SCHEDULE-B1

GUJARAT STATE ELECTRICITY CORPORATION LTD.

Sardar Patel Vidyut Bhavan, Race Course, Vadodara: 390 007

TECHNICAL SPECIFICATION

FOR

220kV ISOLATORS
SPECIAL INSTRUCTIONS TO BIDDER

Please read following instructions carefully before submitting your bid.

1. All the drawings, i.e. elevation, side view, plan, cross sectional view etc., in AutoCAD format and manuals in PDF format, for offered item shall be submitted. Also the hard copies as per specification shall be submitted.

2. The bidder shall submit Quality Assurance Plan for manufacturing process and Field Quality Plan with the technical bid.

3. The bidder shall have to submit all the required type test reports for the offered item. In absence of this, the evaluation shall be carried out accordingly as non-submission of type test reports.

4. The bidder must fill up all the point of GTP for offered item/s. Instead of indicating “refer drawing, or as per IS/IEC”, the exact value/s must be filled in.

5. All the points other than GTP, which are asked to confirm in technical specifications must be submitted separately with the bid.

6. Please note that the evaluation will be carried out on the strength of content of bid only. No further correspondence will be made.

7. The bidder shall bring out all the technical deviation/s only at the specified annexure.

8. The bidder should indicate manufacturing capacity by submitting latest updated certificate of a Chartered Engineer (CE).
QUALIFYING REQUIREMENT DATA

(For Supply)

Bidder to satisfy all the following requirements.

1) The bidder shall be Original Equipment Manufacturer (OEM). The offered equipment have to be designed, manufactured and tested as per relevant IS/IEC with latest amendments.

2) The minimum requirement of manufacturing capacity of offered type, size and rating of equipment shall be 7 times tender / bid quantity. The bidder should indicate manufacturing capacity by submitting latest updated certificate of a Chartered Engineer (CE).

3) Equipment proposed shall be of similar or higher rating and in service for a minimum period of THREE (3) years and satisfactory performance certificate in respect of this is to be available and submitted.

4) The bidder should clearly indicate the quantity and Single Value Contract executed during last FIVE (5) years, for the offered equipment. Bidder should have executed one single contract during last five years for the quantity equivalent to tender / bid.

The details are to be submitted in following format,

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>ITEMS SUPPLIED TO</th>
<th>ORDER REFERENCE No. &amp; DATE</th>
<th>ITEMS</th>
<th>QUANTITY</th>
<th>ORDER FULLY EXECUTED. YES/NO</th>
<th>STATUS, IF ORDER UNDER EXECUTION</th>
<th>REMARK</th>
</tr>
</thead>
</table>

5) Equipment offered shall have Type Test Certificates from accredited laboratory (accredited based on ISO/IEC Guide 25 / 17025 or EN 45001 by the National accreditation body of the country where laboratory is located), as per IEC / IS / technical specification. The Type Test reports shall not be older than FIVE years and shall be valid up to the expiry of validity of offer.
1.1.0 SCOPE

1.1.1 This covers the specific technical particulars, climatic and isoceraunic conditions, system particulars etc., according to which the isolators with accessories shall be offered as per the requirement specified.

1.1.2 The isolators shall be suitable for retrofitting on existing structure of HBB make and Wigman make. The drawing of existing structure is attached here with however, Bidder is advised to visit site and take all the dimensions of existing structure to check all feasibility for mounting of base and operating mechanism on existing structure before manufacturing. For any mismatching of dimensions of base/operating mechanism at site will not be entertained after manufacturing and required fabrication/modification along with materials will have to carry out by supplier at his risk and cost.

1.2.0 CLIMATIC & ISOCERAUNIC CONDITIONS

1.2.1 The climatic conditions at site under which the equipment shall operate satisfactory are as under:

(i) Altitude above mean see level (meters) : Not exceeding 1000 meters
(ii) Maximum ambient air temperature °C : 50 °C
(iii) Maximum daily average ambient air temperature °C : 40 °C
(iv) Relative humidity for design of equipment % : 95%
(v) Maximum yearly average temp °C : 30 °C
(vi) Minimum temperature of air in shade °C : 4 °C
(vii) Climate : Moderately hot and humid tropical climate conductive to frost and fungus growth.
(viii) Maximum annual rain fall in mm : 1150 mm
(ix) Isoceraunic level : 30
(x) Average number of thunder storm Nos. : 15 days per annum
(xi) Maximum wind pressure(kg/mt^2) : 150
(xii) Earth-quake acceleration (G) : 0.08 x 2 g.

1.2.2 All electrical devices shall be given tropical and fungicidal treatment and shall be capable of satisfactory operation under the severe climatic conditions that would prevail at site as described above.

1.2.3 The equipment offered shall be suitable for continuous operation under above conditions at the full rated capacity.
1.2.4 Since the sub-stations, where the equipments are to be installed, are on the coastal and/or industrial areas, the equipment offered shall be suitable for heavily polluted atmosphere.

1.2.5 The equipment offered shall be suitable for hot line maintenance techniques.

1.3.0 SYSTEM PARTICULARS

1.3.1 Nominal system voltage : 220 KV rms

1.3.2 Highest system voltage : 245 KV rms

1.3.3 System frequency : 50 Hz

1.3.4 No. of Phases : Three (3)

1.3.5 System neutral : Effectively earthed

Note: The rated voltage of Isolator shall be the highest system voltage.

1.4.0 AUXILIARY POWER SUPPLY

1.4.1 Auxiliary Electrical equipment shall be suitable for operation on the following supply system: Particulars.

   (i) AC control & protective devices:
       240 V, 1-phase, 2-wire, lighting & space heaters AC supply with one lead grounded.
   (ii) DC alarm, control and protective device:
       220 V DC supply from station batteries.
   (iii) AC/DC control for motor operating:
       415 V, 3-phase, 4 wire, Mechanism neutral grounded AC supply or 220V DC supply by providing Diode circuit for converting AC supply to DC supply for DC motor only.

1.4.2 In the above supply, voltage may vary as follows:

   All devices shall be suitable for continuous operation over entire range of voltage. Stated below.

   (i) AC supply : Voltage variation ±10%
                   Frequency variation ±3%
   (ii) DC supply : -15% to +10% variation

1.4.3 Each of the foregoing supplies will be made available by the purchaser at one terminal point for each Isolator for operation of the accessories and auxiliary equipment. Bidders scope shall include distribution beyond the points of supply including supply of terminal blocks, HRC Fuses, Switches etc. Interconnection of poles will be done by purchaser.

1.4.4 110 V, 1-phase AC supply will not be provided by the purchaser. To obtain 110 V supply from purchaser’s 415 V, 3-phase, 3 Wire supply, the supplier shall incorporate 415/110 V single phase dry type control transformers with ± 10% OFF – circuit voltage of taps on 415 Volt side with switches and fuses on both primary and secondary sides, with one end of secondary earthed.
### 1.5.0 SPECIFIC TECHNICAL REQUIREMENTS

1.5.1 The Isolators shall comply with the following technical requirements:

- **(i)** (a) Nominal system voltage: 220 kV  
  (b) Rated voltage: 245 kV
- **(ii)** Rate frequency: 50 Hz.
- **(iii)** No. of phases: Three (3)
- **(iv)** Type of disconnector: Center break outdoor gang operated type.
- **(vi)** Rated normal current: 1600 Amp.
- **(vii)** Rated short time current with stand: 40 kA.
- **(viii)** Rated duration of short circuit: 3 seconds.
- **(ix)** Rated peak short circuit current withstand: 100 kA (peak)
- **(x)** Interruption capacity:
  - (i) Magnetizing current: 0.7 Amps. At 0.15 P.F.
  - (ii) Line charging current: 0.7 Amps. At 0.15 P.F.
- **(xi)** 1.2/50 microsecond lighting impulse withstand voltage:
  - (a) Between Poles and earth: 1050 kV (peak)
  - (b) Across the open disconnector: 1200 kV (peak) (voltage applied to one terminal with opposite terminal grounded).
- **(xii)** 1-Minute power frequency withstand voltage:
  - (a) To Earth & between poles: 460 kV (rms)
- **(xiii)** Safe duration of over load:
  - (a) 150% of rated current: 5 minute
  - (b) 120% of rated current: 30 minute
- **(xiv)** Temperature rise:
  The temperature rise shall not exceed the maximum temperature rise specified below:

<table>
<thead>
<tr>
<th>Sr.</th>
<th>Part</th>
<th>Maximum permissible temperature rise in °C over an ambient temp. up to 45 °C</th>
<th>50 °C</th>
<th>55 °C</th>
</tr>
</thead>
<tbody>
<tr>
<td>1)</td>
<td>Copper contacts in air:</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(a)</td>
<td>Bare</td>
<td>30</td>
<td>25</td>
<td>20</td>
</tr>
<tr>
<td>(b)</td>
<td>Silver facing less than 1 mm thick.</td>
<td>45</td>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td>(c)</td>
<td>Silver facing more than 1 mm thick</td>
<td>60</td>
<td>55</td>
<td>50</td>
</tr>
<tr>
<td>2)</td>
<td>Terminals to be screwed or bolted to external conductors.</td>
<td>45</td>
<td>40</td>
<td>35</td>
</tr>
<tr>
<td>3)</td>
<td>For all other current carrying parts.</td>
<td>30</td>
<td>25</td>
<td>20</td>
</tr>
</tbody>
</table>
NOTE: (i) The temperature shall not reach a value where elasticity of the materials is impaired.
(ii) Rated ambient temperature is 50 ºC

(xv) Minimum cantilever strength : 800 Kg.

(xvi) Minimum creepage distance of support insulators. : 6125 mm

(xvii) Operating mechanism of : Motor operated and Manual Isolator operation shall be provided for isolator manual for earth switch.

(xviii) Current Density: Current density to be adopted for all part of the Isolator and terminal connector shall not exceed the following limits :

(a) Hollow tube section : Copper – 2.0 A/mm²
Aluminium–1.25 A/mm²

(b) Other sections & terminal connectors: Copper – 1.60A/mm²
Aluminium – 1.0 A/mm²

(xix) Auxiliary contacts on main switch : 12 NO & 12 NC

(xx) Phase to phase spacing : 4500 mm

(xxi) Ground clearance : 6500 mm

(xxii) Interlocks with circuit breaker. : Electrical interlocking required.

1.6.0 OTHER REQUIREMENTS

1.6.1 In case of center break isolators, all three poles of the Isolator shall be mechanically ganged and operated by a common operating mechanism and closing of to ensure all three poles close simultaneously.

1.6.2 Each Isolator will be electrically interlocked with its breakers and other Isolators as per the switchyard interlocking scheme. Isolator manufacturer shall have to co-ordinate with breaker supplier for this purpose. For this Auxiliary Switches are to be provided with 12 NO & 12 NC auxiliary contacts per pole. Out of that, two pair of auxiliary contacts i.e. 2 NO + 2 NC shall be adjusted for advancement as per the sketch (attached as Annexure) of total travel for bus bar protection application. The auxiliary contacts shall be make before break type with adjustable contact travel.

1.6.3 Signaling of the closed position shall not take place unless it is certain that the movable contacts have reached a position in which the rated normal current, the peak withstand current and the short time withstand current can be carried safely. Limit position switches shall be provided for this signaling.

1.6.4 Signaling of the open position shall not take place unless the movable contact have reached a position such that the clearance between the contacts is at least 80% of the isolating distance.
1.6.5 In addition to being mechanically interlocked with its main blades solenoid type electrical interlocking feature suitable for operation on purchaser’s 220 V DC supply shall also be provided. The interlock shall comprise of electromechanical castle locks with the key to prevent operation of isolator closed and vice versa. The key can be released by energizing the coil when certain preset conditions of purchaser’s interlock scheme are fulfilled, hence making the interlock feature “fail safe type”.

1.6.6 The terminal connectors shall be supplied for connecting isolator terminals to purchaser’s conductor, terminal connectors shall be suitable for twin ACSR “Moose” Conductor with conductor spacing of 350 mm. It should be suitable for horizontal and vertical take-off. Terminal connector should withstand short time current of 40 kA for 3 seconds. The terminal connectors suitable for twin ACSR moose conductor with conductor spacing of 350 mm shall be supplied. The terminal connector shall be suitable for both vertical & horizontal connections of the transmission line conductor or station bus bar. Terminal connector shall be manufactured as per relevant IS/IEC. The terminal connector shall be of compression type bimetallic connector type. Each S.S. bolt shall be supplied with one no. of S.S. washer and two no. of S.S. bolts shall be used. The drawings of the clamp connectors shall be submitted with the technical bid.

1.6.7 The frame of each disconnector (isolator) shall be provided with two reliable earthing terminals for connection to an earthing conductor having a clamping screw suitable for specified earth fault currents. The size of the earthing conductor will be furnished to the successful bidder.

1.6.8 Disconnecting switches, including their operating mechanism shall be so constructed that they can not come out of their open or closed position by gravity, wind pressure, vibrations, reasonable shocks or accidental touching of the connecting rods or their operating mechanisms. The reliability of current carrying capacity shall not be impaired due to such forces.

1.6.9 The isolator shall be capable of making/breaking normal currents when no significant change in voltage occurs across the terminal of each pole of the isolator on account of make/break operation.

1.6.10 The equipment offered shall be suitable for hot line washing.

1.6.11 Total operating time of disconnector along with its operating mechanism shall not exceed 12 seconds.

SPECIFICATIONS FOR RETROFIT MATERIALS. (220 KV Isolators)

1. The detailed drawing of retrofit materials with all dimensions & bill of material should be submitted along with the offer.

2. All the retrofit materials shall be fully galvanised using only structural mild steel. The use of high tensile steel is not permitted. Hexagonal head bolts with nuts and spring washers shall be used for connection.

MATERIAL:

1. The steel required for fabrication of retrofit materials shall conform to IS: 2062 - Grade A.
2. The zinc required for galvanising shall be of Zn-99.95% and shall conform to IS:209-1966.
3. The bolts and nuts shall conform to IS:6639-1972 or IS: 12427-1988. The bolts shall be of minimum class 4.6 and nuts shall be of class 4.
5. All bolts and nuts shall have hexagonal heads. The heads, being forged out of the solid, truly concentric and square with the shanks, must be perfectly straight.
6. Fully threaded bolts shall not be used. The length of bolts shall be such that the threaded portion will not extend into the place of contact of the member.
7. All bolts shall be threaded as per IS: 1363 (1967) to take full depth of the nut and be threaded for enough to permit firm gripping of the member, but no further threaded portion of each bolt shall project through the nut at least 6mm. when fully tightened. All nuts shall fit hand tight to the point where the shank, of the bolt connects to the head. Flat and tapered washers shall be provided where necessary.
8. The diameter of bolts shall be 12 mm, 16mm and 20mm. The thickness of spring washers shall be 2.5 mm, 3.5 mm and 4 mm respectively. Spring washers shall be provided under all nuts. These washers shall be positive lock type hot dip galvanized.

GALVANISING : (Hot dip galvanising)

1. The galvanising shall be done to all the retrofit materials after the fabrication work is completed. The nuts may be tapped or re-run after galvanising. Threads of bolts and nuts shall have neat fit and can be turned with finger throughout the length of the threads of bolts and they shall be capable of developing full strength of bolts.
2. The zinc deposition should not be less than specified per galvanized surface area of the fabricated structure member.
3. The galvanising of all the retrofit materials shall conform to IS:2629-1966 & IS: 4759-1968. All galvanized members shall withstand tests as per IS:2633-1972. The weight of zinc coating shall be determined as per the method stipulated in IS:2633-1964. Spring washers shall be electro galvanised as per IS:1573-1970.

STANDARDS :

1. The design, fabrication, galvanising and testing of material used for manufacture of retrofit materials shall conform to the latest edition of the following standards (as mentioned up-to-date) except where otherwise specified in the Specification.
5. Technical supply conditions for threaded IS : 1367-1967 fasteners (First Revision)
6. Plain washers IS : 2016-1967
7. Steel for general structural purposes Specification. IS : 2062-1992
8. Recommended practice for hot-dip galvanizing of iron and steel. IS : 2629-1966
9. Methods of testing weight thickness and uniformity of coating on hot-dip galvanized articles. IS : 2633-1972
10. Single Coil Rectangular Section spring washers for bolts, nuts, screws. IS : 2063-1972
13. Heavy washers for steel structures. IS : 6610-1972
GENERAL TECHNICAL REQUIREMENTS

2.1.0 SCOPE

2.1.1 This covers design, manufacturer, assembly, inspection and testing at manufacture’s works, supply and delivery at site, 245 KV high voltage, center break type air-break alternating current isolators suitable for outdoor use. Also, at the discretion of the purchaser. The seller may undertake supply, supervision of erection, testing and commissioning of the isolators & included, in his scope of supply. Bidder shall quote for these items as required in the price schedule.

2.1.2 It is not the intent to specify completely herein all the details of design and construction of the equipment. However, the equipment shall conform, in all respects, to high standards of engineering, design and workmanship and be capable of performing, in continuous commercial operation up to seller’s Guarantee in a manner acceptable to the purchaser, who will interpret the meaning of drawings and specification and shall have the power to reject any work or material which in his opinion are not in full accordance therewith.

2.2.0 CODES AND STANDARDS

2.2.1 The design, manufacture and performance of high voltage isolators and accessories shall comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. Nothing in this Specification shall be construed to relieve vender of this responsibility.

2.2.2 Unless otherwise specified, the equipment shall conform to the latest India or IEC Standards (including amendments) as specified below:

- IS:2544 : Specification for porcelain post insulators (3.3 KV and above)
- IS:5350 : Solid core insulators or multi-core type insulators.

2.2.3 In case equipment conforms to other internationally acceptable standards which ensures equivalent or better performance than that specified under Clause-2.2.2, then English version of such standards or relevant extracts of the same shall be forwarded with the bid and the salient features of comparison shall be brought out separately in the bid.

2.2.4 Accessories, components, parts and raw materials shall conform to relevant Indian Standards.

2.3.0 DRAWINGS

2.3.1 As a part of the proposal, the bidder shall furnish relevant descriptive and illustrative literature and the following drawings for preliminary study.

(i) Drawing showing plan and elevation of isolator incorporating mounting dimensions, overall dimensions, weight etc.
(ii) Dimensional drawing for the line and earth side terminals of the isolator.
(iii) Mounting details of operating handle and operating devices.
(iv) Details of jaw contacts and main isolator blades.
(v) Control wiring diagram.
(vi) Copies of type test certificates and relevant oscillograms.
2.3.2 The bidder may furnish any other drawings which he considers necessary for giving complete information about his equipment.

2.3.3 After receipt of an order, the successful Bidder shall have to furnish within one month, the following drawings for approval of the purchaser.

   (i) Assembly drawing showing plan and elevation of isolators incorporating mounting dimensions, detailed dimensions, shipping weight, net weight etc.
   (ii) Schematic control wiring diagram and interlocking scheme.
   (iii) Dimensional control for the line and earth side terminals of the isolator. Also dimensional drawing of the clamps and connectors.
   (iv) Location and mounting details of operating handle and operating devices.
   (v) Drawing giving details of guides and guide bearings to be mounted on isolator supporting structure.
   (vi) Details of jaw contacts and main isolator blades.
   (vii) Details of terminal stud.
   (viii) Drawing necessary for design and fabrication of isolators supporting structure, if structures are not included in the scope of supply.
   (ix) Drawing showing various position (close and open) of the isolator.
   (x) Drawing of corona rings.
   (xi) Drawings of supporting insulators & operating rods insulators.
   (xii) Name plat details.
   (xiii) Bill of materials.

2.3.4 After receipt of the order the supplier shall prepare a program for submission of drawing for the approval of the purchaser. Submission of drawing should be as per clause no. 2.3.3.

2.3.5 Drawing, diagrams, instructions and report shall be identified by descriptive title indicating their application to the equipment offered. All drawings and data shall be annotated in English language. Dimensions shall be in metric system.

2.3.6 Supplier shall furnish of requisite no. of copies of all the approved and revised drawings pertaining to the equipment along with reproducible print for each as the final submission. Required no. of copies of approved drawings will be furnished at the time of approval of drawings.

2.4.0 GENERAL CONSTRUCTION DETAIL

2.4.1 The isolators shall be completed with all parts that are necessary or essential for efficient operation. Such part shall be deemed to be within the scope of supply, whether specifically mentioned or not.

2.4.2 All similar parts shall be interchangeable.

2.4.3 Base channels and other structural steel members such as operating pipes, phase coupling rods or pipes, bolts etc. operating mechanism boxes, shall be hot dip galvanised. The coupling/ linkage of operating rods of all three phases with mechanism box shall be of EYE coupling type only. All castings accept current carrying parts shall be made of malleable cast iron or cast steel. Grey iron shall not be used in the manufacture of any parts. Manual operating handles shall be of galvanized steel.

2.4.4 Live metal parts shall be of non-rusting and non-corroding metal. Current carrying part shall be non-ferrous material such as Aluminium or Copper. Bolts, screws and pins shall be provided with lock, washers, keys or equivalent locking facilities, and current
carrying shall be made of non-rusting and non-corroding metal, such as Copper, Silicon, Alloy or equivalent.

2.4.5 The design of isolator shall be such that no lubrication of any part is required except at very infrequent intervals.

2.4.6 During the course of normal operations, it is likely that the isolator may be left in the open closed position for long periods, of time. They shall be designed to operate satisfactorily even after they are kept in one position for long periods.

2.4.7 The isolators shall be designed to withstand stresses corresponding to short circuits duties specified.

2.4.8 Isolators shall be able to bear on the terminals the total force including wind loading and electrodynamics forces and the attached conductor without impairing reliability of current carrying capacity.

2.4.9 The isolator design shall be such that it is free from visible corona discharge in both open and closed positions. Necessary stress relieving rings or shields shall be provided to meet this requirement.

2.5.0 CONTACTS

2.5.1 The isolators provided with high pressure current carrying contacts on the hinges and jaw and all contact surfaces shall be silver plated, copper (apix.20 micron). The contacts shall be accurately machined and self aligned in case of centered break isolators, the hinged ends shall be provided with flexible copper connection adequate to carry rated current and suitable for the short-circuit rating specified.

2.6.0 BASE

2.6.1 Each single pole of the center break isolator shall be provided with complete galvanised steel based with holes for mounting on a supporting structure.

2.6.2 The position movable contact system of each of the isolator and earthing switches shall be indicated by a mechanical indicator at the lower. The indicator shall be of metal and shall be visible from operating level.

2.7.0 BLADES

2.7.1 All live metal parts shall be designed to eliminate sharp points, edges and other corona producing surfaces.

2.7.2 The isolators shall be so constructed that the switch blade contact will not fail to the close position if the operating shaft gets disconnected.

2.8.0 INSULATORS

2.8.1 The insulators of solid core type (six nos for centre break) shall be in scope of Bidders.

2.8.2 All isolators should be suitable for 220 KV Solid core insulators having Top PCD-127 and Bottom PCD-225 mm. All the other technical specifications of GETCO/GSECL for 220 kV BPI shall be followed.
2.8.3 Necessary fixing bolts, nuts, washers etc. for insulators fixing in metallic part should be supplied by the bidders.

2.8.4 The necessary detailed drawing for insulators shall be furnished by the bidder with Bid and at the time of drawings approval of insulators.

2.8.5 The insulators shall be offered for inspection at manufacturer site for acceptance test as per IS/IEC.

2.8.6 Bidder should submit type test reports of Insulators for the approval of GSECL within commencing period.

2.10.0 OPERATING MECHANISM

2.10.1 The isolators shall be suitable for electrical motor operated mechanism and manual operation and the mechanism shall be easy to operate by a single person. The height of the handle above the foundation shall be such as to ensure ease of operation. The operating mechanism shall have smooth movement and shall be designed for simultaneous manual operation of all three single pole units through single operating rod of adjustable length and operating mechanism mounted on one end of switch only. Operating mechanism of main switch shall be on opposite ends. The rotating insulators stacks shall be provided with double roller or double ball bearings and shall be adjustable and shall be easily accessible for dismantling in the field. Bearing housing shall be weather and dust proof. The vertical operating shaft of requisite length shall be supported on ball or roller thrust bearing. Position indicators shall be provided near the operating mechanism for open and close position. Provision shall be made for pad locking the mechanism of isolators in both the close and open positions. The isolator shall be such that its stack position will not be affected by wind pressure, vibration, reasonable shocks etc. Auxiliary switches shall be mounted in weather proof housing which shall have provision of entry of conduits of proper size and for fixing of cable glands.

2.10.2 Operating mechanism and control

The operating mechanism shall provide a quick, simple and effective operation. One man shall able to operate the isolator without undue effort.

2.10.3 The Bidder shall offer the operating mechanism as specified. The design of operating mechanism shall be such that minimum energy is required for operation. Each pole of isolator shall have individual drive for main blade and earth switch. The operating mechanism of the three poles shall be well synchronized and interconnected.

2.10.4 The isolator shall be provided with positive continuous control throughout the entire cycle of operation. The operating pipes end rods shall be sufficiently rigid to maintain positive control under the most adverse conditions and when operated in tension or compression for isolator closing. They shall also be capable of withstanding all torsion and bending stresses due to operation of the isolator.

2.10.5 After final adjustment has been made there should not be any displacement at any point to allow improper functioning of the isolator during opening and closing operation at any speed. All holes in cranks, linkages and drives through shafts of MOM should be provided with eye coupling to minimize slack and lost motion in the entire mechanism.
2.10.6 All isolators shall be provided with detachable type operating handles with padlocking arrangements. All brackets, angles or other members necessary for attaching the operating mechanism to them isolator supporting structure shall be supplied.

2.10.7 All bearings wherever provided shall be of reputed make. Bearings shall be provided with required members of nipples for lubrication. The type of bearing shall be stated.

2.10.8 The control cabinet shall be sheet steel enclosed and shall be dust, water and vermin proof. Sheet steel used shall be at least 2.0 mm thick and properly braced to prevent wobbling. Control cabinet shall be with double hinged doors with padlocking arrangement. Control cabinet shall be of free standing, floor mounting type or wall mounting type or pedestal mounting type as applicable.

2.10.9 All doors, removable covers and plates shall be gasketed all round with continuous neoprene gaskets, louvers shall have screens and filters. The screen shall be of fine wire mash made of Brass or GI wire.

2.10.10 Cable entries shall be from bottom Suitable removable cable gland plate shall be provided on the cabinet for this purpose. Necessary number of cable glands shall be supplied fitted on to this gland plate. Cable gland shall be screw-on-type and made of Brass.

2.10.11 All sheet steel work shall be degreased, pickled and phosphated using seven tank process. Painting shall be done by epoxy based paint. Shade of paint shall be Light Grey in accordance with shade no 631 of IS:5

2.10.12 Suitable heaters shall be mounted in the cabinet to prevent condensation. Heaters shall be controlled by differential thermostat so that the cubical temperature is always maintained approximately 10 ºC above the outside air temperature. ON/OFF switch and fuse shall be provided. Heater shall be suitable for 240 V AC supply voltage.

2.10.13 The terminals shall be so staggered that the connection of external cable to any terminal block should be possible without disturbing the rest of the connections. The terminals blocks arrangements shall be such as to provided maximum accessibility to all conductor terminals and any arrangement preventing ready access to other terminal. Screws shall not be accepted. Stud type terminals preferable. 20% spare terminals shall be provided in each block.

2.10.14 The terminal blocks to be provided shall be fully enclosed with removable covers and made of molded, non-inflammable plastic material with boxes and berries molded integrally. Such block shall have washer and binding screws for external circuit wire connections.

2.10.15 The arrangement shall be such that it is possible to safely connect or disconnect terminals on live circuits and replace fuse-links when the cabinet is live.

2.10.16 The enclosure of the control cabinets shall provide a degree of protection of not less than IP:55 (as per IS:2147).

2.10.17 A ‘local/remote’ selector switch and a set of open/close push buttons shall be provided on the control cabinet of the isolator to permit its operation through local or remote push buttons.

2.10.18 Provision shall be made in the control cabinet to disconnect power supply to prevent local/remote power operation.
2.10.19 All cabling from operating mechanism and auxiliary contacts to control cabinet shall be in the scope of supply and shall be carried out using 1100 V grade, 2.5 mm² stranded copper conductor. PVC insulated, armoured, multi-core cables or single core wires. Inter pole cabling will be done by purchaser.

2.10.20 The control cabinet shall be provided with a 240 V, 1Phase, 50 Hz, 40 W lighting for interior illumination controlled by a ON/OFF switch. Power source for this interior lighting shall be completely independent of control power source.

2.11.0 MOTOR OPERATED MECHANISM

2.11.1 The motor shall be squirrel cage induction motor or 220V DC motor and shall be totally enclosed, weather proof, out door type conforming to the latest edition. The DC source shall be made available by providing Diode circuit for converting AC supply to DC supply for DC motor only.

2.11.2 Suitable reduction gear shall be provided between the motor and the drive shaft of the isolator. The mechanism shall come to standstill quickly on switching OFF the power supply to the motor.

2.11.3 Limit switches for motor control shall be fitted on the isolator shaft, within the cabinet, to sense the open and close positions of the isolator.

2.11.4 Motor for operating mechanism to be supplied with the isolator shall be of reputed make to assure trouble free performance of the operating mechanism. Bidder should confirm to attend the defects if any without any extra charge within the guarantee period.

2.12.0 INTERLOCKING

2.12.1 Isolators shall be provided with padlocking facilities to lock them in full open or fully closed position. Operating mechanism shall also be provided with facility for padlocking of the front door.

2.12.2 Isolator shall be interlocked such that it will not be possible to close the earthing switch when the isolator is closed and vice-versa.

2.12.3 Each Isolator shall be electrically interlocked with it associated barker, such that the isolators can not operated unless the associated circuit barker is in open position.

2.12.4 Electrical interlocking arrangement shall be fail safe type.

2.13.0 ACCESSORIES

2.13.1 Position Indicator
A position indicating device shall be provided for each isolator irrespective material at opposite ends, brazed to the channel base for connecting to the grounding system. Flexible copper ground connectors shall be provided for connecting operating handles of isolators, to the grounding system.

2.13.2 Grounding Pads
Each pole of the isolator shall be provided with two grounding studs of non-corrosive material at opposite ends, brazed to the channel base for connecting to the grounding system. Flexible copper ground connector shall be provided for connecting operating handles of isolators, to the grounding system.
2.13.3 Name Plate
A weather-proof and corrosion-proof name plate conforming to the requirement of ICE shall be provided. The name plate shall incorporate all the details including year of manufacture and GEB order reference number.

2.13.4 Operating Mechanism & Control Cable
Operating mechanism and control cable shall be provided as specified in Clause No.2.10.0.

2.13.5 Clamps & Connectors
Clamps and connectors shall be supplied as a part of the isolators. The clamps and connectors shall be made of materials listed below:

(i) For connecting AAAC/ACSR : Aluminium Alloy. Connectors. Compressed type Palm connector /clamp suitable for ACSR Moose conductor shall be supplied as per drawing attached here with.

(ii) For connecting equipment: Bimetallic connectors made from terminals made of brass to Aluminium alloy casting with 2 mm AAAC/ACSR Conductor. Thick cast copper liner.

(iii) For connecting G.I: Malleable Iron casting. Shield wire.

(iv) Bolts, nuts, plain washers: Hot dip galvanized mild steel of & spring washers for Item: ultimate strength.

(v) For copper to copper brass: Copper Alloy having composition and brass to brass. of-
- Zinc : 2 to 3 %
- Lead : 2 to 2.5 %
- Tin : 0.6 to 1.5 %
- Iron : 0.5 to 1.0 %
- Copper: 92 to 95 %

(vi) Bolts & Nuts for Item : Rolled brass rods.(v) above.

(vii) Spring washer for Item : Phosphor bronze.(v)above.

2.13.5.1 All casting shall be free from blow holes, surface blisters, cracks and cavities. All sharp edges and corners shall be blurred and rounded off.

2.13.5.2 No part of clamp or connector shall be less than 12 mm thick. Bolts and nuts shall have hexagonal heads.

2.13.5.3 For bimetallic clamp and connectors, copper alloy liner of minimum thickness of 2 mm shall be cast integral with the Aluminium alloy body. 2.13.6.4 All current carrying connectors shall be designed so that hysteresis and eddy current losses are small and all clamps and connectors must withstand 40 KA rms short time current for 3 seconds.

2.13.5.5 Bolts shall have M 12 thread. Tightening torque shall be 80 Nm for M12.

2.14.0 TESTES AND INSPECTION

2.14.1 Type Tests
All the Isolators offered shall be fully type tested as per latest edition relevant standards as specified at the Government approved laboratory of the eligible country or independent internationally recognized testing laboratory. The Bidder shall furnish four sets of the type test reports for the Isolators of the type and Design offered by him along with the offer. The Type Test report shall not be older then 5 (five)
years prior to the date of expiree of the Bid, otherwise the offer will not be considered. However the purchaser reserves the right to demand repetition of some or all the type tests in the presence of purchaser's representative. For this purpose the Bidder may quote unit rates for carrying out each type test. This will not be considered for Evaluation.

2.14.2 All the routine and acceptance tests shall be performed on each isolator in the presence of purchaser’s representative.

2.14.3 The routine tests shall be conducted at the works of manufacturer on isolators along with insulators offered for supply as stipulated in IS:9921 (part-4/1985, as amended upto date, Clause No. 4.0.1, including power frequency voltage withstand dry test of the main circuit on the offered lot.

2.14.4 The purchaser will have the right of having at his own expense any other test(s) of responsible nature carried out at supplier’s works or at site or in any other place in addition to the aforesaid type and routine tests, to satisfy that the material confirms to with this specification. The purchasers reserves the option for carrying out any or all the type tests to be conducted on the equipment

2.14.5 Inspections may be made at any stage of manufacture at the option of the purchaser and the equipment. If found unsatisfactory as to workmanship or quality of material, is liable to be rejected. Contractor shall grant free access to the places of manufacture purchaser’s representative at all item when the work is in progress. The contractor shall keep the purchaser informed well in advance about the progress of the manufacture of the equipment under this specification so that urgent can be made for inspection.

2.14.6 All the test reports including test records, oscillograms, curves etc. shall be submitted to the purchaser for his approval prior to the dispatch of equipment. No equipment shall be dispatched without approval of respective test reports.

2.15.0 ERECTION AND COMMISSIONING

2.15.1 The Bidder shall quote for the services of an Erection Engineer who shall assure full responsibility for the complete erection, testing and commissioning for first isolator and at least one day for testing, alignment and commissioning for other isolators at early destination or place of commissioning the equipment. Skilled and unskilled labour and normal erection tools would be provided by the purchaser. All special erection tools required for the erection, testing and commissioning of the isolators, shall be provided by the Bidder.

2.15.2 It is not possible to replace/ retrofit all the isolators continuous in programme as these isolators are to be retrofitted on existing structures after dismantling of existing isolators as per availability of individual line/ bus shut down, so supplier/ manufacturer will be informed two days in advance on confirmation of shut down and Service Engineer shall be deputed accordingly.

2.15.2 “After erection as required in clause NO 2.15.1 the supplier shall demonstrate & perform 50 Nos. of consecutive successful open close operation of isolator with motor operated mechanism on at least one isolator at every place of erection. If during above 50No of operation any abnormality or difficulty is observed then after due rectification again 50 Nos of consecutive operations will be performed. This may be repeated till 50 Nos of consecutive operations are successful.”
2.15.3 Purchaser shall provide local workman as well as all ordinary tools required for erection, at his own expense. Apart from the above, the purchaser shall not be responsible for any other expenses incurred by the Bidder and expenses such Erector’s salary, insurance against personnel injuries to the Erector etc. shall be to the Bidder’s account.

2.15.4 Tenderer shall not be liable for any loss, damage or injury to property or person at the installation site unless such damage or injury is caused by any act or negligence of the supervising Erector.

2.16.0 PACKING AND TRANSPORT INSTRUCTIONS

2.16.1 Bidder shall ensure that all equipment covered by this specification shall be prepared for rail/road transport and be packed in such a manner as to protect it from damage in transits. The Bidder shall be responsible for and make good at his own expense any or all damaged due to improper preparation and packing.

2.16.2 Loose material, e.g. bolts, Nuts etc. shall be packed in gunny bags and sealed in polythene bags with proper tagging.

2.16.3 Components containing glass shall be carefully covered with shock absorbing protective material such as ‘Thermocole’.

2.16.4 All opening in the equipment shall be tightly covered, plugged or capped to prevent dust and foreign material from entering in.

2.16.5 Wherever necessary, proper arrangements for attaching slings for lifting shall be provided.

2.16.6 All spare parts shall be packed and treated for long storage conditions at site.

2.16.7 Any material found short inside the intact packing cases shall be supplied by the vendor/contractor at no extra cost to the purchaser.

2.16.8 No material shall be dispatched without prior consent of the purchaser or his authorized representative.

2.17.0 SPARE PARTS

2.17.1 A list of spare parts, with item-wise price required for five years satisfactory operation of the isolator shall be furnished with the Bid. The purchaser will decide the actual quantity of spares to be ordered on the basis of the list and item-wised prices quoted.

2.18.0 INSTRUCTION MANUALS

2.18.1 Ten (10) copies of erection, maintenance and operation manuals shall be supplied prior to the dispatch of the equipment. The manuals shall be bound volumes in English language and shall contain all the drawings and information required for erection, maintenance and operation of the equipment supplied. The distribution of manuals shall be intimated when required.

2.19.0 TECHNICAL AND GUARANTEED PARTICULARS

2.19.1 The Bidder shall furnish all guaranteed technical particulars as called for in Schedule-‘A’ which are subject to guarantee shall be clearly marked. Bids lacking of information in this respect may not be considered.
2.20.0 GENERAL

2.20.1 Schedule-'A' enclosed with the specification form are integral part of the enquiry and shall be submitted along with the offer duly completed.

2.21.0 BAR/PERT CHART

2.21.1 The bidder shall furnish a bar chart or a network schedule along with his Bid incorporating significant milestone dates, e.g. for completion of engineering and design of procurement of critical raw material of brought out items, of manufacturing and testing and of transportation to site and erection, as may be applicable. The total period for all the above activities as applicable should not exceed the completion period given in the specification. The successful bidder will have to furnish a detailed bar/chart/PERT network within a month after the award of contract covering all activities for effecting supply. They should also furnish periodic reports for the purpose of monitoring of the job.
## SCHEDULE – ‘A2’

### GUARANTEED TECHNICAL PARTICULARS

(This shall be enclosed with Technical Bid)

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>TECHNICAL PARTICULARS</th>
<th>Isolator245 KV,1600A(min.),</th>
<th>Isolator245 KV,2500A(min.),</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Maker’s Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Manufacturer’s Type and Designation</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>Reference Standard</td>
<td></td>
<td></td>
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<tr>
<td>4</td>
<td>Rated Voltage (KV)</td>
<td></td>
<td></td>
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<tr>
<td>5</td>
<td>Maximum Design Voltage at which the Isolator can Operate (KV)</td>
<td></td>
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<tr>
<td>6</td>
<td>Frequency (Hz)</td>
<td></td>
<td></td>
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<tr>
<td>7</td>
<td>Derating Factor, if any, for Specified Site Conditions</td>
<td></td>
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<tr>
<td>8</td>
<td>Maximum Current that can be safely interrupted by the Isolator (Amp rms and pf)</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(a) Inductive</td>
<td></td>
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<tr>
<td></td>
<td>(b) Capacitive</td>
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<tr>
<td>9</td>
<td>Continuous Current rating</td>
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<tr>
<td></td>
<td>(a) Nominal</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(b) Under site conditions</td>
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<td></td>
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<tr>
<td>10</td>
<td>Rated Short time Current : Main Switch Earth Switch</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(a) For 3 seconds</td>
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<td></td>
<td>(b) Rated peak short time current</td>
<td></td>
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<tr>
<td>11</td>
<td>Current Density at minimum cross section : of _____ (A/mm²)</td>
<td></td>
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<tr>
<td></td>
<td>(a) Moving Blade</td>
<td></td>
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<tr>
<td></td>
<td>(b) Terminal Pad</td>
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<td></td>
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<tr>
<td></td>
<td>(c) Contacts</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(d) Terminal Connector</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>(a) Maximum temperature of current : carrying parts when carrying rated current continuously (°C)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b) Maximum ambient temperature : for which (a) is applicable (°C)</td>
<td></td>
<td></td>
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<tr>
<td>13</td>
<td>(a) Short circuit type test certificate no. :</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b) Whether (a) is enclosed : YES/NO</td>
<td></td>
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<tr>
<td>14</td>
<td>Insulation Tests :</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(a) One minute power frequency : wet withstand voltage</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(i) Across the isolating distance (KV) :</td>
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<tr>
<td></td>
<td>(ii) To earth and between poles (KV) :</td>
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<td></td>
<td>(b) 1.2 / 50/micro see impulse withstand voltage : (+ and – polarity)</td>
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<td></td>
</tr>
<tr>
<td></td>
<td>(i) Across the isolating distance (KV) :</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(ii) To earth and between poles (KV) :</td>
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<tr>
<td></td>
<td>Main switch current density and material and size of block/channel/pipe etc. Earth switch current density and material and size of block/channel/pipe etc.</td>
<td></td>
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<tr>
<td>15</td>
<td>Contacts and material of current carrying parts :</td>
<td></td>
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<tr>
<td></td>
<td>(a) Type of main, earth and arcing contacts :</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>(b) Contacts for main and earth switch :</td>
<td></td>
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<tr>
<td>16</td>
<td>Clearances :</td>
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<td></td>
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<tr>
<td>(a) Between poles (mm) :</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>(b) Between live parts and earth (mm) :</td>
<td></td>
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<tr>
<td>(c) Between live parts when the switch is open :</td>
<td></td>
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<tr>
<td>(i) On the same pole (mm) :</td>
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<tr>
<td>(ii) Between adjacent poles (mm) :</td>
<td></td>
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<table>
<thead>
<tr>
<th>17</th>
<th>Whether suitable for specified phase spacing :</th>
</tr>
</thead>
<tbody>
<tr>
<td>YES/NO</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>18</th>
<th>Type of Interlocks :</th>
</tr>
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<table>
<thead>
<tr>
<th>19</th>
<th>Torque required to operate the gang :</th>
</tr>
</thead>
<tbody>
<tr>
<td>OPERATED ISOLATOR</td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>20</th>
<th>Switch design and type :</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Rotating/tilting/lifting :</td>
<td></td>
</tr>
<tr>
<td>(b) Horizontal/vertical break :</td>
<td></td>
</tr>
<tr>
<td>(c) No. of auxiliary contacts :</td>
<td></td>
</tr>
<tr>
<td>(i) For isolator :</td>
<td></td>
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<tr>
<td>(ii) For earth switch :</td>
<td></td>
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<tr>
<td>(d) Whether make before break with : YES/NO</td>
<td></td>
</tr>
<tr>
<td>adjustable travel</td>
<td></td>
</tr>
</tbody>
</table>

| 21 | Operating mechanism : Manual & Electrical |

<table>
<thead>
<tr>
<th>22</th>
<th>Terminal stud :</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Whether horizontal or vertical (mm) :</td>
<td></td>
</tr>
<tr>
<td>(b) Diameter (mm) :</td>
<td></td>
</tr>
<tr>
<td>(c) Length :</td>
<td></td>
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<table>
<thead>
<tr>
<th>23</th>
<th>Terminal connectors :</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) Material of connector :</td>
<td></td>
</tr>
<tr>
<td>(b) Material of Bolts :</td>
<td></td>
</tr>
<tr>
<td>(c) Range of diameter of conductors :</td>
<td></td>
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<tr>
<td>that can be received</td>
<td></td>
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<tr>
<td>(d) Maximum temperature rise when carrying :</td>
<td></td>
</tr>
<tr>
<td>rated current at 50 °C ambient temperature</td>
<td></td>
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<tr>
<td>(e) Weight of each type of connector (kg) :</td>
<td></td>
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<tr>
<td></td>
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<td>---</td>
<td>------------------------------------------------------------------------------------------</td>
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<tr>
<td>24</td>
<td><strong>BASE</strong>:&lt;br&gt; (a) Size (mm) :&lt;br&gt; (b) Weight (kg) :</td>
</tr>
<tr>
<td>25</td>
<td><strong>Total weight of isolator (kg) (excluding structure) :</strong>&lt;br&gt; (a) 3-phase for current break :</td>
</tr>
</tbody>
</table>
| 26 | **INSULATOR** :<br> (a) Size (mm) :<br> (b) Weight (kg) :<br> (c) Size (mm) :<br> (d) Weight (kg) :
| 27 | **INSULATOR** :<br> (a) Size (mm) :<br> (b) Weight (kg) :<br> (c) Size (mm) :<br> (d) Weight (kg) :
| 28 | **Standards to which insulators will confirm : IS:2544-1975 & IS:5350**                  |
| 29 | **Insulating material :**                                                                  |
| 30 | **Insulating material :**                                                                  |
| 31 | **Height of insulator : Mm**                                                                |
| 32 | **Power frequency flashover voltage :**<br> (a) Dry : KV<br> (b) Wet : KV                  |
| 33 | **Power frequency withstand test voltage :**<br> (a) Dry : KV<br> (b) Wet : KV              |
| 34 | **Impulse flashover (1.2/50 us wave) :**<br> (a) Positive wave : KVP<br> (b) Negative wave : KVP
| 35 | **Impulse withstand (1.2/50 us wave) :**<br> (a) Positive wave : KVP<br> (b) Negative wave : KVP
| 36 | **Nominal system voltage**                                                                  |
| 37 | **Highest system voltage :**                                                                |
| 38 | **Mechanical characteristics :**<br> (a) Cantilever strength :<br> (b) Tensile strength :<br> (c) Tensional strength :<br> (d) Compression strength :|
| 39 | **All ferrous parts hot dip galvanized as per IS:2629**<br> YES/NO                         |