Technical SPECIFICATIONS Document FOR DSITC OF 11KV, 3 PHASE, 630A, 4 PANEL HT SWITCHGEAR FOR Doordarshan Geo Diversity Disaster Recovery Centre (GDDRC) at Chintalakunta, LB Nagar, Hyderabad

SUMMARY OF CONTENTS:

SECTION I

DESIGN FEATURES THE EQUIPMENT

1.1. SCOPE:

This section covers Design, manufacture, supply, installation, testing, commissioning of Indoor HT switchgear and it should be in accordance with the latest standard of CPRI.

1.2. GENERAL:

1.2.1. Design, Supply, Installation, Testing and Commissioning (DSITC) of 11 kV, 3 phase, 50 Hz, 4-panel, metal-clad, floor-mounted Indoor HT switchgear, suitable for a rated voltage of 11 kV, designed to operate satisfactorily within a voltage range of 9.0 kV to 12.0 kV and at a frequency of 50 Hz ±4%.

The switchgear shall be provided with a 630A rated **copper bus-bar** and shall be suitable for a Contract Demand of 320 kVA. The complete HT switch gear shall be designed, supplied, erected, tested and commissioned complete in all respects

1.2.2. The technical specifications provided herein are indicative of the requirements of Doordarshan (DD) and are intended to enable the tenderers to offer their standard and latest proven design, in regular manufacture by the OEM, and shall meet or exceed the technical requirements specified herein.

1.3. CONSTRUCTION FEATURES:

1.3.1. The panels shall be of modular, metal-clad construction, extendable on either side, to cater for future system expansion.

1.3.2. The Switchgear shall consist of panels fabricated from minimum 3.0 mm thick M.S. sheet, and shall be totally enclosed, dust & vermin proof suitable for Indoor installations.

1.3.3. The panels shall be self-supporting and rigid in construction, without the use of any external bracing. The HT switchgear shall comply with relevant IS / IEC standards, as amended up to date, and shall be designed for safe operation, ease of maintenance, and future extension.

1.3.4. Separate and adequately segregated compartments shall be provided for bus bars, metering, circuit breakers, cables and cable termination chambers, with proper access for maintenance. Suitable mechanical and electrical interlocks shall be provided as per drawings **(Drawing No. HTSG 630 – 02/2026).** All instruments shall be of non-draw-out type, with mechanical indicators to show breaker connected and disconnected positions. The switchgear shall be complete with all internal wiring, control wiring, fuses, auxiliary contacts, terminal blocks and accessories necessary for proper functioning.

1.3.5. When the circuit breaker is in the drawn-out position, no live parts inside the HT switchgear shall be accessible. Safety shutters shall be of robust construction and shall automatically cover the live contacts both in the fully inserted and fully withdrawn positions of the Vacuum Circuit Breaker.

1.3.6. Each cubicle shall provide three distinct positions for the Vacuum Circuit Breaker, namely: Service (Connected) position, Test (Isolated) position, Withdrawn position

1.4. BUS BARS AND CONNECTORS:

1.4.1. The bus bars shall be of single air-insulated type, made of high conductivity electrolytic copper (HDBC) with rectangular cross-section.

1.4.2. The bus bar cross-section shall be of adequate capacity to carry the rated current of 630A continuously without excessive temperature rise and shall be suitably rated to withstand the thermal and dynamic stresses arising due to short-circuit conditions in the system, up to the full MVA fault level (refer for detail specifications in Section-II)

1.4.3. The bus bars shall be firmly and rigidly supported on suitable, non-hygroscopic, high-strength insulating supports, capable of withstanding short-circuit forces and operational vibrations.

1.4.4. Adequate phase-to-phase and phase-to-earth clearances shall be provided to ensure safety, in accordance with CEA (Measures relating to Safety and Electric Supply) Regulations, 2010, as amended from time to time.

1.4.5. Sharp edges and abrupt bends in the bus bars or their connections shall be avoided as far as practicable. Where such bends or edges are unavoidable, suitable insulating compound, heat-shrink sleeves, or other approved insulation methods shall be applied to prevent local ionization and flashover.

1.4.6. The bus bar height, spacing and overall arrangement shall strictly conform to the latest applicable IS / IEC standards.

1.5. VACUUM CIRCUIT BREAKER:

1.5.1. The vacuum circuit breakers shall be draw-out type suitable for installation in the switchgear cubicles. The breakers shall comply with relevant IS/IEC with and latest amendment thereof. Construction of breaker shall be such that any point, which required frequent maintenance or inspection are easily accessible.

1.5.2. The circuit breakers shall be spring loaded, manually operated, for 3 pole simultaneous operation. The speed of closing operation shall be independent of the speed of hand operating Lever. The indication device shall show the OPEN and CLOSE position of breaker visible from the front of cubical.

1.5.3. Comprehensive interlocking system to prevent any dangerous or inadvertent operation shall be provided as per latest standard. Isolation of circuit breaker from bus bar or insertion into bus bar shall only be possible when the breaker is in the open position.

1.5.4. Vacuum Circuit Breaker shall have completely sealed interrupting units for interruption of arc inside the vacuum. The vacuum bottle sealed for life shall be provided with contact wear indicator.

1.5.5. Vacuum loss indicator lamp wired for alarm shall be provided for all breaker panels.

1.5.6. Vacuum Circuit Breaker should have an expected life of 30,000 mechanical operations and 10,000 electrical operations at rated normal current.

1.5.7. All the high voltage compartments must have pressure discharge flap for the exit of gas due to internal arc to insure operator safety.

1.5.8. The design of circuit breaker shall be proven through all the routine and type tested in accordance with IS 13118: 1991/IEC 56 with latest amendment.

1.6. CURRENT TRANSFORMERS:

1.6.1. CTs shall be double or resin cast core and dual ratio.

1.6.2. The requirement of ratio, VA capacity, class of accuracy, limit factor, resin cast with specification are tabulated in Sec II. Short time rating of CTs shall be 20 KA for 3 second.

1.6.3. CTs shall confirm to ISS/2705 with latest amendment, and will be subjected to all routine and type test specified in the ISS.

CT shall be of reputed manufacturer like L&T/ABB / Siemens / Schneider make only.

1.7. POTENTIAL TRANSFORMER:

1.7.1. Potential transformers (PT) 11000/110Volts, 3 phases, oil filled complete (drawer type) shall be provided as per latest standard.

1.7.2. The requirement of VA capacity, class of accuracy, limit factor etc. for resin cast. Specification of PT to be installed are tabulated of in Section II.

1.7.3. PT shall confirm to IS-3156 with latest amendment.

1.7.4. PT should be of reputed manufacturer like L&T/ABB / Siemens / Schneider make Only.

1.8. PROTECTION DEVICES/RELAYS:

1.8.1. All the VCBs shall be provided with IDMT type protective relays of reputed manufacturer like L&T/ABB / Siemens / Schneider make only designed to disconnect fault, circuits with speed and discrimination.

1.8.2. The protective relays mounted on the panels shall be of the draw-out type. The relays must be capable of resetting without necessity of opening the case. The relays shall be provided with flag indicators. Each functional element of a relay shall be provided with its own flag indicator to enable the type of fault condition to be identified.

1.8.3. The IDMT type relays should have Inverse Definite Minimum Time lag (IDMTL) characteristic. The over current releases shall be of indirect release Type, energized through current transformers of suitable ratio. They shall have provision for adjusting the setting from 50% to 200% of normal working current.

1.8.4. Earth fault Release**,** energized through current transformer for tripping the circuit breaker on earth faults. The release shall be adjustable from 10% to 40% of the normal working current.

1.8.5. VCBs are to be electrically & mechanically interlocked.

1.9. INDICATING AND INTERGRATING INSTRUMENTS CONTROL SWITCHES:

1.9.1. HT Switchgear shall be provided with the following metering facilities as indicated in the enclosed drawing. Each of the incoming H.T. Circuit Breaker panels shall be provided with three phase indications. HT Bus bar shall be provided with DIGITAL MULTIFUNCTION METER.

1.9.2. A metering panel of Trivector DIGITAL MULTIFUNCTION METER having a KWH meter, KVAH meter, PF, maximum demand meter for both KWH and KVAH demand for each incoming HT line.

1.9.3. Accuracy for these meters should be 0.5 class or better. Current transformers are to be provided to meet the required accuracy.

1.9.4. Metering panels are to be got calibrated from concerned State Electricity board, where HT panel is to be installed.

1.9.5. 3 Nos. of coloured indicating (LED Type) lamps shall be provided on front side of the Panel through suitable potential transformer and fuses to indicate the live phases.

1.10. CABLE GLANDS AND CLAMPING ARRANGMENT FOR HOLDING SUITABLE CABLE BOXES:

1.10.1. Cable glands and armour clamps shall be provided on both incoming and outgoing panels of the switchgear.

1.10.2. Suitable cable boxes as per requirement of cable shall be supplied by the Tenderers.

1.10.3. The panel shall have a flat of size 50 mm x 6 mm with suitable clamp made of 50mm x 6mm flat along with nuts, bolts and washers for holding the cable boxes. The flat should be fitted at a suitable height with allotted arrangement for adjustment of height from 300mm to 500 mm at site.

1.10.4. The clamp and flat shall have suitable stud type arrangement for earthing cable and cable box.

1.10.5. All control cable/wire entries shall be by means of suitable cable glands, such glands shall be of brass and tinned.

1.11. CONTROL /AUXILIARY WIRING:

All the control / Auxiliary wiring in the panel shall have high quality PVC insulation and the same shall have conductor size of not less than 2.5 sq. mm of copper. Colours of the control / auxiliary wiring should confirm to ISS 375/1963 and latest amendment thereof. All wiring shall be neatly run through group of clamp conduits. Wiring between fixed and moving portion of the panel shall be run in flexible tubes conduits and the same shall be so mounted to avoid any damage to them due to mechanical movements. Ferrules with numbers shall be provided on both end of the wiring.

1.12. AUXILIARY SUPPLY WITH TRICKLE CHARGER:

A self contained tripping battery unit with Trickle Charger for providing the D.C. source for the tripping circuit of the VCB shall be included in the supply. The Battery autonomy shall be minimum eight hours. The Battery unit may, preferably, use sealed maintenance free of reputed make like Exide, HBL, ABB, Siemens specifically meant for the purpose. The tripping battery unit shall be complete with its own trickle charger, suitable for working on 230V, single phase 50Hz supply. The unit shall be provided with necessary switches, fuses and meters to indicate the voltage and charging current of the Battery. The entire unit shall be mounted in a steel cabinet with adequate protection.

1.13. TESTS:

Following tests as per mutually accepted procedure as well as keeping in view of relevant BIS, shall be witnessed at the manufacturer's works and site by the client:

i. General Observation

a. Workmanship
b. Material
c. Provision of all accessories

d. Literature & Certificates
e. Misc.

ii. **Routine Test for PTs/CTs:**
a. Measurement of Insulation Resistance of winding.
b. Output voltage test.
c. Measurement of CT/PT Ratio.
d. Measurement of VA
e. Calibration check of O/L & E/F relays for various simulated load conditions & VCBs positions.

iii. **Functional Test:**
a. Operation of HT switchgear for all type of possible simulated condition at works.
b. Operation of O/L & E/L for various simulated conditions.
c. Operation of HT switch gear for all conditions as per Spec. at site.

iv. Type Test for PTs/CTs:
HT switchgear manufacturer must possess and produce type test certificate for similar capacity HT switch gear. If type test certificate is not available then manufacturer shall have to conduct these tests in the presence of indenter at their own expenses.
a. Lightning Impulse Test.
b. Dynamic Short Circuit Test.

1.14. EARTHING:

Two separate and distinct lug / terminals are to be provided for extending the earthing to the equipments on the chassis. Earthing shall comply with **IS 3043** and CEA regulations.

1.15. MARKING OF PARTS:

For facilitating the erection, the several parts of the plant and equipment shall be suitable marked.

1.16. NAME PLATE AND DIAGRAM PLATES:

All equipment shall have weather proof and non-corrosive metal plates fixed in suitable position with full particulars engraved, printed / written in indelible ink thereon with white letters against black background.

1.17. SPARES:

The Tenderer shall also quote separately for recommended spares for five years operation of HT Switchgear along with list. The list of recommended spares should be based upon field reports and should be sufficient enough for trouble free operation of the HT Switchgear even at remote locality.

1.18. CEA CLEARANCE:

The supplier shall have to arrange and get CEA clearance for the HT Switchgear before the same is offered for acceptance to DD after installation, testing & commissioning at Doordarshan GDDRC site.

1.19. PAINTING:

All metallic surface {except enameled and bright parts} exposed to weather shall be given suitable primer coat and two coats of first quality paints of approved color. The supplier shall also supply adequate quantities of paints, Varnish etc. for use of furnished cost and for use of patching up any scratches received during transport handling, erection testing and commissioning.

SECTION-II

TECHNICAL SPECIFICATION

2. GENERAL:

The HT Switch Gear shall generally conform to all provisions of IS-3427-1997 amended to date.

2.1. AMBIENT CONDITION:

The HT Switch Gear covered by these specification shall be required to work under the ambient conditions as follows

a) Ambient Temperature : **50° c**
b) Humidity : 95% Non-condensing
c) Altitude : 516 M

2.2. TECHNICAL PARAMETER:

2.2.1. HT switch Gear:

Sl.No	Item	DD s Requirements	Tenderer s offer
(a)	Type	Indoor	
(b)	Nos. of Panel	4	
(c)	Nominal Operating Voltage	11KV	
(d)	Rated Current	630A	
(e)	Rated Capacity	250 MVA	
(f)	Overall and detailed dimensions of the (i)complete switchboard (ii) Individual panel	To be submitted by tenderer	(i) a. Width b. Depth c. Height (ii) a. Width b. Depth c. Height
(g)	Weight of each panel	To be submitted by tenderer	a. Net b. Gross
(h)	Minimum clearance required from the walls	To be submitted by tenderer	a. Front b. Side c. Back
(i)	Minimum clearance required in front of the switchboard for drawing out of the circuit breaker	To be submitted by tenderer	a. Normal Operation b. Maintenance c. Servicing
(j)	Thickness of M.S. Sheet used for the Board.	3.0 mm	

2.2.2. Vacuum Circuit Breakers:

The VCB shall be of repute manufacturer L&T/ABB / Siemens / Schneider make Only having valid ISO certificate**.**

Sl.No	Item	DDs Requirements	Tenderers offer
(a)	Number of poles	3	
(b)	Rated Voltage	11KV	
(c)	Rated current	**630A**	
(d)	Rated Capacity	250MVA	

(e)	Rated Frequency	50Hz	
(f)	Rated Insulation Level	(a) **28KV** for 1 min. at Power frequency, (b) 75 KV lightening impulse with stand voltage	
(g)	Rated short circuit with stand, current (3 sec)	13.1KA	
(h)	Rated Breaking Current	13.1KA	
(i)	Rated making Current	33.4KA	
(j)	Number of Break Contacts per pole	To be submitted by tenderer	
(k)	Type of main contacts	Copper-Chromium (Cu-Cr)	
(l)	Type of arcing contacts and/ or arc control devices	To be submitted by tenderer	
(m)	Number of tanks	To be submitted by tenderer	
(n)	Steady Hydraulic test pressure that the tanks can withstand for one Minute without permanent deformation	To be submitted by tenderer	
(o)	Indication of Position of VCB	(i) Service (ii) Isolated (iii) Test (iv) Withdrawn	
(p)	Method of closing	Manual wound spring loaded operation	
(q)	Normal voltage of shunt trip coil (s)	24Volt DC	
(r)	Power Required at normal voltage for shunt trip coil	To be furnished by tenderer	
(s)	Weight of Circuit breaker complete with arc extinguishing medium and mechanism	To be furnished by tenderer	

2.2.3. **Current Transformer:**

Sl.No.	Item	DDs Requirements	Tenderers offer
(a)	Rated voltage	11KV	
(b)	Transformer ratio	600/1 A	
(c)	Class of Accuracy	0.5	
(d)	Short time thermal current & its duration	**20 KA** for 3 sec.	
(e)	Type	Epoxy Cast resin	
(f)	Impulse with stand voltage for primary winding	75 KV Peak **28 KV rms**	
(g)	With stand voltage of secondary winding	2KV rms	
(h)	Rated output	To be furnished by Tenderer	
(i)	Applicable Standard	IS-2705(1992) amended to date	

2.2.4. **Potential Transformer:**

Sl.No.	Item	DDs Requirements	Tenderers offer
(a)	Ratio	11000/110	
(b)	Rated voltage	11KV	
(c)	No. of phases	3	
(d)	Insulation level: (i) Primary (ii) Secondary (iii)Impulse with stand voltage	**28 kV rms/ 1min** 3 KV rms / 1min 75 KV peak	
(e)	Rated output	100VA	
(f)	Accuracy Class	0.5	
(g)	Type	Epoxy Cast resin	
(h)	Type of fuses provided	Primary- HT fuse	
(i)	Applicable standard	IS-3156(1992) amended to date	

2.2.5. **Protection Relays:** L&T/ABB / Siemens / Schneider make Only

Sl.No.	Item	DDs Requirements	Tenderers offer
a)	Type designation	IDMT	
b)	Time of operation at Max. dial setting & 10 times the tap setting current	1.3 sec.	
c)	Type of characteristic	**IDMT – Standard Inverse**	
d)	Whether draw out	Yes	
e)	Applicable Standard	IS-3231(1987) amended to date	

2.2.6. **Bus Bar:**

Sl.No.	Item	DDs Requirements	Tenderers offer
a)	Main bus bar- a) Size b) Material c) Rated short time current for 3 seconds	 50 mm x 6mm Copper 20 KA	
b)	Interconnecting bus bar- a) Size b) Material c) Rated short time current for 3 seconds	 50mm x 6 mm Copper 20 KA	
c)	Applicable Standard	IS-375 amended to date	

2.2.7. **Indicating & Integrating Instruments:**

The indicating and integrating instruments must be repute manufacturer like L&T/ABB / Siemens / Schneider make only ,having valid ISO certificate.

Sl.No.	Item	DDs Requirements	Tenderers offer
(a)	Digital Voltmeter (i) Range (ii) Class/ Accuracy	 0-15KV 0.5	

(b)	Digital Ampere meter (i) Range (ii) Class/Accuracy	0-60 A 0.5	
(c)	Digital KWH, KVAH & MDI Meters (i) Type designation (ii) Accuracy/ Class (iii) Size	 TRIVECTOR 0.5 To be furnished by tenderer	
(d)	Indicating lamp (i) Type designation (ii) Operating collage Voltage (iii) Wattage	 LED Type To be furnished by tenderer To be furnished by tenderer	
(e)	Applicable standard	IS -1248, IS-13779, IS-3231 (1987) Amended upto date.	

2.2.8. Interlocking:

Sl.No.	Item	DDs Requirements	Tenderers offer
(a)	Electrical & Mechanical interlocking of VCBs	As per standard	

2.2.9. **AUXILIARY SUPPLY WITH TRICKLECHARGER:**

Sl.No.	Item	DDs Requirements	Tenderers offer
(a)	Tripping coil voltage	24Volt DC	
(b)	Tripping coil Ampere	To be furnished by Tenderer	
(c)	Type of tripping coil	Shunt trip	
(d)	Sealed maintenance free battery& Their No. (of reputed make Exide, HBL, ABB, Siemens)	To be furnished by Tenderer	
(e)	Mechanical Dimension of unit	To be furnished by Tenderer	

SECTION –III
SCHEDULE OF REQUIREMENTS

DD requires the following equipments/ services as per technical specifications detailed under section I, & II. The present requirement is for Doordarshan Geo Diversity Disaster Recovery Centre (GDDRC) at **Chintalakunta, LB Nagar, Hyderabad**.

The tenderer shall quote prices of each item separately in price bid with necessary break up details keeping in view the following.

i. Make and model of each item, to be indicated.
ii. Indenter reserves the right to choose & decide the quantity of equipments at the time of finalization of tender.

MAIN ITEM:

S.NO.	DESCRIPTION	QTY.	Make & Model
3.1	**Supply of 11KV, 3 phase, 50 Hz, 630A bus bar 4panel, 250MVA, HT switchgear consisting of:** (a) Vacuum Circuit Breakers 630A (b) Bus Bars (c) Potential Transformers with oil fill. (d) Current Transformers (e) Digital multifunction Meters (f) Protective Relays (g) Cable Glands as required (h) Trickle Charger with Sealed maintenance free battery (of reputed make).	01 set 4 Nos 1 Set 1 Set 1 Set 1 Set 1 Set 1 Lot 1 Set	
3.2	Insurance, Transportation and unloading at site of the above switchgear.	1 job	
3.3.	(a)Installation, including Civil foundation, consumable hardware, inter connecting control cabling with cables, input & output supply cable connections with kits to and fro from HT panel and extension of earth from clients earth bus etc. (b) Testing & Commissioning, of the above HT Switchgear. (c) Complete Installation material for the above switch gear. **NB: HT Cable for input & output shall be supplied by DD.** **►The tenderer may visit the site before submitting the tender, to assess the quantum of work to avoid any delay while execution.**	1 job 1 job 1 job	
3.4.	Charges for getting CEA / State Electricity Board clearance for complete switchgear Installation.	1 job	
3.5	Special tools if any required for field maintenance and repair of VCBs (List of Tools to be enclosed).	1 set	
3.6	Book of Instructions for Installation, operations Testing, Commissioning and maintenance including finalized drawings.	4 sets	

OPTIONAL :

3.7	Spares (list to be enclosed)	1set	
3.8	Charges for comprehensive AMC for 2nd, 3rd, 4th, 5th year after guarantee period. (Detailed items covered under AMC for Repair/ Replacement/Routine test Checking/ Adjustment/ Measurement and Periodical Maintenance Schedule intended to be adopted by the Tenderer shall be enclosed with technical bid as a separate document)	1 job	

PROPOSED 11KV 3 PHASE 630A 4 PANEL HT SWITCHGEAR FOR GDDRC HYDERABAD