

ICT ENGINEERING

REHABILITATION OF THE SAUDI MATERNITY HOSPITAL

KASSALA HEALTH CITADEL, SUDAN

DETAILED DESIGN

TECHNICAL CONDITIONS

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1. INFORMATION & COMMUNICATIONS TECHNOLOGY (ITC)

1.1. GENERAL DESCRIPTION

The voice and data network proposal comprises a structured cabling system that provides voice communication lines and data seamlessly to various locations.

The network will have a star configuration originating from the existing rack, until outlets.

The solution will provide users of all types of today IP services, or as much as this time is predictable, future ones.

The cable provided exceeds the standards of Category 6 UTP, supporting higher information speeds with much more favorable "cross-talk" rates.

The sockets are flush mount on the wall, technical trunk and pavement boxes.

The IT infrastructure will consist generally of:

- Campus Backbone Cabling Subsystem;
- Backbone Cabling Subsystem (Building);
- Structured Cabling Infrastructure (Fibre Optic/Data/Voice Cabling, Cabinets, Hardware, etc.);
- Satellite Master Antenna Television System (SMATV);
- Nurse Call System;
- Electronic Safety and Security: Fire Safety detection and alarm System; Closed Circuit Television (CCTV).

1.2. SCOPE OF REQUIREMENT

The word "installation" shall mean not only the major items of plant and apparatus conveyed by this Specification and the Contract, but also all the incidental sundry components necessary for the complete execution of the work and for the proper operation of the installation, with their labour charges, regardless whether these sundry components are mentioned in detail in the tender documents issued in connection with the Contract.

1.3. ENTRANCE FACILITY

Entrance facility (EF), Meet-Me Room (MMR), otherwise known as ENI (External Network Interface) or MDA (Main Distribution Area), is a relatively small but very important space inside a data center where internet service providers, telecommunications carriers, cable companies, etc. converge to interconnect¹ or cross-connect² with one another and exchange data before distribution of services to other areas of the building/complex.

1.3.1. LEAD-IN DUCTS

The lead-in ducts will be for the exclusive use of Operators.

The lead-in duct specifications are as follows:

- made from black uPVC
- Upmost part of ducts must be buried to a depth of 600mm below finished ground level
- clearly marked above ground level for easy location
- sloping away from the building
- protected by concrete when running under permanent paved surfaces
- sealed at each end to prevent the ingress of any materials such as water, sub-soil, gas, and pests
- an entry/pull box must be installed for any right-angled or sharp bends in the lead-in duct route
- if required at the entry to the main telecom room, a wide-angle long radius bend (factory made) may be provided; alternatively an entry box may also be provided.

1.3.2. ENTRY BOX

Entry boxes are required for the Operators to install their cables through the main duct inside the plot.

Entry boxes must be included wherever the duct system has right-angle or sharp bends where there are other factors that might restrict cable pulling

The following specifications must be followed:

- Constructed of reinforced concrete;
- Fitted with a ductile iron frame and cover;
- Minimum load rating 400 kN;
- Cover to be marked 'Telecoms'.

1.3.3. BUILDINGS ENTRY

Where lead-in ducts cannot be routed directly into the main telecom room, Hot-Dip Galvanized (HDG) slotted steel cable trays must be provided as an alternative. These trays must be easily accessible in common areas to facilitate any future provision of additional cables. However, if these trays are in an area accessible to the public and are less than 4.8m above the floor then the trays must be covered.

1.4. TELECOMMUNICATIONS ROOMS

A number of telecom rooms will be required in a building depending on its characteristics. The following room types are required and the details of these rooms shown below:

- Main telecom room;
- Floor telecom closet.

Telecom rooms must not be in close proximity to any sources of the following:

- Heat;
- Moisture;
- corrosive atmospheric or environmental conditions;
- high voltages;
- radio frequency interference (RFI);
- electro-magnetic interference (EMI);

The rooms must not be directly beneath or next to wet areas such as:

- Showers;
- Washrooms;
- Swimming pools;
- Garbage area.

The rooms should be clean and free from any items not directly related to the specifications in this document such as:

- Non-du equipment;
- Utility pipes;
- Sprinkler systems;
- Windows.

All telecom spaces and pathways must be pest controlled using best available practices. It should be noted

that rodents often gnaw cables resulting in damage and the potential for service disruption.

Hence, special attention should be given to preventing rodents from entering telecom spaces and pathways. This could involve the installation of covers to cable trays; if this is the case these covers must be removable to allow for the installation of additional cables.

The walls, floor, and ceiling should be painted and treated with anti-dust and anti-static coating to minimize dust and static electricity. Walls and ceilings shall receive primer and finish coat of light colour paint.

1.4.1. TEMPERATURE AND HUMIDITY

All telecom rooms must be maintained at $20^{\circ}\text{C} \pm 3^{\circ}\text{C}$ and the relative humidity at $50\% \pm 10\%$. However, floor telecom closets can be maintained within 20°C to 30°C temperature range.

1.5. BUILDING BACKBONE-MULTI-MODE

All multi-mode indoor distribution fiber optic cables shall have a LSZH sheath construction meeting IEC 60332-3-24c (flammability), having an IEC 61034 (Smoke Generation) rating of 0 and an IEC 60754-1 (halogen content) of zero.

Belden/CDT LSZH - 50/125 μm OM 3.

This is a dry loose tube construction cable containing between 4 and 24 fibers with 2 embedded FRP strength members and a LSZH sheath.

The core size and count of the fiber will generally be specified in a detailed design statement but in the absence of this information 24 Cores will be used.

1.6. HORIZONTAL DISTRIBUTION

Horizontal distribution systems comprise of two general sections, pathways and spaces and cabling systems.

Pathways and spaces are used to contain, support, distribute and provide access to the horizontal cabling from a telecommunications room (TR) to the work area (WA).

- Pathways and spaces include:

- Physical pathways such as conduit, tray and trunking etc.
- Non-physical pathways such as the space between open cable supports.
- Transition and consolidation points.

Horizontal cabling systems are the means by which signals are transmitted between the work area (WA) and the floor distributor (FD) in the telecommunications room (TR), i.e. the cables and connectors.

Horizontal cabling systems include:

- Telecommunications outlets in the work area and/or MUTOA's
- One optional consolidation point.
- Horizontal cable.
- Mechanical terminations.
- Patch cords used to configure horizontal cable connections that comprise the floor distributor.

1.7. HORIZONTAL PATHWAYS AND SPACES

The design of the horizontal containment system or pathways and spaces should take into account the following considerations:

- Allow for potential future growth.
- Provide suitable protection for the cables in the pathway environment.
- Provide a neat and serviceable appearance when in visible locations.
- Accommodate future additional containment.
- Provide as much protection from EMI as practicable.
- As a general rule of thumb all containment systems shall be designed with 50% expansion capacity.

1.8. SIZING

The sizing of pathway systems can generally be determined from the manufacturer guidelines, governing fill factors and weight considerations. These should be closely studied as part of the design process.

UTP and FTP are generally 4-6mm in diameter, 4-core indoor fibre cable 3-6mm and STP 8-11mm

depending on manufacturer.

Sizing of tray and conduit is a complicated task and manufacturer's guidelines should be followed. Fill calculation depend on the number and diameter of cables.

- However, for information purposes ONLY, the following simple guidelines can be followed:
- Conduits, where 1 cable is installed the max fill ratio is 53%, 2 cables is 31% and 3 or more cables 40%.
- 20mm conduit. No more than 2 x CAT6 telecommunications cables to be installed.
- 25mm conduit, No more than 4 x CAT6 telecommunications cables to be installed.
- 32mm conduit, No more than 8 x CAT6 telecommunications cables to be installed.
- Basket tray, 50% fill ratio is allowed for open cable tray.
- Each 90 degree bend reduces the conduit capacity by 15%, gusset or fillet bends are required on all bends exceeding 45 degrees radius

1.9. PASSIVE EQUIPMENT

Based on the guiding principles set out in the network description made in the specification in this section will be presented, passive equipment and cabling specifications needed to run the network.

It is considered passive equipment the tube infrastructure, boxes, and cables, racks equipped with patch panels (existing), outlets and RJ45 patching lashes.

1.9.1. COMMUNICATIONS CABINETS

Generally, all new CRs (19" Racks) will be fitted with open frames as detailed above. However in certain installations, residential buildings for instance, there may be a need to install floor standing cabinets to house horizontal and backbone cabling, active equipment and environmental monitoring devices. Where a cabinet is detailed to be installed, its specification will usually be detailed in the scope of works, but will generally have the following components:

- Heavy duty castors;
- 19" front mounting verts;
- Vented top cover;
- Fan Tray;

- 6 way PDU fitted with 13amp IEC plug;
- Locking front and rear doors;
- Locking side panels.

Power Supply:

A 16 amp command socket should be installed for each communications cabinet installed, unless otherwise specified. The socket should be located either to the rear or side of the cabinet position.

The supply must be fed from its own dedicated radial circuit.

Earthing the cabinet:

Where a communications cabinet is not installed in a dedicated CR, where Earthing arrangements are already detailed. A separate 16mm CSA earth will be installed from the main building incoming location, to either a TMGB or TGB located either behind or to the side of the communications cabinet.

1.9.2. CAT6 COPPER CABLES

To deliver services from the consolidation points to the building outlets, unshielded twisted pair (UTP) copper cables must be provided. The complete design of this service is the responsibility of the building developer. However, the following minimum requirements must be followed for the efficient and effective provision of services:

- the cables must conform to a minimum of CAT6 specification (Category 6, 100 Ohm, 4pair 24 AWG as specified in ANSI/TIA/EIA 568-B.2 Addendum 1);
- the wiring must be in a 'star' topology fanning out from the consolidation point;
- dual RJ45 outlets with spring load sliding shutters must be provided wherever service is required (all outlets should comply with the performance specifications as detailed in ANSI/TIA/EIA 568-B.2 Addendum 6);
- each socket in the dual RJ45 outlet must be wired back to the consolidation point;
- outlets must not be cascaded or looped and there must be no splitting of cable pairs;
- the maximum cable length from consolidation point to outlet must not exceed 90m;
- at the consolidation point the cables should be terminated on an RJ45 patch panel and labeled with

the socket and outlet served;

- in each outlet the cable must be terminated to maintain the twists in each pair up to within 5mm of the termination;
- proper strain relief should be provided at the terminated ends of the cable;
- the components of the CAT6 system must be from the same supplier or at least compatible to insure maximum performance;
- design should incorporate built-in flexibility to meet the growing needs of the occupants;
- the CAT6 cabling system must be tested using an appropriate field test instrument for compliance with ANSI/TIA/EIA 568-B.2 Category 6 (or equivalent if a higher specification has been used);
- Numbering and colouring of the pairs should be as defined in EIA/TIA 568B, ISO 11801/EN50173 using the T568B option.

Reference equipment: Belden / CAT6 UTP LSZH, or equivalent.

1.9.3. RJ45 SOCKETS

The RJ45 sockets, category (level) 6A, shall have the following characteristics:

- Sockets for RJ45 jacks (ISO 8877) for 8 conductors;
- frame for installation in PVC boxes embedded in the wall;
- NEXT (Near End Crosstalk) at least 40 dB at 100 MHz between all combinations of conductive contacts;
- Toolless contacts for eight conductors with color coded identification of conductors and connections;
- Sockets support in plastic, with contacts protective cap, allowing space for the respective identification.

The jack CAT.6A UTP guarantees performances in accordance with standard Cat 6A UTP. Must be compliant with cabling standards and with the clips and frames in use.

Reference equipment: BELDEN/CDT or BRAND-REX, or equivalent.

1.9.4. PATCH CORDS

Voice:

Green RJ45-RJ45 Category 6A patch cords with moulded boots are used for voice patching. Retained companies shall provide one patch cord for each voice pair of a suitable length for patching within the frame or cabinet that the panel is installed into.

Red RJ45-RJ45 Category 6A patch cords with moulded boots are used for VOIP patching. Retained companies shall provide one patch cord for each voice pair of a suitable length for patching within the frame or cabinet that the panel is installed into.

Telecommunication Cabling Specification.

Category 6A Patch Cords:

Patch cords used for patching within TR's shall be Grey and from the BELDEN/CDT PS 6A range, RJ-45 to RJ-45. Or BRAND-REX RJ-45 to RJ-45

One patch cord shall be supplied for each RJ-45 panel outlet installed of 2mtr in length unless otherwise specified.

Fiber Optic:

Fiber optic patch cords will normally be defined in the detailed design statement. However, in the absence of this each duplex SC connector presented on a patch panel shall be provided with a 3m SC-SC (duplex) patch cord colored orange for multi-mode ports and yellow for single mode ports.

Fiber patch cords shall be either from BELDEN/CDT or BRAND-REX, or equivalent.

1.9.5. BACK BOXES

Standard PVC back boxes for surface or recessed mounting shall be used; either double or single gang depending on the project requirements.

In order to provide as much internal space as possible, as a minimum 32mm back boxes shall be used. The use of extension collars are not permitted, unless the outlets are being installed in existing containment which 32mm back boxes cannot be fitted.

Perimeter trunking will require back boxes to be selected from the relevant manufacturer's product portfolio and spacing collars may be required in order to support the maximum allowed bend radius of the installed cable.

In general back boxes shall be fitted at the same height as existing outlets or power sockets but in a new

installation the bottom of the outlet shall be installed no less than 375mm from the floor & within 100mm of a 220AC Power socket.

1.10. IDENTIFICATION

1.10.1. CABLE IDENTIFICATION

It is envisaged the use of identifiers marker Legrand Duplix type, or equivalent.

All cables to be used in the installation are identified at the two ends and each 12 meters along its length.

In case of failure, for example in the case of cables intubated, cable marking shall be clearly identified in the frame of the terminal equipment.

In the case of complete failure will be confirmed with the Authority or the Employer the possibility to register directly on the cable, with indelible ink, non-aggressive for the isolation, the code assigned to this cable.

1.10.2. BOXES AND SOCKETS IDENTIFICATION

The boxes and outlets identification shall be made by plastic labels stickers, of very good quality, preferably with black background and characters embossed white.

In the case of boxes, shall be used "traffolyte" labels with black background and engraved white characters.

If the frames have to provide label holders, label can be used on paper to introduce in the label holder.

If there are no label holders, can be used adhesive plastic labels, DYMO type of TESA (3M), or equivalent.

1.11. INSTALLATION

1.11.1. TWISTED PAIR CABLE

Twisted pair cable is susceptible to excessive pulling tensions and therefore the manufacturers specified pulling tensions shall be carefully adhered to. It is noted that it is very difficult to accurately measure pulling tensions in the field but approximation can be made. The maximum pulling tension of a typical twisted pair cable is 111n or about 25lb. Cables shall not be pulled through more than 2, 90-degree conduit bends without using a pull box, slip sleeve or other similar space. Round conduit (besa) boxes are not to be used under any circumstances. When pulling twisted pair cables the maximum bend radius is 8x the outside

diameter and when installed the maximum bend radius shall be 4x the cables outside diameter. (Consult manufacturer's guidelines).

Care shall be taken to ensure that during installation cable is protected from other trades and water ingress. If any cable is found to be damaged either during or post installation, the cable shall be replaced.

Care shall also be taken when pulling cables around corners etc. to ensure that no undue stresses are placed on the cable.

The installation of TP cables should be in general, performed in accordance with the following principles:

- The cable must be connected without interruption, amendments or derivations, and RJ45 jacks panels passive existing on the racks;
- The cable length should not exceed 100 meters;
- It should be ensured by the isolation physical separation of TP cables over power cables;
- The cables will be identified clearly and indelibly marked with the identification number of the rack and the outlet corresponding to the ends and branch points;
- The cables shall be secured at regular intervals in order to decrease the effort of traction;
- The passage of cables should be done with caution in order to avoid the folds that may cause the decrease of the electrical properties of the cable;
- The connection of TP cables to jacks and patch panels should be performed according to standard EIA 258A.

1.11.2. ELECTRICAL SEGREGATION

The minimum segregation distance between unscreened electrical and unscreened telecommunication cables shall be 75mm (minimum); this applies to telecommunication cables of up to 90m total length and up to 10 240V AC, 20amp, 50/60Hz single-phase circuits.

A single three phase 415V AC circuit would account for three of the power cables as defined above.

A minimum of 130mm separation from fluorescent lights shall be maintained.

Where power and data cables cross they shall use a 'bridge' data cables on top and cross at 90 degrees.

1.11.3. TIES, WRAPS AND GROMMETS

Nylon/Plastic tie wraps cannot be used to secure bundles of CAT6 cables. This includes during the installation phase of the telecommunications cabling. Velcro cinch ties or wraps shall be used. Care shall be taken to ensure that cables are not damaged due to over tightening.

Cables shall be secured in bundles of no more than 24 in all cases.

Specifically, when cables are contained in horizontal basket tray they shall be loose laid except at any change of direction where they shall be tied in bundles of no more 24 cables and secured to the basket.

When contained vertically on any type of cable tray they, shall be tied in bundles of no more than 24 cables at appropriate distances.

Where cables enter metal boxes, ducts or through similar apertures then the edges shall be covered with suitable grommet edge or circular grommets.

1.11.4. CABLE DRESSING

It is understandable to equate absolutely parallel and neat cable dressing with 'good' installation practice, however given the installation constraints of high performance cable systems a degree of non- uniform cable dressing when in open containment systems is preferable.

Wherever possible cable shall be laid in rather than pulled.

1.11.5. RJ45 SOCKET

The RJ45 sockets should be installed the following principles:

- The lock groove of RJ45 female plug should be placed from the bottom (in this position the pin 1 is the leftmost);
- They should be numbered in a conspicuous place provided for that purpose, following the specification in Annex B;
- The TP cable connection must be made according EIA 258A.

1.12. TESTING AND CERTIFICATION

Materials and equipment to be installed should verify the following requirements:

- Be approved by Libyan standards or, failing that, by international standards;

- Being in a state of new and conform to the specifications given;
- Checking after installation, the correct operation of all equipment and materials installed, through tests to be in the building and should be accompanied by representatives of the Authority or the Employer;
- In the case of wires shall be performed category 6 certification of all new installed components (sockets, cables and panels), and the results of the certification organized file. In the case of partial removal of the network is required to provide the results of the certification party involved, before being placed in a production environment;

2. NURSE CALL SYSTEM

2.1. GENERAL DESCRIPTION

This performance specification provides the minimum requirements for a supervised audio-visual Voice over IP-based Nurse Call System. The System shall include, but not be limited to all equipment, materials, labour, documentation, and services necessary to furnish and install a complete, operational Voice over IP-based Nurse Call System. The System shall have full duplex audio as well as "push to talk" control for high-noise areas. The System shall comply in all respects with all pertinent codes, rules, regulations, and laws of the hospital authority and local jurisdiction.

The System shall support networking of systems to a single integrated platform for:

- Wireless communications system(s)
- Reporting Database
- ADT Integration
- Wireless Asset and Staff Locating
- PC Staff Console (List View and Floorplan view) applications
- Patient/Staff Assignments
- Automatic/Manual Messaging

It is further intended that upon completion of this work, the Owner be provided with complete information and drawings describing and depicting the entire System(s) as installed, including all information necessary for maintaining, troubleshooting, and/or expanding the System(s) at a future date, and complete documentation of System(s) testing.

2.2. MANUFACTURER

All equipment and components shall be the Manufacturer's current model. The materials, appliances, equipment, and devices shall be tested and listed by a nationally recognized approval agency for use as part of a Nurse Call System. The Manufacturer's representative shall be responsible for the satisfactory installation of the complete System.

The Contractor shall provide, from the acceptable Manufacturer's current product lines, equipment and components, which comply, with the requirements of these specifications. Equipment or components, which do not provide the performance and features required by these specifications, are not acceptable, regardless of manufacturer.

The Manufacturer of the System equipment shall maintain quality system processes for the design, manufacture, and distribution of all products specified in this document. These processes shall be monitored under a quality assurance program that meets ISO 13485 and U.S. FDA Quality System Regulations. The Manufacturer shall have the financial stability to provide project financing/lease options to the Owner if desired.

All System components shall be the catalogued products of a single Supplier. All products shall be listed by the Manufacturer for their intended purpose. Ascom Patient Systems products constitute the minimum type and quality of equipment to be installed.

All connected field electronics shall be both designed and manufactured by the same company, and shall be tested to ensure that a fully functioning System is designed and installed. The IP-based Nurse Call System shall utilize Ethernet topology, switches, gateways, and devices. These devices shall make up a nurse call LAN/WAN. The Nurse Call System shall be FDA Registered, Class II, 510(k) exempt.

2.3. NETWORK EQUIPMENT

All control equipment shall be IP-based, utilizing IP Switches and gateways for connection to room devices. These devices shall make up Nurse Call LAN/WAN. The controller equipment shall mount in a standard 19" rack to be shared with the facility's IT equipment or shall mount in an independent rack. The IP switches and gateways shall have power supplies to support all field devices internally. Systems using a proprietary enclosure/card cage for central equipment and/or requiring power supplies apart from the control equipment shall not be accepted.

IP Switches shall be networked, allowing all units/floors of a facility to connect as a single System. Each nurse call system shall connect to the hospital's network via a software bridge that isolates the hospital network from the nurse call network. This connection will provide connectivity to supplemental features such as display screens, an ADT system, wireless telephones, pocket pagers, wireless Voice over IP devices, and a reporting database.

2.4. DIAGRAM

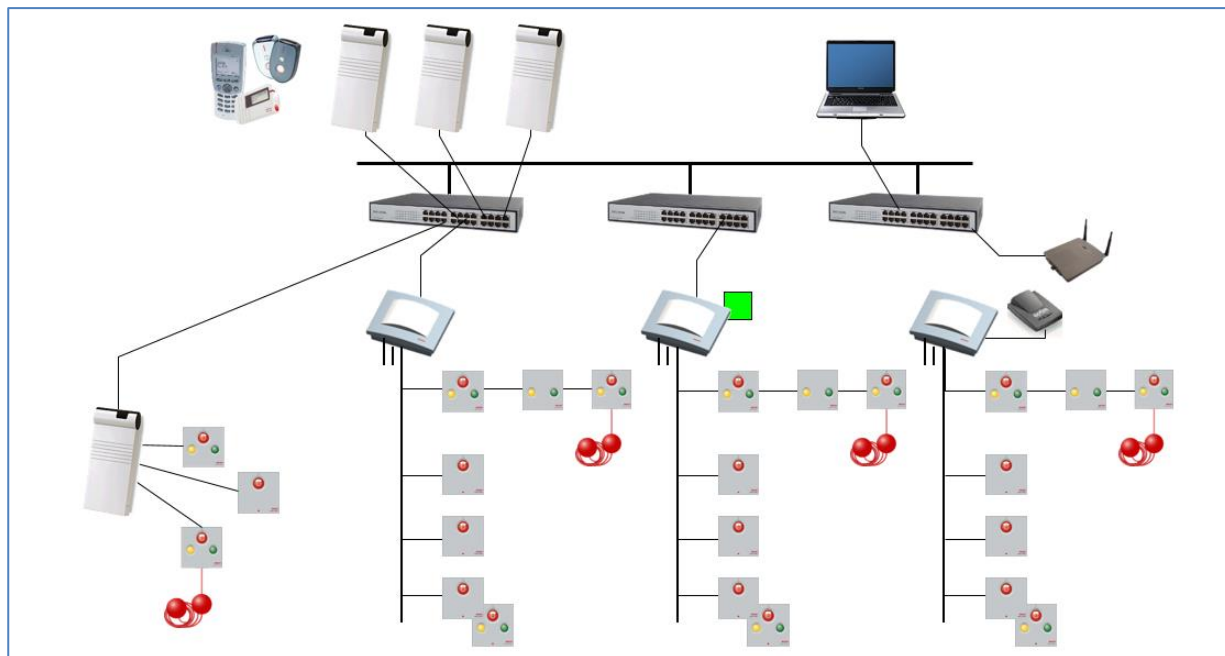


Figure 1 - NCS generic diagram

2.5. EQUIPMENTS




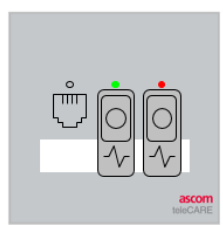
RFID card reader	Water resistant pullcord IP-X4	Corridor display	Multiple medical alarm module
			
<ul style="list-style-type: none"> ▪ Mifare RFID technology ▪ Nurse presence with ID ▪ Simple access control ▪ Relays output ▪ Door status input ▪ Unite openness 	<ul style="list-style-type: none"> ▪ Pullcord for wet area's ▪ IP-X4 specification ▪ Available for tC IP & M 	<ul style="list-style-type: none"> ▪ IP based LED display ▪ Single and double sided ▪ Calls & nurse presence 	<ul style="list-style-type: none"> ▪ 3/4 safe release inputs ▪ Local signaling ▪ SMA philosophy based ▪ Alarm priority settable ▪ Active type (individual) ▪ Passive type (parallel)

Figure 2 - NCS equipments

3. FIRE AND COMBUSTIBLE GAS DETECTION SYSTEM

3.1. FIRE ALARM AND DETECTION SYSTEM

3.1.1. CONTROL UNIT

The control unit shall be a compact 4 zone, simple to use and flexible compatible with conventional detectors.

Detection:

- Each line programmable for current limited or noncurrent limited operation
- Detectors and call points on same line with functional differentiation (where allowed)
- Intrinsically safe detectors via line coupler DC1192 and safety barrier SB3
- Each line programmable for non-latch function and/or technical alarms
- Line continuity with diode bases according to British Standard

Inputs / Outputs:

- Dry contacts for general alarm and fault
- 3 common control outputs
- 2 monitored control lines 24 V/500 mA for horns, flash lights, and external remote transmission.
- 2 fire control relays, rated 10 A/250 V
- Driver outputs per detector line
- 3 control inputs (1 programmable)

PMI:

Individual indicator labeling with inscription stripe sets in various languages

Individual zone isolate/test buttons for clear and easy user operation

Commissioning:

Basic functions that can be adapted on-site if required without laptop

Technical Data:

- Supply voltage AC 115/230 V, +10 %/–15 %, 50/60 Hz
- Power consumption 13 ... 25 VA

– Quiescent current	80mA
– Emergency power operating	... 72 h
– Outputs	
– Dry contact Alarm	30 V/1 A, NO/NC
– Dry contact Fault	30 V/1 A, NO/NC
– Fire control relays (2)	250 V/10 A, NO
– Monitored control lines (2)	24 V/500 mA
– Driver outputs (5 or 7)	24 V/40 mA
– Control inputs (3)	Positive potential via dry contact
– Operating temperature	0 ... +50 °C
– Storage temperature	–20 ... +60 °C
– Humidity (no condensation permitted)	
– at T = 25 ±3 °C	≥95 % rel.
– at T = 40 ±2 °C	93 % rel.
– Cabinet	
– Dimensions (W x H x D)	370 x 286 x 90 mm
– Color cover	white, RAL 9003
– Protection category (IEC 60529)	IP40
– Standards	EN 54-2, EN 54-4

Reference equipment: Infrasecur / Siemens, model FC1004-A or equivalent.

3.1.2. OPTICAL SMOKE DETECTOR

Optical smoke detector for early detection of smoke generated by flames and slow combustion fires. Addressable.

The detectors shall be in accordance with EN54-7 and quality ISO9002 and EN29002.

Sensor should operate on the principle of light dispersion. The sample chamber opto-electronics, should avoid light interference of other sources, effectively detecting dark or clear smoke particles.

Should be possible to select the detection behaviour by choosing two levels of sensitivity, robust and sensitive

Detectors shall have a low profile design, white (RAL9010), and in its construction shall not have any moving parts or contaminants materials of any type.

Should provide immunity to mobile radio electrical characteristic phenomena, paging systems or similar, resisting fields to 50V / m (rather than the norm IEC 1000-4-3), protection of electrical discharges to 2kV peak values (rather than IEC 1000 - 4-4) and resistance to electrostatic discharges up to 8 kV (better than IEC 1000-4-2).

Must be applied over bases protruding interchangeable in the same series.

Technical Data:

– Communication Protocol	Collective / Conventional
– Operation Voltage	16... 28 VDC
– Quiescent current	~100 µA
– Alarm indicator	2 maxim
– Operating temperature	-10... +50 °C
– Storage temperature	-30... +70 °C
– Humidity	≤ 95%
– Protection category	IP40
– Color	White (RAL 9010)
– Standard	EN54-7, EN54-17, EN 54-5, CEA4021
– Dimensions (Ø x H)	117 x 56 mm (including base)

Reference equipment: Infrasecur / Siemens, model OP110, or equivalent.

3.1.3. DETECTOR BASE

The universal base for conventional detectors installation allows the use of various electrical accessories for easy installation in sight tube or embedded wiring.

The bases shall conform to EN54 and quality ISO9002 and EN29002.

Shall be constructed in ABS plastic, white (RAL9010), for understated design and surface mounting.

All connections should be implemented within the base carried out by clamping the terminal block.

Technical Data:

– Terminals	0,2... 1,6 mm ²
– Dimensions	117 x 23 mm 120 x 25mm (BA720)
– Color	White (RAL9010)

Reference equipment: Infrasecur / Siemens, model DB110 / BA720, or equivalent.

3.1.4. CONVENTIONAL MANUAL CALL POINTS**Technical data:**

– Communication Protocol	Conventional
– Operating voltage	16... 28 VDC
– Max. current permanent	60 mA
– Max. current pulsating	100 mA
– Operating temperature	-25... +70 °C
– Storage temperature	-30... +75 °C
– Terminal block	0.28... 1.5 mm ²
– Color red,	~RAL 3000
– Protection category EN60529 / IEC529	IP44
– Standard	EN54-11
– Approvals	
– VdS	G209148
– LPCB	126as/01 / 126as/02
– 126as/05 / 126as/06	
– QS Standard	Siemens Standard SN 36350

Reference equipment: Infrasecur / Siemens, model FDM1101-RP+FDMH295-R, or equivalent.

3.1.5. INPUT / OUTPUT MODULES

Input / output modules shall comply with the requirements of and be approved to EN54-17 and for the VdS interface for extinguishing activating devices. Input / output modules should connect directly to the loop and not require further power supply connections. Each input / output module shall take one address but

have four separate programmable inputs and four separate programmable outputs. Input / output modules shall additionally include:

- Integral short circuit isolator.
- Alarm response indicator.
- Facility for adding additional protective flap.
- Wireless communication device to facilitate testing; enable readout of current status and wiring diagnostics.
- Operating temperature: -25°C to + 70°C
- An EMC Compatibility of at least 50V/m
- Ingress protection of at least IP44 (IP64 with protection seal)

Reference equipment: Infrasecur / Siemens, model FDCIO224, or equivalent.

4. FIRE STOPPING

In most cases fire stopping will be carried out by the main contractor and will fall under certain building regulations. However, where telecommunications cables pass through walls or slabs which need to keep a fire rating integrity, products such as the Abesco cable transit system or Cablofil EZ Path or any equivalent should be used to allow ease of future works and maintenance, whilst ensuring that the fire protection integrity is kept.

These products should be sized accordingly to allow the same amount of spare capacity as the cable highway that the telecommunications cabling is installed on.

Under no circumstances should any telecommunication cable be sealed with a fire stopping material that comes into contact with the cable sheathing, for example, putties, foam and decorating sealant (also paint) as this may invalidate the 25 year performance warranty and also cause issues for future expansion and maintenance.