

TECHNICAL PROCUREMENT SPECIFICATION

for

11 kV, 50 Hz, 630 Amps RING MAIN UNITS

FACT-UC

TPS NO. : TPS-RMU-TS-01

R0	Antony Shajan		Ramesh Babu K		Joy M A	
ISSUE	PREPARED BY	DATE	CHECKED BY	DATE	APPROVED BY	DATE

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1. INTRODUCTION

- 1.1. This specification gives minimum user requirements for a new 11 kV, 50 Hz, 630 A Ring Main Units (RMU) to be provided in the indoor substations of FACT Udyogamandal, Cochin, Kerala.
- 1.2. Fertilisers And Chemicals Travancore (FACT) is a Government of India Enterprise engaged in manufacture of fertilizer, chemical & petrochemical products, engineering consultancy and engineering fabrication. FACT-Udyogamandal Complex (FACT-UC) is a division of FACT located at Udyogamandal, Kochi, Kerala that manufactures intermediates and products like sulphuric acid, oleum, ammonia, ammonium phosphate, ammonium sulphate, caprolactum etc.
- 1.3. Vendor's scope shall include design, manufacture, testing, documentation, packing, dispatch, supply and commissioning assistance of RMU, as further described in sections that follow.
- 1.4. The feeder details of proposed RMU are provided in the data sheet.
- 1.5. The proposed RMU's are intended to commission in three substations in ring connection, sited at FACT Udyogamandal Township. Two RMUs feeds 500kVA transformers each and one RMU feeds 250kVA transformer.
- 1.6. The electrics supplied shall be complete with all accessories and shall comply with all required statutory requirements and standards.
- 1.7. The workmanship and the entire construction shall be in accordance with IS/IEC.
- 1.8. The vendor shall provide warranty for the RMU as specified in section 17 herein.
- 1.9. This is a two bid enquiry with Pre-Qualification Criteria. An unpriced copy of the price bid as specified in Annexure II shall be attached with the technical bid for technical evaluation.
- 1.10. Only offers that comply with the requirements as specified in the bid documents and specification shall be considered for further evaluation. If the vendor however finds some deviation unavoidable, such deviations shall be clearly mentioned in the compliance and deviation statement in the specified format with proper justification. The purchaser reserves the right to reject or accept the offer with such deviations.

2. PERIOD OF COMPLETION

- 2.1. The vendor shall complete the supply of the RMU within a period of 20 weeks from date of final drawing review/approval. The drawings for review/approval shall be submitted within 10 days from the date of LOI. Revised final drawings for final approval, after incorporating the all comments/ changes from Purchaser, if any, shall be submitted within 10 days from date of intimation of comments/ changes in drawing from Purchaser.

2.2. Time is of the essence of this contract. The vendor shall complete the supply of the RMU within the time specified above.

2.3. All drawings and documents as per Vendor Data Requirement shall be supplied as specified.

3. SCOPE OF SUPPLY

Vendor's scope shall include:

3.1. Design, manufacture, testing, documentation, packing, dispatch, supply and commissioning assistance of RMU as specified herein.

3.2. Furnishing all drawings and documents as per section 16, 'Vendor Data Requirements'.

3.3. Inspection and tests as per section 14.

3.4. All necessary accessories including special base frame if required, bolts and nuts shall be supplied by the vendor. However, basic civil foundation and foundation frame, as per GA diagram are under the scope of purchaser.

3.5. Any other item that may not be specifically mentioned in this specification but found required for the efficient working of the system and the successful completion of the job.

4. STANDARDS

Unless otherwise specified elsewhere in this Specification, the RMU, Switchboard (Switchgear), Load Break isolators, Instrument Transformers and other associated accessories shall conform to the latest revisions and amendments thereof to the following standards.

1. IEC 62271-200/IS 12729:1988 - General requirement for Metal Enclosed Switchgear.
2. IEC62271-102&103/IS 9921- Alternating current disconnectors (Load break isolators) and earthing switches.
3. IEC 62271-100 & 200/IEC 60056/IS 13118:1991 - Specification for Circuit Breaker.
4. IEC 60044-1/ IS 2705:1992 - Current Transformer.
5. IEC 61869-3/ IS 3156:1992 - Voltage Transformer.
6. IEC 60376 - Filling of SF6 gas in RMU.
7. Indian Safety Regulations 2010 / Relevant IS.

All other included items shall conform to latest IEC/IS standards.

5. GENERAL REQUIREMENTS

- 5.1. The equipment shall operate satisfactorily at the rated load under the service conditions and power supply conditions specified in the data sheets.
- 5.2. The RMU shall be Indoor, floor mounted, single front, non-extensible, free standing type fabricated preferably from CRCA sheet steel folded construction. Thickness of sheet steel for load bearing members, partitions and doors shall be as per manufacturer's standard design. All fasteners used for assembly and fixing of components shall be of corrosion resistant / passivated MS. All components, cable connections, bus bars, etc. shall be easily accessible for maintenance work.
- 5.3. The RMU shall be Louver less design, fully compartmentalized, and dust, damp & vermin proof. Doors and openings shall be provided with neoprene gaskets. Degree of protection for cable chamber, mechanism chamber etc. shall be as per manufacturer's standard design. However Degree of protection for SF6 gas enclosure shall be IP65 (Min).
- 5.4. If a sectionalized construction is adopted for the RMU for ease of transportation, the vertical units shall form a continuous line up of uniform height and front line up when assembled together. Adequate lifting eyes shall be provided on each section.
- 5.5. Individual feeder modules shall be housed in independent and separate enclosed compartments, separated from each other by barriers.
- 5.6. There shall be ample space for connection of incoming and outgoing power cables (sizes mentioned in data sheet). Sufficient clearance shall be maintained between phases and also the frame as per IEC/IS.
- 5.7. There shall be provision for battery back-up with charger for control supplies.
- 5.8. Purchaser shall provide normal 230V, 50Hz AC supply for each RMU to feed the battery charger unit if required. Necessary power supply modules to be engaged by supplier for realizing breaker control supply, other auxiliary supplies, spring charging motor supply etc.
- 5.9. Outgoing feeder is planned as a transformer feeder with Vacuum circuit breaker. Vendor to devise suitable control supply, spring charging motor supply, battery and battery charger.
- 5.10. The SF6 gas enclosure shall be made up of non-magnetic stainless steel.
- 5.11. Pressure relief in the event of internal arc to the bottom only.
- 5.12. Cable compartment also to be type tested for 21kA/1s to ensure the safety of operator.
- 5.13. Any design less than AFLR (Internal arc classification- Front, Lateral & Rear) is not acceptable.

- 5.14. Fault Passage Indicator using optical sensor is required.
- 5.15. Voltage presence indicator is required. (Preferably Capacitive voltage detection system).
- 5.16. Gas Density Monitor is required.
- 5.17. Suitable CT, PT for metering and protection is required.
- 5.18. Multifunction meter to view Current, Voltage, Energy, Power factor etc is required.
- 5.19. Transformer protection relay shall be microprocessor based numerical type relay having protection like over current (IDMT), Earth fault (Instantaneous) etc. (Transformer name plate details provided in the data sheet).
- 5.20. Acceptable makes of relays are GE/ABB/SIEMENS/SCHNEIDER/L&T.
- 5.21. All operating positions shall be on the front of the unit and position of each of the switches shall be displayed on a mimic diagram. Clear indicators showing 'ON', OFF' and 'Earth' shall be provided on polycarbonate or metal painted labels. (Sticker type labels are not acceptable).
- 5.22. Meters, Lamps, Switches shall be flush mounting type and shall be installed in easy accessible position within the appropriate chamber on the front of the cubicle. All fixing bolts, screws etc. appearing on the panel shall be so arranged as to present a neat appearance. Door hinges shall be concealed type.
- 5.23. Necessary foundation bolts, nuts and washers shall be supplied along with the equipment.
- 5.24. Unloading of materials to FACT UD store and leading to site shall be done by the purchaser.
- 5.25. Painting shall be as mentioned in the data sheet. Final coat shall be epoxy based. All unpainted parts shall be plated to prevent corrosion.
- 5.26. Special tools if any shall be supplied with of RMU.

6. BUSBARS

- 6.1. Busbars shall be of high conductivity aluminum or copper, rated for 630A continuous current.
- 6.2. The bus bar supports shall be of non-hygroscopic material and shall be mechanically strong.
- 6.3. Appropriate identification shall be provided on the busbars.

7. FEEDER ARRANGEMENT

- 7.1 RMU shall have two numbers of load break Isolators as incomers and one number of vacuum circuit

breaker as outgoing transformer feeder.

- 7.2 There shall be suitable earthing provision with interlock, for all feeders as per standard manufacturer's design.

8. CABLE TERMINATION

- 8.1. Necessary arrangements shall be provided for terminating the cables of the type and size specified in the data sheet.

9. INSULATION

- 9.1. All insulating materials shall be non-hygroscopic.

10. EARTHING

- 10.1. Earthing shall be as per IS 3043.

11. CABLE SWITCH MODULE

- 11.1. The cable switch Module shall be a three position load break Isolator with earthing switch using SF6 gas as an arc quenching medium.
- 11.2. The switch positions shall be close – open – earthed. In the open position the switch shall satisfy the Isolator requirements.
- 11.3. Position indicators shall be available for load break Isolator and earthing switch.
- 11.4. Mechanical interlocks shall be available between load break Isolator and earthing switch.
- 11.5. Operation of load break Isolator and earthing switch shall be electrical / manual. Suitable control supply for closing/opening mechanism, as per manufacturer's design requirements shall be employed.
- 11.6. The isolating distance between the OFF and the ON position in the load break Isolator should be sufficient to withstand dielectric test as per IS/IEC, so as to have enough isolating distance for ensuring safety during DC injection for Cable testing.

12. CABLE COMPARTMENT

- 12.1. All bushings shall be situated at the same height from the floor and shall be protected by a cable compartment cover.
- 12.2. Bushings shall be rated for the specified voltage and current in data sheet.
- 12.3. Bushings shall be suitable to connect single run of cable per phase.

13. FUSES

- 13.1. Fuses shall be as per IS/IEC.

14. INSPECTION AND TESTS

- 14.1. Comprehensive Inspection and Testing Plan for RMU shall be submitted by the bidder including testing, inspection & witnessing required by the Purchaser. The Comprehensive Inspection and Testing Plan shall be approved by the Purchaser.
- 14.2. Type Test certificates as per IS/IEC shall be provided along with offer.
- 14.3. Routine tests shall be as per IS/IEC.
- 14.4. Bidder shall bear the cost of all the tests.
- 14.5. Bidder shall arrange for a Pre-Dispatch Inspection at manufacturer's works, to be witnessed by representative of purchaser. Bidder shall give 15 days advance intimation to Purchaser for inspection and witnessing of routine tests on completely assembled RMU. Travel and lodging costs shall be borne by the purchase.

15. DATA SHEET

1	Service conditions	
1.1	Location	Udyogamandal, Cochin
1.2	Humidity Min.	50 %
1.3	Humidity Max.	95 %
1.4	Humidity Design	100 % at 40 Degree Celsius
1.5	Ambient Temperature °C - Min.	19.2
1.6	Ambient Temperature °C - Max.	40
1.7	Ambient Temperature °C - Design	40
1.8	Environment	Tropical atmosphere
1.9	Indoor/Outdoor	Indoor
2	Power System Details	
2.1	Voltage (V)	11 kV
2.2	Frequency (Hz)	50 Hz
2.3	No. of phases	3
3	GENERAL DATA	
3.1	Degree of protection	As per clause 5.3 of TPS
3.2	Execution	Single front (with rear access)
3.3	Incoming/ Outgoing connections	Cable
3.4	Cable entry- Whether Top or Bottom	Bottom entry
3.5	Cable lugs	Not required with switchboard
3.6	Compression type cable glands	Not required
3.7	Painting	RAL 7032/ RAL 7035

3.8	Busbar continuous Rating	630 Amps				
3.9	Busbar Short time Rating	21 KA for 1 sec				
4	INCOMER PANEL					
4.1	Type of feeder	Load Break Isolator with earth switch.				
4.2	Rating	630 Amps				
4.3	No. of feeders	2				
4.4	No. of Poles	3 (R, Y, B)				
4.5	Short time Rating	21 KA for 1 Sec				
4.6	Arc Quenching Medium	SF6				
4.7	Earth Switch	Reqd.				
4.8	Interlocks	Reqd.				
4.9	Padlock	Reqd.				
4.10	Operation Indication (On/Off/Earth)	Reqd.				
5	OUTGOING PANEL					
5.1	Type of feeder	Vacuum circuit breaker followed by offload disconnect switch with earthing switch at outgoing end, having suitable interlocks.				
5.2	Rating	630 Amps				
5.3	No of feeders	1				
5.4	Short time Rating	21 KA for 1 Sec				
5.5	No. of Poles	3 (R, Y, B)				
5.6	Arc quenching Medium	Vacuum				
5.7	Earth Switch	Reqd.				
5.8	Interlocks	Reqd.				
5.9	Padlock	Reqd.				
5.10	Operation Indication (On/Off/Earth)	Reqd.				
6	TRANSFORMER DETAILS					
	Location	kVA rating	HV		LV	
			Voltage (V)	Current (A)	Voltage (V)	Current (A)
6.1	Substation #1	500	11000	26.24	433	666.69
6.2	Substation #4					
6.3	Substation #2	250	11000	13.12	416	347
7	CABLE DETAILS					
7.1	Type	11kV XLPE Aluminium Armoured				
7.2	Size					
		INCOMER #1	INCOMER #2	OUTGOING FEEDER		
	RMU #1 (Substation #1)	1X3X150 Sq.mm	1X3X150 Sq.mm	1X3X95 Sq.mm		
	RMU #2 (Substation #2)	1X3X150 Sq.mm	1X3X150 Sq.mm	1X3X95 Sq.mm		
	RMU #3 (Substation #4)	1X3X150 Sq.mm	1X3X150 Sq.mm	1X3X95 Sq.mm		

16. VENDOR DATA REQUIREMENTS

Sl. No.	Description	With offer		After LOI/PO		Final	
		No.of copies	Date	No.of copies	Date	No.of copies	Date
1	Duly filled in Technical Particulars of RMU, as per Annexure 1	S	With tech bid				
2	Signed copy of Technical Procurement Specification	S	With tech bid				
3	Dimensioned general arrangement drawing with catalogue/brochure.	S	With tech bid	S	10 days from LOI	S/1P	As per Clause 2.1
4	Foundation plan, showing cutouts/floor openings, foundation pockets etc. along with outline dimensions			S	10 days from LOI	S/1P	As per Clause 2.1
5	Single line diagram	S	With tech bid	S	10 days from LOI	S/1P	As per Clause 2.1
6	Schedule of materials / components, with quantity, rating, type, make, etc.	S	With tech bid	S	10 days from LOI	S/1P	As per Clause 2.1
7	Type Test Certificates	S	With tech bid				
8	Inspection and Testing Plan			S	10 days from LOI	S	As per Clause 2.1
9	Routine test certificates.					S/1P	Along with Panel
10	Duly filled and signed Compliance statement as per format attached.	S	With tech bid				
11	Unpriced copy of price bid.	S	With tech bid				

Notes:

- S : Soft copy, P: Printout
- Vendor shall fill in proposed lead time if different from the required lead time.

17. WARRANTY

- 17.1. The vendor shall provide warranty for the entire RMU and accessories, for a period of 12 months from the date of commissioning or 18 months from date of dispatch, whichever is earlier.
- 17.2. Vendor shall be fully responsible for proper design, manufacture, testing, packing, dispatch and supply of complete system including all accessories.
- 17.3. Equipment and its components shall be covered under warranty against faulty design, defective / improper materials poor workmanship or failure from normal use during the warranty period. The warranty shall also cover all bought-out items by the vendor, for the same period mentioned.
- 17.4. Vendor shall have full defect liability during the warranty period. It shall be obligatory on the part of vendor to modify and/ or replace any hardware completely at vendor's cost, in case any malfunction is revealed during the warranty period.
- 17.5. Other warranty terms shall be as stated in the Terms and Conditions governing the Purchase Order.

ANNEXURE I
TECHNICAL PARTICULARS (TO BE FILLED BY VENDOR)

1.0	Maker's name	
2.0	Rated voltage	
3.0	Nominal current rating of RMU	
4.0	Bus bar details	
4.1	Location of bus bar W.R.T Switch Board	
4.2	Material & grade	
4.3	Size, shape and number of bars per phase	
4.4	Rated current in amps	
4.5	Short circuit withstand current in KA for 1 sec	
4.6	Clearance of bus bar in SF6-Phase to phase	
4.7	Clearance of bus bar in SF6-Phase to earth	
4.8	Details of Busbar insulation	
4.9	Type of bus bar support	
4.10	Colour coding for Phase Busbars	
5.0	Constructional details	
5.1	Sheet steel type used	
5.2	Thickness of door in mm	
5.3	Thickness of load bearing members in mm	
5.4	Thickness of base frame in mm	
5.5	No. of sections	
5.6	Dimensions in mm of each section (Length X Depth X Height)	
5.7	Weight of each section in KG	
5.8	Overall dimensions in mm of the entire switchboard (Length X Depth X Height)	
5.9	Weight of the entire switchboard in KG	
6.0	Other details	
6.1	Degree of protection for SF6 gas enclosure	
6.2	SF6 gas enclosure material	
6.3	Pressure relief vent position	
6.4	Details of Relay	
6.5	Whether Internal arc classification is AFLR (Yes/No)	
6.6	Gas Density Monitor (Yes/No)	
6.7	Voltage presence indicator (Yes/No)	
6.8	Fault Passage Indicator (Yes/No)	

6.9	Signed and sealed TPS (Yes/No)	
6.10	Signed and sealed Compliance Statement (Yes/No)	
6.11	Type test certificates attached (Yes/No)	

**ANNEXURE II
PRICE BID FORMAT**

Sl.No	Code	Item	Quantity	Unit Price (Rs)	Total Price (Rs)
1	672104101	Design, Manufacture, Testing and Supply of fully wired up 11 kV Ring Main Unit consisting of two Incomer Load Break Isolators and one outgoing vacuum circuit breaker (3 pole, 11 kV, 630 A) having earthing provision, complete with all accessories as per detailed specifications attached (TPS-RMU-TS-01).	3 Set	*	*
2	New activity code	Supervision for commissioning of 11kV RMU as per TPS-RMU-TS-01 (Approximately 3 days for 3 units)	LS	*	*

**ANNEXURE III
COMPLIANCE STATEMENT**

ENQUIRY No: _____

We state that our Quotation No.....is in full compliance with the documents issued against the Enquiry No: -----except for the deviations listed below.

LIST OF DEVIATIONS

Sl. No	Description	Reason for deviation

Name of Vendor:

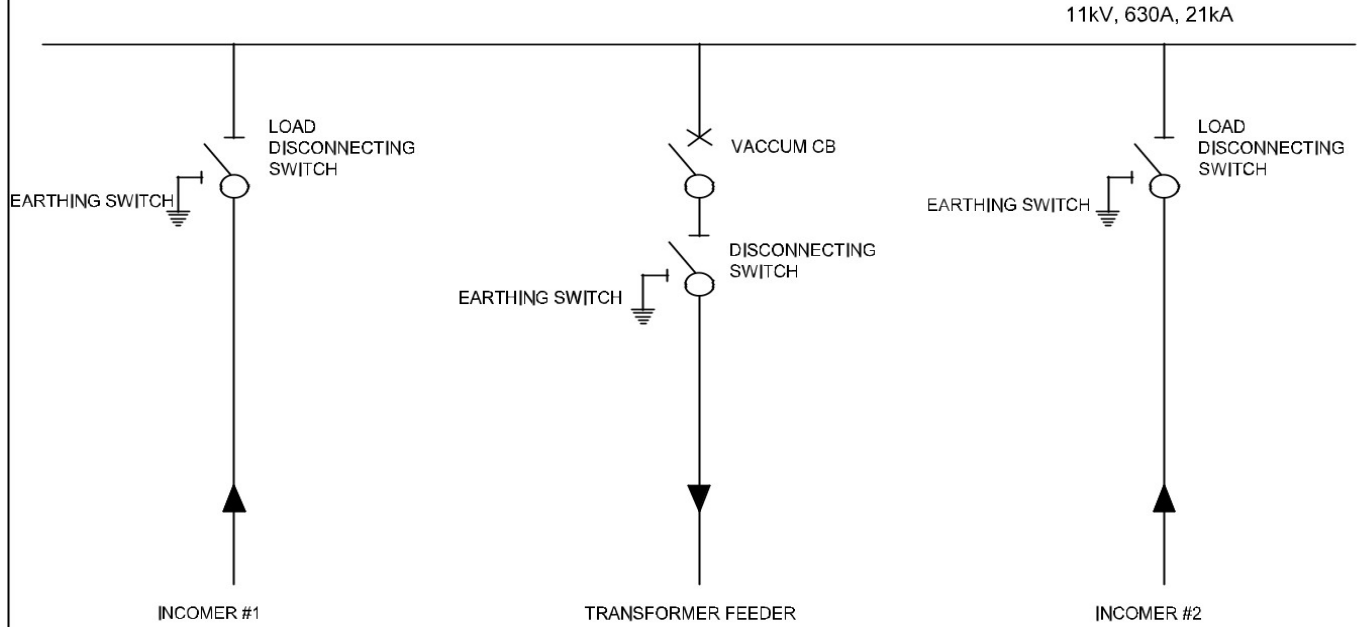
We have read, understood and accepted the terms and conditions of the enquiry as given in the Technical procurement Specification, Annexures, Terms and Conditions for Purchase attached with the tender documents, except for the deviations distinctively listed above.

Date:

Name & Designation

Seal & Signature

ANNEXURE IV
TYPICAL SCHEMATIC DIAGRAM OF RMU



NOTE:- THE DIAGRAM SHOWN IS INDICATIVE ONLY, FOR TENDERING PURPOSE. VENDOR SHALL INCORPORATE ENTIRE REQUIREMENTS AS PER STANDARD MANUFACTURING PRACTICE. CT & PT AS APPLICABLE TO BE INCLUDED.