².

Area coverage for an installation may be a result of a network based on radars on other installations.

Minimum target size:

Surface vessel with a radar cross section of 25 m² with 3 m height and 100 m² with 6 m height.

Frequency band and polarisation:

Project specific.

Antenna directivity azimuth:

1 degrees typical.

Antenna elevation:

Project specific.

Receive optimising technique: Swept gain.

13.5 Availability

Availability shall be better than 99,5 %.

13.6 Process/ambient conditions

Equipment shall be designed to operate at environmental conditions according to project requirements.

13.7 Operational requirements

Remote presentation shall be digital video and tracking information superimposed on a digital chart (DX90/S57) on PC based workstations, including facilities for adding user defined objects and layers. Digital video resolution shall not be affected by setting of individual range and centre.

Information only presentation shall be radar track superimposed on a digital chart base including user defined objects and layers for local PC-based presentation.

Remote control minimum requirements:

- Start/stop of scanner.
- Adjustment of pulse length.
- Transceiver selection.

13.8 Maintenance requirements

Design shall allow for maintenance of equipment, or parts of equipment, quickly and with minimum disruption of service.

13.9 Interface requirements

Local radar LAN shall be according to TCP/IP protocol, IEEE 802.3.

13.10 Commissioning requirements

Design shall allow for testing and commissioning of subsystems and individual equipment with minimum disruption of normal operation.

14 SYSTEM 81 - Main distribution frame (MDF)

14.1 General

This clause defines the requirements for distribution frames for equipment cabling including shutdown facilities for field equipment.

Distribution frames provide interchangeable connection facilities for telecommunication systems. The frames act as interface point for cabling between:

- Different telecommunication subsystems.
- Telecommunication central equipment and associated field equipment.
- Telecommunication systems and other systems on the installation.

14.2 Equipment/schematic

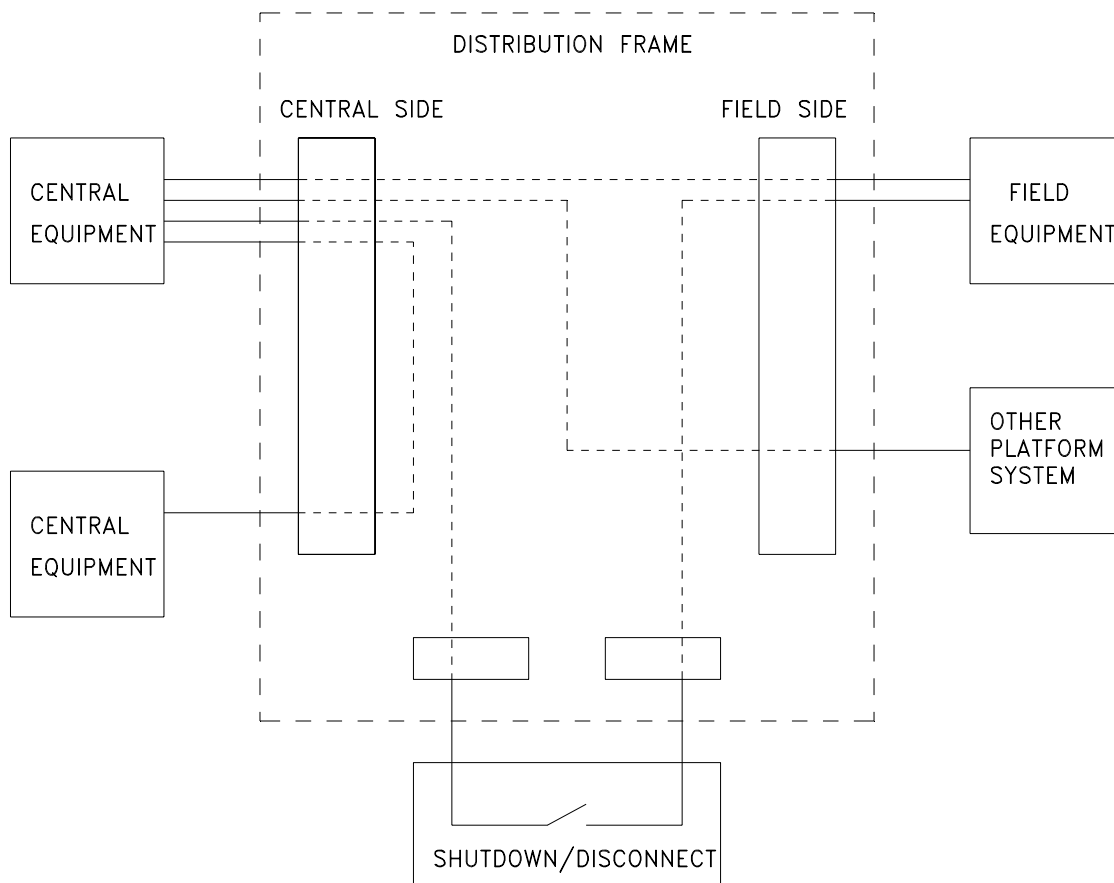


Figure 10 - Equipment/schematic diagram

14.3 Performance

14.3.1 Terminal blocks/single terminals in distribution frames

Terminal blocks shall be of a modular type with a minimum of eight terminals per strip.

Blocks for termination of 0,5 mm to 1,0 mm diameter solid cores shall have IDC.

Terminals for multistranded wires shall be of clamp spring type, and allow termination of 0,5 mm to 2,5 mm diameter stranded cores.

Wire-wrapping terminals, soldering terminals, or screw terminals should be avoided.

All types of terminals shall have circuit isolation and testing facilities.

14.3.2 Voice frequency circuits

Termination of voice frequency circuits shall be terminated as defined in Annex A.

14.3.3 Spare capacity

See NORSOK T-001, 4.6.3.

14.3.4 Shut down facilities

Shutdown facilities shall provide for disconnection of non-Ex equipment during hazardous conditions. Shut down facilities may be placed in any distribution frame.

14.4 Operational requirements for alarms

Power failure alarm: Loss of power to shut down module (minimum requirement).

14.5 Layout requirements

The MDF and the shut down facilities shall be located in the telecom equipment room. Additional distribution frames may be placed in local equipment rooms.

The distribution frames should preferably be wall mounted and single sided.

Dedicated distribution panels may be placed in the telecommunication equipment racks or adjacent to the equipment racks.

In order to ensure sufficient flexibility for future reterminations/changes in cross connections there shall be adequate spacing between sections and rails in the distribution frame. Jumper rings or equivalent shall be included to allow tidy wiring to terminals in any part of the frame.

Central and field side cabling to the frames shall be allocated to different sections.

14.6 Interface requirement

14.6.1 Alarm output from shut down equipment

Individual alarms: A voltage free contact normally closed. Open in alarm state or loss of power.

14.6.2 Input to shut down facility

ESD signals: 24 VDC in normal condition.
0 VDC in ESD alarm condition.

15 SYSTEM 82 - Telecom power supply

15.1 General

This clause defines the requirements for uninterruptible DC telecom power supplies.

Guidelines on dimensioning of battery capacity are included.

Equipment powered by supply:

- Safety systems.
- Other essential telecom subsystems.

15.2 Products/services

- Battery bank.
- Chargers mounted in cabinet(s).
- DC power distribution and fuses.

15.3 Equipment/schematic

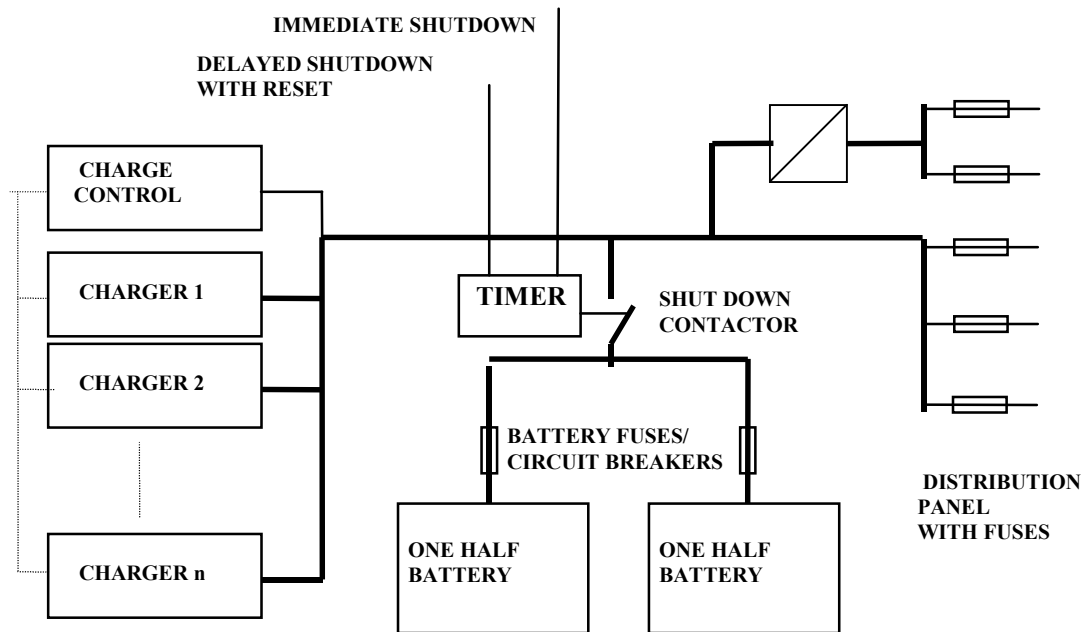


Figure 11 - Equipment/schematic for one individual power supply

15.4 Performance

15.4.1 Battery banks

Preferred battery type: Lead-acid with valve controlled gas discharge.

Battery cell voltage lower limit: 1,8 V for lead acid batteries.

Battery bank subdivision: Two halves operating in parallel with 50/50 % load sharing, individually fused.

15.4.2 Battery capacity evaluation

The capacity of each battery bank shall be sufficient to meet the load and ambient temperature requirements over the stated battery life time.

Battery capacity shall be evaluated based on a realistic mean load current, taking various types of load currents into account, e.g.:

- Duty cycle dependent load current, e.g. the PA system and radio transmitters.
- Voice dependent load current, e.g. PA audio amplifiers and single side band transmitters.
- Utilisation dependent load current, e.g. due to the actual mean power consumed by the loudspeakers of the PA system.

15.4.3 Charger cabinet(s)

Design: Modular, for plug in charger units.

15.4.4 Charger units

Battery charging method: Constant voltage float charging.

Input voltage: 690/400/230 VAC -30/+20 V, 45 Hz to 63 Hz.

Output voltage: Battery manufacturer's recommended float charging voltage.

Output voltage limits at consumer: -10/+20 % of nominal voltage.

Ripple voltage (worst case):

- <2 mV RMS psophometric.
- <50 mV RMS flat, overall.
- <5 mV RMS flat, $f > 3$ kHz.

Radio interference: NEK EN 55022, Class B.

Recharging time: 10 h from discharged state to 90 % of full capacity with nominal load.

Current at overload: Constant current.

Quantity of plug in modules: $n+1$, where n is the required number of modules.

Load sharing between modules: Near the same fraction of the total load current supplied from each module at all loads.

Battery overcharging protection: Protection shall be included against voltages and currents that may cause overcharging of batteries with resulting excessive gassing.

Alarm output: See 4.11.

15.4.5 Load distribution

Location: Integrated with charger cabinet(s) or separate.

Fuses: Automatic.

15.4.6 Shutdown circuit breaker/timer

In case shutdown is required, the following facilities shall be included:

Shutdown circuit breaker: Installed in the battery leads close to the battery but outside the battery room (if separate). The breaker may be located in the charger cabinet.

Shut down operation: Remotely initiated via two inputs: delayed shutdown and immediate shutdown.

Delayed shutdown: A timer shall start when delayed shutdown is initiated and shutdown shall occur at the end of the counting period. It shall be possible to reset the timer during and after its counting period.

Immediate shutdown: Timer is bypassed.

Reset of timer: Manually operated by push button on charger cabinet and by remote floating contacts.

Timer period: Adjustable up to 60 min.

15.5 Availability

100 % on DC line output.

15.6 Process/ambient conditions

The operational temperature range for the batteries shall be based on reasonable assumptions with respect to possible minimum and maximum temperatures at the location where the batteries are located.

15.7 Operational requirements

15.7.1 Autonomy time (minimum 6 h with normal operational consumption)

The following guidelines should be used when designing the system:

PA system:	15 % full effect, 85 % standby
PABX/radio link:	100 %
Radio systems (UHF/VHF):	25 % transmit, 75 % receive

15.7.2 Recharging time

From lower voltage limit: 10 h to 90 % of nominal battery capacity.

15.7.3 Alarms (minimum requirement)

Charging failure alarm:	when the current from each charger drops below a set limit.
Battery low alarm:	when the power supply voltage drops below a set limit.
Overcharge alarm:	when the power supply voltage exceeds a set limit.
Shutdown alarm:	when the shutdown circuit breaker has been operated.

15.8 Maintenance requirements

A facility shall be provided to perform discharge testing on one half battery bank which is disconnected from charger and load by means of its battery fuse/circuit breaker.

15.9 Interface requirements

Alarms, see 4.11.

15.10 Commissioning requirements

Design shall allow for testing and commissioning of subsystems and individual equipment with minimum disruption of normal operation.

16 SYSTEM 83 - Real time clock (RTC)

16.1 General

This clause defines the requirements for a RTC system as a common time reference for offshore production installations.

Purpose of the system: Generation of real-time signals for time-tagging of signals and events.

16.2 Equipment/schematic

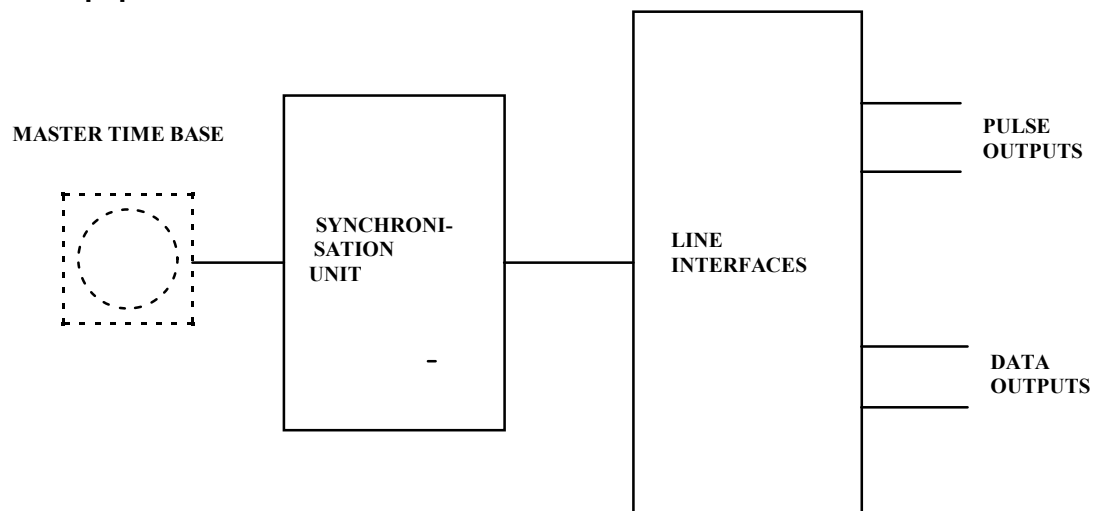


Figure 12 - Equipment/schematic diagram

16.3 Performance

16.3.1 Analogue outputs

Synchronising pulse interval: 1 min.

Timing: In second 59.

Duration of timing pulse: 1s.

Timing accuracy: Better than 20 ms.

16.3.2 Data outputs

Data telegram interval: 1 min.

Synchronising character timing: Start of second 00: sub (Hex 1A).

Timing accuracy: Better than 20 ms.

Telegram format: NMEA 0183, Sentence ZDA.

16.4 Reliability

See 4.5.

16.5 Process/ambient conditions

Radio receiving antennas: Located outdoor in a non-hazardous area.

16.6 Operational requirements

Summer/winter time change: Automatic on selected outputs.

Local time/CUT: Selectable on individual outputs.

Line interfaces: The data output interface module shall be expandable and shall accommodate modular built modems if required.

16.7 Maintenance requirements

Design shall allow for maintenance of equipment, or parts of equipment, quickly and with minimum disruption of service.

16.8 Interface requirements

Analogue outputs: Transistor-transistor logic or 24 VDC (selectable).

Data interface output: See 4.11.

Alarm output: A voltage free contact.

16.9 Commissioning requirements

Design shall allow for testing and commissioning of subsystems and individual equipment with minimum disruption of normal operation.

17 SYSTEM 84 – Telecommunication monitoring system (TMS)

17.1 General

This clause defines the requirements for remote monitoring of telecom subsystems on offshore production installations.

Monitoring is a standard function. The TMS shall be able to receive and present spontaneous alarms from the telecom subsystems. The TMS shall have an alarm interface for transmission of alarms to a central control system (like the safety and automation system).

Remote diagnostics and control may be included as an option where a telecom subsystem has such a function. The diagnostic software that is normally supplied together with the telecom subsystem should then be used.

The communication protocols used and the physical interfaces to the telecom subsystems should be adapted to common standards in order to permit standardised communication into a TMS workstation.

17.2 System overview

17.2.1 General

The following units are included in the TMS:

- TIUs
- TMS workstation(s)

Different telecom subsystems may have different interfaces to a TMS. Remote diagnostics and control (option) requires more interfaces and functions than monitoring only.

17.2.2 Monitoring

On/off signals or LAN/WAN should be used for transmission of alarms between the telecom subsystems and the TMS, see Figure 13a.

- Telecom subsystems with on/off interface for monitoring are interfaced to a TIU
- Telecom subsystems with LAN interface for monitoring are interfaced to the TMS workstation via LAN/WAN

LAN/WAN (preferred) or serial interface should be used between the TIU and the TMS workstation.

17.2.3 Option: Remote diagnostics and control

LAN/WAN or serial interface should be used between the TMS and the telecom subsystems for remote diagnostics and control (in addition to monitoring), see Figure 13b.

- Telecom subsystems with LAN interface for remote diagnostics and control are interfaced to the TMS workstation via LAN/WAN.
- Telecom subsystems with serial interface for remote diagnostics and control are interfaced to a TIU. LAN/WAN should be used between the TIU(s) and the TMS workstation.

17.3 Equipment/schematic

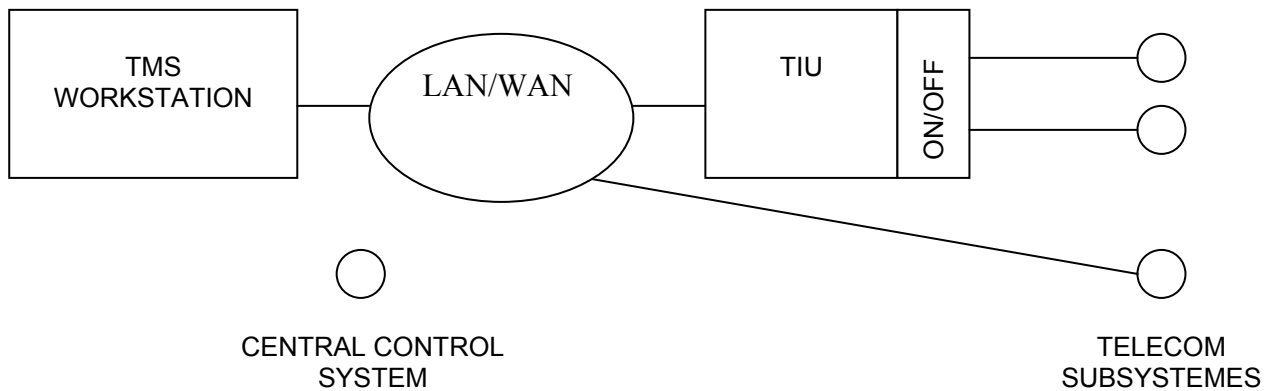


Figure 13a. Equipment/schematic diagram for monitoring only

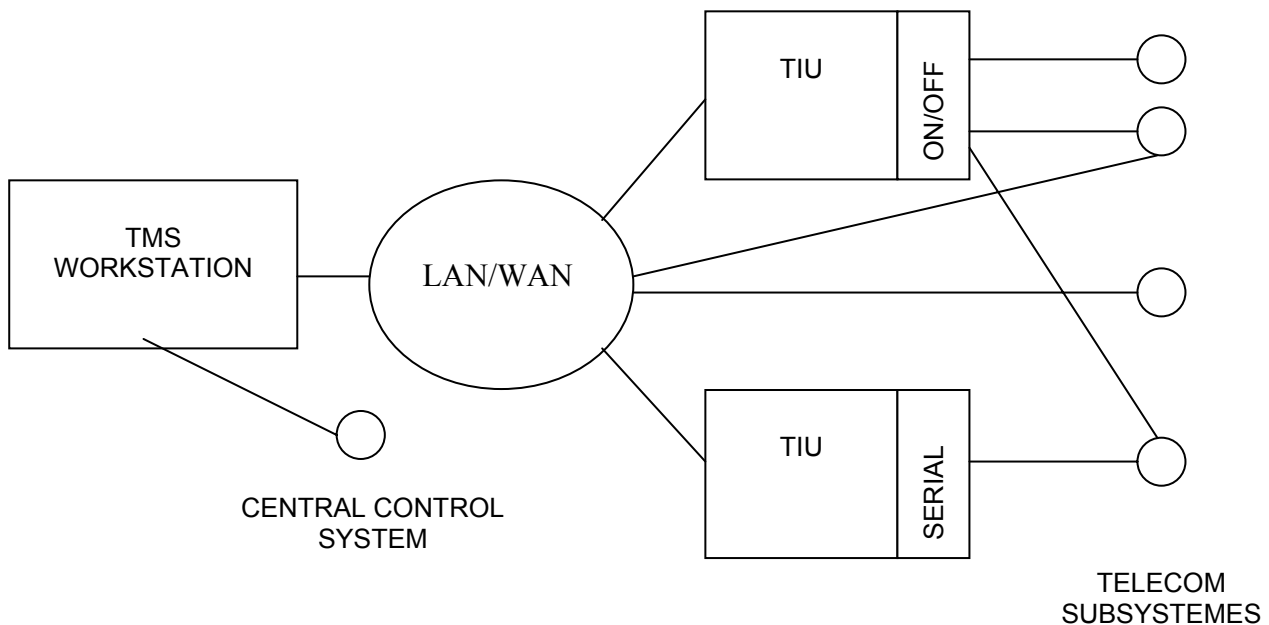


Figure 13b. Equipment/schematic diagram for monitoring, diagnostics and control

Figure 13 - Equipment/schematic diagram

17.4 Reliability

See 4.5.

17.5 Process/ambient conditions

Equipment shall be designed to operate at environmental conditions according to project requirements.

17.6 Operational requirements

17.6.1 System operation

System operation for:

- Monitoring.
- Option: diagnostics and control shall be done from the TMS workstation.

The location of the TMS workstation, the number of workstations or integration with other platform systems is not detailed in this NORSOK standard.

The presentation format and handling of alarms on the TMS workstation is not detailed in this NORSOK standard.

Printing facilities shall be provided.

17.6.2 Operational requirements for monitoring

The TMS shall present an overview of telecom subsystems and other objects that are monitored. The overview shall indicate alarm position.

The TMS shall be designed to receive, process and present alarms/warnings from telecom subsystems:

- Alarms for:
 - Telecom subsystem malfunction.
 - Major/important parts of the system not operating.
 - External conditions affecting systems performance.
- Warnings for:
 - Conditions that may lead to an alarm condition (proactive alerting).
 - Minor parts of the system out of operation.

Note - The meaning of alarms and warnings sent to the TMS will depend on facilities in the telecom subsystems.

Each alarm and warning shall be given a time stamp. Alarms and warnings shall be stored in an event log for minimum one week.

The TMS operator shall be given a signal when the TMS receives an alarm requiring operator attention. The type of signal is not specified in this standard. The function shall be implemented according to the platforms alarm handling philosophy.

Major alarms shall be transmitted to a central control system (like the process control data accusation system). The function shall be implemented according to the platforms alarm handling philosophy.

The specific standard for each telecom subsystem may detail requirements for alarms.

When the telecom subsystems can provide the relevant information to the TMS, the incoming alarms should be groped according to category. Consequence alarms should be suppressed.

17.6.3 Option: Operational requirements for remote diagnostics and control

To be integrated as a part of the TMS, the diagnostics and control software for telecom subsystems should

- Run on the same operating system as for the TMS workstation.
- Use standard functions in the operating system for external connections and information exchange.
- Use protocols that enable information to be transferred via LAN/WAN between the telecom equipment and the TMS workstation.
- Coexist with software from other suppliers.

17.7 Maintenance requirements

The system shall monitor its own functions and give alarms to a central control system if not operational.

17.8 Interface requirements

The following interfaces standards and protocols, or equivalent should be used:

- On/off interface:
On/off potential-free relay contacts
- Serial line standard:
See 4.11
- Protocol over LAN/WAN:
TCP/IP or simple network management protocol

17.9 Telecommunication monitoring system (TMS) workstation requirements

17.9.1 Monitoring

- Operating system: Industry standard.
- Computer platform: Industry standard.
- The required functions for communication with on/off interface TIU.
- The required functions for communication with LAN connected telecom subsystems over LAN/WAN.
- If the monitoring function is stopped due to a software failure, the failing application should be terminated and the monitoring function should be restarted automatically.

17.9.2 Option: Remote diagnostics and control

- The required functions for communication with telecom subsystems via serial interface TIU.
- The required functions for communication with connected telecom subsystems over LAN/WAN.
- The ability to host and run supplier's standard diagnostic software.

17.10 Telecommunication interface unit (TIU) requirements

17.10.1 On/off interface TIU for monitoring

- Industry standard programmable logic controller or equivalent, with the required communication facilities.
- Functions for collection of on/off signals from connected equipment (telecom subsystems).
- Functions for repacking of signals in a form suitable for transmission over LAN/WAN to the TMS workstation.

17.10.2 Option: Serial interface TIU for remote diagnostics and control

- Industry standard terminal server or equivalent, with the required communication facilities.
- The ability to be addressed from a TMS workstation for communication between TMS workstation and telecom subsystem.
- Functions for repacking of signals between serial form and a form suitable for transmission over LAN/WAN to/from TMS workstation.

18 Commissioning requirements

Design shall allow for testing and commissioning of subsystems and individual equipment with minimum disruption of normal operation.

Annex A

(normative)

Detailed operation of the public address alarm (PA) system

A.1 Alarms set automatically by external signals

A.1.1 General alarm (set by the fire and gas system)

1. The general alarm is set and zones are selected by external signals. The corresponding alarm button, the corresponding zone buttons, and the 'Emergency Message' button light up on all operators' panels. The alarm tone is sounded and PA flashing lights are switched on in the selected zones.
2. Press the 'TALK' button to broadcast a message preceded by the emergency message alert signal in the selected zones; the alarm tone is fully muted while the 'TALK' button is held down.
3. Press the 'Cancel' button to bring the system back to normal state.
4. Restart the alarm, if required, by pressing the 'General Alarm' button and relevant zones.

A.1.2. Toxic gas alarm (if applicable)

As for general alarm, except toxic gas alarm is set.

A.2 Alarms set manually from PA/alarm operator's panels

A.2.1 Muster alarm

1. Press the 'Muster Alarm' button.
The muster alarm button lights up on all operator's panels.
All zones are automatically selected, even if a different zone selection was set before.
The 'All Zones' button and the 'Emergency Message' button lights up on all operator's panels.
The alarm tone is sounded and PA flashing lights are switched on in all zones.
2. Press the 'TALK' button to broadcast a message preceded by the emergency message alert signal in all zones.
The alarm tone is fully muted while the 'TALK' button is held down.
3. Press the 'Cancel' button to cancel the alarm and bring the system back to normal.

A.2.2 General alarm

1. Select relevant zones (required only if different from all zones, since all zones are automatically selected if no zone buttons have been pressed). The corresponding zone buttons light up on all operator's panels.
2. Press the 'General Alarm' button.
The 'General Alarm' button and the 'Emergency Message' button light up on all operator's panels. The alarm tone is sounded and PA flashing lights are switched on in the selected zones.
3. Press the 'TALK' button to broadcast a message preceded by the emergency message alert signal in the selected zones. The alarm tone is fully muted while the 'TALK' button is held down.
4. Press the 'Cancel' button to cancel the alarm and bring the system back to normal.

A.3 Voice messages

A.3.1 Emergency message

1. Press relevant zone buttons.
Corresponding zone buttons light up on all operators panels (all zones except cabins are automatically selected if no zone buttons are operated).
2. Press the 'Emergency Message' button.
The 'Emergency Message' button light up on all operator's panels. PA flashing lights are switched on in the selected zones.
3. Press the 'TALK' button to broadcast a message preceded by the emergency message alert signal in the selected zones.
4. Press the 'Cancel' button to bring the system back to normal.

A.3.2 Normal message

Press relevant zone buttons (except the 'All Zones' button).

Corresponding zone buttons light up on all operators panels (all zones except cabins are automatically selected if no zone buttons are operated).

A.4 Detailed description

A.4.1 The 'Emergency Message' button

The 'Emergency Message' button automatically lights up, and subsequent voice messages are automatically preceded by the emergency message alert signal after the 'All Zones' button has been pressed and until the 'Cancel' button is pressed.

A.4.2 The 'TALK' button

The 'TALK' button shall light up on all operators panels when held down on one panel

A.4.3 Cancellation of alarms/emergency message

Press the 'Cancel' button. It shall be possible to reset the system from any alarm access panel regardless of where the alarm/emergency message was initiated.

A.4.4 Automatic return to default zone selection

Alarm automatically selected:

5 s after the external signals change to normal.

Alarm manually selected:

5 s after the alarm is cancelled.

'Emergency Message' button pressed, no alarm set:

When emergency message is cancelled.

'All Zones' button pressed:

When the 'All Zones' button is pressed again or when Emergency Message is cancelled.

Zone button different from 'All Zones' button pressed:

When the zone button is pressed again or 5 s after the talk button is released.

A.4.5 Multiple platform installations

For multiple platform installations, several 'All Zones' buttons may be required.

Annex B (informative)

Typical layout of public address and alarm (PA) system operator's panels

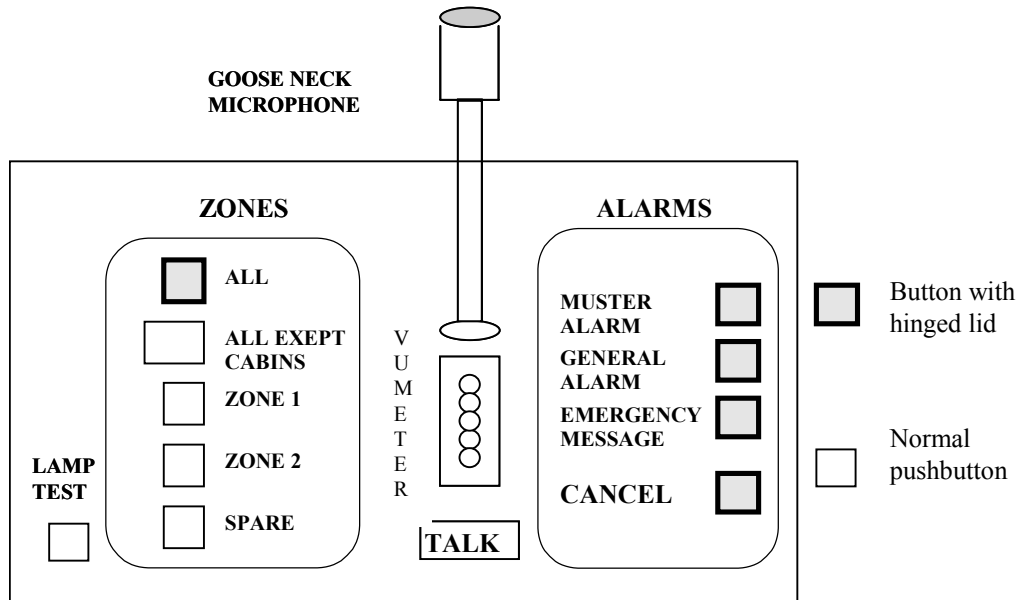


Figure B.1 - Operator's panel with PA and ALARM functions

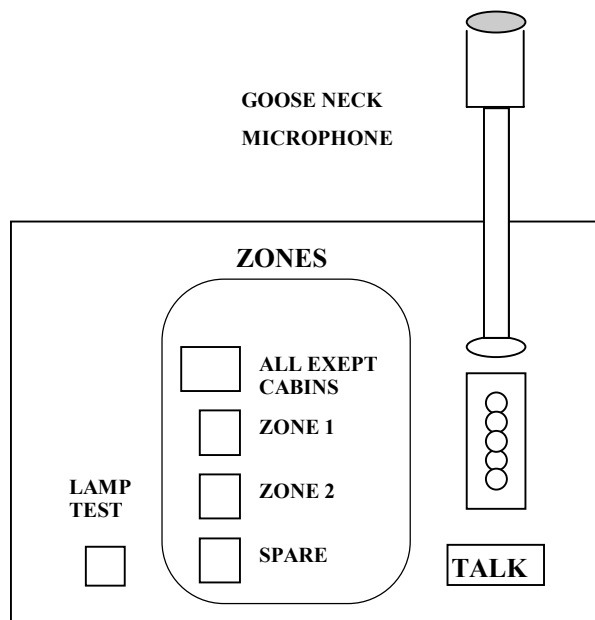


Figure B.2 - Operator's panel with PA function only

Annex C
(informative)
System 24 – Office data and telephone cabling network

Table C.1 - Connection standard for cables to the NS-ISO 8877 (RJ 45)

Pair no./part	Colour code	NS-ISO 8877 pin no
1/a	White/Blue	5
1/b	Blue	4
2/a	White/Orange	1
2/b	Orange	2
3/a	White/Green	3
3/b	Green	6
4/a	White/Brown	7
4/b	Brown	8

Annex D (normative)

System 41 - Mandatory radio (GMDSS) and general radio

Equipment summary for the different sea areas.

Depending of sea area, the following minimum equipment is required:

Equipment	A1	A2 ^a	A3 ^a	A4 ^a	Note
VHF-Transceiver	1	1	2	2	
VHF-DSC En-/decoder	1	1	1	1	
VHF-DSC Watch receiver	1	1	1	1	
MF/HF transmitter			1	1	
MF/HF receiver			1	1	
HF-DSC Watch receiver			1	1	
MF Transceiver		1			
MF DSC En-/decoder		1			
MF-DSC Watch receiver	1	1			
Radiotelex			1	1	May be replaced by Inmarsat ship earth station in A3
Inmarsat C transceiver			2	2	
Enhanced group calling receiver			2	2	
NAVTEX receiver	1	1	1	1	May be omitted if platform is part of a larger field
Emergency light	1	1	1	1	
Aeromobile VHF/AM radios, Fixed	1	1	1	1	
Aeromobile VHF/AM radios, Portable	2	2	2	2	
Handheld GMDSS VHF	2	2	2	2	
Radar transponder	2	2	2	2	
Float free emergency position indicating radio beacon	1	1	1	1	
Global positioning system (GPS)	1	1	1	1	

^a For fixed installations with main communication system arranged according to NPD regulations, column A2, A3 and A4 will be irrelevant.

