

Telecom subsystems

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Standards Norway
Strandveien 18, P.O. Box 242
N-1326 Lysaker
NORWAY

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Telephone: + 47 67 83 86 00
Fax: + 47 67 83 86 01
Email: petroleum@standard.no
Website: www.standard.no/petroleum



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Foreword

The NORSOK standards are developed by the Norwegian petroleum industry to ensure adequate safety, value adding and cost effectiveness for petroleum industry developments and operations. Furthermore, NORSOK standards are as far as possible intended to replace oil company specifications and serve as references in the authorities' regulations.

The NORSOK standards are normally based on recognised international standards, adding the provisions deemed necessary to fill the broad needs of the Norwegian petroleum industry. Where relevant, NORSOK standards will be used to provide the Norwegian industry input to the international standardisation process. Subject to development and publication of international standards, the relevant NORSOK standard will be withdrawn.

The NORSOK standards are developed according to the consensus principle generally applicable 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

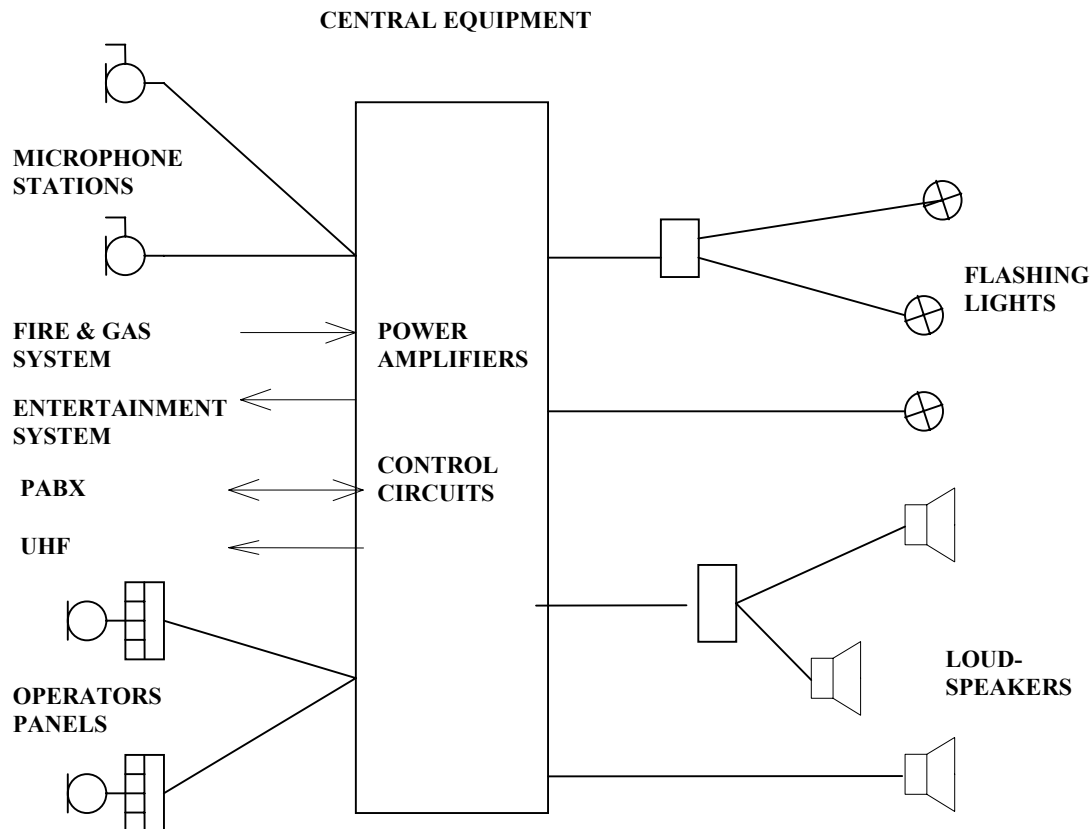


Figure 1 - PA system

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

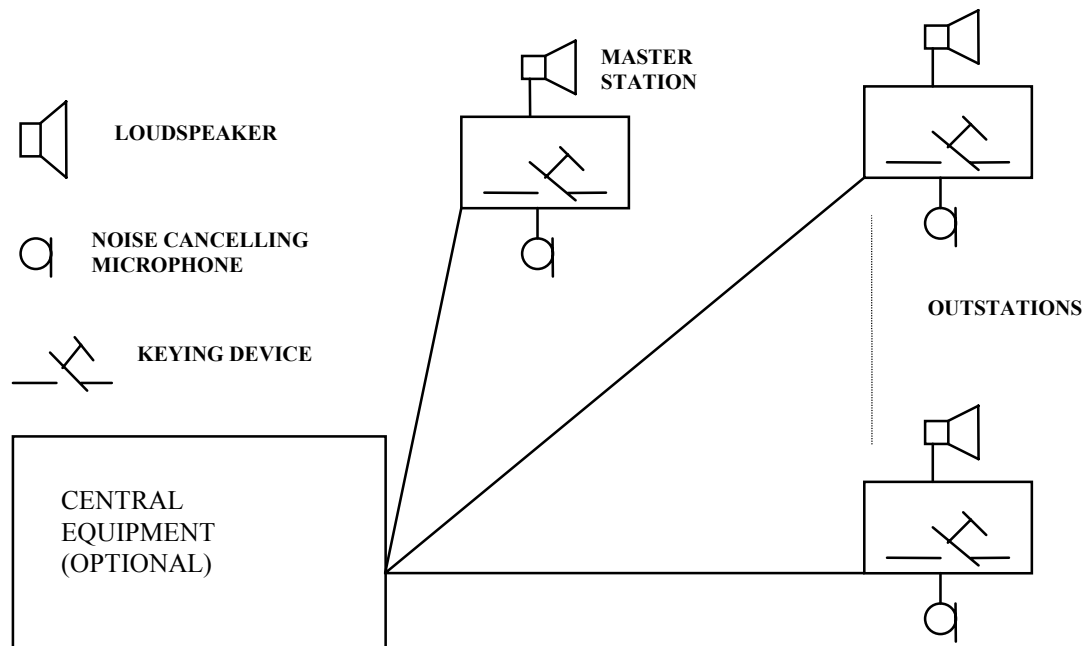


Figure 2 - Drillers intercom system

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).