DEENDAYAL PORT AUTHORITY

An ISO 9001:2008 & ISO 14001:2004 Certified Port

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Office of the Executive Engineer

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No.: EL/WK/ **Date: 30/05/2025**

EXPRESSION OF INTEREST

EXPRESSION OF INTEREST [EOI] for "Providing power supply for 1.6 KVA H.T 11 KV & 300 KVA LT distribution network at 7th berth oil jetty for 1MW GH Demonstration Project at DPA at Kandla".

(This Notice is issued only 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.)

Executive Engineer (Electrical), DPA invites Expression of Interest for the work of "Providing power supply for 1.6 KVA H.T 11 KV & 300 KVA LT distribution network at 7th berth oil jetty for 1MW GH Demonstration Project at DPA atKandla". 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 06/6/2025. A soft copy of EOI is also acceptable through e-mail Id. xene@deendayalport.gov.in

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Yours faithfully

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Executive Engineer (Electrical)
Deendayal Port Authority.

"Schedule B"

Sr. No.	Description of Items	Qty	Rate	Unit	Amount
1	a) Supply of following type 12 KV, 630Amps , 21KA motor operated SF 6 Gas insulated IP 67 degree of protection ,IP 54 Class outdoor type with both side extensible Ring Main Unit complete along with, Motorized with battery and battery charger etc. as per tech spec no 1(a). 1) 6way RMU (2 Incomer + 4 outgoing). b) Installation, testing & Commissioning of 12KV,630Amps 21KA Outdoor mounted RMU Unit over pedestal platform as per Technical Specification No. 1(b). 1) 6 way RMU (2 Incomer + 4 outgoing).	1 1		No. No	
2	Removal, Shifting, of RMU from existing location at 7th berth oil jetty substation & Re- erection at thermal substation, Kandla with complete testing & Commissioning of RMU Unit over pedestal platform as per Technical Specification No. 2. a) 2 way RMU (1 Incomer + 1 outgoing).	1		Comp Job	
3	Supply, of 3Ph, 4 wire Tri Vector Energy Meter for HT O/g with DLMS protocol of accuracy class 0.2s, with Metering Panel as per technical Specification no 3.	1		No.	
4	Installation, testing & Commissioning of 3Ph, 4 wire Tri Vector Energy Meter for H.T O/g on the pedestal Stand as per technical Specification no 4.	1		No.	
5	Supply at site following type of Heat shrink Straight through joint Kit & end termination kit for 3 core, 300 Sq. mm size 11kV XLPE aluminum cable as per Technical Specification No. 5. a) Outdoor / indoor type	10 20		No No	

	b) Straight through joint type				
6	Supply at Site 1.1KV grade LT XLPE Cable steel armored aluminum conductor cable, Cross linked Polyethylene (XLPE),FRLS, insulated, PVC sheathed, armoured power cables for effectively earthed systems of approved make and manufacturer as per relevant IS and as per Tech Specification No. :-06				
a)	4C x 35 Sq. mm	300		Mtrs.	
b)	4C x 70 Sq. mm	500		Mtrs.	
c)	4C x 240 Sq mm	500		Mtrs.	
d)	1C x 630 sq. mm.	600		Mtrs.	
07	Supply of 16Way 415V, L.T Distribution Panel in existing substation as per technical specification no. 07.	1		No	
08	Installation, testing and commissioning of 16way LT Distribution Panel at existing site after altering / removing the old panel at inside the substation as per technical specification no.08.	1		No	
09	This includes Design, supply of **0.45 KV** Hybrid Harmonic Filter cum Compensation bank such that >0.98 power factor can be maintained at the 0.45 kV bus for all loading conditions from 40% to 100%. for **1 MW green Hydrogen plant** at 7th OIL jetty Kandla produced using **water electrolysis**, with all equipment and accessories as per Technical Specification No. 09	1		set	
10	Installation, testing and commissioning of **0.45 KV LV Power Quality Solution** for **1 MW green Hydrogen plant** at 7th berth Oil jetty substation after altering / removing the 160KVA DG Set from inside the substation as per technical specification no.10.	1		set	
11	Disconnection, Removal, Shifting, Installation & Commissioning of DG Set AMF Panel from existing 7th berth oil jetty Substation on the newly constructed PCC				

	platform outside substation as per Technical Specification No. 11	1		Com Job	
				TOTAL	

(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 Contractor

Executive Engineer (E)
Deendayal Port Trust

1.0 Scope of Work

1.1 Execution of Design, manufacturing, inspection & testing at manufacturer's works in accordance with agreed QAP, packaging, delivery to site; handling at site – unloading, storage, shifting from point of unloading to store, storage and from store to the installation site; cleaning, assembly, touch up painting; installation at site; inspection & testing and commissioning; and operation, along with with all accessories.

1.2 The work involves to provide uninterrupted 1.6KVA 11H.T & 300KVA 2 no's L.T power supply at 7th berth Oil jetty for providing power supply to 1 megawatt green hydrogen plant

1.3 The work involves Design, Supply, fixing & termination of 6 Way RMU panel at 7th oil jetty Substation and simultaneously the existing 2-way panel from 7th oil jetty should be removed & re-erected at thermal substation the work involves with all labour & material etc.

1.4 The work involves Supply, Installation & testing of H.T metering panel at 7th berth oil jetty Substation.

1.5 The work involves Design, Supply, fixing & termination of new 16 Way L.T distribution panel at 7th oil jetty substation with 800A Capacity.

1.6 This work involves Design, supply of **0.45 KV LV Power Quality Solution** for **1 MW green Hydrogen plant** at 7th berth OIL jetty Kandla produced using **water electrolysis**, with all equipment and accessories.

1.7 The work involves Shifting of 160KVA DG set from the existing location inside 7th oil jetty Sub-station and re –locate the DG set on the PCC plinth to be constructed outside Substation were the location will be given by the Engineer-in-charge.

1.8 All equipment and material shall be designed manufactured and tested in accordance with the latest applicable Indian Standard / IEC standard.

1.9 Equipment and material confirming to any other standard which ensures equal or better quality may be accepted. In such case copies of English version of the standard adopted shall be submitted.

1.10 The electrical installation shall meet the requirement of Indian Electricity Rules as amended upto date relevant IS code of practice and Indian electricity act for releasing / providing power to the Equipment's.

1.11 Chemical Earthing system (both copper & G.I) for the entire work.

1.12 The contractor shall submit 4 copies of drawing of the complete installation showing complete layout of H.T /L. T cables, earthing etc and same to be handed over to Engineer- in –charge.

Technical Specification

Technical Specification No. 1:

Supply of Gas insulated 6-way extensible RMU switchgear which should comply the requirement stated in the following standard & specification amended up to date.

12kV, 630A, 21kA/3sec, 6 Way One Side-Extensible, Indoor Type SF6 Gas Insulated Ring Main Unit with Six (6) Motorised Vacuum Circuit Breakers (VCB) with Air Insulated Bus PT Panel

STANDARDS AND MECHANICAL DATA

Metal Enclosed switchgear:	IEC 62271-200
General Purpose switches:	IEC 60265-1
Disconnectors and Earthing switches:	IEC 62271-102
Switch Fuse Combination:	IEC 62271-105
Circuit Breakers:	IEC 62271-100
Common clauses:	IEC 60694
Pressure of SF6 gas:	1.4 bar at 20 °C
Cable bushings:	DIN 47636
Temperature class:	-25 °C - +40 °C Indoor
Degree of protection:	
- SF6 tank:	IP 67
- Front cover:	IP 2X
- Cable cover:	IP 3X
Busbars:	240 mm2 Cu
Earth bar (external):	120 mm2 Cu - Bolt dimension: M10
Thickness of Stainless Steel Tank:	2.5 mm
Thickness of CRCA Enclosure:	2.0 mm
Colours:	

- Front cover: RAL 7035

- Side and cable cover: RAL 7035

ELECTRICAL DATA – 12 kV - 28kV-1min

Nominal voltage: 11 kV

Rated frequency: 50 Hz

Rated current busbars: 630 A

Rated current cable switch disconnector : 630 A

Short time withstand current:

- cable switch disconnector with interface C (400-bolt) bushing: 21 kArms 3 sec.

- vacuum circuit breaker with interface C (400-bolt) bushing: 21 kArms 3 sec.

Rated current for transformer T-off : 630 A

Impulse withstand voltage :

To earth and between phases: 75 kV

Insulation level:

- Power frequency 1 min: 28 kV

Vacuum Circuit Breaker (6 nos.)

Vacuum circuit breaker module with vacuum circuit breaker, three position isolator/earthing switch, busbars, interlocking, earthbar and stored spring energy mechanism

1	Vacuum circuit breaker 12kV, 630A.
1	Stored energy mechanism for motorized operation
1	Integrated disconnectors switch manual operation (DS)
1	integrated earth switch making fault type manual operation (ES)

1	Cable door standard with Interlocking
1	Cable bushings interface C (400 bolted), 630 A, **site replaceable** Cable size up to: **300Sqmm 3Cx1R**
1	Cable support bar standard for single run termination
3	Terminal protector Raychem make
1	Capacitive voltage indication fixed type VPIS
1	**Aux-powered Numerical protection relay for 50,51,50N,51N,27,59 with RS485 Modbus. Make: ABB REF615 or equivalent**
1	**Trafo Protection Scheme (Master Trip Rely+ 6 nos Aux Relay+ Annonciator with Hooter) for K05 & K06 Feeder.**
3	**Protection CT 300-200/1 A, 2.5VA, 5P10 (for 01 & 02 Incomer Feeder)** **Protection CT 300-200/1A,2.5VA,5P10 (for 03-06 outgoing Feeder)** **Metering CT 300-200/1A,2.5VA,Cl 1.0 (only for 01 & 02 Incomer Feeder)**
1	**DIGITAL Multi Function Meter ,Cl 1.0 (only for K01 & K02 Feeder)**

BUS PT Metering Module

1	Air insulated metering module 12kV, 630A
3	12 kV Indoor single-phase epoxy cast resin voltage transformers cast resin Ratio: 11kV/rt3/110V/rt3 Burden and Accuracy (Secondary): 50VA Cl 0.5/3P Frequency 50Hz, Insulation Class B
1	Indication lamps – "R", "Y" & "B"
1	Space Heater with thermostat

Additional equipment mounted in respective panel.

1	Operating handle
1	Manometer per RMU tank

- **General Requirement:**

  - **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 items 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 equipments 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, Indoor Compact Switchgear (Gas Insulated), Extensible on One Side, Motor Driven Spring Charging having 4 nos. Circuit Breaker Modules mentioned as under:
Module No. 1 as 11 kV Incomer along with PT, Module 2 & 3 as Circuit Breaker Module suitable for Distribution Transformer and Module No. 4 as spare 11 kV outgoing feeder suitable for Distribution Transformer.

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

The work also includes installations, testing and commissioning of supplied RMU panel at existing Substation, Kandla.

All the RMU Panel application shall be erected by using suitable size of M.S. channel (to be supplied & erected by contractor, as per each module approved foundation drawing) foundation bolts including grouting of the bolts of each Module RMU panel. The RMU panel shall be connected with two separate and distinct earthing system. After installation of RMU panel, necessary test and 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 work includes supply & fixing of required length of insulated Rubber Mat having withstand capacity up to 33 kV, the Rubber Mat shall be laid in such a way, near the panel for operation of RMU.

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. 2:

The work involves removal & shifting of 2 way RMU from the existing location and re assemble the same at thermal substation along with testing and commissioning at thermal Substation, Kandla. This includes end terminations of Incoming and outgoing cables in all respect with cable glands, lugs for incoming & outgoing cables. During transportation or while removing outmost care should be taken

proper tools & tackles should be used for loading & transportation.

The RMU Panel shall be erected by using suitable size of M.S. channel (to be supplied & erected by contractor, as per each module approved foundation drawing) foundation bolts including grouting of the bolts of each Module RMU panel. The RMU panel shall be connected with two separate and distinct earthing system. After installation of RMU panel, necessary test and 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 work includes supply & fixing of required length of insulated Rubber Mat having withstand capacity up to 22 kV, the Rubber Mat shall be laid in such a way, near the panel for operation of RMU.

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 SPECIFICATIONS FOR ITEM NO.3.

This includes supply, of 3Ph, 4 wire Tri Vector Energy Meter for HT O/g with DLMS protocol of accuracy class 0.2s, with Metering Panel. The meter should be capable to record & LED Display KWH, KVARh, KVAH & maximum demand in KVA for 3 phase 4 wire as well as 3 phase, 3 wire AC balanced / unbalanced loads for a power factor range ZERO (Lagging) through unity up to ZERO (Leading) as per requirement given in specification.

Application: - In 7^{th} oil jetty Substation at 1 no. for Outgoing Panel for 1 mega watt GH2 plant

Sr. No	Items	Requirement
01	Type	AMR compatible static, Tri Vector for 3phase, 4/3 phase 3 wires for tariff metering purpose.
02	CT	100-150/50-5 class 0.2s
03	PT	11KV/110 v Class 0.2s
04	Ammeter	Digital type with selector switch
05	Voltmeter	Digital type with selector switch
06	Frequency	50Hz(+-)5%
07	Accuracy Class	0.2s as per IS 14697/CBIP-88
08	Secondary Voltage	For CT/PT operated HT Meters –suitable for operation from 110V Ph-Ph or 63.5V ph-N.

09	Current	CT operated I b ….1A,5A. I Max…..200% of Ib. Whole Current Ib…..20Amps. Imax……up to 600% of Ib.
10	Power factor	0.0lag-unity -0.0 lead
11	Power Consumption	The active and apparent power in each circuit .
12	Measured value	4 quadrant measurement of KWH, KVARh, KVAh
13	Parameter Shown in LED Display	**1,** 3ph-ph to neutral Vg. **2,** 3ph-ph to ph Vg. **3,** 3ph-current. **4,** 3ph KVA, KW, KVAR & PF Frequency. **5,** Total voltage, Current, Frequency, KVAh, KWH, KVArh, PF& Average PF till last MD reset. **6,** TOD KWH, KWH, KVARh (Lag & Lead) for 4 Zones. **7,** rising demand. **8,** prediction Demand KVA. **9,** Max Demand with Date & Time. **10.** TOD max Demand & date in 4 zones. **11.** Cumulative MD & MD reset counts.
13	Tamper Recording	Should be lag the following Tampers with date & Time of occurrence & restoration. - Missing Potential. - Missing I. - I&V unbalance. - Current Reversal.

		Snapshot of V, I, PF, Energy at time of Tamper. Flag for phase sequence, I reversal, V.
14	Display	LCD with Backlight, 8 Digits, 7 Segment Display. 1. Auto Scroll Display. 2. 3 Display Modes. 3. Up-Dn keys scroll.
15	Maximum Demand	Up to 3 MD register can be programmed integration period programmable from 1 to 60 minute. Reset: auto/manual/through.
16	communication	Optical port as per IEC 1107. -RS 232 port (optimal) - RS 485 using MODBUS protocol (optimal).
16	Data security	Data storage in non volatile memory 2 levels of password :- For Data reading. For programming.
17	Design	Meter shall be designed with application specific integrated circuit (ASIC) or micro controller ; shall have no moving part; electronics component shall be assembled on printed circuit board using surface mounting technology; factor calibration using high accuracy (0.2s class) software based test bench.

Specification for Metering Panel.

Sr. No	Description	Specification
01	MOC	CRC with bolted Strcurere
02	Thickness	2.5mm for door 2.0mm rest of the strucrere. 1.0mm for explosion vent.
03	Main Bus Bar	1X50X10 AL bus Bar.
04	Earth Bus bar	25X6 Al. Bus Bar
05	Sleeves	Color Coded PVC sleeves

06	Paint	RL 7032 Powder Coated after seven tank Process –Epoxy
07	Power cable Entry	Bottom
08	Control Cable entry	Bottom
09	Wiring For CT , PT Circuit For Control Circuit	2.5 Sq.mm Stranded cu wire 1.5 Sq.mm Stranded cu wire
10	Installation	Indoor Type Floor Mounted free standing.
11	Over All Dimension	600X900X1800mm
12	Min Clear Draw Out Space	1.2Mtr.
13	Weight	200 Kg approx.
14	Testing offered	Polarity & CT /PT primary injection.

4. TECHNICAL SPECIFICATIONS FOR ITEM NO. 04

This includes installation Metering Panel at the S/s wiring includes necessary wiring connection & earth linking, the works also include CT, PT shall be Tested in NABL accredited Lab, in this regard contractor shall be submitted the Test Report of CT, PT , HT Tariff Meter Works comprise with all material, licensing ,labour tools & tackles as directed by EIC.

5. TECHNICAL SPECIFICATIONS FOR ITEM NO. 05.

(a) This include supply at site outdoor & indoor type heat shrink end termination kit for 3 core, 300 Sq. mm HT armored aluminum conductor XLPE Cable of 11 kV grade as per the approved make list.

(b) This include supply at site Straight through heat shrink kit for 3 core, 300 Sq. mm HT armored aluminum conductor XLPE Cable of 11 kV grade as per the approved make list.

6. TECHNICAL SPECIFICATIONS FOR ITEM NO. 6.

This item includes supply at site 1.1 kV grade, following size of aluminium conductor XLPE insulated armoured cable confirming to IS: 7098 (Part-I) 1985 with up to date amendments, having ISI mark and of approved make. The cable shall have marking/embossing at the interval of every meter showing its progressive length. The size of LT armoured XLPE aluminium conductor cable are:

a) 4 Core, 70 Sq.mm,
b) 4 Core, 150 Sq.mm,
c) 4 Core, 240 Sq.mm,
d) 1 Core, 630 Sq. mm.

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

07. TECHNICAL SPECIFICATIONS FOR ITEM NO. 07.

This item includes design, manufacture, testing & supply at site 16 Way, 2000 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 dust and vermin proof, free standing, compartmentalized made from 14 SWG, indoor type, and fabricated from CRCA sheet on robust angle iron frame painted with two coats of Zinc rich primer paint and two coats of colour pigmented epoxy paint shade no. 631 of IS: 5. Before painting the panel, the surface treatment shall be carried out by 7 tank process including degreasing etc.

LT distribution panel shall have Bus-bars which shall be made 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 2000 Amp rating for three Phases and Half the size of Neutral including and PVC sleeving. All the bus bar shall be supported on hylem /epoxy insulator. The 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/Radium film 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 electrolytic copper 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.

The panel shall be comprised with following accessories:

1) Main Incomer (1 No.)

The Main Incomer Feeder shall be provided with 1 no. 800 Amp, 50 kA, 415 Volt, Triple 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 800/5 Amps, class 1 tape wound, shall be provided for metering on each feeder and 4 nos. control fuses / neutral links are to be provided with incomer & the control wiring shall be done with copper wire.

2) <u>DG Set Incomer (1 No.)</u>

The AMF DG Set Incomer Feeder shall be provided with 1 no. 800 Amp, 50 kA, 415 Volt, Triple 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 800/5 Amps, class 1 tape wound, shall be provided for metering on each feeder and 4 nos. control fuses / neutral links are to be provided with incomer & the control wiring shall be done with copper wire.

3) <u>OUTGOING FEEDERS (10 Nos.):</u>

The Outgoing Feeders shall be provided with

(1) 2 no. 400 Amp, Triple Pole, MCCB, 415 Volt, Thermal Magnetic , Ics=100% Icu , Breaking Capacity =50KA,

(2) 1 Nos. 400 Amp, Four pole, MCCB, 415 Volt, Thermal Magnetic , Ics=100% Icu , Breaking Capacity =36KA

(3) 2 no 250A, FP, MCCB, Thermal Magnetic , Ics=100% Icu , Breaking Capacity =50KA

(4) 6 no 100A, MCCB,FP,125A, Thermal Magnetic , Ics=100% Icu , Breaking Capacity =50KA.

(5) 3 no 63A, FP, MCCB, Thermal Magnetic , Ics=100% Icu , Breaking Capacity =25KA

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 lamp 1 no. for ON 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.

The rates shall be inclusive of all the taxes (excluding GST), insurance, transportation, unloading at site as directed by Engineer in charge.

08. TECHNICAL SPECIFICATIONS FOR ITEM NO. 08.

This item includes installation, testing and commissioning of supplied 16 way LT Power Distribution Panel in new Substation of 7th oil jetty Sub-station. The work includes end termination, connection of cables laid between Transformer's LT side and 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. The work includes all material, labour, tools & tackles as directed by Engineer in charge.

09. TECHNICAL SPECIFICATIONS FOR ITEM NO. 09.

This includes supply of **0.45 KV LV Power Quality Solution** for **1 MW green Hydrogen plant** at 7th berth OIL jetty Kandla produced using **water electrolysis**, with all equipment and accessories the specification is intended to cover the minimum requirement for complete system design, engineering, manufacturing, material, testing at manufacturer's works, painting, packing for transportation, forwarding, Supervision of Testing and Commissioning at site, site painting (if any), performance guarantee test of LV Power Quality Solution, with all equipment and accessories.

Site Information

- Project Title : 1 MW Green Hydrogen Generation Unit
- Location : Kandla
- State/ Country : Gujarat, INDIA
- Nearest town/ city : Gandhidham
- Nearest airport : Gandhidham
- Rainy Season : June to September
- Annual rainfall (Min/Avg/Max) : 15.50/467.5/1393 mm

- Seismic Zone : V (Five).

Ambient conditions:

Parameters	Units	
Ambient temperature During Summer (Min / Max)	°C	21.68 / 48.44
Ambient temperature During Monsoon (Min / Max)	°C	29.32/ 33.38
Ambient temperature During Winter (Min / Max)	°C	21.68 / 31.24
Relative humidity During Summer (Min / Max)		30.59 % / 76.32%
Relative humidity During Monsoon (Min / Max)		66.85 % / 84.57%
Relative humidity During Winter (Min / Max)		49.02 % / 59.69%
Atmospheric pressure	Kg/cm2(a)	1.026
Design Ambient Temperature	°C	50

Code and Standards

All equipment, systems and services covered under this specification shall comply with all currently applicable statutes, regulations, and safety codes in the locality where the equipment will be installed. The equipment and systems shall also confirm to the latest applicable standards.
All standards and codes referenced in the codes and standards listed below, or listed in the relevant design criteria, are considered implicit in this document. Where applicable, all codes and standards must incorporate all amendments.

IS: 5 Colours for ready mixed paints and enamels.
IS: 1248 Direct acting indicating analogue electrical measuring instruments and their accessories
IS: 2071 High Voltage Test Technique
IS: 2705 Current transformers
IS: 2099 Bushings for alternating voltages above 1000V
IS: 2544 Porcelain post insulators for systems with nominal voltage greater than 1000V
IS:3618 Phosphate treatment of iron and steel for protection against corrosion.
IS:5082 Wrought Aluminum and Aluminum alloy bars, rods, tubes and sections for electrical purposes.
IS: 5553 Reactors
IS: 5578 Guide for marking of insulated conductors
IS: 8084 Interconnecting bus bars for AC voltage above 1kV up to and 36kV .
IS: 9402 HV fuses for the external protection of shunt power capacitors
IS: 10601 Dimensions of terminals of high voltage switchgear and Control-gear
IS: 11353 Guide for uniform system of marking and identification of Conductors & apparatus terminals
IS: 12672 Internal fuses and internal overpressure dis-connectors for shunt capacitors
IS: 13925 Shunt capacitors for AC power systems having a rated voltage above 1000/ 660V IEC 60282-1 High voltage fuses -Current Limiting fuses
IS/IEC 60470 High Voltage Switchgear Alternating Current Contactors and contactor-based motor starters
IEC 60871 Shunt capacitors for AC power systems having rated voltage above 1000V. IEC

60076	Power Transformers
IEEE-519	Recommended Practice and Requirements for harmonic Control in electric power Systems
IS/IEC 62271 (Part 1, 102, 103, 105, 109, 200, 201)	High Voltage Switchgear and Control gear
IEC 62271	High Voltage Switchgear and Control-gear
IS I IEC: 60529	Degrees of protection provided by enclosures (IP Code). IS:13925(Part-1) Capacitor IEC 60871-1,
IS:5553	Series Reactor
IEC 60931-3	Internal fuse

Scope of Work:-

The package in general includes but not limited to design engineering, manufacturing, handling, cleaning, inspection & testing at manufacturers work ,coating ,shop painting and related approvals of statutory bodies as applicable, packing and delivering at site, supervision of erection and commissioning ,supervision of performance guarantee testing at site and site services as specified elsewhere for LV Power Quality Solution and providing the service as delineated in the document and in accordance with applicable codes and standards . The work shall include all necessary and/or usually supplied equipment and appurtenances for the safe, efficient, and reliable operation of LV Power Quality Solution within the scope of this specification whether such items are specifically referred to in this specification and in accordance with applicable codes and standards. LV Power Quality Solution shall confirm to high standard of engineering design and workmanship and be capable of performing in continuous commercial operation up to Bidder's guarantee in a manner acceptable to PURCHASER/OWNER. Bidder/contractor shall supply the Power Quality Solution as a hybrid of Active and Passive compensation and filtering. The passive component shall provide maximum kVAR compensation and the active component shall be designed to cater to the variable kVAR requirements, according to different plant loading conditions, such that there is no overcompensation of kVAR causing leading power factor occurs. The share of passive and active compensation in the Power Quality Solution package should be optimised with respect to efficiency, total footprint as well as initial CAPEX.

Any items though not specified but which are required to make reliable trouble-free operation shall also be taken to be included in the scope of supply.

The scope of supply of shall cover the following:

Sr.No.	Description of Equipment	Quantity (Nos.)

1	Bidder to design 0.45 kV Hybrid Harmonic Filter cum Compensation bank such that >0.98 power factor can be maintained at the 0.45 kV bus for all loading conditions from 40% to 100%. Please note that our requirement is to install harmonic filters and compensation banks on the 0.45 kV bus to improve power factor an mitigate harmonics in compliance to IEEE-519 limits. Here, also attached are the harmonic spectrums and harmonic limits along with system data for reference. **Type: Indoor Type**	1

All fittings and accessories required for the completeness of the equipment, whether specifically mentioned or not, but considered essential for satisfactory performance, shall be included in the scope of supply.

Terminal Points

The following is a list of terminal points:

(a) The Power terminals for Panels.

(b) One no. (1) of 240V/415V AC auxiliary power supply shall be provided by Purchaser. Further distribution within Panel as per manufacturer's standard type tested design shall be by Bidder.

(c) Panel Control and CT/PT terminals (for connection to equipment not under the scope of supply of this specification) shall be provided by Bidder. All external connections shall be through terminal block. Terminal blocks shall be grouped according to Power supplies, annunciation, functioning etc. Spare terminals shall be wired up to terminal block.

Information/ Documents/ Data to be furnished with the bid

Bidder shall submit the following drawings / data / information along with offer. Several blank documents in excel format have been attached. Bidder to fill up the excel sheets and submit along with offer:

Sr No	Document
1.	Technical datasheet
2.	General Arrangement drawing along with different views and cable termination details
3.	Single line Diagram & Bill of Material
4.	QAP and Inspection & Test Plan
5.	Past Project References
6.	Type Test Certificates not Older than 5 Years
7.	Commissioning & start-up spares list

Technical Description

(a) 0.45 kV LV Power quality solution shall be supplied with indoor equipment e.g., reactor, Capacitor etc.

(b) 0.45 kV LV Power quality solution shall be located indoor in ventilated substation area.

(c) LV Power quality solution shall provide maximum net KVAR at rated nominal voltage. The

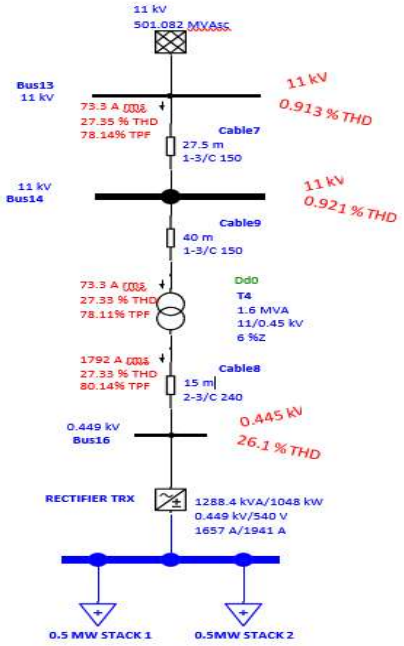
insulation system shall be designed to withstand continuous over voltage of 110%.

(d) It is supplier's responsibility to ensure that effect of harmonics shall be taken in consideration while designing the complete system. Supplier shall comply with relevant standards, as applicable.

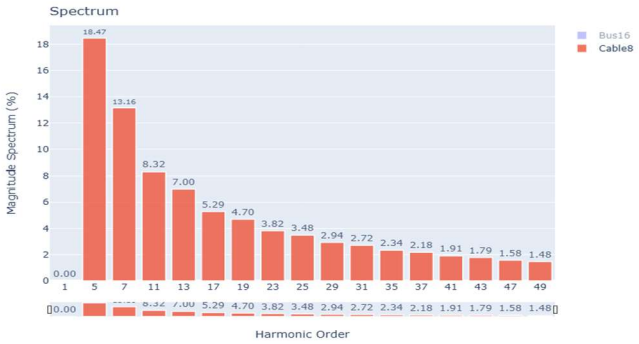
1.0 Attachments

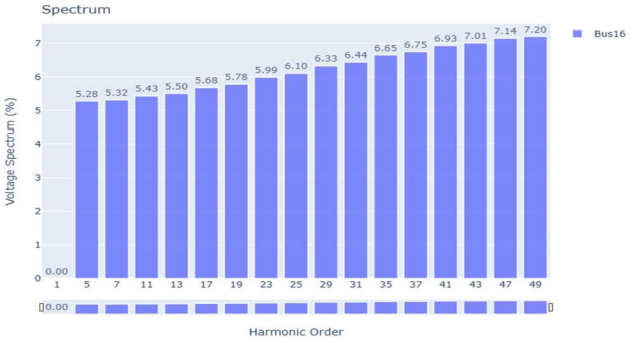
Annexure-1. SLD
Annexure-2 . Harmonic Spectrum
Annexure-3. Impedance Plots
Annexure-4. Rectifier Loading Characteristics Annexure-5bb Harmonic Limits.

ANNEXURE-1 SLD

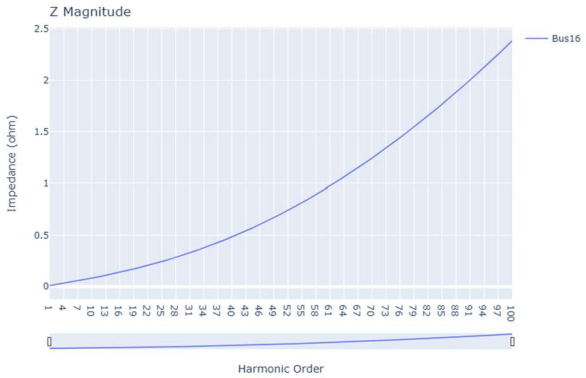


Annexure-2 . Harmonic Spectrum





Annexure-3. Impedance Plots



Annexure-4. Rectifier Loading Characteristics

RECTIFIER LOADING CHARACTERISTICS

	BOL	EOL
Amp load	Power Factor	Power Factor
900	0.6	0.73
1125	0.61	0.74
1350	0.62	0.75
1575	0.63	0.77
1800	0.64	0.78
2025	0.66	0.8
2250	0.67	0.81
2300	0.67	0.83

Annexure-5 Harmonic Limits.

System

Bus voltage V at PCC	I_{SC}	I_L (100% loading)
11kV	26.3 kA	73.3 A

Voltage distortion limits

Bus voltage V at PCC	Individual harmonic (%) h≤50	Total Harmonic distortion (%)
11kV	3.0	5.0

Bus voltage V at PCC	Individual harmonic (%) h≤50	Total Harmonic distortion (%)
11kV	3.0	5.0

Current distortion limits

Maximum harmonic current distortion in percent of I_L						
I_{SC}/I_L	2≤h<11	11≤h<17	17≤h<23	23≤h<35	1≤h<50	TDD
<20	4.0	2.0	1.5	0.6	0.3	5.0
20<50	7.0	93.5	2.5	1.0	0.5	8.0
50<100	10.0	4.5	4.0	1.5	0.7	12.0
100<1000	12.0	5.5	5.0	2.0	1.0	15.0
>1000	15.0	7.0	6.0	2.5	1.4	20.0

10. TECHNICAL SPECIFICATIONS FOR ITEM NO. 10

This includes installations, testing and commissioning of supplied 0.45KV LV Power Quality Solution panel at exiting 7th berth 11/0.433 kV Substation, Kandla. the 0.45KV LV Power Quality Solution panel shall be erected by using suitable size of M.S. channel (to be supplied & erected by bidder/contractor, as per required approved foundation drawing) foundation bolts including grouting of the bolts of LV panel. The RMU panel shall be connected with two separate and distinct earthing system. After installation of L.V panel, necessary test and trial shall be carried out for proper functioning of safety, devices, relay etc. and before charging L.V 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 work includes supply & fixing of required length of insulated Rubber Mat having withstand capacity up to 22 kV, the Rubber Mat shall be laid in such a way, near the panel for operation of L.V panel.

The Works comprise with all material such at connecting L.t cable, control cables, labour tools & tackles as directed by EIC.

11. TECHNICAL SPECIFICATIONS FOR ITEM NO. 11

This item includes removal, shifting, installation and commissioning of 160kVA DG Set from substation Room to outside S/.s on the PCC plinth.

This item includes preparation of PCC Foundation which should be of ratio of 4:2:1. The length and breadth of the foundation shall be 300 mm more from the respective length and breadth of the Power Generator. The height of the foundation shall be 500 mm, i.e., 200 mm below and 300 mm above the ground level.

The work 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 best workmanship & best industrial practice to the satisfaction of 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 AMF Panel shall be completed, checked and adjusted to ensure safety and satisfactory operation of the equipment. After installation of the AMF Panel, testing and commissioning shall be done as directed. The work includes all material, labour, tools & tackles as directed by Engineer in Charge.

-s/d-

Signature & Seal of Contractor

Executive Engineer (E)
Deendayal Port Authority