MATERIAL SPECIFICATIONS CELL

TECHNICAL SPECIFICATION

TECHNICAL SPECIFICATION
OF
11 KV 400 AND 800 AMP ISOLATORS WITH AND WITHOUT EB
FOR
OUTDOOR SWITCHGEARS
IN
MAHARASHTRA

TECHNICAL SPECIFICATION NO.

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

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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, 400 Amps and 800 Amps, 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 Insulators

5.11.1 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.

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

5.11.3 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.

5.11.4 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.

5.11.5 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.

5.11.6 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.

5.11.7 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

5.12 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 and without E.B.) IS:9921 (Part IV)		
Sr. No.	Description of Type Test	IS Clause No.
1.	Lightning Impulse Voltage withstand Test	3.1.6
2.	Power Frequency Voltage Withstand Test a) Dry b) Wet	3.1.8
3.	Temperature Rise Test	3.2
4.	Short Time Withstand Current and Peak Withstand Current Test	3.3
5.	Mechanical Endurance Test	3.5
Post Insulators (IS: 2544)		
1.	Visual Examination	9.12
2.	Verification of Dimensions	9.7
3.	Visible Discharge Test	9.2
4.	Impulse Voltage withstand Test	9.3
5.	Dry Power Frequency Voltage Withstand Test	9.4
6.	Wet Power Frequency Voltage Withstand Test	9.5
7.	Temperature Cycle Test	9.8
8.	Test for mechanical strength	9.6
9.	Puncture Test (For Insulator type B only)	9.9
10.	Porosity Test	9.10

11.	Galvanizing Test	9.11
Terminal connectors (IS:5561)		
	All type tests as per IS:5561	
1	Tensile Test	10
2	Resistance Test	11
3	Temperature Rise Test	12
4	Short Time Current Test	13
5	Dimensional Check	14
6	Galvanising test where applicable	15

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 DOCUMENTATION

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 400 And 800 Amp Isolators 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:9921	-do-
3	IEC:129	-do-
4	IS:2544	Insulators
5	IS 2147	Degree of protection provided by enclosures
6	IS:4691	-do-
7	IS:4722	Rotating Electrical Machines
8	IS:2629	Recommended practice for hot dip galvanising of iron and steel
9	IS:4759	Hop dip galvanization coating on Structural Steel.
10	IS:2633	Method of testing weight thickness and uniformity of coating on fasteners
11	IS:1573	Electro plated coating of zinc on Iron & Steel.
12	IS:3033	Spring Washers
13	IS:2016	Plain washers
14	IE Rules 1956	Indian Electricity Rules
15	IEC:168	Tests on Indoor and Outdoor post Insulator
16	IS:3961	Recommended current rating for PVC Insulated and PVC Sheeted heavy Duty Cables.
17	IS: 5561	Power Connectors
18	IS:1554	PVC Cables
19	IS:5578	Guide for marking of Insulated conductors and arrangement for switchgear bus bar main connectors & Auxiliary wirings.
20	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 9921 (Part 1-4)
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 for feeder 400 Amp for Incomer 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 AND TECHNICAL PARTICULARS

ITEM NAME	11KV 400 AND 800 AMP ISOLATORS	
SR. NO.	**PARTICULARS**	**GTP VALUES**
(1)	NAME OF MANUFACTURER	TEXT
(2)	MANUFACTURER'S TYPE	TEXT
(3)	THE EQUIPMENT SHALL BE CONFORMED TO IS:9921	BOOLEAN
(4)	OFFERED ISOLATOR SHALL BE SUITABLE FOR SYSTEM FREQUENCY 50 HZ ±3%	BOOLEAN
(5)	RATED VOLTAGE OF ISOLATOR SHALL BE 12 KV	BOOLEAN
(6)	MAX. CURRENT THAT CAN BE SAFELY INTERRUPTED BY THE ISOLATOR IN AMPS	TEXT
(7)	NOMINAL CONTINUOUS CURRENT RATING	TEXT
(8)	RATED SHORT TIME CURRENT FOR 3 SECONDS	BOOLEAN
(9)	RATED PEAK SHORT TIME CURRENT IS 12.5 KARMS FOR 3 SEC	BOOLEAN
(10)	CURRENT DENSITY AT MINIMUM CROSS SECTION AT ANY PLACE IN CURRENT PATH SHALL NOT MORE THAN 1.6 A/SQ MM	BOOLEAN
(11)	CLEARANCE BETWEEN ADJACENT POLES SHALL BE 850 MM	BOOLEAN
(12)	CLEARANCE BETWEEN LIVE PHASE TO EARTH SHALL BE 370 MM	BOOLEAN
(13)	PHASE TO PHASE CENTRE DISTANCE SHALL BE 1000 MM	BOOLEAN
(14)	ONE MIN POWER FREQUENCY VOLTAGE(WET) SHALL BE 28 KVRMS	BOOLEAN
(15)	IMPULSE WITHSTAND VOLTAGE OF INSULATORS SHALL BE 75 KVP	BOOLEAN
(16)	MANUAL OPERATING MECHANISM SHALL BE PROVIDED	BOOLEAN
(17)	MECHANICAL INTERLOCK BETWEEN MAIN SWITCH	BOOLEAN

	AND EARTH SWITCH SHALL BE PROVIDED	
(18)	TYPE OF CONNECTION BETWEEN EARTH BLADE (ROTARY CONTACT) AND EARTHING SHALL BE FLEXIBLE COPPER CONTACT	BOOLEAN
(19)	OPERATING MECHANISM SHALL BE MANUAL	BOOLEAN
(20)	DESIGN AND CONSTRUCTION a) NO. OF INSULATOR PER POLE b) NO. OF BREAKS PER POLE	TEXT
(21)	FIXED CONTACTS a) MATERIAL AND GRADE b) CROSS SECTIONAL AREA c) NO. OF OPERATIONS THE ISOLATOR CAN MAKE WITHOUT DETERIORATION OF CONTACTS	
(22)	MOVING CONTACTS/ BLADES a) MATERIAL AND GRADE b) CROSS SECTIONAL AREA	BOOLEAN
(23)	MATERIAL AND SIZE OF CONTACT SUPPORT	BOOLEAN
(24)	MATERIAL AND CLASS OF TANDEM PIPE	TEXT
(25)	MATERIAL AND CLASS OF DOWN PIPE	TEXT
(26)	CREEPAGE DISTANCE OF PORCELAIN INSULATOR SHALL BE MIN 300 MM	BOOLEAN
(27)	IS LIGHTING IMPULSE VOLTAGE WITHSTAND TEST REPORT FOR OFFERED DESIGN ISOLATOR SUBMITTED?	BOOLEAN
(28)	IS DRY POWER FREQUENCY VOLTAGE WITHSTAND TEST REPORT FOR OFFERED DESIGN ISOLATOR SUBMITTED?	BOOLEAN
(29)	IS WET POWER FREQUENCY VOLTAGE WITHSTAND TEST REPORT FOR OFFERED DESIGN ISOLATOR SUBMITTED?	BOOLEAN
(30)	IS TEMPERATURE RISE TEST REPORT FOR OFFERED DESIGN ISOLATOR SUBMITTED?	BOOLEAN

(31)	IS SHORT TIME WITHSTAND CURRENT AND PEAK WITHSTAND CURRENT TEST REPORT FOR OFFERED DESIGN ISOLATOR SUBMITTED?	BOOLEAN
(32)	IS MECHANICAL ENDURANCE TEST REPORT FOR OFFERED DESIGN ISOLATOR SUBMITTED?	BOOLEAN
(33)	CROSS SECTION OF FIXED CONTACT OF E.B. IN SQ.MM.	TEXT
(34)	CROSS SECTION OF MOVING CONTACT OF E.B. IN SQ.MM.	TEXT