STYRENE PARK OFFSITE

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Specification For Electrical Bulk Materials

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1. INTRODUCTION

This specification covers the requirements for the design, selection, manufacture, inspection and testing, and shipping of the Electrical Bulk.

- Bulk Materials For Wiring
- Bulk Materials For Earthing System
- Cable glands
- Conduits
- Junction Boxes
- Lighting Poles
- Local Control Station

2. ORDER OF PRECEDENCE

In case of conflict between documents, the order of precedence shall be:

- Drawings and other documents,
- The Data Sheets,
- This Specification,
- I.E.C. standards,
- Other standard and codes when I.E.C. publications have not yet been issued.

3. STANDARDS AND CODES

3.1 Materials selection, design, manufacture and test of the Electrical Bulk materials shall comply with the latest editions of the following codes and standards.

IEC 60079**:** Electrical apparatus for explosive gas atmosphere.

IEC 60529**:** Degrees of protection provided by enclosures (IP Code)

IEC 60598**:** Lighting fixtures

IEC 60617**:** Graphic symbols for Electrical diagrams

IEC 60695**:** Fire Hazard testing of Electro technical products

API 505: Electrical Installations in Petroleum Processing

BSI: British Standards Institution

NPCS: National Petrochemical Company Standard (NPCS)

ANSI: American National Standard Institute (ANSI)

IEEE: The Institution Of Electrical and Electronics Engineers(IEEE)

ISO Metric System shall be applied for thread type

3.2 The above mentioned list, is not intended to be complete, and indicates major standards only. The Vendor shall state in the quotation, the codes and standards applicable to the equipment proposed. If these are the national standards, then the vendor shall state in the quotation, the deviations (if any) from the relevant IEC recommendations.

3.3 In the case of conflict between IEC and above mentioned codes /standards ,the IEC standards shall be prevailed

4. SITE CONDITIONS

The Equipments shall be suited for installation in ambient conditions as follows:

- Max. outdoor Recorded Temperature +48°C
- Max. indoor Recorded Temperature +45°C
- Min. outdoor Recorded Temperature 10°C
- Min. indoor Recorded Temperature 5°C
- Humidity 80%
- Soil Temperature 30°C

4.1 Requirements for Hazardous Area Use Equipment

The electrical equipment for use in hazardous area shall comply with API 505 and shall be certified by an internationally recognized testing organization such as Baseefa, PTB, LCIE, CESI, or other nationally organized testing organization approved by the owner.

5. CONSTRUCTION

5.1 LIGHTING POLES

5.1.1 General Requirements for Lighting Poles:

a) Lighting Poles shall consist of hot dip galvanized steel pipe with base plate and anchor bolts. The pole stem shall consist of a round tapered pole. Hexagonal lighting poles are also acceptable.

b) The height of the lighting pole shall be as specified in the requisition, and the lighting pole length shall be suitable for the given lighting fixtures.

c) The base plate welded to the pole stem shall be provided with at least four holes for anchor bolts.

d) The anchor bolts with nuts and washers shall be supplied by Vendor. The pole shall have cable clamping facility.

5.1.2 Street Lighting Poles

a) The overall height of poles including bracket for lighting fixture shall suit width of the street and shall be as specified in the requisition. The arrangement of the bracket shall be such that the angle between horizontal plan and the lighting fixture axis shall be between 15° and 20°, and the bracket length and angle shall be as specified in the requisition.

b) It shall consist of a hot dip galvanized steel arm suitable for fixing at the top of the pole by means of locking screws. The extremity for fixing the lighting fixture shall be circular with a suitable diameter (to be finalized later).

c) All metallic parts shall be bonded together. Earthing terminals connected to the pole frame shall be provided for earthing conductors and cable armors.
d) The lighting pole shall have a separate junction box with terminals and fuses, mounted on hot dip galvanized steel, welded to the pole. Terminals shall be suitable for the cable sizes as specified in the requisition. A suitable opening shall be made in the pole to carry the branch cable from Junction box to lighting fixture.

5.1.3 Flood Lighting Poles

a) The lighting pole for flood lights shall have a separate junction box (as a wring compartment) with terminals and fuses, mounted on hot dip galvanized steel, welded to the pole. Terminals shall be suitable for the cable sizes as specified in the requisitions. A suitable opening shall be made in pole to carry the branch cable from the junction box to lighting fixture.

b) Lighting poles shall be equipped with permanent access ladder, platform and mounting provision for the lighting fixtures, as specified in the requisition.

c) A suitable opening shall be made in pole to carry the branch cable form junction box to lighting fixtures.

d) All metallic parts shall be bonded together. Earthing terminals connected to the pole frame shall be provided for earthing conductors and cable armors.

5.1.4 Socket Outlets and Plugs

5.1.4.1 Small Power and Convenience Outlets

For maintenance purposes adequate number of 230V 1 Ph outlets for movable equipment shall be foreseen.

Accepted standard ratings for 1Ph outlets are as follows:

- 10/16 A, 250 Volt Two pole socket outlets with centre earthing
- 10/16 A, 250 Volt Two pole plugs with centre earthing
- 10/16 A, 250 Volt Two pole socket outlets with pin type earthing contact
- 10/16 A, 250 Volt Two pole plugs with pin type earthing contact

The extension cord shall be 25 meters long with suitable sockets shall be located in plant.

Appliances shall be in compliance with the requirements of BS 5501 Parts 5 convenient for Zone 1 and Zone 2 apparatus Groups IIA and IIB with type of protection EEx ‘d’ degree of protection IP 55, 20mm entry.

Plugs shall not be interchangeable with sockets of a different voltage or current rating, nor shall it be possible to insert an industrial type of plug into a Zone 1 classified outlet.

Every convenience outlet circuit shall be protected by phase short circuit protective devices and by current-operated earth leakage protective devices which are in accordance with IEC 60947-2, i.e., residual current circuit breakers (RCCB).

5.1.4.2 Power and Welding Outlets

Power and Welding outlets shall generally be in accordance with IPS-M-EL-290 "Material Standard for General Electric Items Section 5 Material Standard for Socket Outlets, Industrial and Explosion-proof)".

Power and Welding outlets shall have 400V, 3-Phase, 50Hz supply for feeding movable equipment. These outlets for movable equipment with motors shall be rated for 32A, 63A or 125A, for Welding

equipment shall be rated for 100A, 160A, 250A, 400A or 630A and be suitable for outdoor installation, They shall be spaced in such a way that, with the aid of extension cables feeding movable secondary supply boards, all points can be served conveniently. The power outlets shall be connected so as to have the same phase rotation, ensuring that correct rotation of movable equipment is obtained from all outlets.

The extension cord shall be 25 meters long suitably sockets shall be located in plant.

Appliances shall be in compliance with the requirements of BS 5501 Parts 5 convenient for Zone 1 and Zone 2 apparatus Groups IIA and IIB with type of protection EEx ‘d’ degree of protection IP 55, 20mm entry.

5.2 CABLE GLANDS

5.2.1 Ingress protection of cable glands shall be IP 55 of IEC 60529 and suitable for the hazardous area where they are installed and as specified in the requisition.

5.2.2 Cable glands shall be made of Nickel plated brass, unless otherwise specified.

5.2.3 Cable glands shall have ISO metric threads to IEC 60423, and the thread sizes shall be as specified in the requisition.

5.2.4 Cable glands shall be manufactured to provide with cable sealing of inner and outer sheaths and clamping of armor by special ring.

5.2.5 Cable glands for single core cables shall be made of non-magnetic material, and one of two shall be provided with insulation adaptor when so required.

5.2.6 Cable glands used for cable entry to enclosures located indoors, in a safe area, can be only with an outer seal provided that the degree of protection is IP42.

5.2.7 The cable glands for use in hazardous areas shall be certified by internationally recognized testing organization.

5.2.8 Cable glands that are used with EExd enclosures shall be compound barrier type. Compound filled compression type cable glands, supplied by the cable manufacturer, shall be used for the termination of mineral insulated metal sheathed cable.

5.3 JUNCTION BOXES

5.3.1 Outdoor Junction Boxes shall be IP55 of IEC 60529 and suitable for the hazardous area where they are installed and as specified in the requisition.

5.3.2 Indoor Junction boxes shall be industrial type with the degree of protection of IP42.

5.3.3 Enclosure material shall be metallic.

5.3.4 Operating voltage shall be 230V,1Ph,50Hz or 400V, 3Ph, 50Hz as specified in the requisition.

5.3.5 Cable entries (ISO threaded) and terminals shall be suitable for the cables specified in the requisition.

5.3.6 The junction boxes shall be suitable for mounting on steel structure/column/wall.

5.3.7 Installation hardware and accessories shall be supplied by Vendor.

5.3.8 The junction boxes shall be provided completely with terminals, mounting rails, end plates, marking strips or tags, etc., when so specified in the requisition.

5.3.9 Outside identification plates shall be corrosion proof by nature (stainless steel) and securely fixed to enclosure (not glued).

5.4 CONDUITS

5.4.1 Above grade conduits shall be hot dip galvanized rigid steel except at the cooling towers where aluminum conduit shall be used.

5.4.2 The minimum size of the above grade conduits shall be 20mm trade size.

5.4.3 All concealed conduits installed in offices, ancillary buildings, etc. shall be rigid steel, black enameled or galvanized, in accordance with DIN 49020 with PG thread according to DIN 40430, or BS 4568.

5.4.4 The exposed conduits used in zone 2 areas and unclassified areas shall be rigid steel, hot dip galvanized in and out, heavy gauge, welded or seamless, with metric threads of ISO form, according to IEC 60423 or BS 4568.

5.4.5 The conduits used in zone 1 areas shall be rigid steel, hot dipped galvanized in and out, heavy gauge, solid drawn (seamless) with metric threads of ISO form according to IEC 60423 or BS 4568.

5.4.6 Conduit fittings used in zone 2 areas shall be of the vapor-proof gasket type, with corrosion resistant finish. Copper-free aluminum fittings shall be used with aluminum conduits.

5.4.7 Conduit fittings used in zone 1 areas shall be of the flame-proof type, with corrosion resistant finish, Copper-free aluminum fittings shall be used with aluminum conduits.

5.4.8 Flexible conduits shall be liquid tight and suitable for the area classification in which they are installed. Flexible conduits shall be used for the final connection to vibrating equipment other than motors.

5.5 WIRING BULK MATERIALS

Wiring bulk materials shall be designed according to site conditions with good constant color codes, and shall be included but not limited to the following**s:**

- Clamps for cable fixing on cable ladders and trays
- Lugs and connectors for wiring,
- Cable and wire markers,
- Cable shoe,

5.6 Cable Tray

Three types of cable trays are considered, they are:

- Light duty cable tray and accessories: Light duty cable tray shall comply with the requirements of BS 1449, BS 2989 and shall be hot galvanized to BS 729 after fabrication.

- Medium duty returned flange cable tray: Medium duty return flange shall be similar to light weight, but with return flange and strong enough for most applications.

- Heavy duty return flange: Heavy duty return flange cable tray. Shall be designed and manufactured for applications where strength and rigidity is paramount and shall be manufactured from steel to BS 1449, BS 2989 or stainless steel and shall be finished by hot deep galvanized to BS 729 after fabrication.

The size and the accessories of cable trays shall be in accordance with the requirements of IPS-M-EL-290.

Vendor shall supply the cable tray cover and all the accessories.

5.7 EARTHING BULK MATERIALS

5.7.1 Earthing bulk materials shall be included but not limited to the following**:**

a) Earthing Cable, soft drawn copper, PVC covered.
b) Copper Earth Rod with coupling and driving head and spike & concrete inspection driving stud.
c) Graphite mould for Tee joint conductors exothermic welding with handle and standard tools and accessories (Each one suitable for 80 No).
d) Thermit welding powder.
e) Six Way Copper Earth Bar.
f) C- Brass Type Clamp for connection grounding conductors.

g) Phosphor- Bronze Clamp for rod to cable lug connection.

h) Phosphor-Bronze Hexagon Head-Bolt.

i) Wrapping Paste.

5.7.2 The cable sheath's color shall be as below**:**

a) Green/ yellow for electrical,

b) Green/ yellow for instrument,

c) Purple for I.S. instrument (or green / yellow with purple tag)

d) Sizing and manufacturing of earthing cables, refers to earth fault calculation and shall be according to IEC 60227 or equal standard.

5.7.3 All earth connections points (electrical and instrument) shall be marked with hard plastic black number**.** This tagging shall be registered in the as-built drawings.

5.8 Remote Control Stations

5.8.1 Enclosures

Remote control stations may be installed in safe areas, or in zone 1 or zone 2 of hazardous areas.

All enclosures shall be of robust metallic construction, and suitable for outdoor use without any further protection. The unit will be arranged for wall mounting or for fitting to structural steelwork.

All internal steel parts shall be of stainless steel.

Particular attention is drawn to the requirement for reliability under the arduous climatic conditions and all materials, specially gaskets, plastic mouldings, insulation, etc., to be able to withstand these conditions without undue deterioration.

The weatherproofing design aspects of the enclosure shall not contravene the BASEEFA certification or similar approval for use in hazardous areas.

The degree of protection shall be IP 65.

5.8.2 Push Buttons

All push buttons shall be spring loaded and the push button assemblies to be readily removable for maintenance purpose.

Start push button to be shrouded or of inset design to avoid accidental operation and to be colored green.

Stop push buttons to be of the stay-put reset type i.e. the stop button remains in the stop position until released by a twist and pull action and to be colored red.

The control switch shall be labelled OFF/N/ON and shall be lockable in the off position. Selector switches shall have a stay-put action to remain in any selected position, which shall be lockable.

The push button functions to be clearly marked either by deep engraving on the front of the button or by a stainless steel engraved label on the enclosure.

The engraving shall be in English.

5.8.3 Temperature Rise

No part of a control switch shall attain a temperature which may cause damage to the part itself or to adjacent parts, when the control switch is installed and operated in accordance with the instructions of the manufacturer.

In particular, the temperature rise of the terminals shall not exceed 70℃ when tested under the conventional conditions laid down in Clause 8.1.1 of IEC publication No. 337.1.

Operating Conditions For mechanical details of the operating conditions refer to Clause 3 of IEC publication 337.2 Part 2.

5.8.4 Ammeters

Ammeters shall be provided for motors rated 4 kW and above. Ammeters shall be normally direct operated up to 30A (site) the ammeter above 30A to be current transformer operated.

Ammeters shall be of flush mounted industrial grade, enclosed in a dust and damp proof casing, non-projecting dial, with non-glare non-reflecting window and in compliance with the requirements of pertinent parts of IEC publication 51, and the accuracy shall be class 2.5.

Ammeters shall have a compressed overload end scale of at least 6 to 8 times the full load motor current. Indication shall be of the actual values and the pointer shall be adjustable.

The limit of current range shall be 60% to 70% of full scale.

The dial to be marked with the:

- Current transformer ratio.
- Accuracy class.
- Serial No. particular.

5.8.5 Indicating Lamps

Indicating lamps with flat lens either with connecting lead or screw terminals shall be flash mounted, low wattage long life type with the degree of ingress protection (IP) 65 adequate for temperature ranging from -20 degree centigrade to 80 degree centigrade.

Color of indicating lights shall comply with the requirements of IEC publication No. 73.

5.8.6 Earthing Terminal

Earthing terminal shall be provided for each remote control station where necessary.

5.8.7 Nameplates and Labels

The nameplates, labels and their fixing materials shall be proven, durable under the service conditions, they shall be corrosion and moisture resistant and provided with indelible inscription in English.

Stainless nameplates and labels are acceptable.

Holes for fixing of nameplate or labels shall not influence in any way the degree of ingress protection of enclosure

Marking shall be visible and they may be on a nameplate or on a major or essential part of the contact element. The information shall be marked on nameplate in accordance with the requirements of IPS-M-EL-185.

6. LABELS

6.1 All items of equipment shall have suitably inscribed identification labels. The equipment shall be identified with the nameplates at the front.

6.2 Nameplates shall be made on stainless steel and shall be permanently fixed.

6.3 The labels other than danger shall be of black letters on white background.

6.4 The danger labels shall be of black letters on yellow background.

7. PAINTING

7.1 No additional painting is required for galvanized materials. For other metal enclosures, Vendor shall submit his standard protection and coating specification for Purchaser's review.

7.2 All metal parts shall be protected against corrosion in accordance with Vendor's standard corrosion protection system suitable for the environmental conditions specified.

7.3 Color of top coat shall be Vendor's standard if no specific color is specified in the requisition.

8. INSPECTION AND TESTS

8.1 Equipment, materials and accessories shall be inspected for physical and dimensional details, satisfactory operation and conformity with the specification.

8.2 Vendor shall provide with the certificates issued by an internationally recognized testing organization for hazardous area used equipment.

8.3 Vendor shall notify to Contractor/ Client at least 8 weeks in advance for each scheduled inspection.

8.4 Vendor shall provide with adequate facilities for the Contractor/ Client's inspector to verify all equipment and accessories in compliance with the specifications.

9. SHIPPING

Preparation for shipment shall be in accordance with Manufacturer's standards, unless otherwise noted on the Request for Quotation and/or Purchase Order. The Manufacturer shall be solely responsible for the adequacy of the Preparation for Shipment.