MATERIAL SPECIFICATIONS CELL

TECHNICAL SPECIFICATION

TECHNICAL SPECIFICATION

OF

11 KV 800 AMP ISOLATORS WITHOUT EB & 400 AMP ISOLATORS WITH EB

FOR

OUTDOOR SWITCHGEARS

IN

MAHARASHTRA

TECHNICAL SPECIFICATION NO.

CE/T-QC/MSC-II/11KV ISOLATORS, DATE: 21.06.2019 (UPDATED)

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1.00 SCOPE

1.01 This specification covers design, manufacture, testing at manufacturer's works, inspection, packing and delivery of the 11 kV, 800 Amps Isolator without EB & 400 Amps Isolator with EB, 50 Hz outdoor type air break disconnects(isolators) with accessories and auxiliary equipment for installation in various substations in Maharashtra state (India)

1.02 It is not the intent to specify completely herein all details of the design and construction of equipment. However, the equipment shall conform in all respects to high standards of engineering mentioned in clause No. 3.0, design and workmanship and shall be capable of performing in continuous commercial operation upto the supplier's guarantee in a manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the powers to reject any work or material which, in his judgment, is not in accordance therewith.

1.03 The equipment offered shall be complete with all components necessary for its effective and trouble free operation alongwith associated equipment, interlocks, protection schemes etc. Such components shall be deemed to be within the scope of supplier's supply, irrespective of whether those are specifically brought out in this specification and/or the commercial order or not. All similar parts particularly removable ones shall be interchangeable

2.00 SERVICE CONDITIONS

Equipment to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions

Environmental Conditions

a)	Maximum ambient temperature	55^0 C
b)	Minimum temperature of air in shade	3.5^0 C
c)	Maximum daily average temperature	40^0 C
d)	Maximum yearly weighted average temperature	32^0 C
e)	Relative Humidity	10 to 100 %
f)	Maximum Annual rainfall	1450 mm
g)	Maximum wind pressure	150 Kg/m^2
h)	Maximum altitude above mean sea level	1000 meters
i)	Isoceraunic level	50 days/year

j) Seismic level (Horizontal acceleration) 0.3 g

k) Climate: Moderately hot and humid tropical climate conducive to rust and fungus growth.

3.00 APPLICABLE STANDARDS

3.01 Unless otherwise specified elsewhere in this specification, the rating as well as performance and testing of the Disconnect shall conform to the latest revisions of all the relevant standards available at the time of placement of order as listed in Annexure-I

3.02 Equipments meeting with the stipulations of equivalent IEC, ANSI, CSA, DIN Standards, which ensure equal or better quality than the standards listed in Annexure-I, shall also be acceptable. In such case the tenderer should submit alongwith his offer, two copies of such standards, in authentic English translation, if the language of the standard is other than English. In case of dispute, the stipulations in the English translation, submitted by the tenderer, shall prevail. Further, in the event of conflict between the stipulations of the standard adopted by the tenderer and the corresponding Indian Standard Specification the latter shall prevail

4.00 PRINCIPAL TECHNICAL PARAMETERS

The equipment covered in this specification shall meet the technical requirements listed in Annexure II

5.00 GENERAL TECHNICAL REQUIREMENTS

5.01 All isolators shall be of center post rotation, double brake, horizontal isolation type and shall have a short time rating of 12.5KA for 3 seconds. The contacts and blades of the isolators shall be of electrolytic grade copper. The fasteners (nut-bolts) used for current carrying parts shall be of non magnetic stainless steel. Spacing between phases for all isolators shall be of 1000mm. Further the current density for copper current carrying parts shall not be more than 1.6 Amp./mm.sq in solid conductor and 2 Amp/sq.mm. in hollow tubes. The current density for Alluminium current carrying parts shall not be more than 1 Amp./mm.sq.

5.02 Tenderers shall quote separately for isolators with integral earthing facility. Such isolators shall have built-in mechanical inter lock between the main and earth blades so that the closing of the main blade is not possible without opening the earth blade and closing of the earth blade will not be possible without opening the main blade.

5.03 All the fixed contacts shall be provided with a sheet metal rain hood. This rain hood shall be fabricated out of at least 2 mm thick Galvanised iron sheet metal and shall be designed such that it will in no case shall obstruct or restrict the movement of moving contracts (blades) and arcing horns, if provided.

5.04 Operating mechanism:

Manual operating mechanism gang operated through Hand operated lever shall be provided for main switch and earth switch separately.

The operating mechanism shall provide quick, simple and effective operation. The design shall be such that one man shall be able to operate the isolator without undue effort. The operating mechanism shall be suitable to hold the main switch or earth switch in closed or opened position to prevent operation by gravity, wind, short circuit, seismic acceleration, vibration, shock, accidental touching etc.

5.05 Padlocking device:

The isolator and earthing switch shall be provided with padlocking device to permit locking of the isolator and earthing switch in both fully open and fully closed positions

5.06 Earthing:

5.06.1 Flexible branded copper connections shall be provided between rotating earth blades and the frame which shall have a cross section of at least 50 sq mm and shall be tinned or suitably treated against oxidation.

5.06.2 The frame of each disconnect and earthing switch shall be provided with two reliable earthing terminals for connection to the purchaser's earthing conductor/flat so also clamping screw suitable for carrying specified short time current. Flexible ground connectors shall be provided for connecting operating handle to the earthing flat. The diameter of clamping screw shall be atleast 12 mm. The connecting point shall be marked with earth symbol

5.07 Moving blades:

5.07.1 Contact surface of moving blades and associated connectors/contacts and terminal pads shall be heavily silver plated to atleast 15 microns thick. The surface shall be wiped during closing and opening operations to remove any film, oxide coating etc. Wiping action shall not cause scouring or abrasion of surfaces.

5.07.2 Material of Earthing blades & contacts shall be the same as those of the main moving blades and contacts respectively. Cross-sectional area of the Earthing blades and contacts shall not be less than 50% of corresponding area of main moving blades and contacts.

5.08 Bearings:

All the friction locations and rotating parts shall be provided with two nos. of bearings of at least 25 mm ID. 50 mm clear spacing between the bearing shall be provided. The housing for bearings shall be made of gravity dia cast metal with smooth surface and suitably machined for seating the bearings. The bearings bushes, joints, springs etc. shall be so designed that no lubrication shall be required during the service

5.09 Tandem pipe:

Tandem pipe shall be of at least 25 mm NB, at least 2200 mm long and class B Mild steel galvanised. One single tandem pipe shall be used for phase coupling of double break isolators. Base plate of rotating insulators for connection of tandem pipe shall be made out of one piece of at least 6 mm thick M.S.plate. Bolt and shackle device shall be used to connect tandem pipe to the base plate. Wherever unavoidable sliding clamps may be used. These clamps shall be made out of at least 6 mm thick M.S.flat with four nos. of nuts and bolts. A grubscrew shall be provided for securing connection on tandem pipes

5.10 Down pipe:

50 mm ID class B Mild steel galvanised single piece pipe shall be provided for operating disconnects. The pipe shall be terminated into a suitable swivel type joint between the tandem pipe driving mechanism and the operating mechanism if required to take care of marginal angular misalignment at site.

5.11 Support structure

5.11.1 The tenderer shall quote unit prices for support structure for the isolators offered. These support structures shall be fabricated out of galvanised ERW pipe conforming to IS:1239 or tube fabricated out of M.S. plates.

5.11.2 The support structure shall be suitable for mounting operating mechanism and guides. It shall be designed to withstand short circuit forces,wind pressure, seismic forces etc. along with the operating forces, vibration, shocks etc. at actual site conditions with adequate factor of safety. The tenderer shall furnish detailed design, calculations, etc. for support structures. These details shall also

include loading data.

5.11.3 The masonry or concrete in foundations shall be arranged and constructed by the purchaser. The tenderer shall furnish complete data for design of foundations. The foundation bolts for the structures shall be in the scope of supplier of structures. The foundation bolts shall be supplied well in advance for grouting.

5.11.4 The purchaser reserves the right to purchase the support structure with foundation bolts from the tenderer or make his own separate arrangements for any type/quantity of isolators.

5.12 Terminal connectors

5.12.1 The tenderer shall quote unit rates for the following type of terminal connectors:

It should be made of EC Grade Aluminium alongwith suitable bimetallic plate of minimum 1 mm thickness. It should be crimping type and suitable for 0.1 sq.inch single ACSR conductor

5.12.2 6 numbers of the terminal connectors are required per set of Isolator. The purchaser reserves the right to procure terminal connectors from the tenderer in part or full quantity or make his own arrangement for the balance or full quantity.

5.13 Assembly

The disconnect shall be fully assembled at the works of the tenderer. Typical operations shall be carried out on each type of fully assembled disconnect to ascertain that all parts fit correctly and function satisfactorily.

5.14 Insulators

5.14.1 All outdoor type Porcelain insulators shall have a creepage distance of 25mm/kV (i.e. 300mm). The insulators shall be of outdoor post type conforming to IS 2544. All insulators shall have a rated voltage not less than 12 kV and rated current of 2000 Amps.

5.14.2 Post type insulators with 57 mm PCD shall only be provided. Pin type or Polycone insulator shall not be acceptable.

5.14.3 The insulators shall be provided with a completely galvanised steel base designed for mounting on the support. The base and mounting arrangement shall be such that the insulator shall be rigid and self standing. Cap provided on top of the insulator shall be of high grade cast iron/malleable steel casting or alluminium alloy. It shall be machine faced and hot dip galvanised in case of first two options. The cap shall have four nos. of tapped holes with PCD same of that of insulator base. The holes shall be suitable for

bolts with threads having anticorrosive protection. The effective depth of threads shall be adequate.

5.14.4 The insulator shall be made of homogeneous and vitreous porcelain of high mechanical and dielectric strength. It shall have sufficient mechanical strength to sustain electrical and mechanical loading on account of wind load, short circuit stresses etc. Glazing of the porcelain shall be of uniform brown or dark brown colour with a smooth surface arranged to shed away rain water. The porcelain shall be free from lamination and other flaws or imperfections that might affect the mechanical or dielectrical quality. It shall be thoroughly vitrified, tough and impervious to moisture.

5.14.5 The porcelain and metal parts shall be assembled in such a manner and with such material that any thermal differential expansion between the metal and porcelain through the range of temperature specified in this specification shall not loosen the parts or create undue internal stresses which may affect the mechanical or electrical strength or rigidity. The assembly shall not have excessive concentration of electrical stresses in any section or across leakage surfaces. The cement used shall not give rise to chemical reaction with metal fittings. The insulator shall be suitable for water washing by rain or artificial means in service condition.

5.14.6 The insulator unit shall be assembled in a suitable jig to ensure correct positioning of the top and bottom metal fittings relative to one another. The faces of the metal fittings shall be parallel and at right angle to the axis of the insulator and corresponding holes in the top and bottom metal fittings shall be in a vertical plane containing the axis of the insulator.

5.14.7 It shall be the sole responsibility of the supplier to carry out thorough inspection and quality checks on the insulators at the insulator supplier's works, before offering the insulators for purchaser's inspection.

5.15 Name Plates:

The disconnect shall be provided with a name plate. The name plate shall be weather proof and corrosion-proof. It shall be mounted in such a position that it shall be visible in the position of normal service and installation. It shall carry the following information duly punched or engraved on it

6.00 TESTS

6.01 TYPE TESTS

The equipment offered in the tender should have been successfully type tested at NABL Laboratories for following tests in line with relevant standard and technical specification, within the last 5 (five) years from the date of opening of tender. The bidder shall be required to submit complete set of the following type test reports alongwith the offer.

Isolators (with & without E.B.) (IS/IEC 62271-102 amended upto date)	
Sr. No.	Description of Type Test
1.	Lightning Impulse Voltage withstand Test
2.	Power Frequency Voltage Withstand Test a) Dry b) Wet
3.	Temperature Rise Test
4.	Short Time Withstand Current and Peak Withstand Current Test
5.	Mechanical Endurance Test
Post Insulators (IS: 2544)	
1.	Visual Examination
2.	Verification of Dimensions
3.	Visible Discharge Test
4.	Impulse Voltage withstand Test
5.	Dry Power Frequency Voltage Withstand Test
6.	Wet Power Frequency Voltage Withstand Test
7.	Temperature Cycle Test
8.	Test for mechanical strength
9.	Puncture Test (For Insulator type B only)
10.	Porosity Test
11.	Galvanizing Test
Terminal connectors (IS:5561)	
	All type tests as per IS:5561

1	Tensile Test
2	Resistance Test
3	Temperature Rise Test
4	Short Time Current Test
5	Dimensional Check
6	Galvanising test where applicable

6.02 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 tenderer may quote unit rates for carrying out each type test.

6.03 If type tests are carried out beyond 5 years, then the offer may be considered for placement of order however, successful bidders have to carry out the said type tests before commencement of the supply at their own expense.

6.04 During the type test the disconnect shall be mounted on its own support structure or equivalent support structure and installed with its own operating mechanism to make the type tests representative. Drawing of equivalent support structure if any and mounting arrangements made for type tests shall be furnished for purchaser's approval before conducting the type tests.

6.05 The type tests shall be conducted on the disconnect alongwith approved insulators and terminal connectors

6.06 Mechanical endurance test shall be conducted on the main switch as well as earth switch on one disconnect of each type.

6.07 Successful tenderer shall submit all type test reports of offered design of isolator as per relevant IS/IEC standards to office of the Chief Engineer (Testing & QC) Cell and get approved it before commencement of the supply. The original type test reports should be made available for verification

6.08 Acceptance and Routine Tests:

6.08.1 All acceptance and routine tests as stipulated in the relevant standards shall be carried out by the supplier in presence of purchaser's representative.

6.08.2 Mechanical operation test (routine test) shall be conducted on the complete disconnect (Main switch and Earth switch) at supplier's works and a certified test report be furnished to the purchaser.

Alternatively the tenderer may offer to conduct this test at purchaser's substation in which case the purchaser shall make necessary arrangement to erect the disconnect at his substation site under supervision of tenderer's representatives (if necessary) in case this test is offered to be conducted at site. Expenses of the tenderer's representatives for supervision shall not be borne by the purchaser.

6.08.3 The test report of power frequency voltage withstand test conducted on the insulator shall be furnished for purchaser's acceptance in lieu of conducting the power frequency(dry) test on main circuit(routine test)

6.09 Immediately after finalisation of the programme of type/acceptance/routine testing, the supplier shall give three weeks' advance intimation to the purchaser, to enable him to depute his representative for witnessing the tests.

7.00 INSPECTION

The inspection may be carried out by the purchaser at any stage of manufacture. The successful Tenderer shall grant free access to the purchaser's representative at a reasonable time when the work is in progress. Inspection and acceptance of any equipment under this specification by the purchaser, shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective. The supplier shall keep the purchaser informed in advance, about the manufacturing programme so that arrangement can be made for inspection.

The purchaser reserves the right to insist for witnessing the acceptance/routine testing of the bought out items

8.00 QUALITY ASSURANCE PLAN:

8.01 The tenderer shall invariably furnish following information alongwith his offer, failing which his offer shall be liable for rejection. Information shall be separately given for individual type of the disconnect

i. Statement giving list of important raw materials, including but not limited to :
   a. Copper
   b. Steel
   c. Springs
   d. Bearings
   e. Nuts & Bolts

f. Operating mechanism and its components such as aux. switch, terminal block, etc.

ii. Names of sub suppliers for the raw materials, list of standards according to which the raw materials are tested, list of tests normally carried out on raw materials in presence of tenderer's representative, copies of test certificates etc.

iii. Information and copies of test certificates as in (i) above in respect of bought out accessories.

iv. List of manufacturing facilities available.

v. Level of automation achieved and list of areas where manual processing still exists.

vi. List of areas in manufacturing process, where stage in inspections are normally carried out for quality control and details of such tests and inspections.

vii. Special features provided in the equipment to make it maintenance free

viii. List of testing equipments available with the tenderer for final testing of equipment and test plant limitation, if any, vis-a-vis the type, special acceptance and routine tests specified in the relevant standards. These limitations shall be very clearly brought out in Schedule-F, i.e.schedule of deviations from specified test requirements

8.2. The tenderer shall submit following information alongwith offer.

i. List of raw materials as well as bought out accessories, and the names of sub suppliers selected from the list furnished alongwith offer.

ii. Type test certificates of the raw material and bought out accessories

iii. Quality Assurance Plan (QAP) with hold points for purchaser's inspection. The quality assurance plan and purchaser's hold points shall be discussed between the purchaser and supplier before the QAP is finalised

8.3 The successful tenderer shall submit the routine test certificates of bought out accessories at the time of routine testing of the fully assembled disconnect.

9.00 PERFORMANCE GUARANTEE:

The equipment shall be guaranteed for satisfactory performance for a period of 66 months from the date of receipt at site in good condition or 60 months from the date of commissioning, whichever is earlier. In case of failure within this period the supplier will make good the faulty equipment at no extra cost to the purchaser.

10.00 TRAINING

The successful bidder shall depute their representative to educate Engineers of purchaser as and when they will be called for at no extra cost.

11.00 DOCUMENTATION:

11.01 All drawings shall conform to international standards. All drawings shall be "A3" size only. All dimensions and data shall be in System International units.

11.02 List of drawings and documents:

The tenderer shall furnish four sets of following drawings alongwith the offer.

a. General outline and assembly drawings of the disconnect, operating mechanism, structure, insulator and terminal connector.

b. Sectional views and descriptive details of items such as moving blades, contacts, arms, contact, pressure, contact support, bearing, housing of bearings, bushes, balancing of heights, phase coupling pipes, base plate, operating shaft, guides, swivel joint operating mechanism and its components etc.

c. Drawings with structure for the purpose of type tests.

d. Name plate.

e. Schematic drawing

f. Type test reports in case the equipment has already been type
tested.

g. Test reports, literature, pamphlets of the bought out items and raw material

11.03 The successful tenderer shall, within 10 days from date of LOA get approval of above said drawings from office of CE (Testing & QC) Cell, MSEDCL, Mumbai.

11.04 Six sets of the type test reports, duly approved by the purchaser, shall be submitted by the supplier for distribution, before commencement of supply. Adequate copies of acceptance and routine test certificates, duly approved by the purchaser, shall accompany the dispatched consignment.

11.05 The manufacturing of the equipments shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written approval of the purchaser. All manufacturing and

fabrication work in connection with the equipment prior to the approval of the drawing shall be at the supplier's risk.

11.06 Approval of drawings/work by purchaser shall not relieve the supplier of his responsibility and liability for ensuring correctness and correct interpretation of the latest revision of applicable standards, rules and codes of practices.

11.07 INSTRUCTION MANUALS:

Twenty five copies of the erection, operation and maintenance manuals in English shall be supplied for each type of the disconnect one month prior to dispatch of the equipment. The manual shall be bound volume and shall contain all drawings and information required for erection, operation and maintenance of the disconnect including but not limited to the following particulars.

a. Marked erection prints identifying the component parts of the disconnect as shipped with assembly drawings.

b. Detailed dimensions and description of all auxiliaries.

c. Detailed views of the insulator stacks, metallics, operating mechanism, structure, interlocks, spare parts etc

12.00 SPARES:

The tenderer shall furnish in his offer, a list of spares with unit rates for disconnect that may be necessary for maintenance of the disconnect for a period of five years. The purchaser reserves the right for selection of items and quantities of these spares to be ordered.

The cost of following spares shall be quoted separately.

a. Insulators

b. Contacts

c. Moving blades

d. Springs

e. Bearings

In addition list of optional spares may be enclosed.

13.00 PACKING AND FORWARDING:

13.01 The equipment shall be packed in crates suitable for vertical/horizontal transport, as the case may be, and suitable to withstand handling during transport and outdoor storage during transit. The supplier shall be responsible for any damage to the equipment during transit, due to improper and inadequate packing. The easily damageable material shall be carefully packed and marked

with the appropriate caution symbols. Wherever necessary, proper arrangement for lifting, such as lifting hooks etc. shall be provided, Any material found short inside the packing cases shall be supplied by supplier without any extra cost.

13.02 The supplier shall ensure that the packing list and bill of material are approved by the purchaser before dispatch.

13.03 Each consignment shall be accompanied by a detailed packing list containing the following information.

a. Name of the consignee
b. Details of consignment
c. Destination
d. Total weight of consignment
e. Sign showing upper/lower side of the crate.
f. Handling and unpacking instructions
g. Bill of material indicating contains of each package

14.00 QUALIFYING REQUIREMENTS: As per Tender.

15.00 SCHEDULES

The tenderer shall fill in the following schedules which are part and parcel of the tender specification and offer. If the schedules are not submitted duly filled in with the offer, the offer shall be liable for rejection. The order copies of the order executed mentioned in the list of order shall be invariably enclosed along with the offer. Only those orders mentioned in the list shall be considered whose order copies shall be enclosed with the offer.

Schedule A – Guaranteed and technical particulars.

Schedule C – Tenderer's experience.

Schedule D – Schedule of Deviations From Specification

Schedule E – Schedule of Deviations From Specified Standards

Schedule F – Deviations from test requirements specified in relevant standards

The tenderer shall submit the list of orders for similar type of equipment, executed or under execution during the last three years, with full details in the schedule of tenderer's experience (Schedule - C) to enable the purchaser to evaluate the tender.

16.00 INFORMATION TO BE FURNISHED

Two set of following documents shall be supplied along with each test system.

- Operating manual
- Service manual
- Calibration certificate of reference standard

SCHEDULE – "C"

TENDERER'S EXPERIENCE

Tenderer shall furnish here list of similar orders executed / under execution for supplying 11kV 800 Isolators Without EB & 400 Amp Isolators With EB by him to whom a reference may be made by purchaser in case he considers such a reference necessary.

Sr. No.	Name of client	Order No. & date	Qty. ordered	Qty. supplied

NAME OF FIRM _____

NAME & SIGNATURE _____

DESIGNATION _____

DATE _____

SCHEDULE – "D"

SCHEDULE OF DEVIATIONS FROM SPECIFICATION

Sr. No.	Clause No.	Details of Deviations
1		
2		
3		
4		
5		

NAME OF FIRM _____

NAME & SIGNATURE _____

DESIGNATION _____

DATE _____

SCHEDULE – "E"

SCHEDULE OF DEVIATIONS FROM SPECIFIED STANDARDS

Sr. No.	Parameters	Stipulation of specified standards		Stipulation of specified standards specified by tenderer		Remarks
		Standard Reference	Stipulation	Standard Reference	Stipulation	

NAME OF FIRM _____

NAME & SIGNATURE _____

DESIGNATION _____

DATE _____

SCHEDULE – "F"

DEVIATIONS FROM TEST REQUIREMENTS SPECIFIED IN RELEVANT STANDARDS

Sr. No.	Name of Test	Standard Ref. No. & Clause No.	Requirements of standard	Proposed deviation	Reasons for deviation
1	Type Tests				
2	Special Tests				
3	Acceptance Tests				
4	Routine Tests				

NAME OF FIRM _____

NAME & SIGNATURE _____

DESIGNATION _____

DATE _____

ANNEXURE I

LIST OF REFERENCE STANDARDS

Sr. No.	Standard No.	Title
1	IS:1818	Alternating current isolators (disconnectors) and earthing switches
2	IS/IEC 62271-102 amended upto date	High Voltage Switchgear & Controlgear, Part 102 Alternating Current Disconnectors & Earthing Switches
3	IS/IEC 62271-1 amended upto date	High Voltage Switchgear & Controlgear, Part 1 Common Specifications
4	IEC:129	-do-
5	IS:2544	Insulators
6	IS 2147	Degree of protection provided by enclosures
7	IS:4691	-do-
8	IS:4722	Rotating Electrical Machines
9	IS:2629	Recommended practice for hot dip galvanising of iron and steel
10	IS:4759	Hop dip galvanization coating on Structural Steel.
11	IS:2633	Method of testing weight thickness and uniformity of coating on fasteners
12	IS:1573	Electro plated coating of zinc on Iron & Steel.
13	IS:3033	Spring Washers
14	IS:2016	Plain washers
15	IE Rules 1956	Indian Electricity Rules
16	IEC:168	Tests on Indoor and Outdoor post Insulator
17	IS:3961	Recommended current rating for PVC Insulated and PVC Sheeted heavy Duty Cables.
18	IS: 5561	Power Connectors
19	IS:1554	PVC Cables
20	IS:5578	Guide for marking of Insulated conductors and arrangement for switchgear bus bar main connectors & Auxiliary wirings.
21	IS:11353	Guide for Uniform system of marking and identification of conductors and apparatus terminals.

ANNEXURE II

Principal Technical Parameters for Isolator

I	Reference Standard	IS/IEC 62271-102 amended upto date
II	System voltage c. Normal d. Highest	 11 kV 12 kV
III	Supply frequency	50 Hz
IV	System Neutral earth	Effectively earthed
V	Current a. Normal b. Short time rating	800 Amp without EB for Incomer 400 Amp with EB for feeder 12.5 kArms for 3 sec
VI	Insulation level c. Impulse d. 1 min Power Frequency Voltage(wet)	 75 kVp 28 kVrms
VII	Phase to phase centre distance	1000 mm
VIII	Current density at minimum cross section at any place in current path.	Not more than 1.6 A/sq mm
IX	Clearances c. Between adjacent poles d. Between live phase to earth	 850 mm 370 mm
X	Interlock	Mechanical interlock between Main switch and earth switch.
XI	Operating mechanism	Manual
XII	Type of connection between earth blade (rotary contact) and earthing	Flexible copper contact

SCHEDULE – "A"

GUARANTEED TECHNICAL PARTICULARS

11 KV 800 AMP ISOLATORS WITHOUT EB

Sr. No.	Particulars	MSEDCL requirement	To be offered by Bidder
1.	Name of manufacturer	Mfg to give details	Text
2.	Manufacturer's type	Mfg to give details	Text
3.	The equipment shall be conformed to	IS/IEC: 62271-102 amended upto date	Text
4.	Type of disconnector	Outdoor type air break disconnects three phase gang operated horizontal double break type with rotating type moving blades	Text
5.	Offered Isolator shall be suitable for System frequency 50 HZ ±3% : Yes/No	50 HZ ±3%	Boolean
6.	Rated voltage of Isolator (kV)	12 kV	Text
7.	Max. current that can be safely interrupted by the isolator	Mfg to give details	Text
8.	Nominal Continuous current rating (Amp)	800 Amp	Text
9.	Rated short time current for 3 seconds (kArms)	min.12.5 kArms	Text
10.	Rated peak short time current (kApeak)	min. 31.25 kApeak	Text
11.	Current density at the minimum cross section of moving blade (A/sq.mm)	max. 2 A/sq. mm	Text
12.	Current density at the minimum cross section of Terminal pad (A/Sq.mm.)	max. 1.6 A/sq. mm	Text
13.	Current density at the minimum cross section of Contacts (A/sq.mm.)	max.1.6 A/sq. mm	Text

14.	Current density at the minimum cross section of Terminal connector (A/sq.mm.)	max.1 A/sq. mm	Text
15.	Max. temperature rise of current carrying parts when carrying rated current continuously (°C)	As limit indicated in the IS/IEC: 62271-102 amended upto date	Text
16.	Derating factor for Normal Site Conditions	1	Numeric
17.	Derating factor for heavily polluted area	1	Numeric
18.	Derating factor for costal area (i.e. for high humidity)	1	Numeric
19.	Lightning impulse withstand voltage (kVpeak)	75 kVpeak (min.)	Text
20.	Wet power frequency withstand voltage (kVrms)	28 kVrms (min.)	Text
21.	Minimum Phase to phase center distance (mm)	1000 mm (min.)	Text
22.	Minimum clearance between adjacent poles (mm)	850 mm (min.)	Text
23.	Minimum clearance between live phase to earth (mm)	370 mm (min)	Text
24.	No. of insulators per pole	3	Numeric
25.	No. of breaks per pole	2	Numeric
26.	Type of closing/opening mechanism	Gang operated through Hand	Text
27.	Material and grade of Contacts	Hard drawn electrolytic grade copper	Text
28.	Cross sectional area of fixed Contacts (sq.mm.)	Mfg to give details	Text
29.	No. of operations the isolator can make without	1000	Numeric
30.	Thickness of silver plating provided on the contact surface (microns)	At least 15 microns	Text
31.	Material and grade of Moving blades	Hard drawn electrolytic grade copper	Text

32.	Cross sectional area of Moving blades	Mfg to give details	Text
33.	Thickness of silver plating provided on Contact surface of	At least 15 microns	Text
34.	Material of contact support	Galvanized M. S.	Text
35.	Size of contact support i.e. either channel or block	Mfg to give details	Text
36.	Material of plate on which a block or channel welded	Galvanized M.S.	Text
37.	Size of plate on which a block or channel welded	Mfg to give details	Text
38.	Thick steel sheet shall be used for rain hood : Yes/No	Thick steel sheet shall be used for rain hood	Boolean
39.	Thickness of steel sheet used for Rain hood	min 2 mm	Text
40.	Material of 5\8" and higher size Nuts and Bolts used in live part shall be	Hot dip galvanized	Text
41.	Material of less than 5\8" size Nuts and Bolts used in live part shall be of	Stainless steel	Text
42.	Size of Nuts and Bolts used in live part	Mfg to give details	Text
43.	Material of 5\8" and higher size Nuts and Bolts used in other part shall be	Hot dip galvanized	Text
44.	Material of less than 5\8" size Nuts and Bolts used in other part shall be of	Nickel plated brass	Text
45.	Size of Nuts and Bolts used in other part	Mfg to give details	Text
46.	Material of Insulator base plate below fixed insulator	M.S. HDG	Text
47.	Size of Insulator base plate below fixed insulator	Mfg to give details	Text
48.	Thickness of Insulator base plate below fixed insulator	min 6 mm.	Text
49.	Material and size of stud and bolts used for fixing of Insulator on base plate	M.S. HDG Size - Mfg to give details	Text

50.	Material of Insulator base plate below rotating insulator	M.S. HDG	Text
51.	Size of Insulator base plate below rotating insulator	Mfg to give details	Text
52.	Thickness of Insulator base plate below rotating insulator	Min. 6 mm	Text
53.	Material of Bearing housing	Gravity die cast metal	Text
54.	Size of Bearing housing	Mfg to give details	Text
55.	Method of casting of Bearing housing shall be gravity die cast (Yes/No)	Method of casting of Bearing housing shall be gravity die cast	Boolean
56.	No. of bearings	min. 2 Nos	Text
57.	Location of bearings	Below rotating Insulator	Text
58.	Size of bearings	Atleast 25 mm inner dia.	Text
59.	No. of bushes	Mfg to give details	Text
60.	Joints of bushes	Mfg to give details	Text
61.	Location of bushes	Mfg to give details	Text
62.	Bushes shall be made of	Brass	Text
63.	Size of bushes	Mfg to give details	Text
64.	Size of Tandem pipe	Atleast 25 mm NB	Text
65.	Length of Tandem pipe (mm)	Atleast 2200 mm	Text
66.	Class of Tandem pipe	Class B	Text
67.	Single Tandem pipe shall be used (Yes/No)	Single Tandem pipe shall be used	Boolean
68.	Size of shackle and screw to fix the tandem pipe	Mfg to give details	Text
69.	No of clamps	Mfg to give details	Text
70.	Clamps shall be made of	M. S. Flat	Text
71.	Thickness of clamps shall be	min. 6 mm	Text
72.	Size of Down pipe	50 mm ID	Text
73.	Length of Down pipe in mm	Mfg to give details	Text
74.	Class of Down pipe	Class B	Text

75.	Type of joint between bearing and down pipe (swivel type)	Swivel type	Text
76.	Type of joint between down pipe and operating mechanism	universal/swivel type	Text
77.	Material of Control Cabinet shall be	Sheet Steel	Text
78.	Thickness of Control Cabinet shall be	min. 2mm	Text
79.	Degree of protection of Control Cabinet	At least IP55	Text
80.	Type of cable gland of Control Cabinet	Double compression type brass cable glands	Text
81.	Size of cable gland of Control Cabinet	Mfg to give details	Text
82.	No. of cable gland of Control Cabinet	Mfg to give details	Text
83.	Removable gland plate shall be provided for Control Cabinet : Yes/No	Removable gland plate shall be provided for Control Cabinet	Boolean
84.	Make of Insulated Wires	Mfg to give details	Text
85.	Type of Insulated Wires	2.5 sq. mm PVC insulated copper wire	Text
86.	Rating of Insulated Wires	1100 V Grade	Text
87.	Quantity of Insulated Wires	Mfg to give details	Text
88.	Type of Insulators	Post insulators	Text
89.	No. of units per insulator	one	Text
90.	Height of each insulator stack (mm)	Mfg to give details	Text
91.	No. of holes of Insulators	4 Nos. of Tapped holes	Text
92.	Pitch circle diameter of Insulator	57 mm	Text
93.	Tensile strength of Insulator in kg	Mfg to give details as per Type Test of Insulator	Text
94.	Compressive strength of Insulator in kg	Mfg to give details as per Type Test of Insulator	Text
95.	Torsion strength of Insulator in kg cm	Mfg to give details as per Type Test of Insulator	Text

96.	Cantilever strength upright of Insulators in kg	Mfg to give details as per Type Test of Insulator	Text
97.	Rated Voltage of Insulator (kV)	12 kV	Text
98.	Dry – 1 min Power frequency withstand test voltage of Insulators	35 kV rms	Text
99.	Wet – 1 min Power frequency withstand test voltage of Insulators	35 kV rms	Text
100.	Impulse withstand voltage of Insulators shall be	75 kVp	Text
101.	Power frequency puncture voltage of Insulators (kVrms)	Mfg to give details as per Type Test of Insulator	Text
102.	Visual discharge voltage level of Insulators	9 kVrms	Text
103.	Creepage distance of Insulators	min 300 mm	Text
104.	Size of steel sections used for Base structure	Mfg to give details	Text
105.	Size of steel sections used for supporting structure	Mfg to give details	Text
106.	Overall size of Base and supporting structure	Mfg to give details	Text
107.	Total weight of Base and supporting structure	Mfg to give details	Text
108.	Materials of braids	Flexible tinned copper	Text
109.	Cross section of braids	At least 50 sq. mm	Text
110.	Is the the test certificate for copper submitted? (Yes/No)	Mfg to give details	Boolean
111.	Is the test certificate for steel submitted? (Yes/No)	Mfg to give details	Boolean
112.	Is the test certificate for spring submitted? (Yes/No)	Mfg to give details	Boolean
113.	Is the test certificate for Bearings submitted? (Yes/No)	Mfg to give details	Boolean
114.	Is the test certificate for Nuts & Bolts submitted? (Yes/No)	Mfg to give details	Boolean
115.	Is name of sub supplier for raw material submitted? (Yes/No)	Mfg to give details	Boolean

116.	Is list of available manufacturing facilities submitted? (Yes/No)	Mfg to give details	Boolean
117.	Is list of available testing equipment submitted? (Yes/No)	Mfg to give details	Boolean
118.	Is Quality Assurance Plan submitted? (Yes/No)	Mfg to give details	Boolean
119.	Is drawings for general outline and assembly submitted? (Yes/No)	Mfg to give details	Boolean
120.	Is drawings for operating mechanism submitted? (Yes/No)	Mfg to give details	Boolean
121.	Is drawings for structure submitted? (Yes/No)	Mfg to give details	Boolean
122.	Is drawings for Insulators submitted? (Yes/No)	Mfg to give details	Boolean
123.	Is drawings for terminal connector submitted?(Yes/No)	Mfg to give details	Boolean
124.	Is sectional views and descrptive details of moving blades submitted? (Yes/No)	Mfg to give details	Boolean
125.	Is sectional views and descrptive details of contacts submitted? (Yes/No)	Mfg to give details	Boolean
126.	Is sectional views and descrptive details of contact support submitted? (Yes/No)	Mfg to give details	Boolean
127.	Is sectional views and descrptive details of bearing submitted? (Yes/No)	Mfg to give details	Boolean
128.	Is sectional views and descrptive details of housing of bearings submitted? (Yes/No)	Mfg to give details	Boolean
129.	Is sectional views and descrptive details of base plate submitted? (Yes/No)	Mfg to give details	Boolean
130.	Is detailed drawings for name plate submitted? (Yes/No)	Mfg to give details	Boolean
131.	Is Lighting Impulse Voltage withstand test report for offered design Isolator submitted? (Yes/No)	Mfg to give details	Boolean
132.	Is Dry Power frequency Voltage Withstand test report for offered design Isolator submitted?(Yes/No)	Mfg to give details	Boolean
133.	Is Wet Power frequency Voltage Withstand test report for offered design Isolator submitted? (Yes/No)	Mfg to give details	Boolean
134.	Is Temperature Rise test report for offered design Isolator submitted? (Yes/No)	Mfg to give details	Boolean

135.	Is Short Time Withstand Current and Peak Withstand Current test report for offered design Isolator submitted? (Yes/No)	Mfg to give details	Boolean
136.	Is Mechanical Endurance test report for offered design Isolator submitted? (Yes/No)	Mfg to give details	Boolean
137.	Is reports for Visual Examination test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
138.	Is reports for Verification of Dimensions for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
139.	Is reports for Visible Discharge Test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
140.	Is reports for Impulse Voltage withstand Test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
141.	Is reports for Dry Power Frequency Voltage Withstand Test for Insulators as indicated in IS:2544 or IEC : 168 submitted?(Yes/No)	Mfg to give details	Boolean
142.	Is reports for Wet Power Frequency Voltage Withstand Test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
143.	Is reports for Temperature Cycle Test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
144.	Is reports for Test for mechanical strength for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
145.	Is reports for Puncture Test (For Insulator type B only) for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean

146.	Is reports for Porosity Test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
147.	Is reports for Galvanizing Test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
148.	Is reports for Tensile Test for Terminal Connector as indicated in IS:5561 submitted? (Yes/No)	Mfg to give details	Boolean
149.	Is reports for Resistance Test for Terminal Connector as indicated in IS:5561 submitted? (Yes/No)	Mfg to give details	Boolean
150.	Is reports for Temperature Rise Test for Terminal Connector as indicated in IS:5561 submitted? (Yes/No)	Mfg to give details	Boolean
151.	Is reports for Short Time Current Test for Terminal Connector as indicated in IS:5561 submitted? (Yes/No)	Mfg to give details	Boolean
152.	Is reports for Dimensional Check for Terminal Connector as indicated in IS:5561 submitted? (Yes/No)	Mfg to give details	Boolean
153.	Is reports for Galvanising test if applicable for Terminal Connector as indicated in IS:5561 submitted? (Yes/No)	Mfg to give details	Boolean

GUARANTEED TECHNICAL PARTICULARS
11 KV 400 AMP ISOLATORS WITH EB

Sr. No.	Particulars	MSEDCL requirement	To be offered by Bidder
1.	Name of manufacturer	Mfg to give details	Text
2.	Manufacturer's type	Mfg to give details	Text
3.	The equipment shall be conformed to	IS/IEC: 62271-102 amended upto date	Text
4.	Type of disconnector	Outdoor type air break disconnects three phase gang operated horizontal double break type with rotating type moving blades	Text
5.	Offered Isolator shall be suitable for System frequency 50 HZ ±3% : Yes/No	50 HZ ±3%	Boolean
6.	Rated voltage of Isolator (kV)	12 kV	Text
7.	Max. current that can be safely interrupted by the isolator	Mfg to give details	Text
8.	Nominal Continuous current rating (Amp)	400 Amp	Text
9.	Rated short time current for 3 seconds (kArms)	min.12.5 kArms	Text
10.	Rated peak short time current (kApeak)	min. 31.25 kApeak	Text
11.	Current density at the minimum cross section of moving blade (A/sq.mm)	max. 2 A/sq. mm	Text
12.	Current density at the minimum cross section of Terminal pad (A/Sq.mm.)	max. 1.6 A/sq. mm	Text
13.	Current density at the minimum cross section of Contacts (A/sq.mm.)	max.1.6 A/sq. mm	Text

14.	Current density at the minimum cross section of Terminal connector (A/sq.mm.)	max.1 A/sq. mm	Text
15.	Max. temperature rise of current carrying parts when carrying rated current continuously (°C)	As limit indicated in the IS/IEC: 62271-102 amended upto date	Text
16.	Derating factor for Normal Site Conditions	1	Numeric
17.	Derating factor for heavily polluted area	1	Numeric
18.	Derating factor for costal area (i.e. for high humidity)	1	Numeric
19.	Lightning impulse withstand voltage (kVpeak)	75 kVpeak (min.)	Text
20.	Wet power frequency withstand voltage (kVrms)	28 kVrms (min.)	Text
21.	Minimum Phase to phase center distance (mm)	1000 mm (min.)	Text
22.	Minimum clearance between adjacent poles (mm)	850 mm (min.)	Text
23.	Minimum clearance between live phase to earth (mm)	370 mm (min)	Text
24.	No. of insulators per pole	3	Numeric
25.	No. of breaks per pole	2	Numeric
26.	Type of closing/opening mechanism	Gang operated through Hand	Text
27.	Material and grade of Contacts	Hard drawn electrolytic grade copper	Text
28.	Cross sectional area of fixed Contacts (sq.mm.)	Mfg to give details	Text
29.	No. of operations the isolator can make without	1000	Numeric
30.	Thickness of silver plating provided on the contact surface (microns)	At least 15 microns	Text
31.	Material and grade of Moving blades	Hard drawn electrolytic grade copper	Text

32.	Cross sectional area of Moving blades	Mfg to give details	Text
33.	Thickness of silver plating provided on Contact surface of	At least 15 microns	Text
34.	Material of contact support	Galvanized M. S.	Text
35.	Size of contact support i.e. either channel or block	Mfg to give details	Text
36.	Material of plate on which a block or channel welded	Galvanized M.S.	Text
37.	Size of plate on which a block or channel welded	Mfg to give details	Text
38.	Thick steel sheet shall be used for rain hood : Yes/No	Thick steel sheet shall be used for rain hood	Boolean
39.	Thickness of steel sheet used for Rain hood	min 2 mm	Text
40.	Material of 5\8" and higher size Nuts and Bolts used in live part shall be	Hot dip galvanized	Text
41.	Material of less than 5\8" size Nuts and Bolts used in live part shall be of	Stainless steel	Text
42.	Size of Nuts and Bolts used in live part	Mfg to give details	Text
43.	Material of 5\8" and higher size Nuts and Bolts used in other part shall be	Hot dip galvanized	Text
44.	Material of less than 5\8" size Nuts and Bolts used in other part shall be of	Nickel plated brass	Text
45.	Size of Nuts and Bolts used in other part	Mfg to give details	Text
46.	Material of Insulator base plate below fixed insulator	M.S. HDG	Text
47.	Size of Insulator base plate below fixed insulator	Mfg to give details	Text
48.	Thickness of Insulator base plate below fixed insulator	min 6 mm.	Text
49.	Material and size of stud and bolts used for fixing of Insulator on base plate	M.S. HDG Size - Mfg to give details	Text

50.	Material of Insulator base plate below rotating insulator	M.S. HDG	Text
51.	Size of Insulator base plate below rotating insulator	Mfg to give details	Text
52.	Thickness of Insulator base plate below rotating insulator	Min. 6 mm	Text
53.	Material of Bearing housing	Gravity die cast metal	Text
54.	Size of Bearing housing	Mfg to give details	Text
55.	Method of casting of Bearing housing shall be gravity die cast (Yes/No)	Method of casting of Bearing housing shall be gravity die cast	Boolean
56.	No. of bearings	min. 2 Nos	Text
57.	Location of bearings	Below rotating Insulator	Text
58.	Size of bearings	Atleast 25 mm inner dia.	Text
59.	No. of bushes	Mfg to give details	Text
60.	Joints of bushes	Mfg to give details	Text
61.	Location of bushes	Mfg to give details	Text
62.	Bushes shall be made of	Brass	Text
63.	Size of bushes	Mfg to give details	Text
64.	Size of Tandem pipe	Atleast 25 mm NB	Text
65.	Length of Tandem pipe (mm)	Atleast 2200 mm	Text
66.	Class of Tandem pipe	Class B	Text
67.	Single Tandem pipe shall be used (Yes/No)	Single Tandem pipe shall be used	Boolean
68.	Size of shackle and screw to fix the tandem pipe	Mfg to give details	Text
69.	No of clamps	Mfg to give details	Text
70.	Clamps shall be made of	M. S. Flat	Text
71.	Thickness of clamps shall be	min. 6 mm	Text
72.	Type of interlock	Mechanical interlock	Text
73.	Size of Down pipe	50 mm ID	Text
74.	Length of Down pipe in mm	Mfg to give details	Text
75.	Class of Down pipe	Class B	Text

76.	Type of joint between bearing and down pipe (swivel type)	Swivel type	Text
77.	Type of joint between down pipe and operating mechanism	universal/swivel type	Text
78.	Material of Control Cabinet shall be	Sheet Steel	Text
79.	Thickness of Control Cabinet shall be	min. 2mm	Text
80.	Degree of protection of Control Cabinet	At least IP55	Text
81.	Type of cable gland of Control Cabinet	Double compression type brass cable glands	Text
82.	Size of cable gland of Control Cabinet	Mfg to give details	Text
83.	No. of cable gland of Control Cabinet	Mfg to give details	Text
84.	Removable gland plate shall be provided for Control Cabinet : Yes/No	Removable gland plate shall be provided for Control Cabinet	Boolean
85.	Make of Insulated Wires	Mfg to give details	Text
86.	Type of Insulated Wires	2.5 sq. mm PVC insulated copper wire	Text
87.	Rating of Insulated Wires	1100 V Grade	Text
88.	Quantity of Insulated Wires	Mfg to give details	Text
89.	Type of Insulators	Post insulators	Text
90.	No. of units per insulator	one	Text
91.	Height of each insulator stack (mm)	Mfg to give details	Text
92.	No. of holes of Insulators	4 Nos. of Tapped holes	Text
93.	Pitch circle diameter of Insulator	57 mm	Text
94.	Tensile strength of Insulator in kg	Mfg to give details as per Type Test of Insulator	Text
95.	Compressive strength of Insulator in kg	Mfg to give details as per Type Test of Insulator	Text
96.	Torsion strength of Insulator in kg cm	Mfg to give details as per Type Test of Insulator	Text

97.	Cantilever strength upright of Insulators in kg	Mfg to give details as per Type Test of Insulator	Text
98.	Rated Voltage of Insulator (kV)	12 kV	Text
99.	Dry – 1 min Power frequency withstand test voltage of Insulators	35 kV rms	Text
100.	Wet – 1 min Power frequency withstand test voltage of Insulators	35 kV rms	Text
101.	Impulse withstand voltage of Insulators shall be	75 kVp	Text
102.	Power frequency puncture voltage of Insulators (kVrms)	Mfg to give details as per Type Test of Insulator	Text
103.	Visual discharge voltage level of Insulators	9 kVrms	Text
104.	Creepage distance of Insulators	min 300 mm	Text
105.	Size of steel sections used for Base structure	Mfg to give details	Text
106.	Size of steel sections used for supporting structure	Mfg to give details	Text
107.	Overall size of Base and supporting structure	Mfg to give details	Text
108.	Total weight of Base and supporting structure	Mfg to give details	Text
109.	Materials of braids	Flexible tinned copper	Text
110.	Cross section of braids	At least 50 sq. mm	Text
111.	Cross Section of fixed contact of E.B. in Sq.mm. (Not less than 50% of corresponding area of main moving blades & contacts)	Mfg to give details	Text
112.	Cross Section of moving contact of E.B. in Sq.mm. (Not less than 50% of corresponding area of main moving blades & contacts)	Mfg to give details	Text
113.	Is the the test certificate for copper submitted? (Yes/No)	Mfg to give details	Boolean
114.	Is the test certificate for steel submitted? (Yes/No)	Mfg to give details	Boolean

115.	Is the test certificate for spring submitted? (Yes/No)	Mfg to give details	Boolean
116.	Is the test certificate for Bearings submitted? (Yes/No)	Mfg to give details	Boolean
117.	Is the test certificate for Nuts & Bolts submitted? (Yes/No)	Mfg to give details	Boolean
118.	Is name of sub supplier for raw material submitted? (Yes/No)	Mfg to give details	Boolean
119.	Is list of available manufacturing facilities submitted? (Yes/No)	Mfg to give details	Boolean
120.	Is list of available testing equipment submitted? (Yes/No)	Mfg to give details	Boolean
121.	Is Quality Assurance Plan submitted? (Yes/No)	Mfg to give details	Boolean
122.	Is drawings for general outline and assembly submitted? (Yes/No)	Mfg to give details	Boolean
123.	Is drawings for operating mechanism submitted? (Yes/No)	Mfg to give details	Boolean
124.	Is drawings for structure submitted? (Yes/No)	Mfg to give details	Boolean
125.	Is drawings for Insulators submitted? (Yes/No)	Mfg to give details	Boolean
126.	Is drawings for terminal connector submitted?(Yes/No)	Mfg to give details	Boolean
127.	Is sectional views and descrptive details of moving blades submitted? (Yes/No)	Mfg to give details	Boolean
128.	Is sectional views and descrptive details of contacts submitted? (Yes/No)	Mfg to give details	Boolean
129.	Is sectional views and descrptive details of contact support submitted? (Yes/No)	Mfg to give details	Boolean
130.	Is sectional views and descrptive details of bearing submitted? (Yes/No)	Mfg to give details	Boolean
131.	Is sectional views and descrptive details of housing of bearings submitted? (Yes/No)	Mfg to give details	Boolean
132.	Is sectional views and descrptive details of base plate submitted? (Yes/No)	Mfg to give details	Boolean
133.	Is detailed drawings for name plate submitted? (Yes/No)	Mfg to give details	Boolean
134.	Is Lighting Impulse Voltage withstand test report for offered design Isolator submitted? (Yes/No)	Mfg to give details	Boolean

135.	Is Dry Power frequency Voltage Withstand test report for offered design Isolator submitted?(Yes/No)	Mfg to give details	Boolean
136.	Is Wet Power frequency Voltage Withstand test report for offered design Isolator submitted? (Yes/No)	Mfg to give details	Boolean
137.	Is Temperature Rise test report for offered design Isolator submitted? (Yes/No)	Mfg to give details	Boolean
138.	Is Short Time Withstand Current and Peak Withstand Current test report for offered design Isolator submitted? (Yes/No)	Mfg to give details	Boolean
139.	Is Mechanical Endurance test report for offered design Isolator submitted? (Yes/No)	Mfg to give details	Boolean
140.	Is reports for Visual Examination test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
141.	Is reports for Verification of Dimensions for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
142.	Is reports for Visible Discharge Test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
143.	Is reports for Impulse Voltage withstand Test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
144.	Is reports for Dry Power Frequency Voltage Withstand Test for Insulators as indicated in IS:2544 or IEC : 168 submitted?(Yes/No)	Mfg to give details	Boolean
145.	Is reports for Wet Power Frequency Voltage Withstand Test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
146.	Is reports for Temperature Cycle Test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean

147.	Is reports for Test for mechanical strength for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
148.	Is reports for Puncture Test (For Insulator type B only) for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
149.	Is reports for Porosity Test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
150.	Is reports for Galvanizing Test for Insulators as indicated in IS:2544 or IEC : 168 submitted? (Yes/No)	Mfg to give details	Boolean
151.	Is reports for Tensile Test for Terminal Connector as indicated in IS:5561 submitted? (Yes/No)	Mfg to give details	Boolean
152.	Is reports for Resistance Test for Terminal Connector as indicated in IS:5561 submitted? (Yes/No)	Mfg to give details	Boolean
153.	Is reports for Temperature Rise Test for Terminal Connector as indicated in IS:5561 submitted? (Yes/No)	Mfg to give details	Boolean
154.	Is reports for Short Time Current Test for Terminal Connector as indicated in IS:5561 submitted? (Yes/No)	Mfg to give details	Boolean
155.	Is reports for Dimensional Check for Terminal Connector as indicated in IS:5561 submitted? (Yes/No)	Mfg to give details	Boolean
156.	Is reports for Galvanising test if applicable for Terminal Connector as indicated in IS:5561 submitted? (Yes/No)	Mfg to give details	Boolean