सत्यमेव जयते

भारत सरकार GOVERNMENT OF INDIA
रेल मंत्रालय MINISTRY OF RAILWAYS

एस•टी•आर• सं•: टी•आई•/एस•टी•आर•/002(रिवीजन-4)

STR No.: TI/STR/002 (Revision-4)

भारतीय रेलवे के 25 केवी/2x25 केवी एसी ट्रैक्शन सिस्टम के लिए, सुरक्षात्मक रिले के साथ नियंत्रण एवम् रिले पैनलों और 2X25केवी एसी ट्रैक्शन सिस्टम के लिए ऑटोट्रांसफार्मर तटस्थ धारा अनुपात आधारित स्वचालित फॉल्ट लोकेटर की आपूर्ति के लिए विक्रेताओं के अनुमोदन के लिए तकनीकी आवश्यकताओं की अनुसूची

Schedule of Technical Requirements for approval of Vendors for supply of Control & Relay Panels incorporating protective Relays for 25 kV/ 2x25 kV AC Traction System and Auto Transformer Neutral Current Ratio Based Automatic Fault Locator for 2x25 KV AC Traction of Indian Railways

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जारी करने की तिथि/Date of issue
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1.0 SCOPE

This schedule covers the technical requirement to assess the manufacturing capability of the vendor for:-

(a) Control & Relay Panels incorporating protective Relays for 25 kV/ 2x25 kV AC Traction System of Indian Railways.

(b) Auto Transformer Neutral Current Ratio Based Automatic Fault Locator for 2x25 KV AC Traction.

1.1. This "Schedule of technical requirements" shall be read with RDSO's Specification No. TI/SPC/PSI/PROTCT/6072 with A&C Slip No. 1, TI/SPC/PSI/PROTCT/4050 & TI/SPC/PSI/PROTCT/7101 or latest for control and relay panels and RDSO's specification No. TI/SPC/PSI/AFL/0240 or latest for Auto Transformer Neutral Current Ratio Based Automatic Fault Locator.

2.0 GENERAL REQUIREMENTS, INFRASTRUCTURE AND MANUFACTURING FACILITIES

SN	Description	Remarks
2.1	The "Make in India" Policy of the Government of India shall be applicable.	
2.2	The firm should have adequate covered accommodation for effective storage of inward raw material and the finished panels awaiting dispatch and prototype/routine inspection and testing. The firm should have an effective quality control system to monitor the quality control of the:	
2.2.1	Inward raw material	
2.2.2	Stage inspection at various assembly stages.	
2.2.3	Inspection of the final assembled product to conform adherence to the requirements of the specification.	
2.3	The firm should have a proper drawing office to support the design/ development of the product. The company should have a clean and pollution-free environment and should be taking adequate safety precautions during production. The company must have items like fire extinguishers, safety warning boards, shock treatment charts and medical first aid kits on their premises.	
2.4	The relations with the workers should be harmonious and regular employee training programs should be scheduled by the management for regular upgradation of the knowledge and skills of the employees.	

3.0 QUALITY CONTROL REQUIREMENTS

SN	Description	Remarks
3.1.	The firm should have acquired ISO:9001-2015 or the latest certification for the product broadly for which approval is sought.	

3.2.	The system of easy traceability of the product from the raw-material stage to the finished product stage should be available.	
3.3.	QAP for the product following RDSO's guidelines, should be available. QAP shall be approved by RDSO.	
3.4.	The firm should have a system for monitoring customer complaints in a format similar to the format given in RDSO's Guideline for preparing QAP.	
3.5.	The head of the inspection/testing/quality control section must possess at least a Diploma in Engineering with 5 years of experience in the relevant field.	
3.6.	The system should exist for documentation of the following-	
3.6.1	Incoming raw material with the reference of suppliers as well as internal tests.	
3.6.2	Details regarding stage inspection and test results.	
3.6.3	Details regarding the final testing and dispatch to the customer in properly packed condition.	
3.6.4	System for calibration of testing and measuring instruments.	

4.0 MACHINERY AND PLANT REQUIREMENT

4.1 FOR CONTROL AND RELAY PANEL

The following machinery and plant of suitable capacity should be available at the firm's premises for the manufacturing of Control & Relay Panels incorporating with protective Relays for 25 kV/ 2x25 kV AC Traction System of Indian Railways.

SN	Name of M&P	Required for activity	Remarks
i.	a. CNC Machines required for process like shearing, punching, cutting and bending etc. b. Drilling machine c. Suitable welding machine d. Grinding machine and portable grinder e. Mobile trolley and hoist	For fabrication of the control panel	
ii.	a. Seven tank treatment for control panel b. Stove oven / Electric Dryer. c. Powder coating facilities of adequate size.	For dry powder coating on panels	
iii.	a. Portable drilling machines b. Diesel generating set of adequate capacity c. Bench Grinder d. Hand riveting machine e. Crimping tools of various sizes for lugs etc. f. Hand tools such as nose pliers, cutters, wire strippers, screwdrivers, spanners set and mallets. g. Mobile trolley and hoist	For assembly and panel wiring	

iv.	a. PC installed with the latest genuine licensed AutoCAD software b. Colour Printer c. 3D drafting software like Solid Works	Preparation of drawings & printing.	

The activity at para-4.1 (i) & (ii) above may be outsourced, subject to stringent quality control by the manufacturer. The manufacturer has to provide information regarding this in the Quality Assurance Plan (to be approved by RDSO) covering full details of activity being outsourced indicating control over the quality of inward, in-process and finished material as the outcome of the said process

4.2 FOR AUTOMATIC FAULT LOCATOR

The following machinery and plants of suitable capacity should be available at the firm's premises for the manufacturing of an Auto Transformer Neutral Current Ratio Based Automatic Fault Locator for 2X25 KV AC Traction.

SN	Name of M&P	Required for activity	Remarks
i.	a. CNC Machines required for processes like shearing (cutting), punching, bending etc. b. Drilling machine c. Suitable welding machine d. Grinding machine and portable grinder e. Mobile trolley and hoist	For fabrication of the panel	
ii.	a. Seven tank treatment for control panel b. Stove oven / Electric Dryer. c. Powder coating facilities of adequate size.	For dry powder coating on the panel	
iii.	a. Portable drilling machines b. Diesel generating set of adequate capacity c. Bench Grinder d. Hand riveting machine e. Crimping tools of various sizes for lugs etc. f. Hand tools such as nose pliers, cutters, wire strippers, screwdrivers, spanners set and mallets. g. Mobile trolley and hoist	For assembly and panel wiring	
iv.	a. PC installed with the latest genuine licensed AutoCAD software b. Colour Printer c. 3D drafting software like Solid Works d. PC for software program execution e. Licensed PCB design software like ORCAD, Allegro etc.	Preparation of drawings & printing.	
v.	a. Wave soldering machine b. SMT Automatic & Semi-Automatic Printers, SMT Pick & Place Machines, Reflow Soldering Ovens, PCB Loader & Unloader and Solder Paste Mixer. c. PCB Ultrasonic Cleaning Machines. d. Digital Magnifying Lenses	For Electronic components assembly on PCB	

vi.	a. Temperature-controlled soldering machines. b. Temperature-controlled oven c. Crimping tool for lugs etc. d. PCB stuffing stands e. Antistatic (ESD) wrist straps. f. Static free soldering environment Solder Fume extractor. g. Bench drilling machine and portable drilling machine. h. Hand tools such as nose plier, cutter, wire stripper, screwdriver, spanners set etc.	For Calculating and Measuring unit / Assembly / Wiring	
vii.	Air-conditioned area for assembly and testing of Calculating and Measuring unit	The basic requirement for manufacturing and testing	

The activity at para 4.2 (i), (ii) & (v) above may be outsourced, subject to stringent quality control by the manufacturer. The manufacturer must provide information regarding this in the Quality Assurance Plan (to be approved by RDSO) covering full details of the activity being outsourced indicating control over the quality of inward, in-process and finished material as an outcome of the said process.

5.0 INSPECTION AND TESTING FACILITIES

The firm should have the following testing and measuring instruments/ equipment. These instruments should be calibrated with standard master instruments accountable to the national physical laboratory/NABL accredited laboratory or a similar reputed international agency. Each instrument should have a valid calibration certificate.

5.1 FOR CONTROL AND RELAY PANEL

SN	Description	Remarks
i.	Secondary Injection Relay testing kit with the following minimum facilities:	
(a)	At least 2 nos. fundamental 50Hz sinusoidal wave current source: The capacity of each current source shall be at least 30 A. The current shall be variable in the steps of 0.001 A.	
(b)	At least 2 nos. ac voltage source: The voltage shall be variable from 0 to 280 V in steps of 0.01 V.	
(c)	DC output source: the voltage shall be variable from 0 to 250 in steps of 0.1 V.	
(d)	Capable of generating odd and even harmonics up to 13^{th}.	
(e)	Facility to mix each fundamental current source with different harmonics.	
(f)	The current and voltage source shall be usable alone or simultaneously.	
(g)	Facility to measure operating and resetting time of relays.	
(h)	The error of the relay testing kit shall not be more than 0.2%.	
(i)	Phase shifting 0 to 360^0 in steps of 0.1^0 in the leading and lagging phase.	

(j)	Manual as well as automatic testing of relays. The automatic test results shall be saved in memory and shall be printable.	
ii.	High Voltage testing equipment at a minimum of 2 kV.	
iii.	Insulation Resistance tester 500 V and 1000 V.	
iv.	Stabilized DC power supply variable from 0 to 150 V dc.	
v.	Digital Multi-meter (Adequate number of meters should be available), continuity tester.	
vi.	Magnifying Lenses.	
vii.	High rating variable AC current injection source up to 250A.	
viii.	Infrared (IR) Digital thermometer.	
ix.	Digital Vernier Callipers, screw gauge and meter scale.	
x.	KVA & KW meter.	
xi.	Digital Oscilloscopes with probe (Storage type).	
xii.	Inductor and Rheostat of different ratings used for contact making and breaking tests.	

5.2 FOR AUTOMATIC FAULT LOCATOR

SN	Description	Remarks
i.	Secondary Injection Relay testing kit with the following minimum facilities:	
(a)	At least 6 nos. fundamental 50 Hz sinusoidal wave current source: The capacity of each current source shall be at least 15 A. The current shall be variable in the steps of 0.001A.	
(b)	At least 3 nos. voltage source: The voltage shall be variable from 0 to 300V in steps of 0.01 V.	
(c)	DC output source, the voltage shall be variable from 0 to 300V in steps of 0.1V.	
(d)	Capable of generating odd and even harmonics at least to 13^{th}.	
(e)	Facility to mix each fundamental current source with different harmonics.	
(f)	The current and voltage source shall be usable alone or simultaneously.	
(g)	Manual as well as automatic testing facilities. The automatic test result shall be saved in memory and printable.	
(h)	Facility to measure operating and resetting time.	
(i)	The error of the testing kit shall not be more than 0.2%.	
(j)	Phase shifting 0 to 360^0 in steps of 0.1^0 in the leading and lagging phase.	
ii.	High Voltage testing equipment at a minimum of 2 kV.	

iii.	Insulation Resistance Tester 500 and 1000 V.	
iv.	Stabilized DC power supply 0 to 150 V DC.	
v.	Digital Multi-meter (Adequate number of meters should be available).	
vi.	Digital Oscilloscopes with probe (Storage type)	
vii.	Magnifying Lenses.	
viii.	Digital LCR meter.	
ix.	Variable AC current injection source up to 250 A.	
x.	Digital Vernier Callipers, screw gauge, meter scale and multi-channel thermocouple-based thermometer with a minimum of 8 channels.	