



DEENDAYAL PORT AUTHORITY

ISO 9001:2008 | ISO 14001 | ISPS Compliant Port



Office of Superintending Engineer (Electrical),
Ground Floor, Nirman Building, New Kandla,
Kutch, Pin Code 370210.

No.: EL/AC/2879

Date: 21/11/2024

EXPRESSION OF INTEREST [EOI]

"Supply, Installation, Testing & Commissioning of VRV/VRF HVAC System and Electrical items at Sardar Vallabhbhai Patel Auditorium, Gopalpuri with Comprehensive Maintenance of VRV/VRF HVAC System for two years after one year of guarantee period"

(This EOI is issued to elicit Expression of Interest from the parties interested in the work and does not constitute any binding commitment from the Deendayal Port Authority to proceed with the work or invite any or all the parties in the subsequent bidding process. The Open Tenders will be issued subsequently.)

Superintending Engineer (Electrical), DPA invites Expression of Interest for the work of "Supply, Installation, Testing & Commissioning of VRV/VRF HVAC System and Electrical items at Sardar Vallabhbhai Patel Auditorium, Gopalpuri with Comprehensive Maintenance of VRV/VRF HVAC System for two years after one year of guarantee period" from the reputed firms from those who have executed similar work in Government/public sectors and other leading private organizations. The Expression of Interest (EOI) documents containing details of Scope of Work and Technical Specifications are enclosed herewith.

The interested firms are requested to submit their expression of interest for the said work in BOQ format as enclosed at Annexure – I. The completed EOI (Expression of Interest) shall be submitted to the office of the undersigned on or before 28/11/2024. A soft copy of EOI is also acceptable through e-mail Id nikunj.solanki@deendayalport.gov.in & see@deendayalport.gov.in

Superintending Engineer (E)
Deendayal Port Authority

ANNEXURE – I

Sr. No.	Description	Qty.	Unit	Rate	Amount
Part A: Supply, Installation, Testing & Commissioning					
1	Supply at site 3 way, 11kV Gas Insulated RMU as per Technical Specification No. 1	1	No.		
2	Installation, testing & commissioning of 3 way, 11kV Gas Insulated RMU as per Technical Specification No. 2	1	No.		
3	Supply at site 800 kVA, 11/0.433kV, Dyn11, ONAN Indoor type Distribution Transformer as per Technical Specification No. 3	1	No.		
4	Installation, Testing & Commissioning of 800 kVA, 11/0.433 kV, Dyn11, ONAN Indoor type Distribution Transformer as per Technical Specification No. 4	1	No.		
5	Supply at site outdoor type 600 kVA Power Generator DG Set as per Technical Specification No. 5	1	No.		
6	Installation, Testing & Commissioning of outdoor type 600 kVA Power Generator DG Set as per Technical Specification No. 6	1	No.		
7	Supply at site outdoor type 500 kVA Oil Cooled Servo Voltage Stabilizer as per Technical Specification No. 7	1	No.		
8	Installation, Testing & Commissioning of outdoor type 500 kVA Oil Cooled Servo Voltage Stabilizer as per Technical Specification No. 8	1	No.		
9	Supply at site 6-way LT Power Distribution Panel as per Technical Specification No. 9	1	No.		
10	Installation, Testing & Commissioning of 6-way LT Power	1	No.		

	Distribution Panel as per Technical Specification No. 10				
11	Supply, installation, testing & Commissioning of VRV/VRF HVAC System for Auditorium as per Technical Specification No. 11	1	Complete Job		
12	Supply at site Hybrid APFC Panel as per Technical Specification No. 12	1	No.		
13	Installation, Testing & Commissioning of Hybrid APFC Panel as per Technical Specification No. 13	1	No.		
14	Supply at site 3 core, 150 Sq. mm HT armoured aluminium conductor XLPE cable of 11kV grade as per IS: 7098 (Part - II) 1988 & as per Technical Specification No. 14	25	m		
15	Laying, Testing & Commissioning of 3 core, 150 Sq. mm HT XLPE cable in existing Cable Trench as per Technical Specification No. 15	25	m		
16	Supply at site Indoor type Heat shrink end termination kit for 3 core, 150 Sq. mm 11kV XLPE aluminium cable as per Technical Specification No. 16	6	No.		
17	Fixing of Indoor type Heat shrink end termination kit for 3 core, 150 Sq. mm 11kV XLPE aluminium cable as per Technical Specification No. 17	6	No.		
18	Supply at site 4 Core, 400 Sq.mm, 1.1kV grade LT armoured aluminium conductor XLPE cable as per Technical Specification No. 18	120	m		
19	Laying of 1.1kV 4 Core 400 Sq.mm Aluminium Conductor XLPE Insulated Armoured Cable through Existing Trench of Substation as per Technical Specification No. 19	120	m		
20	Supply at site 4 Core, 150 Sq.mm, 1.1kV grade LT armoured aluminium conductor XLPE cable as per Technical Specification No. 20	20	m		

21	Laying of 4 Core, 150 Sq.mm, 1.1kV grade LT armoured aluminium conductor XLPE cable as per Technical Specification No. 21	20	m		
22	Preparation of earthing system with 80mm diameter, 3m GI electrode & chemical back fill compound as per Technical Specification No. 22	10	No.		
23	Preparation of earthing system with copper chemical electrode & back fill compound as per Technical Specification No. 23	4	No.		
24	Supply, Laying, connecting of GI Strip of 50×6 mm size between earth station to the equipment as per Technical Specification No. 24	100	m		
25	Supply, Laying, connecting of Copper Strip of 50×5 mm size between earth station to the equipment as per Technical Specification No. 25	40	m		
Total of Part A:					
Part B: Comprehensive Maintenance of VRV/VRF System					
1	Comprehensive Maintenance Charges for the VRV/VRF System for first year after completion of guarantee period of one year.	1	annum		
2	Comprehensive Maintenance Charges for the VRV/VRF System for second year	1	annum		
Total of Part B:					
Total of Part A & B:					
(In words Rupees _____ only)					
(NOTE: The rates should be inclusive of all taxes, duties, fees, cess etc. and all incidental charges; but exclusive of GST).					
Signature & Seal of Firm			Superintending Engineer (E) Deendayal Port Authority		

SCOPE OF WORK

Deendayal Port Authority (DPA) is one of the Major Port in India. The Specification is intended to cover the work of Supply, Installation, Testing & Commissioning of VRV/VRF HVAC System and associated Electrical Works at Sardar Vallabhbai Patel Auditorium, Gopalpuri. The work shall be executed to the satisfaction of the Engineer in-Charge. Supply & installation of all the required accessories for VRV/VRF HVAC System shall be in the scope of the contractor. The contractor shall arrange all types of tools, tackles, scaffoldings at his own cost for installation, testing & commissioning of the work. The contractor shall provide training to DPA staff to operate the VRV/VRF HVAC System properly as directed by Engineer-in-Charge.

TECHNICAL SPECIFICATION

Technical Specification No. 1:

The contractor shall supply at site gas insulated outdoor type RMU switchgear panel complying with the requirement stated in the following standard & specification amended up to date.

Metal Enclosed Switchgear	IEC 62271-200/ IEC20 298/IS 12729:1988
Medium Voltage Switch	IEC 265
Alternation Current Dis-connector (Load Break Isolator & Earthing switch)	IEC 60129/ IEC 62271 - 102/ IS 9921
Specification of Alternation Current Breakers	IEC 62271-100/IEC/60056/IS 13118:1991
Panel Design , SF-6 Circuit Breakers	IEC 62271-1/IEC 60694
Current Transformer	IEC 60044-1/IEC 60185/IS 2705:1992
HV switches	IEC 60265/IS 19920:1981
Filling of SF-6 in RMU	IEC 376
Pressure of SF6 gas	1.4 bars at 20 °C
Cable bushings	DIN 47636
Temperature class	-25 °C - +40 °C Indoor
Degree of Protection:	IEC 60273/IS 13947 (P-1)
Bus bars	240 mm ² Cu
Earth bar (external):	120 mm ² Cu - Bolt dimension: M10
Colour	
Front Cover	RAL 7035
Side & Cable Cover	RAL 7035

➤ **General Requirement:**

The Ring Main Unit shall be installed at the existing 11/0.433 kV Substation at SVP Auditorium, Gopalpuri. The RMU shall be extensible. Two Circuit Breaker for incoming cable and one Circuit breaker for outgoing feeder, shall be enclosed in the main tank using SF6 gas as insulating and vacuum as arc quenching medium or SF6 gas as both insulating and arc quenching medium. The main tank shall be stainless steel sheet of 2mm thickness and robotically welded with a pressure relief arrangement. Incomer as well as Outgoing feeder shall be provided with Energy Meters.

The cable entry shall be from bottom and the end terminations shall be done on front side. The RMU Panel shall have Ingress Protection of IP54.

Inner enclosure (Main tank)

The tank shall be robotically welded stainless steel sheet of 2mm thickness. The tank shall be sealed and no handling of gas should be required throughout the 25 years of service life. However, the SF6 gas pressure inside the tank shall be constantly monitored by a temperature compensating gas pressure indicator offering a simple go, no-go indication. The gas pressure indicator shall be provided with green pressure and red pressure zones. There shall be one non-return valve to fill up the gas. The manufacturer shall give guarantee for maximum leakage rate of SF6 gas will be lower than 0.1% per Year. An absorption material such as activated alumina in the tank shall be provided to absorb the moisture from the SF6 gas to regenerate the SF6 gas following arc interruption. The degree of protection of the inner enclosure shall be IP 67.

The compact RMU Unit shall be provided with a suitable pedestal made up of M.S. Angle to mount the unit. The height of the bottom of cable box shall be minimum 310 mm to provide the turning radius for the HT cable termination.

➤ **BUS BARS:**

Three nos. of continuous Bus bars made up of EC grade electrolytic copper of rating current 630A shall be provided. The Short time rating current shall be 20kA for 3 seconds for 11kV. The Bus bar connections shall Anti - oxide greased.

ELECTRICAL DATA:

- 12 kV - 28kV - 1min
- Nominal voltage: 11 kV
- Rated frequency: 50 Hz
- Rated current bus bars: 630 A
- Rated current cable switch dis-connector: 630 A
- Short time withstands current:
 - Cable switch dis-connector with interface C (400-bolt) bushing: 21 kA RMS 3 Seconds

- Vacuum circuit breaker with interface C (400-bolt) bushing: 21 kA RMS 3 Seconds
- Rated current for transformer T-off: 630 A
- Impulse withstands voltage: To earth and between phases: 95 kV
- Insulation level: - Power frequency 1 min: 28 kV.

Relay & Protection Scheme:

Numerical Relay with Control Supply 24V DC, 50Hz. Phase current input Relay shall be suitable for 1A and %A CT secondary (selectable at site). Relay shall be suitable for protection core CT connection. Metering core shall be connected to measuring instruments separately. Ground current input Relay shall be suitable for residually connected CT input. The relay shall have provision for digital inputs, speed switch inputs. The Communication System of the relay shall be equipped with RS485 for remote communication or for connection to DCS, SCADA or PLC. The relay shall be suitable for port for connection to Laptop & PC preferably of front side. Relay shall support Modbus Protocol. Relay shall be ABB REF615 / Siemens 7SR45.

➤ **Front Plate:**

The front shall include a clear mimic diagram which indicates different functions. The position indicators shall give a true reflection of the position of the main contacts and shall be clearly visible to the operator. The lever operating direction shall be clearly indicated in the mimic diagram. The manufacturer's plate shall include the switchboard's main electrical characteristics.

➤ **Danger Board:**

The danger Board plate as per relevant IS shall be riveted on the front plate of the RMU in Languages viz. Gujarati, Hindi, English.

TYPE and ROUTINE TESTS:

Type tests:

The equipment offered in the tender should have been successfully type tested at NABL Laboratories in India or ERDA or equivalent international laboratories for the tests in line with the relevant standard and technical specification and manufacture to submit the valid type test certificates.

Following Type Test must have been carried out:

- Short time current withstand test and peak current withstand test.
- Lightning Impulse voltage withstand test.
- Temperature rise test.
- Short Circuit current making and breaking tests.
- Power frequency voltage withstand test (dry).
- Mechanical operation test.
- Checking of degree of protection of main tank and outer enclosure.

- Checking of partial discharge on complete unit.

➤ **ACCEPTANCE & ROUTINE TESTS:**

All acceptance and routine tests as stipulated in the respective applicable standards amended up to date for all the equipment shall be carried out by the contractor in the presence of DPA representative & TPIA without any extra cost to DPA before dispatch.

The routine tests are as follows:

- 1) Conformity with drawings and diagrams,
- 2) Measurement of closing and opening speeds,
- 3) Measurement of operating torque,
- 4) Checking of filling pressure,
- 5) Checking of gas-tightness,
- 6) Dielectric testing and main circuit resistance measurement,
- 7) Power frequency voltage,
- 8) Resistance test for the circuit,
- 9) Mechanical operation tests.

The contractor, in the presence of representative of DPA & TPIA, shall carry out all above acceptance and routine tests. The contractor shall give at least 15 days advance intimation to DPA to enable to depute representative for witnessing the tests.

The DPA reserves the right for carrying out any other tests of a reasonable nature at the works of the supplier/laboratory or at any other recognized laboratory/research institute in addition to the above mentioned type, acceptance and routine tests at the cost of the DPA to satisfy that the material complies with the intent of this specification.

➤ **DRAWINGS:**

All drawings shall conform to relevant IEC Standards Specification. All drawings shall be in ink.

The Contractor shall submit dimensional general arrangement drawings of the equipment, illustrative and descriptive literature in triplicate for various items in the RMUs, which are all essentially required for future automation.

- i) Schematic diagram of the RMU panel
- ii) Instruction manuals
- iii) Catalogues of spares recommended with drawing to indicate each item of spares
- iv) List of spares and special tools recommended by the supplier.
- v) Copies of Type Test Certificates as per latest IS/IEC.
- vi) Drawings of equipment, relays, control wiring circuit, etc.
- vii) Foundation drawings of RMU.
- viii) Dimensional drawings of each material used for item (vi).
- ix) Actual single line diagram of RMU with or without extra combinations shall be made displayed on the front portion of the RMU so as to carry out the operations easily.

The following should be supplied by contractor:

Copies in triplicate of printed volumes of operation, maintenance and erection manuals in English along with the copies of approved drawings and type test reports etc. sets of the manuals as above shall be supplied to the Engineer-in-Charge along with a soft copy of the all Technical and Drawing.

➤ **NAME PLATE:**

Each RMU and its associated equipment shall be provided with a nameplate legible and indelibly marked with at least the following information.

- Name of manufacturer
- Type
- Serial number
- Voltage Current
- Frequency
- Symmetrical breaking capacity
- Making capacity
- Short time current and its duration
- Purchase Order number and date
- Month and Year of supply

TRAINING:

The contractor shall provide training to Operational Staff and Engineers of DPA. In case of training at manufacturer’s works is required, necessary expenses towards boarding, lodging & traveling for the deputed Engineers of DPA shall be borne by DPA.

➤ **PERFORMANCE GUARANTEE:**

All equipment supplied against this specification shall be guaranteed for a period 12 months from the date of commissioning. However, any engineering error, omission, wrong provision, etc. which do not have any effect on the time period, shall be attended to as and when observed/pointed out without any financial implication on DPA.

The contractor shall supply at site 11 kV, 630 Amp, Outdoor Compact Switchgear (Gas Insulated), Extensible on One Side, Motor Driven Spring Charging having 3 nos. Circuit Breaker Modules mentioned as under:

Module No. 1 & 2 as 11 kV Incomer along with PT, Module No. 3 as Circuit Breaker Module as 11 kV Outgoing feeder.

The Circuit breaker modules shall be supplied with three position isolator/earthing switch, bus bars, interlocking, earth bar and stored spring energy mechanism.

Qty. for each module	Details of Module No. 1 & 2
1	Stored energy mech. For manual and Motor Driven Spring Charged operation
1	PT for incomer for metering purpose 11 kV/110 V, Class 0.5

1	Multifunction Energy Meter with RS485
1	Circuit breaker 12 kV, 630 A
1	Control voltage, trip coil 24 V DC
1	Protection system: Relay must be Numeric type with following features: a) Self-Powered OC+EF Protection Relay b) Control voltage, 24 V DC c) Interference RS-485, RS232 port d) Equivalent to CAG 37 for Instantaneous Over Current e) Equivalent to CTUM 15 for short Circuit protection, Inst. Earth fault f) Instantaneous definite time & inverse type protection of over current.
1	Set of three ring core metering & protection CTs: CTs of 300-200/1-1A, 5P10, 2.5VA for protection and 300-200/1-1A CL 0.5, 2.5VA for metering (considering the cable size 3Cx 300 sq. mm HT XLPE cable)
1	Breaker ON (red)/OFF (green)/TRIP (amber) LED Indication
1	Capacitive voltage indication fixed type
1	Suitable Power Pack for Auxiliary DC Power supply for Relays

Qty. for each module	Details of Module No. 3
1	Stored energy mech. for manual and Motor Driven Spring Charged operation
1	Multifunction Energy Meter with RS485
1	Circuit breaker 12 kV, 630 A
1	Control voltage, trip coil 24 V DC
1	Protection system: Relay must be Numeric type with following features: a) Self-Powered OC+EF Protection Relay b) Control voltage, 24 V DC c) Interference RS-485, RS232 port d) Equivalent to CAG 37 for Instantaneous Over Current e) Equivalent to CTUM 15 for short Circuit protection, Inst. Earth fault f) Instantaneous definite time & inverse type protection of over current.
1	Set of three ring core metering & protection CTs: CTs of 150-100/1-1A, 5P10, 2.5VA for protection and 150-100/1-1A CL 0.5, 2.5VA for metering (considering the cable size 3Cx 300 sq. mm HT XLPE cable)

1	Breaker ON (red)/OFF (green)/TRIP (amber) LED Indication
1	Capacitive voltage indication fixed type
1	Suitable Power Pack for Auxiliary DC Power supply for Electro-Mechanical Aux Relays and Master Trip Relays

In addition to above following material shall be supplied by Contractor for each panel.

Qty.	Material to be supplied by Contractor with each panel
3	Set of Terminal Protector boots for covering cable-termination.
1	Manometer installed on RMU for Gas Pressure indication.
2	Operating handle

Note: The contractor shall provide 5 Years warranty against the low pressure of pre-filled SF6 gas in the RMU from the date of commissioning of RMU.

The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 2:

This item includes installation, testing and commissioning of supplied outdoor type RMU panel near exiting 11/0.433 kV Substation Building at SVP Auditorium, Gopalpuri. The contractor shall construct the Civil Foundation as per the instruction manual of the OEM of the supplied RMU. The contractor shall obtain approval of drawing of Civil Foundation of the RMU from the Engineer-in-charge before undertaking construction of the Foundation.

After installation of RMU panel, necessary test & trial shall be carried out for proper functioning of safety, devices, relay etc. and before charging RMU Panel, all the tests required under relevant ISS and IEC – Rules 1956 shall be carried out and the result shall be in conformity with specifications and copies of test results shall be furnished to Engineer-in-Charge. The complete work shall be carried out as directed by Engineer in-Charge. The work includes required labour & material for installations, testing and commissioning of RMU as directed by Engineer-in-Charge.

Technical Specification No. 3:

This item includes supply at site Energy Efficiency Level 3, 800 kVA, 11/0.433 kV indoor type, three phase, 50 Hz, core type double copper wound oil immersed distribution transformer with off load tap changer, accessories etc. as mentioned below:

The transformer shall conform to IS 2026 (Part I, II & III): 1977 / IS 1180 (Part 1): 2014 as applicable and transformer oil shall conform to IS 335 with up to date amendment. The transformer shall have Energy Efficiency Level 3.

- (i) Capacity : 800 kVA
- (ii) H.V. : 11000 Volts
- (iii) L.V. : 433 Volts
- (iv) Supply System : 3 phase, 50 Hz
- (v) H.V. winding : Copper wound delta connected
- (vi) L.V. winding : Copper wound star connected having Neutral separately brought out on porcelain bushing for connecting the same to earth.
- (vii) Type of cooling : ONAN (Oil immersed with natural air cooled)
- (viii) Vector group : Dyn11
- (ix) Impedance : 4.5%
- (x) Conservator : With sump, drain valve, cover plate and magnetic oil level gauge including minimum oil filling level marking and low level alarm contacts.
- (xi) Off load tap : Tap changer shall be changer unidirectional type for voltage variation of - 5% to 12.5% on HT winding in equal steps of 2.5%.
- (xii) The transformer shall be provided with the following accessories:
 - (a) Oil drain valve with plug
 - (b) Filter valve with plug
 - (c) Thermometer pocket
 - (d) Two nos. earthing terminals
 - (e) Silica gel dehydrating breather
 - (f) Air release plug
 - (g) Explosion vent
 - (h) 4 nos. bidirectional flat rollers
 - (i) Lifting lugs for main tank and for all items to be handled independently
 - (j) Rating and terminal marking plate
 - (k) Buchholz relay, double float type with testing and sampling cocks
 - (l) 150 mm dial, winding temperature gauge with maximum reading pointer, alarm and trip contacts

- (m) 150 mm dial, oil temperature gauge with maximum reading pointer, alarm and trip contacts
 - (n) Marshalling box
 - (o) Base channel with towing holes.
- (xiii) Temperature rise in oil/winding shall be 50/55 °C above ambient temperature of 45°C.
- (xiv) CRCA pressed sheet radiator bank complete with air release plug, drain plug and isolating valve at points of connections with tank.
- (xv) Painting:
- (a) Internally with oil resisting varnish paint and,
 - (b) Externally with two coats of zinc rich primer followed by two coats of colour epoxy paint shade no. 631 of IS 5.

Special Conditions for 800 kVA Distribution Transformer

- Maximum Losses at 50% loading at 75°C (Watts): 2015
 - Maximum Losses at 100% loading at 75°C (Watts): 5323
 - Normal Flux Density (at rated voltage and frequency): 1.6 T
 - Maximum flux density (Increase of +12.5% combined voltage and frequency variation from rated voltage and frequency: 1.9 T (Max.)
 - Maximum current density (A/mm²): 2.8
- (1) The transformer shall be double wound, copper coil, oil immersed, naturally cooled (ONAN) and non-sealed type with plain rectangular tank.
 - (2) The transformer shall be suitable for service with fluctuations in supply voltage up to plus 12.5% to minus 2.5%.
 - (3) The transformer and accessories shall be designed to facilitate operation, inspection, maintenance and repairs. The design shall incorporate every precaution and provision for the safety of equipment as well as staff engaged in operation and maintenance of equipment.
 - (4) All outdoor apparatus, including bushing insulators with their mountings, shall be designed so as to avoid any accumulation of water.

2. Core

- The core shall have low loss and good grain properties. It should be coated with hot oil proof insulation, bolted together with frames to prevent vibration and noise.
- The core thickness should be 0.23mm or less and grade should be M3 or better.
- All core clamping bolts (if any) shall be effectively insulated.
- Only one grade and one thickness of core shall be accepted and mixing of different grades shall not be allowed.

- The complete design of the core must ensure maximum permanency of the core losses without continuous working of the transformers.
- The value of the maximum flux density allowed in the design and grade of lamination used shall be clearly stated. The vendor shall submit the calculations in support of the same.
- The transformer shall be suitable for continuous service without damage under 'over fluxing' where the ratio of voltage over frequency exceeds the corresponding ratio at rated voltage and rated frequency up to 12.5% and the core shall not get saturated.
- The No Load current shall not exceed 2% of the Full Load current and shall be measured by energizing the transformer at rated voltage and frequency. Increase of 12.5% of rated voltage shall not increase the no - load current by 5% maximum of full load current.
- The bidder shall be required to submit the following documents in regard to procurement of core material:
 1. Invoice of supplier
 2. Mill's test certificate
 3. Packing list
 4. Bill of landing
 5. Bill of entry certificate by custom
 6. Description of material, electrical analysis, physical inspection certificate for surface defects, thickness and width of material.

3. The contractor shall offer the core for inspection and approval of DPA during the manufacturing stage. Penalty or black listing shall be imposed on the bidders using defective CRGO sheets.

4. SURFACE PREPARATION AND PAINTING

The equipment shall be designed & painted for saline weatherproof & should be guaranteed for any type of damage due to harsh climatic condition for 10 Years.

5. RADIO INTEREFENCE

When operated at voltages up to 12.5% in excess of the normal system rating, transformers shall be substantially free from partial discharges (i.e. corona discharges in either internal or external insulation) which are likely to cause interference with radio or telephone communication.

6. OVERLOAD CAPACITY

The transformer shall be suitable for loading as per IS 6600.

The contractor has to provide all test certificates from original manufacturers & relevant sourcing documents. The manufacturer shall have valid BEE certification having Type Test Report (TTR) issued by CPRI/ERDA/International Accredited Laboratory. The type tests report shall be submitted to the Engineer In-charge of the same design.

The contractor shall conduct all routine tests as specified in IS 2026 on the transformer at his own cost at the manufacturer's works in presence of TPIA/representative of DPA and shall submit test report to the Engineer-in-Charge.

The contactor shall submit general arrangement drawing of the transformer. The contractor shall submit the type test certificate of the distribution transformer from any NABL accredited laboratory which shall not be older than 5 years from the date of issue of work order.

Technical Specification No. 4:

This item includes installation, testing and commissioning of 800 kVA, 11/0.433 kV indoor type distribution transformer at existing electrical substation at SVP Auditorium, Gopalpuri. The transformer shall be installed on existing pedestal in the substation. Before charging the transformer all the tests shall be carried out as per relevant IS specifications and IE Rules 1956. The transformer shall be properly leveled on foundation including suitable stoppers. The transformer oil shall be tested before transformer is charged and dielectric strength acidity, Sulphur contents shall be in accordance with IS 335 with latest amendments. This includes all material, labour, tools & tackles as directed by Engineer-in-charge.

Technical Specification No. 5:

This item includes supply at site outdoor type 600 kVA Power Generator DG Set complying with latest Government Norms.

The Power Generator (DG Set) shall be complete with Diesel Engine, Alternator and AMF/MANUAL Control Panel along with Acoustic Enclosure. Diesel engine and alternator shall be closely coupled or provided with flexible coupling and mounted on a base plate / M.S. frame of robust in construction. Anti-Vibration mountings shall be provided for complete Power Generator in case of flexible coupling. In case of direct coupling Anti-Vibration mountings shall be provided for the Engine as well as the alternator. Power Generator should have protection against under voltage, over voltage, under frequency, over frequency, low battery voltage, over current, earth-fault, short circuit, phase sequence changes etc. Automatic Mains Failure (AMF) control panel shall be able to start up the Power Generator and transfer the load on to the Power Generator on mains failure without requiring any human intervention. Similarly on restoration of mains supply, it shall be able to transfer the load to mains supply and switch off the Power Generator automatically. Control Panel (Manual / AMF) shall be equipped with digital Multi-Function Meter for parameters like Voltage, Current, Frequency, Power Factor etc., Battery charger, Indicators, various switches and MCB / MCCB / Contactor / Circuit breaker for the DG output of appropriate rating and accuracy class as per best industrial practice for better utility. Supply and installation of a change-over Switch / MCCB of suitable rating for Power Generator with manual control panel is inclusive in the scope of supply. Acoustic Enclosure shall be made of Pre-treated and Powder coated CRCA Sheet. The sheet shall be Pre-treated and Powder coated with weather-proof paint. The Acoustic Enclosure shall be vermin proof. The enclosure shall accommodate the fuel tank of the Power Generator to make the system compact. Emergency Stop shall be provided outside the Acoustic Enclosure.

Power Generator shall meet the requirements of Environmental (Protection) Rules 1986 as laid down by Min. of Environment & Forests read with GSR 371 (E) dated 17.5.2002, GSR 520(E) dated 1.7.2003, No.448 (E) dated 12.07.2004, GSR 771(E) dated 11.12.2013 GSR 232(E) dated 31.03.2014, Gazette Notification No.167 dated. 31.03.2014 and Gazette Notification No. 578 dated. 11.11.2014 in respect of noise and emission norms. The latest amendments to above GSRs shall be applicable as and when amended by Ministry of Environment and Forest.

Supply of Fuel tank of suitable capacity, sufficient for minimum 8 hours running the Power Generator, is inclusive in the scope of supply. Fuel Tank shall be complete with fuel piping (between fuel tank and diesel engine), valves, level indications and all standard accessories. MS pipes, heavy class of suitable diameter conforming to IS 1239 (Part-1) – latest shall be used for fuel piping.

The Test Certificates required as per CPCB shall be submitted by the contractor at the time of supply of Power Generator at site. The contractor shall submit Type Approval Certificate for the specified rating of the Power Generator from any of the designated agency authorized by CPCB, COP Certificate for engine, Type test report for Alternator as per IS:13364 (Part-1) latest / IS:13364 (Part-2) latest to prove conformity to the specifications

Power Generator:

Nominal Rated Output Capacity: 600 kVA

No of Phase: 3 Phase

ENGINE:

Rated Engine Power (kWm): 110 % of the required powered at STP (Standard Temperature Pressure) i.e. equal to (Nominal Rated Capacity (KVA) of power generator Any Auxiliary power Consumption by the Power generator) x Power factor (0.8) / Alternator efficiency

Type of Engine cooling: Liquid Cooled

Type of governor: Electronic

Number of cylinders: 8 Nos.

Number of Strokes: 4 Nos.

Rated RPM of Engine (RPM): 1500

Fuel: High Speed Diesel (HSD)

Overload capacity: Engine shall be capable for delivering an output of 10% in excess of rated KVA for a period of one hour in any period of 12 hours continuous running

Specific Fuel Consumption (gm/kWh): 200 to 265

Starting voltage: 24 Volt

Salient Features of Engine: Turbo Charged Engine, Direct injection Fuel System, CRDi Fuel System

GOVERNING CLASS:

Class of governor: A2 or better

Maximum Change of Speed as a Percentage of Rated Speed on suddenly taking-off the rated load (Transient): 15

Maximum Recovery Time in Seconds on suddenly taking-off the rated load (Transient): 15 Second

Maximum Change of Speed as a Percentage of Rated Speed on suddenly taking-off the rated load (Permanent): 5

Maximum Change of Speed as a Percentage of Rated Speed On a change of load, both on and off, by all steps of 25 percent of the rated load (Transient): 4

Maximum Recovery Time in Seconds on a change of load, both on and off, by all steps of 25 percent of the rated load (Transient): 5 Second

Maximum Change of Speed as a Percentage of Rated Speed On a change of load, both on and off, by all steps of 25 percent of the rated load (Permanent): 1

ALTERNATOR:

Alternator Voltage Rating: 415 Volt

Rating of AC Generator (KVA): 600 kVA

Power Factor of AC generator: 0.8

Efficiency at rated Power factor at 75% of full Load: 95 percent

Conformity to Indian Standard (for Alternator): IS:13364 (Part-2) latest

Type of alternator: Brushless

Voltage Regulation Grade: VG 3

Alternator IP Rating: IP 23

Class of Insulation for Alternator: H

AMF CONTROL PANEL:

IP Rating of Control Panel: IP 53

Displayed parameters/Features: Engine Speed, Lube oil pressure, Coolant/cylinder head Temperature, Engine running hours, Engine battery voltage, Engine Running status, Generator Voltage (Ph-Ph), Generator Voltage (Ph-N), Generator Current (R, Y, B), Generator apparent Power (kVA), Generator active Power (kW), Power factor, Frequency, Fuel level, Event log, Control supply Voltage.

Indicators: Low Lube oil pressure, High water / coolant / cylinder head temperature, Low fuel level, Over speed

Audio Alarm: Low Lube oil pressure, High water / coolant / cylinder head temperature, Low fuel level, Over speed

ACOUSTIC ENCLOSURE:

Sheet Thickness: 1.6 mm

Thickness of insulation: 28 mm

Density of insulation: 30 kg/cubic m

Noise level at 1 meter: 75 dB

Fuel Tank:

Fuel Tank Sheet Material Thickness: 2 mm

BATTERY:

Battery Type & Specification: Low Maintenance free to IS: 14257 for high cranking performance

Battery capacity: 180 Ah

Number of batteries: 2 Nos.

Technical Specification No. 6:

This item includes installation, testing and commissioning of 600 kVA Power Generator DG Set near the existing electrical substation at SVP Auditorium, Gopalpuri. The contractor shall construct the Civil Foundation as per the instruction manual of the OEM of the supplied DG Set. The contractor shall obtain approval of drawing of Civil Foundation of the DG Set from the Engineer-in-charge before undertaking construction of the Foundation. After installation of DG Set, necessary test & trial shall be carried out for proper functioning of safety, devices, relay etc. and before charging DG Set, all the tests required under relevant ISS and IEC – Rules 1956 shall be carried out and the result shall be in conformity with specifications and copies of test results shall be furnished to Engineer-in-Charge. The complete work shall be carried out as directed by Engineer in-Charge. The work includes required labour & material for installations, testing and commissioning of DG Set as directed by Engineer-in-Charge. The contractor shall obtain necessary approvals of the statutory authority for commissioning of the DG Set.

Technical Specification No. 7:

This item includes Supply at site 3 phase, 50 Hz, 415 V AC, 500 kVA, oil cooled, outdoor type Servo Voltage Stabilizer. Three Phase Oil Cooled Servo Voltage Stabilizer shall be fully tested for routine test.

Sr. No.	Parameter	
1	Rating	500 kVA, 3 Phase, 4 Wire
2	Input Voltage	340V – 460V
3	Type	Automatic
4	Display	Digital & Microprocessor based
5	Duty Cycle	Continuous 24x7
6	Response Time	Less than 10ms
7	Output Voltage	415 V \pm 1%
8	Overload Capacity	120%
9	Input	MCCB
10	Output	Bypass changeover Switch
11	Oil	Insulating Transformer Oil ISI 335 Marked
12	Cooling	Natural Oil Cooled
13	Display Parameter	Date & Time, Input Voltage, Output Voltage & Current
14	Input / Output Termination	Copper Bus Bar EC grade

15	Class of Insulation	A Class
16	Efficiency	98%
17	Protection	Single Phasing, High Voltage, Low Voltage, Overload Current, Neutral Failure Protection, 10kV Surge Protection.
18	Applicable Standard	IS 9815

The Stabilizer shall be tested as per the relevant IS standard. Before Manufacturing the Stabilizer, the relevant test certificate in support of the Stabilizer manufacturing, along with design & drawing shall be submitted to Engineer-in-charge for approval.

Technical Specification No. 8:

This item includes installation, testing and commissioning of 500 kVA Servo Voltage Stabilizer near the existing electrical substation at SVP Auditorium, Gopalpuri. The contractor shall construct the Civil Foundation as per the instruction manual of the OEM. The contractor shall obtain approval of drawing of Civil Foundation of the Stabilizer from the Engineer-in-charge before undertaking construction of the Foundation. After installation of Stabilizer, necessary test & trial shall be carried out for proper functioning and before charging Stabilizer, all the tests required under relevant ISS and IEC – Rules 1956 shall be carried out and the result shall be in conformity with specifications and copies of test results shall be furnished to Engineer-in-charge. The complete work shall be carried out as directed by Engineer-in-Charge. The work includes required labour & material for installations, testing and commissioning of Stabilizer as directed by Engineer-in-Charge.

Technical Specification No. 9:

This item includes design, manufacture, testing & supply at site 6 Way, 1250 Amp, LT Power Distribution Panel suitable for 415V, 3 Phase 4 Wire, 50Hz AC supply system including Switchgears and internal wiring complete in all respect. The LT panel shall be extensible on one side.

The Panel shall be fixed, indoor floor mounting, free standing, compartmentalized, front opening, enclosed cubicle, dust & vermin proof. The Panel shall have Ingress Protection of IP 54. The thickness of the CRCA sheet for frame, load bearing members, side, top & gland plate shall be minimum 2 mm and for door, cover, partition the thickness shall be minimum 1.6 mm. The Base of Panel shall be made from ISMC 75 channel with two coats of primer & black paint. Surface pre-treatment shall be carried out by 7 tank chemical process. Panel shall be painted with two coats of zinc rich primer paint and two coats of Siemens Grey Wrinkle Shade No. RAL 7032. The Bus-bars shall be of high conductivity aluminum alloy of E91E grade, Bus bar joints shall be complete with high tensile steel bolt and washers and nuts bus bar of 1000 Amp rating for three Phases and Half the size of Neutral including color coded PVC sleeve. All the bus bar shall be supported on hylam/epoxy insulator. Minimum clearance between Phase to Phase, Phase to Neutral and Neutral to Earth for the entire run of horizontal and vertical bus-bars, shall be 25 mm. Bakelite sheet of 12 mm (Minimum) thickness shall be provided in side enclosure of panel and wherever it is found necessary under relevant IS specification and

IER 1956. The panel shall be provided with metallic engraved labels on front for identification of Incoming & Outgoing feeders. The neoprene gaskets shall be provided on the periphery of the doors of all feeders.

The sleeved bus-bars with epoxy insulators with Bakelite support and separators shall be provided with colour code.

All power cables shall enter the switchboard from the bottom on the back of the panel. Sufficient space shall be provided for ease of connection and termination of cables.

Any other electrical component for which details not mentioned but required for operational point of view is to be also considered.

The panel shall be complete in all respect with cable glands, lugs for incoming & outgoing cables along with 2 nos. of earthing terminals.

Suitable interlocking arrangement shall be provided for Incomer Feeders of Main Power Supply & DG Set Power Supply in the LT Power Distribution Panel.

The panel shall be comprised with following accessories:

1) Main Incomer (1 No.)

The Main Incomer Feeder shall be provided with 1 no. 1250 Amp, 50 kA, 415 Volt, Four Pole – MDO (Draw out type) ACB (Air Circuit Breaker) with Microprocessor released over current, Short circuit and Earth fault relay with Shunt Trip & under Voltage Coil.

The Digital Multi-Function Energy Meter (accuracy class 0.5) with LCD display shall be provided with parameters like kWh, MD, Voltage of each phase, Line current for each Phase, PF of each Phase, P.F average, Instantaneous kW, Frequency & Date & Time. The Energy Meter shall have RS485/RS232/Ethernet communication port for output.

The LED Indication lamps 6 nos. for R, Y, B, ON, OFF and trip indication shall be provided.

The 3 Nos. CTs having ratio of 1250/5 Amps, class 0.5 tape wound, shall be provided for metering on feeder and 4 nos. control fuses / neutral links are to be provided with incomer & the control wiring shall be done with copper wire.

2) DG Set Incomer (1 No.):

The DG Set Incomer Feeder shall be provided with 1 no. 1000 Amp, 50 kA, 415 Volt, Four Pole – MDO (Draw out type) ACB (Air Circuit Breaker) with Microprocessor released over current, Short circuit and Earth fault relay with Shunt Trip & under Voltage Coil.

The Digital Multi-Function Energy Meter (accuracy class 0.5) with LCD display shall be provided with parameters like kWh, MD, Voltage of each phase, Line current for each Phase, PF of each Phase, P.F average, Instantaneous kW, Frequency & Date & Time. The Energy Meter shall have RS485/RS232/Ethernet communication port for output.

The LED Indication lamps 6 nos. for R, Y, B, ON, OFF and trip indication shall be provided.

The 3 Nos. CTs having ratio of 1000/5 Amps, class 0.5 tape wound, shall be provided for metering on feeder and 4 nos. control fuses / neutral links are to be provided with incomer & the control wiring shall be done with copper wire.

3) OUTGOING FEEDERS (4 Nos.):

The Outgoing Feeders shall be provided with

(1) 1 No. 1000 Amp, 36 kA, 415 Volt, Four Pole – MDO (Draw out type) ACB (Air Circuit Breaker) with Microprocessor released over current, Short circuit and Earth fault relay with Shunt Trip & under Voltage Coil.

(2) 2 No. FP MCCB, 250 Amp, 415 Volt, 36kA breaking capacity with Microprocessor based

(3) 1 No. FP MCCB, 100 Amp, 415 Volt, 25 kA breaking capacity with Microprocessor based

Each feeder shall have Digital Multi-Function Energy Meter, Accuracy Class 0.5 for measurement of energy consumption of the feeder with RS485/RS232/Ethernet communication port for output. The LED Indication lamps 6 nos. for R, Y, B, ON, OFF and trip indication shall be provided on each feeder. The control wiring & power wiring shall be done with copper wire properly and the power wiring shall be brought up to the Power terminal block of suitable ampere capacity.

The LT Panel shall be tested as per the relevant IS standard. Before Manufacturing the LT Panel, the relevant test certificate in support of LT distribution panel manufacturing, along with design & drawing shall be submitted to DPA for approval and also all Electrical accessories shall be used as per approved Make List of DPA.

Technical Specification No. 10:

This item includes installation, testing and commissioning of supplied 6-way LT Power Distribution Panel in existing Substation. The work includes end termination, connection of cables from Distribution Transformer's LT side, DG Set and outgoing feeders in the LT Power distribution panel including earth connection. This includes necessary mounting hardware for bolting/welding down the base frame to the foundation. All alignment, leveling, grouting, anchoring adjustments shall be carried out in accordance with manufacturer's instruction or as directed by Engineer-in-charge. The work includes termination of the laid Cables along with providing suitable size of lugs, glands and necessary earth linking connection. All connections in Distribution Panel shall be completed, checked and adjusted to ensure safety and satisfactory operation of the equipment. After installation of the Distribution Panel, testing and commissioning shall be done as directed.

Technical Specification No. 11:

This item includes supply at site, installation, testing & commissioning of the VRV/VRF HVAC System for SVP Auditorium as per following technical specification.

(1) Supply at site, installation, testing & commissioning of VRV/VRF HVAC System at SVP Auditorium complete in all respect as per site requirement.

(2) The VRV/VRF type HVAC System shall be the latest in technology, most energy efficient, and easy to maintain and operate.

(3) The contractor shall submit the necessary layout and related drawings for the Units and get approval from the Engineer-in-charge.

(4) All necessary drawings/manuals etc. related to the VRV/VRF system shall be provided to the Engineer-in-Charge.

(5) As the work may involve cutting of false ceiling and repairing of the same after installation of the VRV/VRF system, the contractor must ensure that there shall not be any structural damages / any other damages to the property, if anything happens due

to the same, the necessary repair/replacement to be borne by the contractor and no any payment shall be made by the DPA.

- (6) The VRV/VRF System shall be capable to operate at Ambient Temperature ranging from 15 to 52 °C (Heating & Cooling Modes) and Power Supply of 3 Phase, 380 - 415 Volts, 50 Hz for Non-Stop Cooling.
- (7) The VRV/VRF Units including Air Handling Units (AHU) shall be outdoor type floor mounted.
- (8) The Contractor shall carry out testing & commissioning of installed VRV/VRF Units including supply & charging of environmentally friendly refrigerant as per site requirement after system leak test & 24 hours Nitrogen Pressure Hold & necessary Electric Connection etc. as required for commissioning of the system in all respect.
- (9) The contractor shall arrange necessary scaffolding/hydra/crane/man lifter etc. for execution & completion of the VRV/VRF HVAC System.
- (10) All type of civil work if any required to complete the work shall be in the scope of contractor.
- (11) The Contractor shall co-ordinate with the Engineer-in-charge and shall adopt all the Safety Precautions during execution of the work. Any damage/loss of Port property, during execution of the work, shall be repaired/replaced/made good by the Contractor immediately at their own cost and risk.
- (12) The work shall be carried out to entire satisfaction of Engineer-in-charge. This work includes all material, labour, tools & tackles as directed by Engineer-in-charge.
- (13) The contractor shall provide training to DPA staff/personnel for operating the VRV/VRF HVAC System properly as directed by Engineer-in-charge.

Sr. No.	Description of Item	Qty.
1	20 HP Outdoor Unit (cooling only): Supply at site, installation, testing & commissioning of 20HP VRV/VRF Outdoor Unit, Variable Refrigerant Volume/Flow Type Cooling Only Air Conditioner with Scroll Compressors. 2 Nos. of Compressors per outdoor Unit, 2 Nos. of inverter Scroll compressor with Axial Compliance, shall run up to 1000 m refrigerant piping, Refrigerant R410A, Axial flow type condenser fans.	13 Nos.
2	VRV/VRF Indoor Unit: Indoor Units shall be made of Galvanized Steel Plate Casing, Insulated with Sound Absorbing Material, Drainage arrangements, Fan, Refrigerant Liquid, Gas Piping, Fresh AirPort etc. complete in all respect and as per Specifications. All the Motors shall work on Single Phase AC Power Supply. The Unit shall consist of Cooling Coil, one or more Centrifugal Fans, Electric Motor, Condensate Drain Pan, Galvanized Steel Casing and Electric Junction Box. The Condensate	

	Drain Pan shall be constructed with Heavy Gauge Galvanized Steel adequately treated against Corrosion & shall be Insulated. The Unit shall be provided with Washable Filter or as recommended by the Manufacturer. It shall be provided with Face Velocity through Filter/Coil not to exceed 500 FPM. The Fans shall be Statically & Dynamically Balanced and Specially Designed for quiet operation. The Motor shall be provided with three in-built speeds and Resiliently Mounted with adjustable mounting and shall be Direct Driven.	
2.1	Supply at site, installation, testing & commissioning of 8.0 TR VRV Ductable Unit	2 Nos.
2.2	Supply at site, installation, testing & commissioning of Cordless remote receiver for ductable unit	2 Nos.
2.3	Supply at site, installation, testing & commissioning of Drain pump for ductable unit	2 Nos.
2.4	Supply at site, installation, testing & commissioning of AHU kits with control box	12 Nos.
2.5	Supply at site, installation, testing & commissioning of Branch distribution joints for refringent piping	7 Nos.
2.6	Supply at site, installation, testing and commissioning of Floor mounted dx type air handling unit (thermal break profile) double skin type horizontal air handling units made of 50 mm thick panels consisting of pre coated G.I. casing of thickness 0.8mm outside layer and 0.8 mm inside layer with polyurethane foam (puf) insulation having density 43±2 kg/m ³ factory injected between them by injection moulding machine, consisting plug fans with VFD suitable for static pressure as required class IE2, Mixing Chamber, suitable for 415 ± 10% v, 50 Hz, 3 phase AC supply, cooling coil section dx type with aluminium finned copper tubes, cooling coil of 6 row deep and prefilter-10 micron, pre filter should be washable synthetic type, fine filter - 3 micron, hepa filter - 0.3 micron, drain connections stainless steel drain pan with insulation, wherever required, necessary vibration isolation arrangement. 12800 CFM AHU Unit sp-75 mm. wg Filtration – up to 0.3 micron – 30.5 tr along Motor 10 HP (9.3 KW / Full load 18.5A)	6 Nos.
3.1	Supply at site, installation, testing & commissioning of copper piping between IDU to ODU with insulation sleeve and proper supporting for VRF hard copper pipe for header & soft pipe after ref joint with 19mm nitrile class O insulation. List of Make: MANDEV/PARASMANI/RR/MEXFLOW/RAJCO/	195 m
3.2	Supply at site, installation, testing & commissioning of Cable tray for exposed copper piping on terrace	195 m
3.3	Supply at site, installation, testing & commissioning of Transmission cabling - IDU to ODU (1.0 sq. mm 2 core shielded)	370 m Approx.

	List of Make: ASTRAL/SUPREME/FINOLEX	
3.4	Supply at site, installation, testing & commissioning of Insulated 50 mm PVC Drain piping with 6 mm nitrile class 1 insulation. List of Make: ASTRAL/SUPREME/FINOLEX	120 m Approx.
3.5	Supply at site, installation, testing & commissioning of Factory fabricated TDF Flange rectangular GI ducting, fabricated out of prime quality 120 GSM GI sheets. Complete with necessary supports, expansion fasteners, scaffolding to hang the duct etc. (All ducting should comply with relevant BIS Standards) List of Make for GI Sheets: JINDAL/SAIL/TATA/NIPPON/INDIAN STEEL	
3.5.1	24 G	815 Sq. m Approx.
3.5.2	22 G	1340 Sq. m Approx.
3.6	Supply at site, installation, testing & commissioning of Duct installation:	
3.6.1	SITC of 25mm Duct thermal nitrile insulation class 0. List of Make: ARAMACELL / A FLEX / ARMAFLEX / K FLEX	700 Sq. m Approx.
3.6.2	SITC of 19mm Duct thermal nitrile insulation class 0. List of Make: ARAMACELL / A FLEX / ARMAFLEX / K FLEX	900 Sq. m Approx.
3.6.3	SITC of 25 mm Duct thermal nitrile insulation class 0 with GC UV protected (outside). List of Make: ARAMACELL / A FLEX / ARMAFLEX / K FLEX	355 Sq. m Approx.
3.6.4	SITC of 19 mm Duct thermal nitrile insulation class 0 with GC UV protected (outside). List of Make: ARAMACELL / A FLEX / ARMAFLEX / K FLEX	435 Sq. m Approx.
3.6.5	SITC of 15 mm Acoustic Insulation class 1 open cell nitrile rubber. List of Make: KIMMCO/UP TWIGA	255 Sq. m Approx.
3.7	SITC of 400 mm dia JET NOZZLE for Central area. List of Make: AIRMASTER /CARRYAIRE /COSMOS /DYNACRAFT /TROX / SACHINS /SYSTEM AIR /MAHESHWARI	90 Nos.
3.8	SITC of Aluminium powder coated sq diffuser with vcd for s.a. & r.a., for stage area only.	8 Sq. m Approx.

	List of Make: AIRMASTER /CARRYAIRE /COSMOS /DYNACRAFT /TROX / SACHINS /SYSTEM AIR /MAHESHWARI	
3.9	SITC of Duct damper. List of Make: AIRMASTER /CARRYAIRE /COSMOS /DYNACRAFT /TROX /SACHINS /SYSTEM AIR /MAHESHWARI	15 Sq. m Approx.
4.1	Supply at site, installation, testing & commissioning of Canvas connection for AHU/DUCTABLE AC	8 Nos.
4.2	Supply at site, installation, testing & commissioning of refrigerant charging, APPROVED MAKES: HONEYWELL/DUPONT	1 Lot
4.3	Supply at site, installation, testing & commissioning of MS Fabricated ODU stand for VRV/VRF condenser Unit	810 kg Approx.
5	Supply at site, installation, testing & commissioning of outdoor type LT Panels for VRV/VRF System. Before undertaking manufacturing of the Panels, necessary approval of drawing shall be obtained from the Engineer-in-charge.	Complete Job
6	Supply at site suitable types & sizes of LT Power Cables for VRV/VRF System as per the requirement of OEM standard and laying & connection of the same as per site requirement & as directed by Engineer-in-charge from outgoing of the Servo Stabilizer to the LT Panels, AHUs, Outdoor Units etc.	Complete Job
7	Providing required numbers of chemical Earth Stations for VRV/VRF System. The earth stations shall be maintenance free type earth station by providing 80mm diameter, 3 meter, 100 micron hot dipped GI chemical electrode with back fill compound including accessories & masonry work. A cement concrete (ratio 1:4:8) chamber of 500 mm × 500 mm × 500mm × 50mm (thickness of wall) shall be prepared and a cover of suitable size shall be provided for the chamber. A GI flat size of 50 mm X 6 mm complete with its compound along with labour and material as per IS-3043 & its latest amendments.	Complete Job

List of Make for VRV/VRF System: Daikin/Blue Star/LG/Mitsubishi Electric.

Technical Specification No. 12:

This item includes design, manufacture, supply at site 150 kVAR Hybrid APFC Panel. The APFC system shall operate even with highly fluctuating loads. The APFC system shall assure unity power factor operation at all time, even under the unbalanced load. The APFC System shall compensate negative sequence part of the load current, to maintain balance between three-phase input currents. The output current of APFC System shall be sinusoidal and free from harmonics, even when the significant voltage harmonics are present at the incomer. The System shall operate at high switching frequencies for precise and faster operation, with ripple and noise free operation. The System shall have an integrated 7-inch TFT touch-screen to set/display the all the electrical parameters in real- time. The specifications are as below:

Sr. No.	Description	Specification
1	System voltage (RMS)	360-480V
2	System frequency (Hz)	50 ± 5%
3	Operating temperature range	0 to 45° C (Non-condensing)
4	Semiconductor devices	IGBTs (3-Level Topology)
5	Maximum Reactive Power Output @480V	150 kVAR
8	Configuration	3P3W
9	Power Factor Correction	Unity
10	Load Current Balancing	Yes, Negative Sequence
11	CT Requirement	3CTs with 5A Secondary
12	CT Position	Load Side / Source Side
13	Internal Thermal Losses	<2%
14	Color	Black
15	Integrated Short-Circuit Protection	Yes
16	Controller	ARM based MCU
17	Control method	Adaptive Artificial Neural Network based
18	Dynamic Response Time	100 microseconds
19	Correction Time	10 milliseconds
20	Parallel Operation	Up to 50 modules per CT set
21	Parallel Communication	Mini-USB/CAN Bus
22	Paralleling Options	Master-Slave / Multi-Master
23	Noise Level	<65dB
24	Display	7" TFT Touch Screen Display
25	CT Connections between modules	Daisy Chain Type

The APFC Panel shall be tested as per the relevant IS standard. Before Manufacturing the Panel, the relevant test certificate in support of APFC Panel manufacturing, along with design & drawing shall be submitted to Engineer-in-charge for approval and also all Electrical accessories shall be used as per approved Make List of DPA. The rates shall be inclusive of all the taxes (excluding GST), insurance, transportation, unloading at site as directed by Engineer-in-charge.

Technical Specification No. 13:

This item includes installation, testing and commissioning of supplied Hybrid APFC Panel in the existing Substation. The work includes end termination, connection of cables including earth connection. This includes necessary mounting hardware for bolting/welding down the

base frame to the foundation. All alignment, leveling, grouting, anchoring adjustments shall be carried out in accordance with manufacturer's instruction or as directed by Engineer in charge. The work includes termination of the laid Cables along with providing suitable size of lugs, glands and necessary earth linking connection. All connections in APFC Panel shall be completed, checked and adjusted to ensure safety and satisfactory operation of the equipment. After installation of the APFC Panel testing and commissioning shall be done as directed. The work includes all material, labour, tools & tackles as directed by Engineer in charge.

Technical Specification No. 14:

This item includes supply at site 3 Core, 150 Sq. mm (E), 11kV grade aluminium conductor XLPE insulated armoured cable conforming to IS: 7098 (Part-II) 1988 with latest amendments with ISI mark. The cable shall have marking/embossing at an interval of every meter showing its progressive length. The contractor shall submit type test certificate at the time of supply of Cable at site. The type test certificate shall not be more than 5 years old. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 15:

This item includes laying of single length cable of size 3 Core, 150 Sq. mm XLPE Insulated aluminium conductor armoured cable of 11kV grade in the existing Substation cable trench. The cable shall be laid after opening of trench by removing the MS chequered plates. After laying of the cable, cable trench shall be properly covered with the existing chequered plates as per original. This includes all required material, tools & tackles and labour as directed by Engineer in-Charge.

Technical Specification No. 16:

This item includes supply at site indoor type heat shrink end termination kit for 3 core, 150 Sq. mm (E), HT armored aluminium conductor XLPE Cable of 11 kV grade as per the approved make list.

Technical Specification No. 17:

This item includes fixing of Indoor type heat shrink end termination kit of 3 Core, 150 Sq. mm size for HT armored aluminum conductor XLPE Cable of 11 kV grade. The joint shall make in such a way that joined section can be reeled without sagging and the joint shall be electrically and mechanically permanent. This includes all required material, tools & tackles and labour as directed by Engineer in charge.

Technical Specification No. 18:

This item includes supply at site 1.1kV grade, Four Core, 400 Sq.mm, Aluminium Conductor, XLPE Insulated, PVC Sheathed, Flat Strip Armoured Cable conforming to IS:7098 (Part-I):1988 with latest amendment. The cable shall have marking/embossing at an interval of every 1.0 meter showing its progressive length. The contractor shall submit Type Test Report for the type tests conducted in accordance with IS:7098(Part-I): 1988 within last 5 years from the date of Work Order on similar type of Cables in a NABL accredited Test House or Laboratory at the time of supply of Cable at site. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 19:

This item includes laying of 1.1kV Four Core 400 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in the existing cable trench of Substation. The cable shall be laid after opening of trench by removing the MS chequered plates. After laying of the cable, cable trench shall be properly covered with existing chequered plates as per its original condition. This item includes all labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 20:

This item includes supply at site 1.1kV grade, Four Core, 150 Sq.mm, Aluminium Conductor, XLPE Insulated, PVC Sheathed, Flat Strip Armoured Cable conforming to IS:7098 (Part-I):1988 with latest amendment. The cable shall have marking/embossing at an interval of every 1.0 meter showing its progressive length. The contractor shall submit Type Test Report for the type tests conducted in accordance with IS:7098(Part-I): 1988 within last 5 years from the date of Work Order on similar type of Cables in a NABL accredited Test House or Laboratory at the time of supply of Cable at site. The rate shall be inclusive of all taxes (excluding GST), packing, forwarding, insurance, transportation, and unloading at site of work.

Technical Specification No. 21:

This item includes laying of double run of 1.1kV Four Core 150 Sq.mm Aluminium Conductor XLPE Insulated PVC Sheathed Armoured Cable in the existing cable trench of Substation. The cable shall be laid after opening of trench by removing the MS chequered plates. After laying of the cable, cable trench shall be properly covered with existing chequered plates as per its original condition. This item includes all labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 22:

This item includes preparation of maintenance free earth station by providing 80mm diameter, 3 meter, 100 micron hot dipped GI chemical electrode with back fill compound including accessories & masonry work. A cement concrete (ratio 1:4:8) chamber of 500 mm × 500 mm × 500mm × 50mm (thickness of wall) shall be prepared and a cover of suitable size shall be provided for the chamber. The work shall be carried out to entire satisfaction of Engineer in-Charge. This work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 23:

This item includes preparation of maintenance free earth station by providing 80mm diameter, 3 meter, 250 micron Copper bonded chemical electrode with back fill compound including accessories & masonry work. A cement concrete (ratio 1:4:8) chamber of at least 500 mm × 500 mm × 500mm × 50mm (thickness of wall) shall be prepared and a cover of suitable size shall be provided for the chamber. The work shall be carried out to entire satisfaction of Engineer in-Charge. This work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 24:

This item includes supply at site, laying, fixing and connection of GI strip of size 50x6 mm from earth station to HT RMU Panel/ Distribution Transformer/ LT Distribution Panel/ DG Set as directed. The GI strip shall be laid and clamped suitably on wall/floor/structure or buried in the ground as directed. This work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Technical Specification No. 25:

This item includes supply at site, laying, fixing and connecting of Copper strip of size 50×5 mm from earth station to Distribution Transformer/ DG Set as directed. The copper strip shall be laid from earth station to Distribution and shall be clamped suitably on wall/floor or buried in the ground/ trench as directed. This work includes all material, labour, tools & tackles as directed by Engineer in-Charge.

Scope of Work for Comprehensive Annual Maintenance of VRV/VRF HVAC System

The contractor shall provide comprehensive maintenance service for two years after completion of the guarantee period of the work at SVP Auditorium, Gopalpuri. The maintenance shall be carried out as per the schedule & checklist of the OEM of the VRV/VRF HVAC System. The comprehensive maintenance service covers preventive & breakdown maintenance including consumables & spares for the VRV/VRF System.

Signature & Seal of Firm

**Superintending Engineer (E)
Deendayal Port Authority**

TERMS AND CONDITIONS

1. **Time Schedule: The work shall be completed within 90 days from the date of issue of Work Order.**
2. **Time Schedule for Comprehensive Maintenance Service: Two years after completion of the guarantee period for VRV/VRF HVAC System.**
3. **Bidder shall be Authorized Channel Partner of offered make of VRV/VRF HVAC System.**
4. The bidder, at his own responsibility and risk is encouraged to visit and examine the site of work and its surroundings and obtain all information that may be necessary for preparing the Bid. The costs of visiting the site shall be at the Bidders' own expense.
5. DPA will award the work to the bidder whose bid has been evaluated to be techno – commercially responsive and the lowest evaluated amount bid.
6. Work shall be guaranteed for 12 months from the date of completion of the work.
7. The rates should be quoted in figures and words both. In case of difference in figure & words, the rate mentioned in words will be considered.
8. The contractor shall affix SEAL along with SIGNATURE in the Offer.
9. The work shall be carried out in accordance with the best standards of workmanship and to the entire satisfaction of the Engineer in-Charge.
10. Security Deposit @ 5% recovered from the bill and the SD can be released only after successful completion of guarantee period.
11. **Payments Terms:**
 - i) 70% payment will be released after receipt of material at site in good condition, after obtaining insurance cover as per tender condition and after inspection & certification of the same by Third Party Inspection Agency appointed by DPA and after inspection & acceptance of material by DPA.
 - ii) 30% payment will be released after successful completion of whole work (if TPI appointed then after inspection & certification of the same by Third Party Inspection Agency) and handing over to DPA.All payments shall be made in Indian rupees unless specifically mentioned.
For Comprehensive Maintenance Contract Period:
100% payment will be released after satisfactory maintenance service per annum after receipt of bill.
12. Payment will be made by RTGS only after satisfactory completion of work and submission of duly signed bill.
13. The contractor shall not deposit any materials at such a place that may cause inconvenience to the public or staff or nearby offices.
14. The Contractor shall execute the work in such a way that not to cause inconvenience to the public or staff or nearby offices and not to cause hindrance. Necessary barricading shall be done by the contractor at his own cost if required.

15. Income-tax and surcharge as applicable will be deducted from the bill while making payment to the contractor for carrying out the work and only net amount shall be paid to the contractor.
16. All the materials should be got approved from Engineer-in-Charge before put into use.
17. All the rules and regulations governing DPA will be applicable.
18. After completion of the work, the site should be neatly cleaned by the contractor.
19. The contractor shall ensure not to cause any damages to the port properties in the vicinity of work site during execution of work. If any damage occurs due to workmen/ machinery of the contractor, the contractor has to make good the loss / damage at his cost.
20. For Entry & exist of material and contractor personnel, pass shall be arranged by firm.
21. The contractor shall quote the price exclusive of GST. The contractor shall quote prevailing GST rate separately, which shall be reimbursed by DPA after ascertaining necessary compliance as per Goods & Service Tax, 2017. All other duties, taxes, cesses applicable if any, shall be borne by the contractor.

Income-Tax deductions and surcharge as applicable thereon shall be made good while making payments due to the contractor for carrying out the work and only net amount shall be paid as directed by the Central Board of Direct Taxes, Ministry of Finance, Government of India.

The rates quoted by the contractor shall be deemed to be inclusive of the taxes, duties etc. which the contractor will have to pay for the performance of this contract, except GST. The employer will perform such duties in regard to the deduction of such taxes at sources as per applicable law.

22. All the work shall be carried out to the entire satisfaction of Engineer in-Charge.

Signature & Seal of Firm

**Superintending Engineer (E)
Deendayal Port Authority**