

GOVERNMENT OF INDIA  
MINISTRY OF RAILWAYS



सत्यमेव जयते

TI/STR/005  
(Revision-2)

SCHEDULE OF infrastructure ~~TECHNICAL~~ REQUIREMENTS  
FOR  
~~manufacturing & testing facilities and Quality Control~~  
~~requirements~~ APPROVAL OF VENDOR  
FOR  
SHUNT & SERIES CAPACITOR BANKS FOR TRACTION SUB-  
STATIONS OF INDIAN RAILWAYS  
AS PER RDSO SPECIFICATION NO.

1. TI/SPC/PSI/FC&SR/0100 (01/10) or Latest.
2. ETI/PSI/75(10/97) or Latest.
3. ETI/PSI/126 (08/1989) with A&C Slip No. 1,2 &3 or Latest
4. ETI/PSI/127 (08/1989) with A&C Slip No. 1,2&3 or Latest

ISSUED BY

TRACTION INSTALLATION DIRECTORATE,  
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	Prepared By	Checked by	Approved by
Signature			
Designation			

## 1.0 SCOPE

This schedule covers the technical requirement ~~for manufacture and supply to~~ **assess the manufacturing capability of vendor** of capacitor unit for Shunt & Series Capacitor Banks for use in 25 kV, single phase & 2 X 25 kV AC traction system on Indian railways.

## 2.0 GENERAL INFRASTRUCTURE AND MANUFACTURING FACILITIES

2.1 The ~~manufacturer~~ **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 and testing. The ~~manufacturer~~ **Vendor** should have an effective quality control system to monitor quality of the

- Inward raw material
- Stage inspection at various assembly/manufacturing stages.
- Inspection of the final assembled product to conform adherence to the requirements of the specification.

2.2 The ~~manufacturer~~ **Vendor** should have a proper drawing office with AutoCAD to support the designs/ development of product. The company should have a clean and pollution free environment, taking adequate safety precautions during the production. The company must have items like fire extinguishers, safety warning board, shock treatment charts and medical first aid kit in their premises. ~~The company preferably may have following International certification for management systems-~~

- a) ~~ISO 14001-2004 for Environmental management systems~~
- b) ~~BS OHSAS 18001-2007 for safety and health management systems~~
- c) ~~SA 8000:2008 for Social accountability systems~~

2.3 The relations with the workers should be harmonious and regular employee training programs should be scheduled by the management for regular up-gradation of the knowledge and skills of the employees.

2.4 The applicant firm must have detailed agreement between the applicant firm & contract manufacturer **in case of contract manufacturing** for the purpose of effective quality control on capacitors manufactured at contract manufacturer premises at various stages i.e. raw material stage, production stage, quality control, finished product awaiting dispatch, marketing and after sale service/guaranty obligations. The applicant firm must be the manufacturer of similar product. The detailed agreement must cover the following aspects :

- The Drawing/designs and raw materials should be as per the design & acceptance criteria of the principal applicant for manufacturing the capacitor units in the brand name of applicant firm only. In case the contract manufacturing, firm manufacture similar goods under different brand or for different principal necessary delineation of process to be ensured.
- The capacitors manufacturing should be done under supervision of applicant firm's representative as per quality assurance plan and Control plan of the applicant firm and all testing is done by applicant firm's representative only.
- The marketing, guarantee/warranty obligation etc. will be the responsibility of the applicant firm.

### 3.0 MACHINERY AND PLANT

The following machinery and plant of suitable capacity should be available at the firm's premises for the manufacturing of the capacitor units:

- 3.1 Automatic Capacitor film winding machine
- 3.2 Tag soldering machine
- 3.3 Drying ovens
- 3.4 Vacuum impregnation chamber along with capacitor dielectric oil processing plant
- 3.5 Oil filtration plant
- 3.6 Heating oil chamber, chilling plant along with cooling tower
- 3.7 Paper cutting machine
- 3.8 Tig welding machine
- 3.9 Fabrication tools\*, Insulation cutting and preparation machine, lathe, cutting, drilling machine.
- 3.10 Air compressor
- 3.11 Overhead crane
- 3.12 Humidity controller
- 3.13 Shot blasting machine/Vapor degreasing plant\*
- 3.14 Spray painting bench / and zinc spraying machine\*
- 3.15 DG set
- 3.16 Central air conditioning system.

\* The activity at para 3.9, 3.13 & 3.14 above i.e. Fabrication tools, Shot blasting machine/Vapor degreasing plant and Spray painting bench / and zinc spraying machine may be outsourced subject to stringent quality control by manufacturer. The manufacturer has to provide detail information regarding this in the Quality Assurance Plan (to be approved by RDSO) and also ensure that the Fabrication tools, Shot blasting machine/Vapor degreasing plant and Spray painting bench / and zinc spraying machine shall be essentially available at the premises of the firm from where this facility is outsourced.

### 4.0 QUALITY CONTROL REQUIREMENTS

- 4.1 The Vendor should possess valid ISO 9001 certificate for manufacture of same/similar item at his works address ~~The firm should have valid ISO-9001:2008 ISO-9000 series certification for Design & manufacture for the product for which approval is being sought and it should be broadly covered in the scope of the certification for manufacture and supply.~~
- 4.2 Quality manual of the vendor for ISO- 9001 certificate should clearly indicate at any stage the control over manufacturing and testing of the product.
- 4.3 ~~There should exist a~~ The system of easy tractability of the product from the raw-material stage to the finished product stage ~~should be available.~~
- 4.4 The firm should have a system of monitoring the supplied product complaints. The complaints made by the customer should be identifiable to the various manufacturing stages of the product and linking the complaint for corrective and preventive action of the product.

- 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.**

Quality assurance plan for the product detailing following aspect should be available:—

- ~~Organization chart.~~
- ~~Flow process chart.~~
- ~~Stage inspection details.~~
- ~~Various parameters to maintain the control over the manufacturing.~~
- ~~Policy of disposal of rejected material and its record for documentary evidence~~

- 4.6 **There should exist a** quality manual of the firm indicating the extent of control over production and testing ~~should be available.~~

- 4.7 An Engineering Degree/diploma holder must be the head of the inspection / testing / final control section with 5 years experience in the relevant field.

- 4.8 **There should exist a** system of documentation in respect of rejection at the customer and its warranty replacement ~~should be available.~~

- 4.9 System should exist for documentation of the following.

- Incoming raw material with **Test Certificate (TC)** ~~the~~ reference of suppliers as well as internal test / **audit checking from outside agency.**
- Details regarding stage inspection and test results.
- Details regarding the final testing and dispatch to the customer in proper packed condition.
- System for timely calibration of testing and measuring instruments.

~~4.9—Quality assurance plan (QAP) shall be approved by RDSO.~~

- 5.0 The manufacturer shall have a dust level controlling system. The dust level control in the main capacitor bank winding room shall at no point exceed the following limits:

Particle size	i)	More than 5 microns	- 50 particles per cu.ft.
	ii)	5 microns to 1 micron	- 150 particles per cu.ft.
	iii)	Less than 1 micron	- 200 particles per cu.ft.

## 6.0 INSPECTION AND TESTING FACILITIES

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

- 6.1 Tan delta & capacitance measuring instrument
- 6.2 LCR meter / bridge
- 6.3 Digital capacitance meter
- 6.4 Million mega ohm meter
- 6.5 DC & AC high voltage application test bench fitted with output meters with appropriate time measuring devices.

- 6.6 Discharge test set up
- 6.7 Oven for sealing test
- 6.8 Megger upto 5 kV
- 6.9 DC/AC Digital ammeter, voltmeter, wattmeter, phase angle measurement meter, timer & frequency meter
- 6.10 Oscilloscope
- 6.11 Oscillation null detector
- 6.12 Temperature and humidity indicator
- 6.13 Venire calipers/micrometer
- 6.14 Rheostats of different ratings
- 6.15 Micrometer

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