Annexure- ‘B’

#### Distribution service connection box for lt. Lines / consumer mains pole top mounted 1 in 3 out with housing 5 nos 20 amp mcb

* 1. SERVICE CONDITIONS:

The material to be supplied against this specification shall be suitable for satisfactory continuous operation under the foll wing tropical conditions.

* Maximum ambient temperature :50 °C
* Maximum ambient temperature in shade : 45 °C
* Relative Humidity 10 to 95%
* Maximum annual rainfall 1450 mm
* Maximum wind pressure 150 Kg/m.sq
* Maximum altitude above mean seal level 1000 meters
* Isoceraunic level : 50 days/year
* Seismic level (Horizontal acceleration) : 0.3g
* Moderately hot and humid tropical climate
  1. STANDARDS:

All components used in the manufacture of the materials shall conform to the relevant Indian standards and especially to the followings

|  |  |  |
| --- | --- | --- |
| 3.1 | IS:14772/2000 | General Requirements for Enclosures for Accessories fa  Household and Similar Fixed Electrical Installations- Specification |
| 3.2 | IS:13947/1993  (Part 1) | Specification for Low-voltage Switchgear and Control gear -Part 1 : General Rules& Annex 'C' for Degrees of Protection provided by enclosures of electrical Equipments |
| 3.3 | IS: 13410/1992 | Glass reinforced polyester sheet moulding compounds (SMC) |
| 3.4 | IS: 13411/1992 | Glass reinforced polyester dough moulding compoun ds (DMC) |
| 3.5 | IS: 732/1989 | Code of Practice for Electrical Wiring Installations |
| 3.6 | IS: 4249/1967 | Classification and methods of tests for non-ignitable and self extinguishing properties of solid electrical insulating materials |

1. GENERAL TECHNICAL REQUIREMENTS:
   1. ENCLOSURE:
2. The service connection box shall be made out of thermosetting plastic i.e. glass reinforced polyester sheet moulding compound (SMC) conforming IS: 13410-1992 grade and also conform to self extinguishing properties as per IS-4249 & requirements of this specification.
3. The enclosures shall be made of high grade virgin material with anti- corrosive, rust proof, shock proof, dust and vermin proof, U.V. stabilized with flame retardant property.
4. The S. C. box shall comply with the requirement of IP- 55 type as per the IS - 13947 or the latest version thereof.
5. The wall thickness of the box shall be minimum 2mm. The S.C. Box should have minimum 40 mm clearance on all three sides and bottom clearance of minimum 60 mm for pole mounted boxes.
6. The enclosures should be suitable for outdoor use, Pole mounting and should not soften, bend or melt at high temperature. It should have flame retardant properties and material of it should not generate burning droplets in the event of fire.
7. The Service Connection Box shall be suitable for housing Bus Bar system with adequate clearances. The General arrangement drawing shall be as per the attached drawing.
8. The base and door should be single piece moulded individually with rounded corners without any construction/ fabrication joint.
9. The door in closed position should overlap on base such that direct entry of screw driver, tool or rod is not possible.
10. Concealed hinges should be provided to the S. C. boxes.
11. The Box should have positive locking system by way of bolt and nuts in addition to "U"

Clamp as shown in the Drawing. "U" clamp should have matching Holes on base and door to facilitate wire sealing.

1. Holes for in-coming and out-going Cables should be provided at bottom

shall be shown in the G.A. Drawing. Suitable number of holes with rubber grommets of suitable size shall be provided at the bottom of S. C. box for incoming and outgoing cables.

I) The box should have holes on the back-side as shown in Drawing for fixing it on Pole with suitable clamping arrangement or in metering cabinet in the buildings.

1. The Bus Bar mounting system should be angled and stepped so as

to facilitate easy connection and disconnection of cable without twisting and sharp bending of wire/cable. The mounting steps shall be made out of Thermosetting Plastic insulating material as given above.

1. Fixing of accessories like clamp, handles etc and all metal part excluding hardware shall be of stainless steel only.
2. The surface appearance or part of S. C. Box must be smooth, non porous and homogeneous, free from ripples, defects and marks. No fillers or fibres should be visible at any place.
3. One no Earthing Bolt of size M6 having length of min 25mm with two washers & nuts shall be provided on the connection box for necessary earthing.

3. SPRING LOADED BUS BAR :

* 1. The Bus Bars module shall have casings made out Thermosetting Plastic confirming to IS- 13410. Each module shall contain two Bus Bar; assembly of sliding type pressure plate & spring at bottom of each pressure plate. All such assemblies shall be housed in the casing along with Bus bar. The assembly shall facilitate definite pressure overlap electrical connection on Bus bar.
  2. The Bus Bars shall be made out of EC grade copper and shall be tin plated. The size of Bus Bars shall be adequate as per rating.
  3. The pressure plates shall have built in flat flap to hold conductor flat on Bus Bar. It shall ensure definite overlap contact on the Bus Bar so as to avoid loose contact subsequent over heating at contact. Thus it shall help in line loss reduction.
  4. Multiple modules shall be fitted in a box so as to fulfill the system requirement.
  5. The current carrying parts shall be of electrolytic grade and the hardware, spring, links etc. used along with shall be of non- magnetic type. The Bus bar shall be made of EC grade copper with total cross section of 75 sq mm & length as per the requirement. (Two nos of copper conductors of37.5 sq mm. each making a total of 75 sq mm may be used).
  6. The pressure plates which keep pressing the cable conductor & springs with sufficient strength of thickness 2mm. The diameter of the spring wire shall not be less than 2.0 mm. Both are

to be made of Stainless steel only.

* 1. The springs are required to be retained in the housing by means of a stainless steel rod at the bottom end of the housing so as to exert pressure on the pressure plate when cable is inserted in the bus bar.
  2. The connection system shall be spring loaded so that no fasteners are required to add a new connection from the distribution system. Also each connected cable shall have a pressure applied to it at the point of connection to provide connection integrity & eliminate loose connections.
  3. Provision for one incoming circuit of single/three phase with neutral of cable size 95 or

70 or 50 Sqmm cable & outgoing connections of cable size 10 sq mm. size as per requirement on each phase bus bar & neutral shall be provided.

* 1. Single/Three phase Boxes shall have following combinations.

1. One incoming & 9 outgoing for single phase connection housing 5 nos 20 Amp MCB.
2. One incoming & 3 Outgoing for three phase connection

#### Specifications for Fiberglass Reinforced Plastic Sheet moulding compound

1. FRP Sheet Moulding Compound shall conform to IS:13410-1992
2. The Surface appearance of the door must be smooth, non porous, and homogeneous, free of ripples, defects, and marks. No filler or fiber shall be visible at any place.
3. Other properties of SMC material shall be as follows & shall pass the test mentioned against the same.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Sr.  No. | Characteristic | Requirement | Type of test | Method of test  Ref. to |
| 1. | Material. | Thermosetting  Plastic |  |  |
| 2. | Grade of material | SMC Electrical  grade 53 |  | IS:13410-1992 |
|  | Material requirement for Sheet Moulding Compound | | | |
| 4. | Glass content, percent  by mass (Min.) | 20 | Type | Annexure A of IS:13411-1992 |
| 5. | Mould shrinkage, linear  %Max | 0.25 | Acceptance | Annexure B of  IS:13411-1992 |
| 6. | Flow, mm, Minimum | 170 | Acceptance | Annexure C of  IS:13411-1992 |
|  | Requirement for Moulded Sheet Moulding Compound | | | |
| 7. | Water Absorption, %  Max | 0.20 | Type | Annexure D of IS:13411-1992 |
| 8 | Izod impact strength (Notched), KJ/m2 | 55 | Type | Annexure E of IS:13411-1992 |
| 9 | Flexible Strength ,MPa ,  Min | 170 | Type | Annexure F of  IS:13411-1992 |
| 10 | Power Arc Resistance  Sec. Min. | 180 | Type | Annexure G of IS:13411-1992 |
| 11 | Modulus of Elasticity,  103, MPa | 12 to 15 | Type | IS: 8543 Part-4  (Sec-1)/1984 |
| 12 | Tracking Resistance  CTI, Min | 1000 | Type | IS: 2824/1975 |
| 13 | Dielectric Strength at  90oC in Oil KV/mm | 11 | Type | IS :6262/1971 |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 14 | Dissipation factor (4  days at 80 % RH & 1 KHz) | 0.01 | Type | IS: 4486/1967 |
| 15 | Heat Distortion  Temperature, oC ,Min | 150 | Type | Annexure H of IS:13411-1992 |
| 16 | Oxygen Index,% Min | 24 | Type | IS: 13360 Part-  6 (Sec-6)/1992 |
| 17 | Post shrinkage, % Max | 0.01 | Acceptance | Annexure B of  IS:13411-1992 |
| 18 | Tensile Strength ,MPa , Min | 70 | Acceptance | IS: 8543 Part-4  (Sec-1)/1984 |
| 19 | Density of Moulding,  g/ml | 1.8 to 2.1 | Routine | IS: 8543 Part-!  /Sec 2/1979 |
| 20 | Surface resistivity (24 H in water), Ohm,Min | 1X 10 13 | Routine | IS: 3396/1979 |
| 21 | Volume resistivity,  Ohm-em, Min | 1X 10 14 | Routine | IS: 3396/1979 |
| 22 | Exposure to flame | Self- Extinguishing |  | IS:4249 |
| 23 | Melting Point | test up to 400DC |  | IS:13360 Part6  : Sec 10 : 1992 |
| 24 | Cross Breaking Strength | (1723 Kg/sq.cm) |  | As per ASTM  D790 |
| 25 | Shear Strength | (879 Kg/sq.cm) |  | As per ASTM  D732 |
| 26 | Flammability ( V2) | UL 94 or IS :  11731 (Pt.II) |  | IS : 11731 (Part-  II) |
| 27 | Marking, Dimensions and  construction |  |  | IS : 14772 |

**Technical Specification for MCB`s “Miniature Circuit Breakers”**

* + MCB`s should comply with IEC:604947/IS:13947 and IS:8826
  + No.of Poles: MCBs required are of single-pole types.
  + Rated Voltage & Frequency:- The rated voltage single pole 240 VOLT & 50 Hz frequency.
  + Rated Current:- The rated currents shall be 20 amperes for single-pole units .
  + Rated short-Circuit capacity :- All Single pole MCBs shall be as per IS: 8828/1996.
  + Service Short Circuit Capacity:- The Service short circuit capacity of MCBs shall be as per table 15 of IS:8828/1996. The procedure for making the ShortCircuit test and the test circuit etc. shall be in accordance with the IS: 8828/1996.

#### TESTS:

* 1. TYPE TESTS:

Type tests as mentioned in specification offiberglass Reinforced Plastic sheet moulding compound shall be carried out on SMC material as per IS 13410/13411. In addition to above following type tests shall be carried out on complete box

* + 1. High Voltage test on Bus bar as per IS 8623 (A.C. voltage 2.5KV applied for one minute.
    2. Temperature Rise Test at 100% rated current as per IS 8623.
    3. Degree of protection Test for IP 55 as per IS 13947/1993 (Part 1).
    4. Mechanical Strength Test as per IS 14772.
* ON MCCB:

All type tests on MCCB as per relevant IS amended upto date shall be carried out.

* 1. ACCEPTANCE TESTS:

Following acceptance tests shall be carried out.

1. Acceptance tests as mentioned in annexure A shall be carried out on SMC material as per IS 13410/13411.
2. Verification of dimensions & construction as per IS 14772.
3. High Voltage test
   1. TEST CERTIFICATES:

The material offered shall be fully type tested as per relevant IS and this specification. The successful Bidder shall furnish detailed type test reports before commencement of supply for necessary approval of the CE Concerned. The detailed Type Test Reports shall be furnished with relevant oscillogram and certified Drawings of the material tested. The purchaser reserves the right to demand repetition of some or all the Type tests in presence of purchaser’s representative at purchaser’s cost.

All the Type Tests shall be carried out from laboratories which are accredited by the National Board of Testing and Calibration Laboratories (NABL) of Government of India such as CPRI Bangalore/ Bhopal, ERDA Baroda, to prove that the material offered meet requirements of the specification. The tenderer should also furnish certificate from laboratories that laboratories are having all the requisite test facility available in house. The type tests reports conducted in manufacturers own laboratory and certified by testing institute shall not be acceptable.

#### TESTING AND MANUFACTURING FACILITIES:

* 1. The manufacturers must have necessary machinery for production of SMC Service Connection LT Distribution Box.
  2. The manufacturer should have in house testing facilities for carrying out acceptance test as per mentioned above.

1. TESTING & MANUFACTURING FACILITIES :

Supplier must be an indigenous manufacturer. The Supplier must clearly indicate what testing facilities are available in the works of manufacturer and whether the facilities are adequate to carry out all Routine & Acceptance Tests. These facilities should be available to Employer’s Engineers, if deputed to carry out or witness the tests in the manufacturer's works. The supplier must have all the in-house testing facilities to carry out the acceptance tests on the Box.

The supplier shall furnish detailed process of manufacturing & Powder coating.

1. DRAWINGS

The tenderer shall submit detailed constructional and dimensional drawing of complete distribution box for each rating with details rating of ,MCB and Bus Bar clearance details.

1. PROTOTYPE

The manufacturer has to manufacture the prototype Unit for as per this specification before bulk manufacturing after approval of standard drawings and GTP. The manufacturer should intimate the readiness of prototype to employer. The JBVNL will inspect the prototype for approval. The manufacturer should submit the final drawings in line with this specification and prototype to employer for approval before bulk manufacturing. The approval of prototype & drawings shall be a responsibility of manufacturer/Contractor. Tentative drawing of box is enclosed herewith