

**GOVERNMENT OF INDIA**  
**MINISTRY OF RAILWAYS**

**TI/STR/028**

**(Revision 2)**

**SCHEDULE OF TECHNICAL REQUIREMENT**  
**FOR APPROVAL OF VENDORS**  
**FOR SUPPLY OF COMPLETE SUPERVISORY CONTROL AND DATA ACQUISITION**  
**SYSTEM FOR**

**25 KV and 2x25kV AC SINGLE PHASE 50 Hz AC TRACTION POWER SUPPLY**

**(Specification No.: TI/SPC/RCC/SCADA/0133 or latest**

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**SCHEDULE OF TECHNICAL REQUIREMENTS (STR)  
FOR TRACTION SCADA VENDORS**

**SCOPE**

This schedule of technical Requirement, herein after referred as “STR”, shall be read in conjunction with RDSO’s Specification No. TI/SPC/RCC/SCADA/0133 or latest. The STR is to assess the manufacturing capability of vendor for new registration/approval. This schedule covers the technical requirement for manufacture and supply of PC base standard SCADA systems for use in 25 kV & 2x25KV single phase AC traction system on Indian Railways as per RDSO specification No. TI/SPC/RCC/SCADA/0133 or latest.

**1.0 GENERAL CONDITIONS AND MANUFACTURING FACILITIES**

S.No.	Details of requirement	Status
1.1	SCADA Vendor should have complete control over the design, modification/alteration of basic structure of RCC Software and RTU such as CPU, its programming, communication protocol, bus configuration, input/output modules and analog modules. Detail circuitry of all such module should be available with the vendor.	
1.2	SCADA vendor should have commissioned at least 1 complete SCADA systems (SCADA system catering acquisition of measurands, control and monitoring of equipments located over geographically distributed network interface with minimum 15 numbers of RTUs communicating over IEC 60870-5-104 or IEC 60870-5-101 or SPORT protocol) for reputed organisation like Indian Railway, SEBs, PGCIL, NTPC, ONGC & other reputed Pvt. & PSU organisations in the last seven financial years and the current financial year.	
1.3	SCADA Vendor should have completely understood the requirement of specification No. TI/SPC/RCC/SCADA/0133 or latest and IEC 60870-5-101,103,104, IEC 61850. The vendor should be able to provide SCADA system which can function properly as per the above protocol standards mentioned in the specification.	
1.4	SCADA Vendor should have adequate setup for providing service support over Indian Railways.	
1.5	SCADA vendor should have adequate covered accommodation for the purpose of effective storage of inward raw material, and the finished product awaiting dispatch and prototype/ routine inspection.	
1.6	SCADA Vendor should have a proper drawing office to support the designs/ development of product.	
1.7	SCADA Vendor should have a clean and pollution free environment, and is taking adequate safety precautions during the production of SCADA system.	
1.8	SCADA Vendor should have items like fire extinguishers, safety warning board, shock treatment charts and medical first aid kit in their premises.	
1.9	SCADA Vendor should carry out regular employee training programs for regular up-gradation of the knowledge and skills of the employees.	

**2.0 MACHINERY AND PLANT REQUIREMENT**

The following machinery and plant of suitable capacity should be available at the firm’s premises for the manufacturing and testing of the SCADA equipment viz. RTU, digital input/output module

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Analog input module, various signal conditioning modules required for RTU, Power supply unit, transducers, contactors and relays.

S. No.	Details of Machinery and Plant	Activity	Status
2.1	Wave soldering machine, de-soldering machine.	PCB assembly/complete PCB fabrication	
2.2	Sheet bending, cutting and welding machine etc. RTU fabrication machine. Facility for Powder coating on cabinets made of CRCA sheets	RTU panel fabrication	
2.3	Nose plier, screw driver, lug insertion tool/ crimping tool	RTU panel assembly	
2.4	UPS of 3 kVA rating or higher	To ensure continuity of power in case of failure of supply	
2.5	Diesel generating set having capacity to meet the load requirement	To ensure the availability of electric power	
2.6	Availability of PCs for software program development/ testing and execution. PC installed with CAD software and color printer. Availability of IT hardware along with licensed development software such as compilers and linkers, debugging tools, etc. to maintain and modify the source code of SCADA as well as RTU firmware.	For development of SCADA	
2.7	Other facilities such as license software, simulation software etc. required for developing SCADA RCC software, RTU firmware and its real time operating system.	For development of SCADA	
2.8	ROM/Flash Programmer (programmer & eraser as required for embedded software)	To program the flash memory	

**Note:**

- i. The item 2.1 & 2.2 above can be outsourced subject to stringent design and quality control over the outsourcing agencies for the activity/ process.
- ii. The information regarding the outsourcing shall be provided by the manufacturer in the QAP including name of the process/ sub assembly/ activity being outsourced of said process.

**3.0 MANPOWER REQUIREMENT**

S.No.	Details of Man Power requirement	Status
3.1	SCADA Vendor should have dedicated group of professionals for SCADA development and support especially software development personnel.	
3.2	SCADA vendor should have adequate number of software and hardware engineers conversant with SCADA system communication technique and knowledge of communication	

	protocol preferably on IEC-60870 series, IEC 61850, MODBUS etc.	
3.3	Software engineers employed with firm should have experience in multiple platform programming like WINDOWS, net, Linux, VB, VC++, ASP etc as applicable.	

#### 4.0 QUALITY CONTROL REQUIREMENTS

S. NO.	Details of quality control requirement	Status
4.1	SCADA Vendor should have acquired ISO-9001-2015 or latest certification for the product broadly, for which approval is being sought.	
4.2	SCADA Vendor should have the system of easy traceability of the product from the raw-material stage to the finished product	
4.3	SCADA Vendor should have a system of monitoring the customer complaints on the supplied product and should maintain records for action taken to avoid the repetition of failure of the same nature.	
4.4	SCADA Vendor should have an effective quality control system to monitor quality control i) Inward Raw Material ii) Stage inspection at various assembly stages such as PCB inspection before and after soldering inspection, IC functionality check, Transducer testing etc. iii) Inspection of the final assembled product to confirm adherence to the requirement/ specification iv) Test equipment to test designed feature of SCADA system, Router and simulators to simulate field signals, Current injection set, Variable and stabilized ac voltage source, Variable PF source of adequate range.	
4.5	Quality assurance plan for the product in accordance with RDSO's guideline should be available. Quality assurance plan (QAP) shall be approved by RDSO.	
4.6	A Degree / diploma holder should be the head of the inspection/ testing/ final control section with 5 years of experience in the relevant fields.	
4.7	The System of documentation in respect of following should be available . i. Rejection at the customer and its warranty replacement e.g. documentation of problems reported from field, corrective action taken thereof, monitoring/validation of the action taken. ii. Incoming raw material with the reference of suppliers as well as internal test. iii. Details regarding stage inspection and test results. iv. Details regarding the final testing and dispatch to the customer in proper packed condition v. System for calibration of testing and measuring instruments. vi. Quality assurance plan( QAP) & internal auditing document.	

### 5.0 INSPECTION AND TESTING FACILITIES REQUIREMENT

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

S. No.	Details of testing equipment	Status
5.1	Voltage (variable between 0 to 230V in steps of at least 1 V) and current (Variable between 0 to 10 A in steps of at least 0.1 A) injection test bench fitted with output meters/injection test kit.	
5.2	Storage type oscilloscope, Multi-meters (Measurement Accuracy at least 0.1% for DC/AC voltage and current measurement) , waveform generators, Tong Testers	
5.3	Testing facility for voltage, phase angle, current and frequency.	
5.4	PCB testing facility (if complete PCB fabrication outsourced, PCB testing facility shall be available at out sourcing agency)	
5.5	High voltage testing facilities. 2 kV	
5.6	Insulation Resistance (IR) tester (1000 V)	
5.7	Facilities for testing stray Capacitance, Inductance & EMI.	
5.8	Simulators for generating field condition in the factory.	
5.9	Physical parameters measuring tools for dimension measurement of RTU e.g. Measuring tape, screw gauge, Vernier caliper, sheet gauge measurement tool etc.	
5.10	Availability of suitable communication protocol data and timing analyser software. Availability of test set with features like master simulation, RTU simulation and line monitoring.	
5.11	Test facilities for bought out item such as Router, transducer, contactors etc.	
5.12	Standard power supply sourced variable between 110 V to 295 V ac & 0 to 140 V dc.	
5.13	Test jigs for simulating RTUs of different switching stations and Router for testing designed features of telecommands, telesignals and measurands in the factory.	
5.14	Testing facilities for software functionality in an RTU, its real time operating system (RTOS), drivers for communication system, device drivers and diagnostics. Facility to update / diagnose firmware of all RTU components.	
5.15	Burn in test facility for components to be placed on PCB or assembled PCB.	
5.16	Facilities to conduct routine/functional tests on all manufactured RTU to validate/demonstrate compliance in line with the specifications.	
5.17	LAN cabling tester	
5.18	Electronic load or Resistive load for testing power supplies	