

TECHNICAL SPECIFICATIONPNS FOR ELECTRICAL WORK

ELECTRICAL INSTALLATIONS

1 General

The Contractor shall supply all labor, materials and equipment necessary for the installation of medium voltage switchboards, sub-main cables and distribution units, lighting and power, together with all other apparatus shown on the Drawings and as detailed in the Particular Specification, with the exception of those items stated specifically as being supplied by others.

All works shall be carried out in a manner satisfactory to the Project Manager and all unspecified materials shall be of approved manufacture. The complete installation is to be to the entire satisfaction of the Project Manager.

The whole of the electrical installation and all works appertaining thereto shall be carried out in strict accordance with the Regulations for the Electrical Equipment of Buildings current edition (including all amendments and supplements made and issued thereto) as issued by the Institution of Electrical Engineers, British or VDE Standards, and also to the national and local requirements.

The Contractor shall further make good, repair, replace all defective work and clear away on completion and leave all installations in perfect working order and to the satisfaction of the Project Manager.

Building works shall include the preparation of trenches and provision and laying in such trenches of asbestos cement or salt-glazed stoneware pipes, having easy bends to form ducts for entry of main cables. The numbers, sizes and locations of such pipes shall be as required by the Particular Specification.

Manufacturer's Recommendations means the recommendations or instructions printed or in writing and current at the date of tender.

The phrase "or other approved" means that commodities of different manufacture may be substituted if prior approval has been obtained.

The Contractor shall be deemed to have included in his price for anything necessary to supply the installation described in the Specification, or as shown on the Drawings. If no figure is put against the item shown in the summary it shall be deemed to have been included elsewhere.

The Contractor shall handle, store and fix each commodity in accordance with the manufacturer's recommendations. He shall inform the Project Manager if these conflicts with any other specified requirement and submit copies of manufacturers' recommendations to the Project Manager when requested to do so.

When choice of manufacturer is allowed for any particular commodity the Contractor shall obtain the whole quantity required to complete the work from one manufacturer or obtain approval of any change in source of supply. He shall produce written evidence of sources of supply when requested to do so by the Project Manager.

All the materials purchased for the work must operate satisfactorily at an ambient temperature of 50°C.

Progress reports shall be made by the Contractor, to be inspected and approved by the Project Manager. Changes in plans or additional works shall be executed by written approval of the Project Manager.

2 Specialist Subcontractors

The Electrical Works shall be executed by an approved Specialist. The Contractor shall attend on same and provide all the usual services required for such attendance.

3 *Builders Work*

The following is a summary of the work to be carried out by the Main Contractor:

- (a) The cutting and forming of holes for conduits or pipes or conduit or pipe fixings through walls, floors, ceilings, partitions, roofs etc. and making good after the work is sufficiently advanced.
- (b) The building of concrete and/or brick ducts in floors, walls etc. . .
- (c) The building of manholes, pits etc. . .
- (d) The excavation, forming of trenches for services etc. and the filling in of same after the cables are laid.
- (e) Excavation forming for underground services of ducts and courses.
- (f) The cutting or forming of chases, recesses etc. in floors, walls etc. for conduits and fittings, and making good.
- (g) Excavation for and laying of cable carrying pipes.
- (h) The building in of brackets and supporting bars or other from of conduit or pipe suspensions.
- (i) The painting of all pipes, tubes and conduits etc. after fixing unless specified to the contrary.
- (j) The providing and building of sleeves through slabs and walls

4 *Testing*

The Contractor shall provide all necessary testing equipment as required by the Project Manager to carry out tests as set out in the Regulations and as required by the relevant Electricity Authority.

The Subcontractor shall also be responsible for the payment of fees to specialists and manufacturers, for testing and commissioning required bringing all such plant and equipment into fully efficient operation as part of the installation.

The Subcontractor shall thoroughly test each section of the Contract Works all generally in accordance with I.E.E. and Electricity Authorities regulations, and except where otherwise specified the tests shall include the following.

Insulation resistance tests to earth and between phases on all circuits and power consuming equipment by means of a 500-Volt insulation tester. During the test all lighting switches, except those controlling fluorescent fittings, shall be turned off and all lamps installed but no inductive apparatus shall be connected.

All insulation tests shall be made between phases, between each phase and earth, and between earth and neutral with the controlling switch neutral link removed.

Insulation tests shall be repeated between phases and between each phase and neutral with all switches off and all lamps removed.

Insulation resistances below 5 mega ohms will not be accepted.

Earth continuity tests shall be made on each main, sub main, circuit and sub circuit.

Polarity of switches and continuity of ring main circuits shall be tested.

Insulation resistance tests of all connected appliances shall be made

Tests of the effectiveness of earthing including resistance of main earth shall be made.

Any other tests the Engineer may reasonably instruct the Subcontractor to make. Such will include readings of potential drop and current balance between phases at full load conditions at various points in the installation.

The Subcontractor is to provide all necessary labor, materials, test media and instruments required and all instruments must carry a recent calibration certificate from an approved body.

All tests are to be witnessed by the Project Manager, and triplicate test record certificates, signed by all test witnesses, are to be provided to the Project Manager as the work proceeds, upon request, or in any event before the commencement of the Maintenance Period.

At least 7 days written notice is to be given of intention to perform any test.

In addition to installation testing the Subcontractor is to carry out operation testing of all sections and is to clean, set, calibrate and fully commission, demonstrate and hand over the entire contract works in a thoroughly complete and operational state to the satisfaction of the Project Manager.

5 *Main- Switchgear and Sub- main Distribution Equipment*

All main switchgear and sub-main distribution equipment to be provided and installed within the Contract shall comply with the relevant British Standards.

Main switchboards shall be 600 volt rating, of sheet steel construction of 2mm minimum thickness, finished in a suitable anti-rust cubicle type front access panels, epoxy-electrostatic painted (color to be approved by the Project Manager), complete with all necessary incoming main isolators, low bars, outgoing fuse switches, distribution units, interconnection accessories, cable glands and entries. The main switchboard shall also be provided with a metering panel and all necessary interconnections as may be required by the Electricity Authority. Three ammeters and a voltmeter complete with an integral phase shift switch shall be provided and connected via the main incoming cable connections. The main switchboard shall also be provided with all necessary labels for each item of switchgear stating the area service duty or equipment controlled there from both in Arabic and English.

All access panels; hinged doors etc. should be provided with rubber or similar gaskets to protect the interiors against ingress of dust.

An 'as installed' diagram of the electrical distribution shall be provided within a glazed frame and fitted adjacent to the main switchboard.

Switch fuses, isolating switches, fuse boards, miniature circuit breaker boards and main distribution panels are to be of the particular types, capacities and manufacture later specified in the Particular Specifications or as indicated on the Drawings and unless otherwise specified are to be generally in accordance with the following.

Switch fuses are to be of the 600 Volt "on-load" pattern with the switch blades mounted on to a solid insulating bar arranged for quick make and break action.

Fuses are to be H.R.C. type mounted independently of the switch mechanism.

Switch operating handles are to be of the 'free handle type' interlocked so that the access door may not be opened unless the switch is 'Off ' but with a means to circumvent this feature. The switch 'On ' or 'Off ' positions are to be clearly marked.

Miniature /mould case type circuit breakers shall have automatic tripping by means of a calibrated bi-metal mechanism for over-current protection and an electro-magnetic tripping device for short circuit protection. All three-phase circuit breakers shall have over-current and short circuit protection devices in each phase.

These devices shall be interlocked with each of the other phases, such that the operation of a trip in any one phase will automatically cause all three phases to be isolated from the supply.

The Fuse /M.C.B. Boards shall be adequately and securely fixed to the surface of the building walls in the positions shown on the various Drawings by means of raw bolts or other metallic fixing devices as approved by the Project Manager. All fixing bolts that can be accommodated in the fixing holes shall be used.

The positions of the Fuse M.C.B. Board as shown on the Contract Drawings shall be agreed with the Project Manager before erection of any Fuse /M.C.B. Board.

The bus bars of all Fuse /M.C.B. Boards shall be connected to the phases of the supply so that the standard arrangement of red, yellow, blue and neutral working from top to bottom of the Fuse /M.C.B. Boards is adhered to throughout the installation to ensure uniformity in phase coloring. The top bus bar of the Fuse board is to be tested to make sure it is fed from the red phase right the way back through the system to the source of supply.

The Fuse /M.C.B. Boards shall be supplied with charts mounted inside their doors and /or across the phase barriers. These charts shall be completed by the Subcontractor to give a clear and permanent indication of :

- (a)The circuit reference of each fuse way /M.C.B.
- (b)The correct H.R.C. fuse /M.C.B. for each fuse way.
- (c)The title of the plant protected by each H.R.C. fuse /M.C.B.

Sweating sockets or facilities for crimped terminals are to be provided for incoming phase and neutral cables.

All live metal parts are to be enclosed by insulating material including when the fuse carriers are withdrawn, and the carriers are to be arranged to protect persons handling them from electric shock or burns.

6 Ear thing

Earth leads and earth tapes shall be of high conductivity bare copper in internal dry conditions and where they are run underground or in damp locations they shall be tinned.

As far as possible they shall be continuous without joints, but where joints are unavoidable, they shall be bolted and soldered. All such joints shall be coated with anti-corrosive paint and wrapped with self -adhesive PVC tape.

Where earth leads and earth tapes are required to be buried, they shall be at a depth of not less than 500mm (1'8"). Where they are fixed to building surfaces they shall be fixed at intervals not exceeding 1.0 m (3'4") with copper or brass saddles of the spacing type. The saddles shall be tinned where necessary to correspond to the lead or tape being fixed.

An earth test link is to be provided adjacent to all switchboards. The link shall be a 13mm x 3mm copper strip secured across a 50mm (2") break in the earth lead or tape by high tensile steel bolts and nuts.

All ear thing cables shall be installed in accordance with the relevant requirements called for in the Cables section of this specification.

All bonding leads in the form of cable having a standard conductor shall be terminated in 'sweated' sockets and shall be rigidly bolted to ear thing terminals.

All ear thing cables shall be insulated with a green PVC sheath. Where connection on the earth lead to the main earth is made with a standard cable, the earth lead shall be double insulated with PVC sheaths, the outer sheath being colored green.

Where a lightning protection scheme is installed the earth lead may be bonded to the lightning conductor earth.

The Main Contractor will execute any trenching and backfilling and erect and cement into position all electrode manholes to details provided by the Subcontractor.

Connections by means of copper earth tape shall be made between the main earth bars to the frame terminals of all items such as switchboards etc.

The main ground connection shall be to a grid of electrodes of galvanized water pipes buried in the ground, and shall provide a minimum ground resistance of 2 ohms.

The connections from the main ground to the switchboard shall be of 50 sq.mm copper cable.

7 Cables

All cables shall be manufactured to comply with the relevant British Standards and are to be obtained from one of the approved manufacturers. All cables shall be NYY, except that underground cables shall be NY.

The minimum size of conductor used for lighting sub circuits shall be 1.5 sq.mm and for local ring main circuits 2.5 sq.mm.

All cables shall be supplied to site on suitable drums with labels clearly indicating the origin and specification of cable.

Where cables are installed underground the Subcontractor shall mark out trenches for excavation by the Main Contractor, according to the Drawings and as directed by the Project Manager.

The Subcontractor shall install the cables on a smooth bed of sifted sand 10 cm thick (minimum), and then cover the cables with another layer of sand up to 10cm above the top of the cable, and provide and install interlocking concrete cable covers engraved 'Electricity' in both English and Arabic along the complete underground length of the cables.

The cable clamps are to be fixed to the building structure by means of loose bolt type raw bolts and by steel nuts and bolts to any other structure.

All cables run within the site buildings are to have the serving removed and the single wire armored cleaned bright and left bare throughout the entire length of the cable, or alternatively the cable is to be taped with 50mm (2") wide PVC tape half lapped. This is to minimize the fire risk of the compound serving on the cable.

All cables shall be colored in accordance with the following:

Red phase - Red

Yellow phase - Yellow

Blue phase - Blue

Neutral - Black

8 *Lighting Fittings*

Lamps and Tubes

The Subcontractor shall supply all lighting fittings unless otherwise specified in the Schedule of Lighting Fittings. The Subcontractor shall provide all the lamps for lighting fittings, which he supplies as part of the Contract.

The Subcontractor shall allow for the installation of all the lighting fittings in the locations as shown on the Drawings. Where lighting fittings are recessed in ceiling panels he shall obtain from the Project Manager detailed drawings of the ceiling layout prior to commencement of fixing.

Lighting fittings shall generally be fixed direct or suspended from the structural ceiling to heights as stated in the Particular Specification. In the case of wall mounted lighting fittings not above doorways or structural openings the mounting heights shall be as indicated on the Contract Drawings. In instances where they are mounted over doorways or structural openings they shall not be fixed more than 300mm (10") higher than the lintel of the doorway.

Where fluorescent lighting fittings are required to be suspended this shall be done by means of a 1" link galvanized heavy jack chain of the welded link type, the chain being attached to standard conduit box hook plates fixed to conduit boxes.

The conduit boxes from which any fluorescent lighting fitting is supported or suspended shall be securely fixed to the building structure by means of at least one 1/4" whit worth bolt , complete with flat washers, spring washer and full size nut or the equivalent diameter roundhead wood screw and /or toggle bolts of Raw plug manufacture or other fixings as approved by the Project Manager .

The supply to each lighting fitting shall be by means of 32/0.2mm 3-core circular, heat resistant butyl sheathed flexible 250 volt grade cable, to be connected to the circuit wiring by means of military P.V.C. connector blocks having brass mechanical screw clamp connections. Screwit type connectors will not be permitted. Taped and soldered joints will not be permitted.

The third core, earth conductor of the flexible cable is being securely earthed in the conduit box, socket or ceiling rose and the lighting fitting. These connections shall be effected in purpose made terminations and the fixing screws of the conduit box lid, hook plate or similar means not specifically intended as a conductor termination shall not be used for securing the ear thing. The connection of the third core to the lighting fitting shall be effected in a similar manner as described above.

The Subcontractor shall allow in his tender for all the necessary supports steelwork and other accessories required for the supporting and /or mounting of all the lighting fittings as shown on the Contract Drawings.

Where fluorescent lighting fittings are mounted direct to purpose made lighting trucking, the lighting trucking manufacturer's purpose made fixings and supports are to be utilized for the mounting of the lighting fittings. The connection and ear thing of the lighting fittings is to be effected as previously described herein.

At every lighting point an ear thing terminal shall be provided and connected to the earth-continuity conductor of the final sub-circuit.

Pendant lighting fittings

The Subcontractor is to supply and install all plain pendant lighting fittings as shown on the Drawings.

All ceiling roses containing permanently 'live' terminals shall be of such a manufacture that 'live' terminals are completely shielded and contact cannot be made there with the normal replacement of the flexible pendant.

Every ceiling rose shall be provided with an ear thing terminal.

9 *Switches and Switch Lighting*

The Subcontractor shall supply and install the lighting switches in accordance with the type specified. Where they are indicated on the Drawings, switches shall be of the two-way or intermediate type, and in some instances shall be ganged in various numbers in a single box with a common cover plate.

All switches shall have 15 Amp interiors for lighting circuit loads in excess of 600 watts.

The lighting switches shall be mounted at a height of 1.4m (4'-8") from finished floor level to the center of the switches unless deemed otherwise by the Project Manager. The switches shall be fixed by any fixing device approved by the Project Manager.

Where ceiling mounted cord operated "PULL" switches are called for on the Drawings they shall be positioned such that the cord will hang free at a distance of 75 mm (3") from any wall surface or door opening. The cords for such switches shall be of a length sufficient to reach a point 1.5m (5'0") above finished floor level.

All switches shall be wired in the live side of the circuit they control.

Where six or more switches are ganged together in one box with a common switch plate, the switch plate shall be engraved to indicate the area, row or points controlled.

Socket Outlets

All socket outlets unless otherwise specified or indicated on the Contract Drawings shall be of the 13 Amp shuttered rectangular pin type complying with BS 1363.

The contacts shall be housed in a track resistant molding, controlled where indicted on the Drawings by integral A.C. type single pole switch.

The finishes of socket outlet plates may vary depending upon the area and these will be as specified in the Particular Specification. However, socket outlets in plant rooms shall have steel front plates.

Mounting boxes shall be either of aluminum or enameled steel for flush installations, or aluminum only for surface installations. All boxes shall incorporate an ear thing terminal.

The Subcontractor shall supply and install all socket outlets in accordance with the types and ratings specified and /or indicated on the Contract Drawings.

The positions of all socket outlets as shown on the Contract Drawings must be checked with the Main Contractor, attention being given to type of wall finish required and the method of mounting thereon.

10 *Telephones*

The Subcontractor shall be responsible for the supply and installation of the necessary encloses, cable trays and draw wires for a complete telephone installation throughout the premises.

The Subcontractor shall ensure that the main cable entry duct is installed by the Main Contractor to the requirements of the local Telephone Company. In all cases the main duct shall have a minimum size of 10cm, be of plastic manufacture, and have no right angle bends.

Each 2.5cm telephone conduit will serve no more than 4 telephone outlets.

At the junction point of risers and conduits and at the main entry duct point the Subcontractor must ensure a clear wall space of at least 1 sq.m for the installation of the telephone company's distribution boxes.

If it is a requirement of the local Telephone Company that the Subcontractor is to install the necessary telephone cables, the Subcontractor shall liaise closely with the Telephone Company and obtain prior approval for any telephone cables installed.

11 *Maintenance Tools, Keys and Spare Equipment*

The Subcontractor is to provide two sets of any special tools and keys necessary for the maintenance of the items of equipment supplied under the Contract.

Spare items of equipment shall only be supplied where particularly specified, as for fuses.

All keys, tools and spare equipment are to be handed over to the Employer, with a detailed list of all items. The Subcontractor is to obtain two receipted copies of the list and forward one to the Project Manager.

12 *Outside Lighting*

The Subcontractor shall supply and install an outside lighting system as shown on the Drawings and in accordance with the Schedule of Lighting Fittings.

The Subcontractor shall be responsible for the supply and erection of the lighting columns, and shall also be responsible for advising the Main Contractor of the routes of the trenches for the mains cables to each column and the siting of the holes for the column bases.

The excavation and backfilling of the trenches and the concreting in of the column bases shall be carried out by the Main Contractor.

Each column shall be fitted with O.C.C. Bs manufacture connecting to the lighting units mounted on the column.

The termination of the cables to each column and the fusing of each column shall be as detailed in the Drawings.

Wiring to floodlights mounted on the building shall be routed on the inside of the building. Cables fixed to the outside face of the building will only be permitted at the discretion of the Project Manager.

13 INTEGRATED ANALOGUE ADDRESSABLE FIRE DETECTION, AND VOICE EVACUATION SYSTEM

PART 1 GENERAL

1.1 General Instruction

1.1.1' Works under this section shall be governed by conditions of contract and sections of Division 01.

1.2 Scope

1.2.1 The contractor shall supply, install, test, connect and commission a high quality fast acting electronic Analogue addressable type fire detection and alarm with truly integrated Voice Evacuation and Emergency Telephone Systems.

1.2.2 The fire detection with integrated voice alarm system shall comprise of main fire alarm control panels, optical smoke/heat sensor, heat sensor, manual call points, electronic sounders with optional pre-recorded speech facility, fire alarm mimic panels, interface units, distributed amplifiers and audio control units.

1.2.3 All the outstations like the optical heat sensors, heat sensors, duct and beam sensors, electronic pre-recorded voice alarm speakers, sounders, manual call points, fire alarm mimic panels, spur off (tee breaker) units and distributed amplifier units shall be provided with short circuit isolators.

1.2.4 The fire alarm mimic panels, master fire alarm control panel and the graphics terminal shall be sited as shown on the drawings. All loop cabling, other components and accessories deemed necessary for a safe, reliable and satisfactory system shall be included in the system.

1.2.5 Prior to placing order for any equipment, the contractor shall submit comprehensive document comprising working drawings, catalogues and descriptive literature of components, maintenance manuals etc for engineer's study and approval.

1..2.6 The contractor shall be required to train and instruct client's personnel in the correct use, operation and supervision of the system, preferably prior to the handing over of the project.

1.2.7 The contractor shall ensure that all system components offered shall be manufactured by one manufacturer who shall also be on the local civil defense authority's list of approved manufacturer ..

1.2.8 The Contractor shall be responsible for all submittals of complete design information to Local Civil Defense Authority and for obtaining all necessary approval certificates prior to the commencement of the installation and upon completion.

1.2.9 In order to ensure whole site integration capability, the fire and voice alarm system will be awarded to a single specialist manufacturer who will be responsible for the design, global operation, management and interfacing of the system

- 1.2.10 The system shall be fully programmed to accommodate fire alarm and voice communication zones as indicated on the drawings and schematics. The system shall be configured to allow on site modifications with the minimum disruption using the PC based software to facilitate future changes or alterations to the building.
- 1.3 System Description
- 1.3.1 The fire detection and alarm system shall be designed to facilitate accurate identification of the source of heat / smoke / fire in their early stages to minimize occurrences of false alarms due to faulty equipment, electrical transients, system faults etc.
- 1.3.2 The fire alarm control panels shall make final decision on whether a fire or fault exists by comparing the plotted patterns from a fire sensor against known fire and fault patterns held in it's memory. System shall be true Analogue with the ability to print the output from a fire sensor over a period of time.
- 1.3.3 All system components and devices shall be connected to two-wire loop circuits with short circuit isolation means either built-in each component or group isolation. Removal or disconnection of any component from the loop shall not *affect* the functioning and performance of other component and the system.
- 1.3.4 System shall facilitate the latest addressing technique i.e. all the devices on the loops of the FACP shall be allocated addresses automatically from the panel at the time of system power up on a numerically lowest unused value basis (algorithms) and also given an address during commissioning, the value of which shall be stored in non-volatile memory, within the electronics module of the outstation. This value shall be read during loop allocation and provided it is valid shall be used to setup the outstations primary address.
- 1.3.4.1 The Fire Alarm System component addressing shall be such that-
- 1.3.4.1.1 If the devices are inserted or removed all the existing devices shall keep the same address.
- 1.3.4.1.2 The panel shall allocate the address in strict sequential order when the loop is powered up to speed up commissioning. It shall be not possible for two devices to have the same address.
- 1.3.5 Facilities shall be provided to constantly monitor and check the following circuits and fault conditions:
- 1.3.5.1 the power supply to the loop is;
- 1.3.5.2 for open-circuit, short-circuit, earth fault and any other fault condition in the loop wiring;
- 1.3.5.3 for communication failure and errors in all cards and loops;
- 1.3.5.4 for faults in keyboard and printer circuits;
- 1.3.5.5 monitoring of all devices status every 1.3 minutes to create a table of each 1 analogue channel for event analysis.
- 1.3.6 All devices i.e., Audio Control Units, Distributed Amplifier Units, Optical/Heat Sensor, Heat Sensor, Duct and Beam Sensors, Fire Alarm Interface Units, Electronic Sounders with/without optional pre-recorded speech facility, Manual Call Points, etc. shall be installed on the same loop.

- 1.3.7 All devices shall be assigned a maximum of 32 character alphanumeric label. In case of fire, fault or warning, the label of device sensing threshold shall appear on visual display unit of the panel.
- 1.3.8 Any correction in label/programming shall have to be carried out from the built-in keyboard of FACP. Use of separate PC or tools for on-site labeling/programming shall not be acceptable..
- 1.3.9 Any event i.e. Fire, fault or warning shall be recorded with time, date and place of occurrence in the memory of FACP. These events can either be displayed on VDU or printed, as required.
- 1.3.10 Provision shall be done at the fire alarm control panels to silence the loop powered alarm sounders and the speaker circuits but the visual indication shall remain until the system is reset.
- 1.3.11 It shall be possible to change the sensitivity of analogue sensors from fire alarm control panel only.
- 1.3.12 The sensitivity shall be varied automatically, if required, by time zoning feature whereby it allows sensors to be programmed to respond at different sensitivities relative to any time of day, and any day of week.
- 1.3.13 The main fire alarm control panel shall be located as shown on the schematics and the floor drawings.
- 1.3.14 There shall be a seamless software interface between the fire detection and voice alarm system.
- 1.3.15 The voice alarm system shall comprise of voice command centers (units with facility to control the audio) and distributed amplifiers as shown in the schematics.
- 1.3.16 All distributed amplifier unit components and devices shall be connected to two-wire loop circuits with each component adhering to NFPA Class A Style 7 standards of wiring. Removal or disconnection of any component from the loop or short circuits on the loop, shall not affect the functioning and performance of other components on the same loop and on the system.
- 1.3.17 Facility to introduce / change delay periods in operating speaker circuits, shall be possible to be programmed from FACP without the need to change any hardware. All the programming related to voice alarm speaker circuits shall be restricted to the FACP. Introduction of separate programming for operation of speaker circuits, into the voice command units shall not be acceptable..
- 1.3.18 The distributed amplifier rack units shall house the amplifiers and the speaker circuits shall be wired as shown in the schematics. The distributed amplifier racks shall be mounted close to the broadcast zone they are to serve so that the loudspeaker wiring is minimized. Each of these units shall house the power supply, battery backup and full monitoring facilities. These units shall be modular in construction allowing for a high degree of flexibility so that the performance can be closely matched to the requirements. This unit shall meet the Voice Alarm Standards as hitherto mentioned in NFPA 72 and BS 5839 Part 8.
- 1.3.19 The voice Command Unit for audio controls shall be designed to complement the fire alarm control panel. It shall provide manual *access* to the voice alarm section of the system..The voice command centre shall be an integral part of the fire alarm control panel unit. Housing both these units in one rack to justify the above shall not be acceptable. If in case this unit has to be independent of the FACP then the interlinking between the FACP and the Voice Alarm Command Unit shall adhere to NFPA Class A

Style 7 standards. Silencing and sounding and the programming of the phased evacuation of the speaker circuits shall all be done from the fire alarm control panel only. Controls on the voice command unit shall be available for upto 64 broadcast zones of the voice alarm. Standard configurations shall allow for recorded Alert and Evacuate messages as well as an emergency microphone to be operated in each area. In addition up to four other recorded messages shall be stored in this unit.

- 1.3.20 The distributed amplifier rack units shall also be wired to the detection loops of the fire alarm control panels only. This shall be in addition to the audio cable interlinking the voice command centre for audio controls the distributed amplifier racks.
- 1.3.21 The integrated Fire alarm and Voice alarm system shall cover the corridor areas and loop powered loop signaled pre recorded electronic voice sounders connected to the fire alarm system.
- 1.3.22 The Distributed Amplifier Rack Units shall include amplifiers for local areas. These units shall be capable of complete standalone operation for the areas it is assigned should the network/interface connections fail
- 1.3.23 In the event of a catastrophic failure occurring on any individual component within the Distributed Amplifier Rack Unit, pre-recorded emergency alarm message shall still be available at the voice command audio control unit.
- 1.3.24 The voice alarm system shall be capable of broadcasting pre-recorded emergency alarm messages and live speech in the event of fire detection system activating.
- 1.3.25 The systems shall be capable of broadcasting upto four different pre-recorded messages to different zones or group of zones simultaneously.
- 1.3.26 Evacuate signal shall relate to a general evacuation message and the alert message shall corresponds to standby instructions.
- 1.3.27 In addition a FIRE DRILL and an ALL CLEAR message shall be incorporated into the operation.
- 1.3.28 A fireman's microphone shall be fitted to the Voice Command Centre units. These shall allow direct voice instructions to be transmitted to a single zone, selected zones or all zones.
- 1.3.29 When a fireman microphone is operated, this shall override any automatic voice alarm signal being transmitted to the selected zone. The Alert and Evacuate pre-recorded messages will be maintained in other zones while live voice fire announcements are being broadcast to selected loudspeaker zones.
- 1.4 Codes and Standards
- 1.4.1 The voice alarm system wiring shall conform NFPA class - A, style 7.
- 1.4.2 Loop cabling and fire alarm components and accessories shall comply NFPA 72, and BS 5839, Part 8.
- 1.4.3 Smoke sensors shall be LPCB approved and shall conform BS 5445, Part 7.
- 1.4.4 Heat sensors shall be LPCB approved and shall conform BS 5444, Part 5.
- 1.4.5 Audio control unit shall meet the requirements of BS 5839, Part 1 and BS7443.
- 1.4.6 Fire alarm system cables shall conform BS 7629 and BS 6387.