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TECHNICAL SPECIFICATIONS

OF

30 VOLT, DC DISTRIBUTION PANEL FOR 33/11 kV SUB STATION

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Specification No.**CE/P&P/SPEC/2022/30V DC Distribution Panel/014**	Date of Issue: **12/08/2022**	Rev 0

This Tender Specification for procurement of 30 VOLT, DC Distribution Panel for 33/11kV Sub Station may be subjected to the modification by the purchaser as per actual field requirement. Supplier to submit the Guaranteed Technical Particulars (GTP) and Drawings, after the award of the Contract, for approval of the Purchaser.

CLIMATIC AND ISOCERAUNIC CONDITIONS (CIC)

1.	The climatic and Isoceraunic conditions at the site of work are approximately given as under:	
	Description	Kashmir
i)	Max. temp of air in shade	30.6^0C
ii)	Min. temp of air in shade	-20^0C
iii)	Max. temp of air in sun	45^0C
iv)	Height above sea level (App.)	1600 Mtrs.
v)	Max. relative humidity	90%
vi)	Min. relative humidity	15%
vii)	Average no. of thunder storm days per year	54
viii)	Average rainfall	80 cm
ix)	Wind Zone	WZ – 3
x)	Average number of rainy days per year	106
xi)	Seismic Zone	SZ – 5
xii)	Area of installation	Heavy Snow Zone

2. **Communication and Transport:**

The nearest railway station is Jammu on the broad gauge line and is connected to the Divisional Stores by a metal road. The equipment is required to pass en-route through various tunnels on NH-44 (Nandni, Nashri and Jawahar Tunnel). The weights and maximum dimension of the packages suitable for transportation through tunnel route are as follows:-

1. Length = 7.0 m
2. Width = 3.0 m
3. Height = 4.55 m
4. Weight = 40 metric Ton

The supplier shall get the permissible weight and dimensions confirmed from the Highway Authorities before proceeding with the manufacture of the equipment. It willbe the responsibility of the supplier to ensure timely and proper delivery of the equipment on door delivery basis, at Srinagar, through road transport. The supplier shall also ensure that the weights and dimension of the packages which are suitable to be carried by road transport up to Srinagar.

3.	**Additional conditions**	
i	Permitted Noise Level	45 dB
ii	Induced Electromagnetic disturbance	1.6 kV
iii	Pollution class/ creepage distance	III/ 25mm/kV
iv	Isoceraunic Level (days/year)	50
v	Condensation	Occasional

TECHNICAL SPECIFICATIONS OF 30V DC DISTRIBUTION PANEL

1. SCOPE:

i) This specification covers supply, design, manufacture, assembly, testing at manufacturer's works, packing and delivery of Indoor type D.C. Distribution Board for protection system of the 33 kV/11 kV substation. The system shall be 30 V, DC.

ii) 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, design and workmanship and shall be capable of performing in continuous commercial operation up to the Bidder's guarantee in a manner acceptable to the Purchaser, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment, is not in accordance therewith.

iii) The equipment offered shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of Bidder's supply irrespective of whether those are specifically brought out in this specification or not.

2. SERVICE CONDITIONS:

Equipment to be supplied against this specification shall be suitable for satisfactory continuous operation under the tropical conditions mentioned above in climatic and isoceraunic conditions.

3. General Nature of Climate:

Moderately hot summers and cold winters with moderate to heavy snowfall and freezing temperatures. The climatic conditions are prone to wide variations in ambient conditions and hence the equipment shall be of suitable design to work satisfactorily under these conditions.

4. STANDARDS:

Components mounted on the DCDB shall confirm to the latest revisions of the following standards:

A	IS: 13947	Degree of protection provided for enclosure for low voltage control gear and switch gear & MCCB
B	IS: 5	Painting
C	IS: 13947/1993 Part-III amended up to date.	Switch Fuse Disconnector unit
D	IS: 2705 amended up to date	CTs
E	IS: 8828/1996 amended up to date.	MCB
F	IS:1248	Indicating instruments
G	IS:375	Wiring
H	IS:13703/1993 Part-I & II	HRC Fuses

5. GENERAL TECHNICAL PARTICULARS:

The D.C Distribution Board shall be supplied as per the following specification.

5.1 Rated Voltage:

Rated voltage for the Distribution Board and its constituent items like Switch Fuse Disconnector unit, MCBs, busbars etc. shall be single phase 2 wire 30 Volt D.C. The supply voltage may vary by ± 10% of rated voltage. All the equipment used in the Board shall operate satisfactorily at this voltage variation.

5.2 General Requirements:

5.2.1. The Distribution Board shall be wall/floor mounted having compact design. The Board shall be closed, dust protected, weather proof and shall be made vermin proof with a special type lining e.g. Neoprene gasket, around the edges of the doors. The distribution board shall comply degree of protection IP 43. MCBs shall be operating vertically upward for ON/OFF operation. The entire distribution board shall have uniform finish and shall be sturdy. The distribution board shall be of modular construction with provision for complete compartmentalization of all feeders. It shall be free-standing, dead front type comprising dust-tight and vermin proof sheet steel cabinets suitable for indoor installation. The doors of cabinets shall be lockable. Handle shall be made of reputed make. The DB shall be provided with double door in front having 2 no. hinges which should be suitable for movement of 120 degree and 2 no. knobs to be provided on the door corners. All instruments and control devices shall be mounted on the front of cabinets and fully wired to the terminal blocks. All switches provided on the distribution board shall be on front side of the cabinets, operable from outside.

5.2.2. The Distribution Board shall be made out of at least 2.0 mm thick cold rolled steel sheet, suitably reinforced to provide flat level surface. Size 1275 mm (H) x 800 mm (W) x 250 mm (D). Gland plate shall be 3.0 mm thick. No welds, rivets, hinges or bolts shall be visible from outside. The doors shall be fitted with double leaf neoprene rubber gaskets.

5.2.3. All cables shall enter and leave from bottom. Suitable cable terminal blocks with cable lugs shall be provided inside each cabinet for the incoming and outgoing cables. The terminals shall be serially numbered to facilitate installation and maintenance. Main busbars shall be accommodated in busbar chambers and cable alleys arranged by their side. Compression type cable glands shall be provided to hold the cables to avoid any pressure or tension on the terminal block connections. The terminal blocks shall be easily accessible for inspection and checking. Panels shall have cable supports and metallic clips for supporting power and control cables for internal wiring of the panels.

5.2.4. The DC Distribution Board shall have double bus arrangement with change over switch. The Distribution Board shall have provision for one set of +ve and –ve terminals connected to Charger-1 and another set of +ve and – ve terminals connected to Charger-2. Each busbar shall consist of tinned electrolytic copper of cross-sectional area of a minimum of 25 mm x 3 mm, suitable for carrying their rated continuous current without their temperature exceeding 85 deg C. The busbars shall be continuous throughout the cross section section. The busbars shall have current rating to suit the requirements corresponding to the loads incident thereon under the various operating conditions and shall withstand the applicable voltage and maximum short circuit stress. The busbars shall be insulated from supporting structure by means of durable non-hygroscopic, non-combustible and non-tracking polyester fibre glass material or porcelain. Busbars shall be encased in heat- shrunk sleeves of insulating material which shall be suitable for the operating temperature of busbars during normal service. The busbar joints shall be provided with removable thermosetting plastic shrouds.

The busbars shall be housed in totally enclosed busbar chambers. The incoming connections from the busbar to the various feeders shall be so designed as not to disturb cable connections and to ensure safety to the operating and maintenance personnel and to facilitate

working outside any outgoing module without the need for switching off in-feed to the adjacent modules, as far as possible. The busbars shall be of high conductivity, adequate uniform cross section and current density shall not be more than 1.6 Amp/sq.mm.
A cable alley preferably 230 mm wide shall be provided in each vertical section for taking cables into the compartments.

5.2.5. All doors shall be provided with mechanical interlocking arrangements along with keys. The distribution board shall have no door on rear side.

5.2.6. Danger plate (Caution Plate) shall be fitted suitably on inner door of the DB. Danger plate shall be of 100 mm x100 mm size with details as per KPDCL standard format.

5.2.7. The DC boards shall be provided with the following equipments wherever applicable:

a) Double bus arrangement with change- over switch with provision for one set of +ve and –ve terminals connected to Charger-1 and another set of +ve and –ve terminals connected to Charger-2. Each busbar shall consist of tinned electrolytic copper of cross-sectional area of a minimum of 25 mm x 3 mm.

b) Terminal arrangement with necessary equipment for connecting the incoming supply.

c) Voltage and current measurement in the incomer feeder.

d) Outgoing modules with switch / MCB units of adequate capacity for the outgoing feeders and 20% spare feeder units of each rating.

e) Necessary cable glands and terminal blocks.

f) Adequate number of spare terminals on terminal blocks for receiving connections for external circuits.

g) The number of outgoing feeders from DC boards shall be such that each substation equipment is fed by separate feeder with 20% as spare.

5.2.8. The ventilating louvers should be covered from inside by a perforated sheet.

5.2.9 All sheet metal used for DB shall undergo seven tank mechanical/ chemical cleaning process & painting shall be done using powder coating process. Colour of the Paint shall be admiral grey as per shade no. 632 of IS 5 on exterior and from interior sides.

6. MAJOR COMPONENTS:

6.1 Incoming cables for DCDB shall be terminated on terminal connectors provided at the bottom. Connection between incomer terminals and MCBs shall be made with 50 sq. mm copper cable. Outgoing terminals shall be connected with 35 sq. mm copper cable.
For all 32 A rated MCBs, 16 sq. mm. stranded cable shall be used. For all 16A rated MCBs, 10 sq. mm. stranded cable shall be used.
All MCBs, cable used in the DB shall be of reputed make and ISI marked.

DCDB should have 2 sets of Bus Bars in Two separate compartments to facilitate termination of Incomers from two sets of Battery and Chargers. One Change over switch should be provided to facilitate DC supply to outgoing load circuit in the event of failure of

anyone of the battery/ Charger. The change over switch should be 2 way, 2 position for changing over of both incomer individually.

6.2 Incoming circuit:

Two double pole MCBs of 63 A capacity shall act as Incoming breaker of load bus. Change over switch of 6 A DP is to be provided.

Incoming cable for incomer LT XLPE, 2 C, 120 sq. mm shall be provided by KPDCL.

6.3 Outgoing Circuits:

S. No	Feeder Rating	Cable size	No. of Outgoing circuits
1.	MCB, 20 A Double Pole, 30V DC	2 core , 6 sq. mm PVC cable	24 no.

6.3.1. Total 24 Nos. outgoing circuits shall be provided as per the details given below. MCBs shall comply following specifications as per IS 8828/1996.

a) Rated current shall be 20A as mentioned above.
b) Rated short circuit capacity shall be min. 10 KA
c) Service short circuit capacity shall be 10 KA as per table 15 of IS: 8828 /1996.
d) MCBs shall have fixed un adjustable time / current characteristics.
e) Under voltage release and shunt-trip release coils are not required. Only overload release and short circuit release shall be provided.
f) Tripping time shall be as per (clause No. 8.6.1) table 6 of IS: 8828/1996. Tripping mechanism thermal magnetic type.
g) MCBs having precision moulded case and cover of flame retardant high strength thermo plastic material with high melting point, low water absorption, high dielectric strength and temperature with stand capacity shall be capable of carrying out given no. of operation cycles as per clause No. 9.11 of IS: 8828 /1996.
h) Limits of temperature rise shall be as per (clause No. 9.8) table 5 of IS: 8828/1996.
i) Standard range of instantaneous tripping shall be type 'B' as per (clause No.5.3.5) table of IS: 8828 /1996.

6.3.2. MCBs shall be of suitable type and should be type tested and of approved make. All MCB outgoing terminals shall be terminated on terminal connector of 10 mm. Stud type provided at the bottom.

6.3.3. The enclosure shall be provided with proper earthing arrangement. Earthing arrangement shall consist of 2 G.I. Bolts of 12 mm x 50mm (min.) with 2 spring/ plain washers and 2 check nuts.

6.3.4. PVC cable glands of adequate size shall be provided for all incoming and out going cables.

6.3.5. The moving contacts of all poles of multi-pole circuit breaker shall be mechanically coupled in such a way that all poles, except the switched neutral, if any, make and break substantially together. Whether operated manually or automatically even an overload occurs on one protected pole only.

Both side terminal should be suitable for direct cabling as well as bus bar connection and should take wire up to cross section area of 25 sq.mm.

Detailed specification is tabulated below:-

Standard	IS:8828:96 & IEC:60898:2002
Type/Series	B&C
Rated Current(DC)	20A for SPN, 36A for DP
Rated Voltage(DC) Volt	30
Rated short circuit breaking capacity kA	10
Protection class	IP-20

6.3.6. DCDB shall also be provided with following relays, bell and buzzer

i. One Mains failure Alarm relay.
ii. One Earth Fault alarm relay
iii. One 30 Volt DC Bell to be operated by the Mains failure alarm relay.
iv. One 30 volt DC Buzzer to be operated by the earth fault alarm relay.

6.3.7. AC/DC Change Over Contacts:

Emergency lighting circuit shall be provided by the supplier so that the lights should normally glow on AC 240 Volts, 50 Hz but in case of failure of AC supply, these come up on DC supply with the help of automatic change over contactors and again change over to AC supply with the restoration of AC supply. There shall be two number double pole ON/OFF switches with HRC fuses one each for AC and DC supply.

6.4 Indicating Instruments:

Principal requirements of indicating instruments are as follows:

6.4.1 D.C Ammeter:

Ammeter shall comply the following requirements

Class of accuracy	1.0
Range	0-100 A
Mounting	Flush type
Size	96 mm x 96 mm
Type	Digital

6.4.2 D.C Volt Meter:

Voltmeter shall comply the following requirements

Class of accuracy	1.0
Mounting	Flush type
Size	96 mm x 96 mm
Range	0-150 volts
Type	Digital

6.4.3. Indicating Lamps:

Indicating lamps shall be panel mounting type 23 mm with rear terminal connections having low wattage LEDs cluster type. Lamps shall have translucent lamp covers to diffuse lights, coloured red for 'DC ON' condition. The lamp cover shall be preferably of screw-on type, unbreakable and moulded from heat resisting fast coloured material. Conventional bulbs are not acceptable. The intensity of light should be minimum 100 milli cd at 20 mA. Indication lamp should be suitable to operate on 30 V DC.

Necessary wiring shall be provided accordingly.

7. MARKING:

Each compartment shall be provided with legible and indelibly marked/ engraved name plate. Name plates shall be white with black engraved letters. On top of each module, name plates with giving its function clearly. Switches shall also have clear inscriptions for each position indication e.g. 'bold letters shall be provided for feeder designation. Each device shall also suitably marked for identification inside the panels. Name plates with full and clear inscriptions shall be provided inside the panels for all isolating switches, links, fuse blocks, test blocks and cable terminals. Every switch shall be provided with a name plate, ON' 'OFF' mark etc.

8. Earthing Arrangements:

Two nos. earthing studs of galvanized M.S. 25 X 6 mm shall be provided for external earth connections at the bottom. These should be complete with plain washer, spring washer, nuts etc. Earthing bolts must be welded to prevent removal of the same from the cabinet.

Flexible stranded copper connector (braided conductor) should be connected of copper equivalent 10 sq.mm. size between door and box enclosure. This flexible braided cable should be terminated using gland and proper size nut/bolts at both ends.

9. Mounting Clamps:

The DCDB box is to be manufactured with suitable mounting arrangement on wall/steel support by means of 4 no. of 25X6 mm size clamps having hole dia. 14 mm, fixed over the body as per drawing.

10. Gland Plate:

The removable gland plate should be provided in the lower portion of the box to accommodate all brass glands (according to requirement) for incoming and outgoing cables.

11. Name Plate:

Aluminium sheet 2 mm engraved with details should be provided duly refitted over front door.

a) DC Distribution Box
b) P.O No.
c)'Property of KPDCL'

12. Control Wiring:

Each DCDB shall be furnished completely factory wired up to terminal blocks ready for external connections.

All wires shall consist of 1100V grade PVC insulated flexible stranded copper wires with a cross-section of 2.5 sq.mm suitable for switchboard wiring and complying with the requirement of relevant IS. Each wire shall bear an identifying ferrule or tag at each end or connecting point.

Control cables for external connections shall consist of stranded copper wire with 1.5, 2.5, 4.0 sq. mm or higher cross-sectional areas and shall enter the bottom.

All interconnecting/outgoing control wiring shall terminate on stud type terminals on terminal blocks. The terminals shall be marked with identification numbers to facilitate connections.

13. Type Tests:

MCBs & other components used in DCDB shall be fully type tested as per relevant standards. The bidder shall furnish detailed type test reports along with the bid. The detailed Type Test Reports shall be furnished with relevant certified drawings of the equipment tested and oscillogram reports. The purchaser reserves the right to demand repetition of some or all the type tests at the cost of bidder by an independent agency, whenever there is dispute regarding the quality of supply.

All the Type Tests shall be carried out from laboratories which are accredited by the National Board of Testing and Calibration Laboratories (NABL) of Government of India such as CPRI, ERDA to prove that the MCBs & other components used in ACDB meet requirements of the specification. The bidder should also furnish certificate from laboratories that these laboratories are having all the requisite test facilities available in house. The type tests conducted in manufacturers own laboratory and certified by testing institute shall not be acceptable.

14. . **DRAWINGS:**

Successful bidder shall submit the detailed drawings of DCDB along with component details/makes etc. for necessary approval.

15. INSPECTION:

All tests and inspection shall be made at the place of manufacturer. The manufacturer shall provide reasonable testing and inspection facilities and co- operation without any charge to purchaser and satisfy him that the material is being supplied in accordance with the standard specifications. The proto type of DCDB shall be inspected & checked by third party inspection agency in presence of Ordering Authority or his representative for approval before the commencement of supply.

16. SCHEDULES:

The bidder shall fill in the "Schedule A", which form part of the tender specification and order. If the schedules are not submitted duly filled in with the offer, the offer shall be liable for rejection.

17. Deviations:

Deviation from this specification, if any, shall be clearly brought out in the offer. Unless purchaser explicitly accepts such deviations, it shall be presumed that the offer fully complies with the specification.

18. WARRANTY CLAUSE

The warranty shall remain valid for a period of eighteen (18) months from the date of delivery or twelve (12) months from the date of commissioning of Goods at Purchaser's destination.

The Supplier warrants that all the Goods supplied under the Contract shall comply strictly with the Contract, shall be first class in every particular and shall be free from defects. The Supplier further warrants that all equipment, materials and supplies furnished by the Supplier for the

purpose of the Goods are new, production of the most suitable grade and fit for their intended purposes.

19. CHALLENGE CLAUSE:

The Purchaser reserves the right to have the material, received after inspection by the authorized inspecting officer, again tested for any parameter(s) from approved/NABL accredited testing house/in house technique of the purchaser. The results if found deviating/unacceptable or in non-compliance with the approved GTP'S, the lot shall be rejected and bidder shall arrange to replace the rejected lot within thirty (30) days of such detection at his cost including to & fro transportation.

SCHEDULE A

GUARANTEED TECHNICAL PARTICULARS FOR 30V DC DISTRIBUTION PANEL		
S.No.	Description	Guaranteed Technical Values
1	PANEL NAME	INDOOR WALL/FLOOR MOUNTED _ •
2	PANEL DIMENSION	
A	Height (Mm)	1275 (With Base)
B	Width (Mm)	800
C	Depth (Mm)	250
3	SHEET USED FOR FABRICATION	2.0 MM THICKNESS MS SHEET & 3 MM FOR GLAND PLATE
4	PROTECTION GRADE	IP-43
5	PAINT SHADE	
A	Interior	Admiral Grey (Shade No.632) Of IS:5
B	Exterior	Admiral Grey (Shade No.632) Of IS:5
6	PAINT THICNESS	AS PER IS: 5 NOTE DCDB SHALL UNDERGO SEVEN TANK MEMECHANICAL / CHEMICAL CLEANING PROCESS & PAINTING SHALL BE DONE USING POWDER COATING PROCESS WITH PAINT THICKNESS NOT LESS THAN 70 MICRONS MICRONS.
7	INCOMER	
A	MCB	63 A, DP, 30 V DC-2 No.
B	Make	
8	OUTGOINGS	
A	MCB 20A DP	24 No.
B	Make	
9	DC AMMETER WITH SHUNT	
A	Accuracy Class	1
B	Range	Range Of 0-100 A
C	MOUNTING	Flush type
D	Size	96x96 mm,90 degree Scale
E	Type	Digital
F	Make	
10	DC VOLTMETER	
A	Accuracy Class	1
B	Range	0-150 V
C	Mounting	Flush Type
D	Size	96x96 mm,90 degree Scale
E	Type	Digital
F	Make	
11	INDICATION LAMP (LED TYPE)	PANEL MOUNTING TYPE 22.5 MM REAR TERMINAL CONNECTIONS
12	WIRE USED FOR INTERNAL WIRING	COPPER FLEXIBLE, PVC INSULATED 1100VOLTS OF SUITABLE SIZE FROM OUTGOING TO TERMINAL
A	20 A	6 Sq.mm
13	CABLE GLAND	AS PER REQUIRMENT

14	TERMINAL CONNECTOR	AS PER REQUIRMENT WITH 20% SPARE
15	GASKET	NEOPRANE
16	MAKE OF SWITCHGEAR	