

## Detailed Brief for EOI Requirements

### 1. Supply of Lead Anode:

LEAD ANODE FOR NICKEL ELECTROWINNING SECTION

WITH COPPER HANGER BAR; AS PER DRAWING ATTACHED

MATERIAL OF CONSTRUCTION:

HANGER BAR OF ELECTROLYTIC TOUGH PITCH (ETP) COPPER CAKE OR EQUIVALENT

ROLLED LEAD CALCIUM TIN ALLOY WITH COMPOSITION OF

Please consider following specifications

Pb 99.5%Min

Ca 0.06-0.07%

Sn 0.07-0.1%

**For Cell house A** – Lead anode dimension & drawing mentioned below.

Rolled Lead Sheet 865x1360x8 MM

Copper bar 30x40x1200

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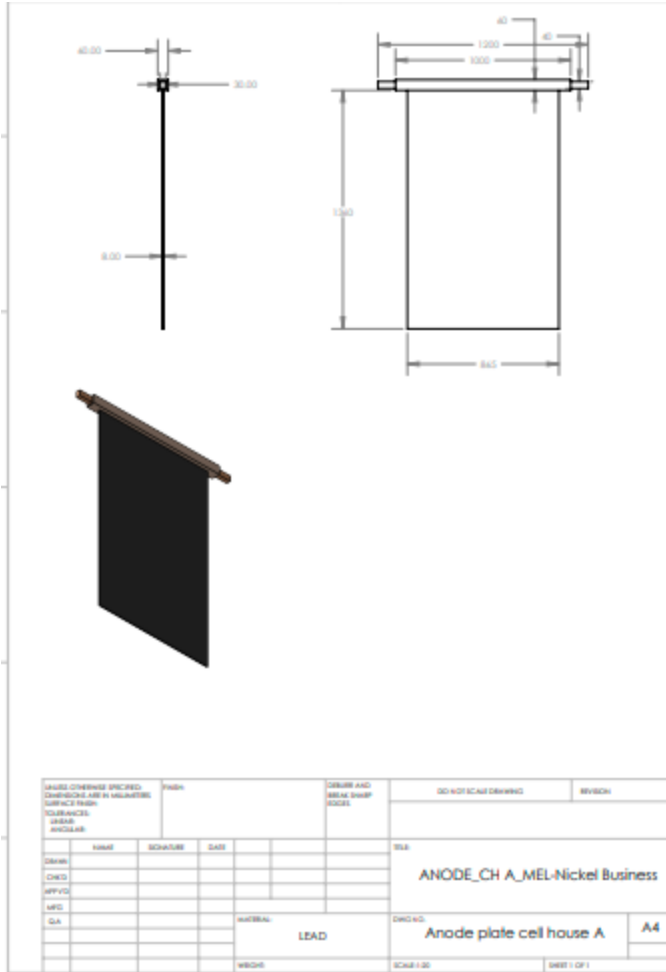
**Works: L-15, L-19, L-20, M-11, Landfill Site, Cuncolim Industrial Estate, Cuncolim, South Goa – 403703, India,**  
**GSTIN NO. – 30AAHCS6896A1ZE, IEC – 0304026336**

Website: [www.vedantalimited.com](http://www.vedantalimited.com)

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**For Cell House B** - Lead anode dimension & drawing mentioned below.

Rolled Lead Sheet 1000x1325x8 MM

Copper bar 20x40x1330

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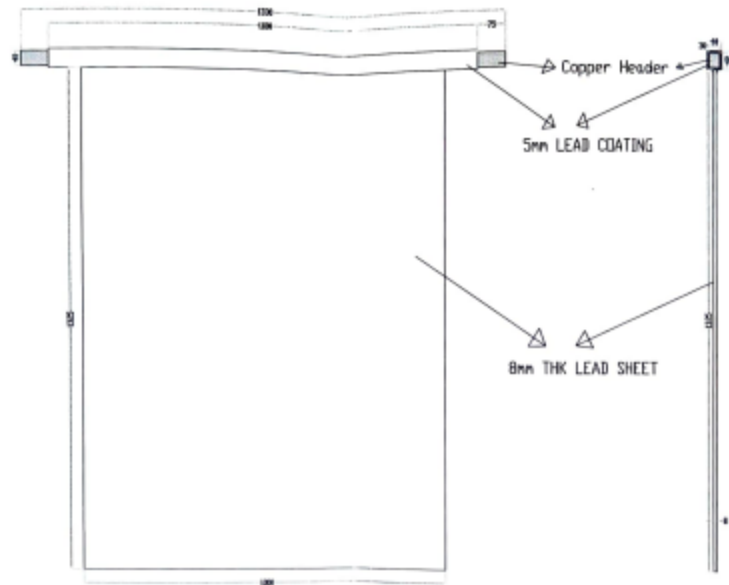
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ALL DIMENSIONS ARE IN mm.

Yearly Qty: 500 no's each type of lead Anode.

Immediate basis 250 no's each qty & after 6 month 250 no's each qty.

## 2. Supply of Copper Bus Bar:

## 3. Supply Rectifier:

Technical Scope of work for Supply, Installation, Erection and Commissioning of 15 K Amp,150 V DC ,33 KV Thyristor based 12 pulse Power Rectifier Transformer for Cell House B

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## INTRODUCTION:

**Vedanta Resources plc.:** Vedanta has entered an exciting phase of growth, with a target of \$30bn revenue and \$10bn EBITDA and has further plans to invest \$20bn in 4-5 years' time in the expansion of our brown field and some green field capacity of Oil & Gas, Renewable energy, display glass, semiconductors, mining, and smelting. In pursuit of this ambitious plan, we have persevered to align our practices to the areas of Digital, ESG, Quality and MIP, as well as a culture of excellence and innovation, to establish a world-class organization within the diversified natural resources and technology space.

### Malco Energy Limited

Vedanta has acquired "Nicomet" (Hereafter referred as Malco Energy Limited) in Nov'21.

- Malco Energy Limited is the 1st and the only company engaged in manufacturing of Primary Nickel in India.
- Our Products are Nickel Metals, Cobalt Sulphate and Nickel Sulphate crystals.
- Our By Products include Sodium Sulphate, Manganese Sulphate Crystals
- MEL is in the elite club of refinery with capacity of 7,500 TPA of Nickel & Nickel Sulphate, Cobalt Sulphate.
- Vedanta's Nickel Business will play a critical role in supporting Govt's mission for an Atmanirbhar Bharat

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## 1. Scope of work:

- **Objective:** Design, Engineering, Supply, Installation and Commissioning of 150 V DC ,15000 Amp DC Thyristor based 12 pulse Rectifier for Cell house B Nickel metal Production.

## Technical scope for plant Automation:

1. Supply ,Installation & Commissioning of Thyristor based Rectifier type TCR HT Voltage 150V/15000 A (12 PULSE) intended to operate off 33 KV  $\pm$  10 %, 50 Hz  $\pm$  5%, and capable of delivering DC output of 150V at 15000A in an ambient temperature of 50 Deg. C. Scope of supply: TCR HT (CC-CP) 150V/15000 A (12 PULSE) Rectifier Transformer – OFWF Cooled Thyristor Rectifier Cubical – DMW Cooled Cooling Skid Control Panel with PLC LT AC DB - AN DC Measuring System (2 Nos) DC motorized Isolators 1000V/18 kA, Off Load-2 no/Rectifier (1 nos). Efficiency should be more than 98 %. with complete Protection System, Duty :100 % Continuous. Insulation class A winding. CONTROL SECTION OF RECTIFIER CUBICLE: The Control cubicle comprises of control components, MPCB's, indicating lamps, fault Annunciation windows, push buttons, Hooter, DC meters, Digital Signal processor-based microcontroller, Synchronizing power supply card, Analog interfacing card, Relay card, Isolation cards etc. Additional PLC and HMI display for all faults indication and interfaced with Remote communication system Protection class shall be IP51 for Control section.
2. Supply, Installation & Commissioning of 33 KV VCB (1. Main Incomer 2. Harmonic Filter /APFC VCB 3) Outgoing Feeder) Reputed make Siemens /SCHIENDER/ABB with Back door interlocking and Electrical and mechanical interlock.

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3. Supply, Installation & Commissioning of Automatic Power factor correction and harmonic filtering with PFIC filter Panel system at 33.00kVac input as per HT Rectifier design on full load.
4. Supply, Installation & Commissioning of make Thyristor Rectifier type TCR 140V/1000 A (6 PULSE) intended to operate  $415V \pm 10\%$  ,  $50\text{ Hz} \pm 5\%$ , and capable of delivering DC output of 145V at 1000A in an ambient temperature of 50 Deg. This will be Used stand by power back supply in case of grid Power Failure. Scope of Supply TCR HT (CC-CP) 140V/1000 A (6 PULSE) Rectifier Transformer – Air Cooled Thyristor Rectifier Cubical – Air Cooled Control Panel -AN with Complete protection system with control panel. Complete Automation with electrical and mechanical interlocks.
5. Supply, Installation & Commissioning of 415 V ACB with interlock for Stand by Rectifier power Rectifier transformer.
6. Supply, Installation & Commissioning of Electrical graded copper busbar from Rectifier to Cell Connection (Electrolyser) as Per design (40 Mtr. Positive and 30 Mtr. Negative Bus bar).
7. Supply, Installation & Commissioning of 110 V ,40 Amp, DC Battery Charger with 1 hours battery backup for VCB, ACB an Control circuit.
8. Supply, Installation & Commissioning Alarm/tripping /metering: Audio Visual Alarm along with Trip will be provided for following faults. 1. Fuse Failure. 2. Thyristors over Temperature. 3. Transformer Over Temperature. 4. DC Over Voltage. 5. DC Over Current. 6) Earth Fault monitoring relay 7). OTI, WTI, Buchholz relay, MOG, PRV 8. RC for Thyristors 9. Heat sink over temperature 10. SCR Fuse failure 11. Emergency OFF 12. Rectifier cooling Fan Fail Etc (add more as per rule and rectifier protection system).
9. Testing of Main and Auxiliary Rectifier transformer at site as well as manufacturing test certificates.: 1) Mechanical tests (Sealing, Support etc.) 2. Loss calculation at rated current. 3. Testing of IR & Polarization index. 4. Calculation of power absorbed by fans, pumps etc.5. Determination of total losses 6. Determination of total losses in rectifier.7) Heat run test. 8) Rated short circuit test for incoming cable box (transformer) enclosure 9) No load 10) Range Test 11) Tan Delta Testing 12) HIPO test /Leakage current test 13) Testing of Reverse power injection test 14) Transformer Oil Test report.
10. Man & Material Loading, boarding and transportation will be under vendor's scope. Supervision, travel charges, local conveyance & Accommodation are in vendor's scope.

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11. Submission of Electrical Power and Control Circuit diagram for each section in Auto cad and submitted 3 coloured copies and soft copy of Control Circuit Diagram. All relevant original software has been submitted to Vedanta.
12. Energy Management System for rectifier power consumption.
13. Civil drawing & E&I Drawing to be submitted as per rectifier design within a week from PO placement.
14. All interconnection power and control cables from 33 KV Main incoming HT VCB to Rectifier outgoing will be under vendor's scope.
15. All statutory compliances related to HT rectifier charging will be under vendor's scope.
16. Delivery Period Should be less than 3 months.
17. Warranty on Complete Rectifier Unit from Date of Commissioning should be 2 yr.
18. Payment Clause :10 % Will be kept on hold and will be released after one year against PBG.
19. LD Clause 0.1 % Per Week against Late material delivery.
20. Vendor Scope of work starts from Main Incoming VCB and END at Bus Bar Termination in Cell house
21. This Project will be done END to END basis inclusive material and service cost.
22. Equipment Manufacturer test certificate must be submitted.
23. Free of Cost Support and service for one year from DOC.
24. Mode of Control will be Remote as well as local (From front of panel through potentiometer/selector switch) & (Control via Analog / Digital Signal through touch HMI controller with Potentiometer/Selector switch).
25. Vendor must be submitted pre -commissioning site requirement (Incoming power /Civil /Control room/GA drawing etc.) along with Offer which his under Vedanta scope.
26. All DC measurement, Power on off /Auto manual, set rest/alarm indication, metering unit & Fault annunciator window /hooter must be available on panel.
27. Supply and Commission PDB/MCC panel related to new rectifier will be under vendor's scope.
28. Any power supply other than 220 V AC /440 V AC will be under vendor's scope.
29. Earthing System will be done by Vedanta under vendors supervision and drawing.
30. Lighting arrangement will be carried out by Vedanta as per vendors requirement.

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31. Testing, inspection & FAT will be carried out as per joint discussion between Vedanta and vendor.
32. List of mandatory /consumable spare list to be provided at the time of PO.
33. Offer should include freight and insurance charges.
34. Output Busbar from Rectifier to Electrolyser (cell) will be a part of vendors scope through copper bus with supporting accessories.

### 3. Offer Submission as per attached Scope of Work for HT Rectifier Procurement:

S.NO.	Activity detail	U O M	N o s .	Un it Co st	Tot al Cos t
1	<p>Supply of Thyristor based Rectifier type TCR HT Voltage 150V/15000 A (12 PULSE) intended to operate off 33 KV <math>\pm</math> 10 %, 50 Hz <math>\pm</math> 5%, and capable of delivering DC output of 150V at 15000A in an ambient temperature of 50 Deg. C . Scope of supply: TCR HT (CC-CP) 150V/15000 A (12 PULSE) Rectifier Transformer – OFWF Cooled Thyristor Rectifier Cubical – DMW Cooled Cooling Skid Control Panel with PLC with heat exchanger. LT AC DB - AN DC Measuring System (2 Nos) DC motorized Isolators 1000V/18 kA, Off Load-2 no/Rectifier (1 nos). Efficiency should be more than 98 % . with complete Protection System, Duty :100 % Continous.Insulation class A winding. CONTROL SECTION OF RECTIFIER CUBICLE: The Control cubicle comprises of control components, MPCB's, indicating lamps, fault Annunciation windows, push buttons, Hooter, DC meters, Digital Signal processor based microcontroller, Synchronizing power supply card, Analog interfacing card, Relay card, Isolation cards etc. Additional PLC and HMI display for all faults indication and interfaced with Remote communication system Protection class shall be IP51 for Control section. Constant Current Regulation. It include power and control cables.</p>	Set	1		

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2	Supply of 33 KV VCB (1. Main Incomer 2. Harmonic Filter /APFC VCB 3) Outgoing Feeder) Reputed make Siemens /SCHIENDER/ABB. It include power and control cables.	Set	3		
3	Supply of Automatic Power factor correction and harmonic filtering with PFIC filter Panel system at 33.00kVac input as per HT Rectifier design on full load	Set	1		
4	Supply of make Thyristor Rectifier type TCR 140V/1000 A (6 PULSE) intended to operate 415V $\pm$ 10 % , 50 Hz $\pm$ 5%, and capable of delivering DC output of 145V at 1000A in an ambient temperature of 50 Deg. This will be Used stand by power back supply in case of grid Power Failure. Scope of Supply TCR HT 140V/1000 A (6 PULSE) Rectifier Transformer – Air Cooled Thyristor Rectifier Cubical – Air Cooled Control Panel -AN with Complete protection system with control panel. Complete Automation with electrical and mechanical interlocks. Air cooled system. It include power and control cables.	Set	1		
5	Supply of 415 V ACB with interlock for Stand by Rectifier power Rectifier transformer and Power distribution panel procurement for rectifier auxiliary supply. It include power and control cables.	Set	1		
6	Supply of Electrical graded copper busbar from Rectifier to Cell Connection (Electrolyser)as Per design (40 Mtr. Positive and 30 Mtr. Negative Bus bar).	Mt r.	7 0		
7	Supply of 110 V ,40 Amp, DC Battery Charger with 1 hours battery backup for VCB, ACB and control circuit. It include power and control cables.	Set	1		
8	Alarm/tripping /metering: Audio Visual Alarm along with Trip will be provided for following faults. 1. Fuse Failure. 2. Thyristors over Temperature. 3. Transformer Over Temperature. 4. DC Over Voltage. 5. DC Over Current. 6) Earth Fault monitoring relay 7). OTI, WTI, Buchholz relay, MOG, PRV 8. RC for Thyristors 9. Heat sink over temperature 10.	LS	1		

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	SCR Fuse failure 11. Emergency OFF 12. Rectifier cooling Fan Fail Etc 13) Reverse charging (add more as per rule and rectifier protection system if require) It include control cables.				
9	Testing of Main and Auxiliary Rectifier transformer: 1)Mechanical tests (Sealing, Support etc.) 2. Loss calculation at rated current. 3. Testing of IR & Polarization index. 4. Calculation of power absorbed by fans, pumps etc. 5. Determination of total losses 6. Determination of total losses in rectifier.7) Heat run test. 8) Rated short circuit test for incoming cable box (transformer) enclosure 9) No load 10) Range Test 11) Tan Delta Testing 12) HIPO test /Leakage current test 13) Testing of Reverse power injection test 14) Transformer Oil Test report.	LS	1		
10	Service Cost which includes Erection, Installation and Commissioning Cost, Service manpower Cos. All Man & Material Loading, boarding and transportation will be under vendor's scope.	LS	1		
11	Cost for Supervision of erection and commissioning, Travel charges, Accommodation, local conveyance are in vendors scope scope.	LS	1		

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2. RESPONSIBILITY OF CLIENT:

All tools, tackles, hydra, Crane, PPE will be under vendor's scope. Any measurement or drawing creation will be under vendor's scope. Electrical, Mechanical, Process, Automation related technical expertise to be provided.

3. SITE CONDITIONS:

Plant is under operation so utmost care to be taken site electrical, instruments, process detail.

Ambient conditions typical in ports such as rain, snow, or fog, are mastered. Ambient temperature 5 to 55 C. Relative humidity 95 % Max at 55 C as per Goa climate.

4. GENERAL INSTRUCTIONS TO TENDERER:

The Vendor shall consider adequate safety factors. Vedanta Safety guideline must be followed.

5. PAYMENT CLAUSE:

60% Payment will be released as per material delivery and 30 % Will be released after commissioning and charging approval. 10 % of total billing will be kept as a retention amount and will be released after One-year PBG clearance.

6. DELIVERY SCHEDULE:

- a) Submission of Quotation: 5 days.
- b) PO Placement after Technical acceptance: 10 days
- c) Civil drawing and per commissioning job plan: 7 days
- d) Rectifier system related material delivery at Site: 3 months

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- e) Erection, Commissioning and charging approval of Complete rectifier system: 15 days
- f) Entire project completion within 4 months from the date of PO.

**4. Complete CHA Services:**

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