

Chapter 3 Appliances (AP)

3.2 Air Conditioners (AC)

C) Copper Pipes for Air-conditioning & Refrigeration System (AP-AC/CP)

Scope:

Specification No (AP-AC/CP)

Supplying & erecting Soft Copper pipes of specified diameter from Indoor to Outdoor units with necessary straightening, bending, flaring, swaging and coupling including Oxy-Acetylene Brazing on wall or flooring or both by fixing with clamps in an approved manner.

Material:

Semi-flexible Soft Copper Pipes made specifically from Copper tubes having Standard specification ASTM B-68/B-75 that are Bilet heated, extruded, drawn, process annealed, eddy current tested and finally hydrostatically tested & inspected to have uniform grain size 0.015–0.004, controlled hardness, elongation (40% Min) & tensile strength having symbol C12200 with or without internal grooves and uniform thickness 22 gauge shall be used. The specified diameter of the pipes shall refer to the inside diameter of the pipes.

Pressure Testing:

All piping shall be factory tested to hydrostatic test pressure of atleast one and a half times the maximum operating pressure. Once installed, the pressure test will be conducted on site at minimum pressure 200psig for a period not less than 24 hours. All leaks and defects in joints revealed during the testing shall be rectified to the satisfaction of the Engineer-in-charge. Piping repaired subsequent to the above pressure test shall be re-tested in the same manner. System may be tested in sections and such sections shall be securely capped. Pressure gauges may be capped off during pressure testing of the installation.

Method of Construction:

Soft Copper pipes of specified diameter, thickness, and fittings with Oxy-Acetylene Brazing shall be erected on wall or flooring using clamps and duly pressure tested as specified. Before preparing the piping, exact measurement shall be taken. The pipes shall be of single length as much as possible and laid on site lower than electrical pipes or DBs. The pieces of pipes will be swaged as required for proper fitting of joints wherever required, loaded into brass flare nuts of appropriate sizes at each end, expanded & flared to perfection without any cracks using flaring tool. Each joint will be cleaned with a file and the burr removed out. If possible (for pipe size over ¾") the pipe pieces will be cleaned internally with a soft muslin cloth. The pieces of pipes will then be welded whilst taking proper care that no burr is left and no dust enters in the system. The pipes will be adequately supported by clamps and the entire system will be satisfactorily tested. Any surplus material shall be disposed off satisfactorily without causing any nuisance.

Mode of measurement:

Measurement shall be for one meter of each type and diameter of pipe laid complete with fittings, clamps, etc. as specified. The length shall be measured net on the straight and bends along the centre line of the pipe and fitting correct up to a cm. (i.e. per meter)

Chapter 4 Energy Saving Devices (ESD)

4.3 Solar Lighting (ESD-SOL)

C) Solar Cell for Street Light (SOL/CELL)

Scope:

Specification No (ESD-SOL/CELL)

Supplying and erecting Solar panel comprising high efficiency mono-crystalline / multi crystalline Photo Voltaic Cell 20 W per Single module suitable for 4-5 hrs backup with necessary clamps and module frame.

Material:

PV Cell: PV Cell of specified output as mentioned in specification no. (ESD-SOL/STL)

Module Frame: - A metallic frame structure is coated with corrosion resistance paint is fixed on the pole to hold the solar photovoltaic module. The frame structure is inclined at an angle of 20° with the horizontal.

Hardware: MS Nuts & bolts with washers, etc.

Clamps: MS Clamp of required width & minimum 3 mm thick.

Method of Construction: The PV Cell for solar light with all accessories shall be installed at designated place and giving necessary testing.

Mode of Measurement: Executed quantity will be counted on number basis. (i.e. each)

D) Battery for Solar Street Light (SOL/BAT)

Scope

Specification No (ESD-SOL/BAT)

Supplying and erecting approved make battery with capacity of 12 V 25/40/75 AH with duty cycle 8-10/10-12 hrs suitable to charge on PV cell with necessary wiring connections erected in powder coated protection box with stand and nut bolts.

Material

Battery: The battery shall be of flooded electrolyte type, positive tubular plate, and low-maintenance lead acid battery. The battery will have a minimum rating of 12V, 25 or 40 or 75 Ah, the discharge rate of 1/10th of the AH capacity of the battery. 75% of the rated capacity of the battery should be between fully charged & load cut off conditions.

Leads: PVC insulated multi stranded copper wire of adequate size.

Enclosure / Box: CRCA sheet 20 SWG or as directed by the Engineer-in-charge, with powder coating.

Hardware: MS Nuts & bolts with washers, etc.

Method of Construction:

The battery for solar light with all accessories shall be installed at designated place, duly wired and giving necessary testing.

Mode of Measurement: Executed quantity will be counted on number basis. (i.e. each)

E) Solar Power Generator (SOL/GEN)

Scope:

Specification No (ESD-SOL/GEN)

Supplying and erecting Solar Power Generator up to 100 WP 230V, 50 Hz for connecting between battery and light fixture.

Material: Solar Power Generator (SPG):

SPG shall give O/P to CFL with input at 12V applied from the module and output rating shall be up to 100 WP, at put 230 to 260V, AC (± 5%), controlled either manually or automatically. The body of solar power generator shall be powder coated form outside and inside.

Method of Construction:

The SPG for solar light with all accessories shall be installed at designated place, duly wired and giving necessary testing.

Mode of Measurement: Executed quantity will be counted on number basis. (i.e. each)

4.5 Miscellaneous

Intelligent Energy Saver for AC Units (ESD-AC) Scope:**Specification No (ESD-AC)**

Supplying and erecting Intelligent Energy Saver suitable up to 5 TR Window / Split Type Air Conditioning Unit and Packaged type Air conditioning units working on voltage of 230V single phase solid state microprocessor based intelligent control wall mounting connected to indoor unit.

Material: As per manufacturer's standard specification.

Method of Construction:

The Energy saver unit with all accessories shall be installed at designated place, duly wired and giving necessary testing.

Mode of Measurement: Executed quantity will be counted on number basis. (i.e. each)

4.6 LED Fittings (ESD-LED)

A) Surface / Recessed Mounting LED Luminaries

Scope:**Specification No (ESD-LED/IDF)**

Supplying & erecting approved make, Surface / recessed mounting indoor fitting of specified wattage to provide specified lux level at specified height with p.f. > 0.95, complete as per manufacturer's specification, with appropriate driver.

Material:

Fitting: Scientifically designed highly polished & anodized Aluminum reflector ensures precise light control with optimum light utilization either with clear glass / frosted glass cover with ring or as per manufacturer's specification, leading to substantial savings in energy cost and excellent ambient conditions. Frame is fabricated from CRCA/MS sheet and epoxy powder coated white. Percolated frame ensure corrosion free life. Retaining clips for recess mounting fittings to facilitate mounting in false ceilings. Luminaries comprises of a deep drawn MS sheet canopy along with LED's with 100 lumens per watt mounted on top of aluminum heat sink of appropriate size for excellent thermal dissipation. The constant current driver circuit should be inside the luminary and can be driven between 80V to 260V AC. It should conform to class 1 of IS: 10322. Fitting shall be wired with multi stranded copper wire terminating on suitable connectors.

Driver: The constant current driver driven at 600mA of constant current should have short circuit protection, thermal protection & should work in the range of 80V to 260Volts.

LED's: The LED's of approved make having life of minimum 50000 burning hours, must have a color temperature between 5000 - 7000 and of 100 lumens per watt.

Metal Core PCB's: The PCB should be of metal core, copper clad laminate composed of 1 oz Electro deposit copper and 1.5mm 5052 Aluminum Alloy Laminated by 60 um high thermal conductive adhesive of modified epoxy.

Hardware: Sheet Metal (SM) screws, washers, plugs / wooden gutties, etc.

Method of Construction:

The fitting shall be fixed firmly in the designated place (False ceiling / unspecified ceiling) with the help of swinging bracket, and making the connection. In case where fittings are to be installed flush with /on false ceiling; layout shall be given to civil wing and work shall be done in co-ordination with civil wing e.g. making recesses in false ceiling.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

B) Bulk Head type LED Luminaries

Scope:

Specification No (ESD-LED/BHF)

Supplying & Erecting LED bulkhead Fitting of appropriate size with 8 W with minimum 50-70 lux level at ground level with p.f. > 0.95 with frosted glass.

Material:

Fitting:

Luminaries comprises of a deep drawn MS sheet body with clear acrylic cover of 3mm thickness or as per manufacturer's specification, along with LED's with 100 lumens per watt mounted on top of aluminum heat sink of appropriate size for excellent thermal dissipation. The constant current driver circuit should be inside the luminary and can be driven between 80V to 260V AC. It should conform to class 1 of IS: 10322. The surface of the canopy should be powder coated / stove enameled. Fitting shall be wired with multi stranded copper wire terminating on suitable connectors.

Driver:

The constant current driver driven at 600mA of constant current should have short circuit protection, thermal protection & should work in the range of 80V to 260Volts.

LED's:

The LED's of approved make having life of minimum 50000 burning hours, must have a color temperature between 5000 - 7000 and of 100 lumens per watt. The angle of illumination of each LED should be 90degrees and should be mounted on star type of metal core PCB's.

Metal Core PCB's: The PCB should be a metal core, copper clad laminate composed of 1 oz Electro deposit copper and 1.5mm 5052 Aluminum Alloy Laminated by 60 um high thermal conductive adhesive of modified epoxy.

Wooden board: As per (WG-PW/PW) 1.6 specified in chapter for Point wiring.

Hardware: Sheet Metal (SM) screws, washers, plugs / wooden gutties, etc.

Method of Construction:

The complete fitting with all the above accessories shall be erected as directed by Site engineer, duly connected and giving necessary testing.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

C) Halogen type LED Luminaries

Scope:

Specification No (ESD-LED/HAL)

Supplying & erecting Halogen type LED fitting of specified wattage to provide specified lux level at specified height, complete with acrylic cover and gaskets, with appropriate driver circuit and erected on provided bracket.

Material:

Fitting: Scientifically designed highly polished & anodized Aluminum reflector ensures precise light control with optimum light utilization either with clear glass / frosted glass cover with ring, leading to substantial savings in energy cost and excellent ambient conditions. Reflector is fitted into the frame with decorative screw arrangement. Frame is fabricated from CRCA/MS sheet and epoxy powder coated white. Precoated frame ensure corrosion free life. Retaining clips facilitate mounting in false ceilings.

Luminaries comprises of a deep drawn MS sheet canopy along with LED's with 100 lumens per watt mounted on top of aluminum heat sink of appropriate size for excellent thermal dissipation. The constant current driver circuit should be inside the luminary and can be driven between 80V to 260V AC. It should conform to class 1 of IS: 10322. Fitting shall be wired with multi stranded copper wire terminating on suitable connectors.

Driver: The constant current driver driven at 600mA of constant current should have short circuit protection, thermal protection & should work in the range of 80V to 260Volts.

LED's: The LED's of approved make having life of minimum 50000 burning hours, must have a color temperature between 5000 - 7000 and of 100 lumens per watt. The angle of illumination of each LED should be 90degrees and should be mounted on star type of metal core PCB's.

Metal Core PCB's : The PCB should be a metal core, copper clad laminate composed of 1 oz Electro deposit copper and 1.5mm 5052 Aluminum Alloy Laminated by 60 um high thermal conductive adhesive of modified epoxy.

Method of Construction:

The complete fitting with all the above accessories shall be erected as directed by Site engineer, duly connected and giving necessary testing.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

D) LED Street Light / Flood Light Luminaires**Scope:****Specification No (ESD-LED/ODF)**

Supplying & erecting Street Light fitting of specified wattage to provide specified lux level at specified height, complete with acrylic cover and gaskets, with appropriate driver circuit and erected on provided bracket.

Material:

Fitting: Luminaires comprises of a deep drawn MS sheet canopy with clear acrylic cover of 3mm thickness, along with LED's with 100 lumens per watt mounted on top of aluminum heat sink of appropriate size for excellent thermal dissipation. The constant current driver circuit should be inside the luminary and can be driven between 80V to 260V AC. It should conform to class 1 of IS: 10322 and Ingress Protection IP-55. The surface of the canopy should be powder coated / stove enameled. Fitting shall be wired with multi stranded copper wire terminating on suitable connectors.

Driver: The constant current driver driven at 600mA of constant current should have short circuit protection, thermal protection & should work in the range of 80V to 260Volts.

LED's: The LED's of approved make having life of minimum 50000 burning hours, must have a color temperature between 5000 - 7000 and of 100 lumens per watt. The angle of illumination of each LED should be 90degrees and should be mounted on star type of metal core PCB's.

Metal Core PCB's: The PCB should be a metal core, copper clad laminate composed of 1 oz Electro deposit copper and 1.5mm 5052 Aluminum Alloy Laminated by 60 um high thermal conductive adhesive of modified epoxy.

Method of Construction:

The complete fitting with all the above accessories shall be erected with provided bracket, on wall/street light pole or at any place as directed by Site engineer, duly connected and giving necessary testing.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e each)

Chapter 5 Switchgears (SW)

5.4 Distribution Board suitable for Mac's (MCBDB)

Scope:

Specification No

DB's shall be prewired and shall be fabricated as per IS: 8623, IS: 13032.

Suitable for flush mounting & surface mounting, with 200 A copper bus bar, neutral bar, earth bar & cable ties for cable management. DB's shall be of IP – 42 degree of protection.

All the distribution boards shall be fabricated out of 18 SWG thick sheets steel duly rust inhibited through a process of degreasing, pickling, phosphating & powder coating to an approved colour over primer & shall be of the totally enclosed dust proof type suitable for wall mounting. All components shall be mounted on DIN rails & covered totally with a sheet steel cover rendering it finger-safe. Access to the internal connections shall be only through removing the cover sheet. All DB's shall be internally prewired using copper insulated high temperature PVC wires. Bus bars & neutral bar shall be fully insulated with standard colour code. Bus bar withstanding capacity shall be 10kA. DB's must have facility of reversing door without modification, pan assembly for ease of installation & convertible locking.

Material: Vertical type DB: ISI marked as per IS 8623, of specified ways (poles), surface/flush mounting, with door, suitable for 415 V.

Iron work: Suitable size of angle/flat.

Hardware: SM screws, rawl plug, gutties, etc.

Method of Construction: DB shall be erected at designated location and directed by site engineer and terminating the provided wires by copper lugs (crimping type) and connecting the same.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

C. MCCB Panel Board (MCCBPB)

Scope:

Specification No (SW-SWR/MCCBPB)

Supplying & erecting Floor / Wall mounting type Panel board suitable for 415 V, of specified rating with provided MCCB's as incomer & outgoing side of specified ways complete erected on provided iron frame. (Excluding MCCB's)

General Specifications

Panel boards shall be fabricated as per IS: 8623, IS: 13947, IS: 2147.

PB's shall be of IP – 31/41 degree of protection.

All the panel boards shall be fabricated out of 1.6 mm thick CRCA sheet steel duly rust inhibited through a process of degreasing, pickling, phosphating & powder coating to an approved colour over primer & shall be of the totally enclosed dust proof type suitable for floor / wall mounting.

Panel boards shall be fabricated in Modular type for coupling future system/Metering Module/Add on Module, etc.

Bus bar shall withstand 25/35 KA short time current having rating of 250 A/400 A respectively.

Incoming Module:

Suitable for accommodating incoming Three/Four Pole MCCB up to 400 A with preformed copper interconnections.

Outgoing Module:

Suitable for mounting Single/Three/Four Pole MCCB's up to 250 A.

Copper bus bar of specified rating with shielded by transparent polycarbonate shrouds with extension tags and with adequate space for termination of cables onto MCCB's.

Material:

Panel Board: ISI marked as per IS 8623, of specified ways (poles), wall / floor mounting, suitable for 415 V.

Hardware: MS nuts & bolts, washers, etc.

Method of Construction:

Panel board shall be erected at designated location and directed by site engineer and terminating the provided wires/cables by lugs (crimping type) and connecting the same.

Mode of Measurement: Executed quantity shall be counted on number basis. (i.e. each)

Chapte 5 Switchgears (SW)

5.9 HT -- SFU's, Load Break Switch (HTS)

B) Ring Main Unit: (RMU)

Scope:

Specification No (SW-HTS/RMU)

Supplying and erecting Indoor type ring main unit with **1 or 2 incoming and 2 or 1 outgoing** with HRC fuses and with IP 55 protection class, complete erected on provided CC foundation/ MS channels/ trench in an approved manner.

Recommended Standards:

IS 9920 (Latest Revision):- Rating, performance, testing of Ring Main Unit

IS 9921:- Standards for temperature of electrical parts exposed to air

Material: Steel Sheet, Electrolytic copper Bus bar of 400 A, Arc Chutes, Epoxy Resin Cast Type Insulators, H.T. Fuses of adequate capacity, Shunt Trip Coil, Manual trip push button, Auxiliary contacts, Earth switch, Earth Bus bar copper (25x3)

Method of Construction:

Ring main unit should be erected on provided MS channels/ trench/foundation as per approved drawing by site in charge. Manufacturer's certificate for type test should be obtained. Routine Type test should be carried out at site. An earth switch having separate operating handle should be interlocked with main switch should be checked. An operating handle with correct sequence device having ON and OFF position and arrangement for pad locking provided should be checked.

Application: Ring Main Unit is suitable mainly for underground distribution system. It can be used for switching of transformers, overhead lines, capacitors, ring mains and cables

Mode of Measurement: Executed quantity will be counted on number basis. (i.e. each)

C) Vacuum Circuit Breaker: (VCB)

Scope:

Specification No (SW-HTS/VCB)

Supplying and erecting approved make 11kV / 22 kV, 630A, Vacuum Circuit breaker of required rating, on provided MS channels / trench / foundation in an approved manner.

Material: Steel Sheet, Aluminum Bus bar Arc Chutes, Epoxy Resin Cast Type CT's & PT's, Earth Bus bar aluminum (25x6), Panel comprising the above manufactured as per Manufacturer's standard specifications.

General Specifications for 11kv / 22 Kv 630A 350MVA VCB Switchboards

Panels shall be suitable for Indoor Free Standing Floor mounting Dust and Vermin proof type complying with IS3427, VCB Panels shall be extensible on either sides and fully compartmentalized with separate chambers for breakers, bus bars, current and voltage transformers relays & instruments and cable chambers, Each cubicle shall be provided with Pressure Relief Flap at top, The panel shall be fabricated with 2mm-sheet steel and 2.5mm-sheet steel shall be used for load bearing members. The panel shall be finished with Electrostatic Powder Coating of LIGHT GREY or with any other colour suggested by the Engineer-in-charge. Panel shall be suitable for rear side bottom cable entry for incoming and outgoing for 11KV panels. Bus bars shall be PVC sleeved or tapped. Vacuum Circuit breakers shall be horizontal Isolated and Horizontal draw out type. Vacuum Circuit breakers shall be fully type tested at CPRI and comply with IS 13118. Vacuum Circuit breakers shall be suitable for Manual/Motor Spring Charging operation. HT Switchgear shall be housed in separate vertical sections for each circuit.

Panel shall be provided with the following:-

Panel space heater controlled by thermostat with On/Off Switch, Cubicle illumination lamp with On/Off switch, 240V AC, 15A Plug & Socket. Panel shall be suitable for degree of protection IP55 as per IS 2147 for Indoor. Current Transformers shall be of Epoxy Resin Cast fixed type. Potential transformer shall be of draw-out type and shall be provided in the rear side of the panel.

MAIN BUSBARS: 630A TP Aluminium, Bus bar size: 50mm X 10 mm X 2 Run per phase.
Earth bus bar: 25mm X 6mm FLAT

Method of Construction:

VCB Panel shall be erected on provided MS channels/ trench/foundation as per approved drawing by site in charge.

Manufacturer's certificate for type test should be obtained.

Testing: Routine Type test should be carried out at site.

Mode of Measurement: Executed quantity will be counted on number basis. (i.e. each)

Chapter 8 Overhead Systems (OH)

8.2 PSC / Spun / GRP Poles (OH-PL/PSC/ SPN / GRP)
Spun Poles (SPN)

Specification No (OH-PL/SPN)

Scope:

Supplying and erecting pre stressed concrete PSC spun tubular pole on provided foundation as per IS 13158/1991 and as per method of construction.

Material:

PSC spun poles are as per specification in the table below and as per satisfactory tests minimum required as per IS. Poles are manufactured by centrifugal compaction process of concrete grade M-50.

Top cross section in mm	Bottom cross section in mm	Length in meter	Weight in kg
160	266	8	300
160	280	9	300
206	353	11	300
206	353	11	500
206	366	12	500

Method of Construction:

The pole shall be erected in provided concrete foundation having circular cavity matching with outer diameter of the pole and of requisite depth as per instructed by site in charge.

Mode of Measurement:

Executed quantity will be measured on number basis

Glass Reinforced Polymer Composite Poles (GRP)

Specification No (OH-PL/GRP)

Scope:

Supplying and erecting glass reinforced polymer composite (GRP) with high impact strength in square / conical with specified top & bottom diameter and thickness, length, etc designed to withstand wind load up to 180 km/ hr.

Material: Poles: Poles shall be as per standard manufacturer's specification.

Technical Specifications for GRP Poles

Sr.No	Details	Units
1	Specific Gravity	1.65 Kg/dm ³
2	Glass content (percentage by weight)	45 – 55%
3	Water absorption	0.5%
4	Tensile strength	400 + 50 MPa
5	Flexural strength	350 + 50 MPa
6	Compressive strength	200 + 50 MPa
7	Impact strength	>180 KJ/ m ²
8	Dielectric strength	3 – 7 KV/mm
9	Thermal conductivity	0.2 – 0.3 Kcal/mH ⁰ C

Method Of Construction:

The pole shall be erected at designate location and at requisite depth as instructed by site in charge.

Mode of Measurement:

Executed quantity will be measured on number basis

Chapter 9 Earthing (EA)

C) Early Streamer Emission Lightning Arrestor (EA-LAP)

Scope:**Specification No (EA-LAP)**

Supply, installation of early streamer storm master type lightning protection complies with lightning air terminal, supporting mast, guy rope, down conductor, maintenance free fast earth electrode at specified location as per drawing and design.

Material:

ESE Storm Master Type Lightning Protection complies with the Lightning Air Terminal - Configured as a Spheroid which is comprised of separate electrically isolated 4 panels surrounding an Earthed Central Finial. The Insulation Material used to electrically isolate the panels shall be comprised of a base Polymer (UV rated Evopren) which provides high Ozone & UV resistance with a di-electric strength of 24-38 KV/mm tested as per NFC 17-102 & IEC 60-1:1989. The ESE terminal shall be tested & certified by CPRI (Central Power Research Institute, Govt of India) for the Impulse current of 45 KA (8/20 micro sec) with 5 positive & 5 negative impulse.

Lightning counter- (6 digits, 7 segment Tercal digital display) in an IP 67 enclosure with the minimum sensitivity of 1500A & maximum capacity of 220 KA (8/20 micro second waveform) tested as per IEC 60-1:1989

Design System:

For designing lightning arrestor the necessary data is length height and width of area to be protected that is complete drawing of area .The protection radius(Rp) of Stormaster terminal is calculated using the formula as defined by national French standard NFC 17-102(July 1995)

$$R_p = \sqrt{h(2D-h) + \Delta T(2D + \Delta T)}$$

R_p:-Radius of protection (in meter)

h=Actual height of stormaster terminal for Area to be protected (in meter)

D: Is a Constant in meter. It depends on protection level as specified in NFC 17-102

D=20 meter for protection level 1(High protection)

D=45 meter for protection level 2(Medium protection)

D=60 meter for protection level 3(Standard protection)

The terminal shall offer a protection radius in meter with the different Level Of Protection & preferably to be mounted on roof top & centre of the building.

Triggering Time 15 in microsecond - 32 mtrs

Triggering Time 30 in microsecond - 48 mtrs

Triggering Time 50 in microsecond - 68 mtrs

Triggering Time 60 in microsecond - 79 mtrs

Method of Installation:

The lightning arrestor air terminal is preferably to be mounted on roof top according to drawing and design; it must contain the supporting mast with base plate, guying rope wire to protect against the wind load. The down conductor should be 70 sq mm single core copper flexible cables properly connected between the air terminal finial to earthing system. The digital counter is fixed at eye level on down conductor

Mode of Measurement:

Executed quantity will be measured on number basis.

Chapter 13 Fire Fighting & Fire Alarm (FF)

Fire Alarm Accessories (FF-FAAS)

E) Mineral Insulated Copper Cable (MIC)

Specification No (FF-FAAS/MIC)

Scope:

Supply and erecting Mineral Insulated copper cable of specified size with an overall (LSF) covering, 500 Volts, to withstand temp. 950 Deg C for period of 3 hrs, Mechanical shock and High Pressure water stream used during the fire fighting.

General:

Mineral Insulated Copper Cable, Light Duty – 500 Volt Grade and Heavy Duty 750 Volts Grade for Fire and performance wiring applications.

All material shall conform to relevant BIS standard and shall have LPCB approval. If any particular category of material for which ISI mark is not available in market, it shall be included in approved list. Work shall be carried out as per method of construction specified hereunder and shall be carried out to the satisfaction of the Engineer in Charge.

Cables (MIC)

To provide the client with the highest standard in performance cables for fire alarm, life safety, fire fighting, and critical systems applications. The cable system should be mineral insulated, robust, 100% screened, and space saving in order to meet the demands of modern building design. The cable should also be capable of surviving fire conditions without loss of integrity (without burning) and without providing an additional fuel load. This specification should be strictly adhered to in order to provide maximum conformity with the Regulatory Reform (Fire Safety) Order 2005.

Material:

Conductor: Copper

Outer Sheath: Copper

Insulation: MgO (Mineral Insulated)

Terminations:

Gland: All terminations shall be supplied by the cable manufacturer and shall comply with the requirements of BS EN 60702: Part 2. They shall be fitted in accordance with the manufacturers recommended termination procedures,

Seals: The following types of seal are available and shall be utilized as appropriate to suit the environment. Standard 105°C and Fire Resistant Seal Increased Safety seal for EEXe Hazardous Area 250°C High Temperature Glazed Insulator

Technical Specifications:

All cables shall carry LPCB approval to specific and relevant standards, BS60702-1, BS6387, BS8434-2, BS5839-1 Clause 26.2, BS EN 50257-2-1, and must be registered by the LPCB to this effect. The supplier shall be accredited and approved to ISO 9001.

The MI wiring system shall be approved by the LPCB to BS8434-2, BS5839-1 Clause 26.2 (Enhanced) and BS EN 50200 Class PH 120, BS EN 50257-2-1, and be documented in the LPCB Red Book.

Light duty grade cables are rated to 500V and are suitable for use where the voltage between the conductor and sheath and between conductors does not exceed 500V r.m.s, A.C, or 500Vd.c. The MI cable shall also be available with an overall LSF covering. This may be employed to protect the copper sheath from corrosive environments, to provide identification by colour, or for other aesthetic reasons. When cables are to be buried in the ground, the type having this outer covering should be specified.

Heavy duty grade cables are rated to 750V and are suitable for use where the voltage between the conductor and sheath and between conductors does not exceed 750V r.m.s, A.C, or 750Vd.c. The MI cable shall also be available with an overall LSF covering. This may be employed to protect the copper sheath from corrosive environments, to provide identification by colour, or for other aesthetic reasons. When cables are to be buried in the ground, the type having this outer covering should be specified. The MI cable system must be capable of the following installation types: - Buried in the ground, Underground ducts, conduit or pipes, Buried in concrete, Buried in plaster, Surface mounted, On cable tray, Outdoor and wet conditions, High ambient temperature environments (continuous temperature of 250°C.) Higher continuous ambient temperatures are also possible with MI., Low temperature environments (where the cable needs to operate at temperatures down to approaching absolute zero.)

Product, Technical, and Performance requirements:

The MI cable system must, as a minimum requirement:

- Be manufactured, tested, and LPCB approved to BS EN 60702-1.
- Be complete with terminations tested and approved to BS EN 60702-2,
- Be approved by the LPCB (and clearly documented in the "Red Book") to:
 - BS8434-2 (120 Minute)
 - BS5839-1 Clause 26. (Standard and Enhanced.)
 - BS EN 50200 Class PH 120.
 - BS EN 50257-2-1
- Have a loss of mass under fire conditions of less than 0.5%. Cables losing mass under fire conditions greater than 0.5% suggest the addition of a fuel load.
- Have a life expectancy in excess of 100 Years.
- Be unaffected in fit, form, and function, to the effects of power system harmonics, including but not limited to, continuous operation at elevated temperatures without premature aging.
- Meet and exceed the requirements of IEC60331 – tests for electric cables under fire conditions.
- Be approved for use with London Underground Ltd. (LUL), and compliant with Fire survival cable (MICC) EME-SP-14-028-A1.
- Carry CE marking on cable drums, reels, termination packaging as required by the directive.
- Demonstrate compliance, where applicable, in the following standards.
 - BS5588 – Fire precautions in the design, construction and use of buildings.
 - BS5266 – Emergency lighting.
 - BS5454 – Storage and exhibition of archival documents.
 - BS5839 – Fire detection and alarm systems in buildings.
 - C.I.O – Lighting and wiring for churches.

Installation, Testing and Commissioning:

The Mineral insulated (MI) cable, shall be specifically designed for ultimate performance and compliance with the current version of BS7671 ("Requirements for electrical installations") and shall be supplied and tested, in accordance with BS EN 60702: Part 1.

BS7671 – Requirements for Electrical Installations (IEE)

Installation, testing and commissioning shall be carried out in strict compliance with all current electrical standards and regulations.

When required by the consultant or specified, cables may be tested prior to installation using a suitable insulation resistance test.

The MI system shall be installed in accordance with all current electrical standards and regulations.

The system shall be compliant with BS7671 (Requirements for electrical installations.)

The MI wiring system shall be tested to BS EN 60702-1 for cables

Mode of Measurement: Executed quantity will be measured on running meter basis.