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सत्यमेव जयते

भारत सरकार
रेल मंत्रालयGOVERNMENT OF INDIA
MINISTRY OF RAILWAYSअनुसंधान अभिकल्प एवं मानक संगठन
रेल मंत्रालयRESEARCH DESIGNS AND STANDARDS ORGANISATION
MINISTRY OF RAILWAYSSignature Not
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Location: IREPS-CRISभारतीय रेल के वातानुकूलित, गैर वातानुकूलित यानो एवं पावर कार के लिये सभी प्रकार के
स्विच बोर्ड कैबिनेट एवं पावर पैनल के लिये तकनीकी आवश्यकता की अनुसूची एस0टी0आर0)SCHEDULE OF TECHNICAL REQUIREMENTS (STR) FOR MANUFACTURE
OF ALL TYPES OF SWITCH BOARD CABINETS AND POWER/CONTROL
PANELS OF COACHING STOCK

RDSO/PE/STR/AC/0027-2009 - (REV. 1)

S. No.	Date of amendment	Revision	Reason
1	May 2019	1	Additional M&P, infrastructural facilities, Personnel requirement and eligibility criteria stipulated.

अनुमोदित
APPROVED

29.05.19

कार्यकारी निदेशक/पी एस एण्ड ई एम यू
ED/PS & EMU

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SCHEDULE OF TECHNICAL REQUIREMENTS (STR) FOR MANUFACTURE OF ALL TYPES OF SWITCH BOARD CABINETS AND POWER /CONTROL PANELS OF COACHING STOCK

- 1.0 The firm seeking approval for manufacture and supply of Switch Board Cabinet or Power /Control Panel for coaching stock should meet the technical requirements, as laid down in this STR.
- 2.0 Capability of firm to design, manufacture & test Electrical panels (Switch Board Cabinet/ Power/control Panel) is mandatory requirement.
- 3.0 The firm should have manufactured and supplied minimum 100 Switch Board Cabinet/Power Panel/Control Panel of at least 25 kW capacity to Indian Railways/Public sector/Electricity Authority/State Government/Central Government body/Corporate body/Private Limited Companies in last 3 years from the date of application for vendor registration. Complete details of orders executed by firm for these organization shall be submitted.

4.0 M&P/T&P/PERSONNEL REQUIRED

A MACHINARIES & PLANTS

SN	Description
1.	Adequately sized covered & open area to manufacture & handle the declared quantity of switch board cabinet/power/control panels.
2	CNC Machines required for process like shearing, punching, cutting and bending for fabrication of Stainless steel structure of switch board cabinet/power/control panel.
3	Drill machine
4	Spot welding machine/TIG & MIG welding machine suitable for SS sheet.
5	Grinding machine and portable grinder
6	Cable handling fixture
7	Automated cable harness set up
8	Hydraulic Crimping tools of various size
9	Zig and fixture for structure fabrication
10	Mobile trolley and hoist.
11	Fork lifter of at least 3 Ton capacity.
12	Seven tank treatment for full structure of switch board cabinet/power panel/control panel.
13	Powder coating arrangement of adequate size.
14	Electric Dryer/oven
15	3 Phase Electrical connection with adequate connected load to conduct temperature rise test at full load.

NOTE:

- 1) Serial number, rating, date of purchase along with purchase bills and quantity of each items shall be furnished by the firm in tabulated for.
- 2) The machine operators should have minimum one-year experience of operating for each M & P mentioned in STR.
- 3) Item no. 12 to 14 are required only for SBC/Power panel/control panel required to be powder coated.

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- 4) The work related to Sr . No. 12 to 14 may be outsourced, provided that the firm (sub vendor) have;
- Powder coating testing facilities having ISO 9001-2008 certification.
 - Phosphate coating Tank of adequate size to accommodate the complete SBC/ panel in one go.
 - Pollution control board certificate for Red category.
 - Powder coating process with necessary gauges & control for accurate coating thickness.
- 5) Capacity of sub vendor shall be assessed by RDSO official through a visit for verification of M&P and quality of work. MOU with sub vendor on Rs 100/- non judicial stamp paper with a validity of 5 years or more. ISO certificate, M&P list of sub vendor and QAP of sub vendor approved by manufacturer of SBC/panel shall be submitted in advance.
- 6) Firm manufacturing SBC/panel should have the facility of checking of quality of powder coating in terms of abrasion, corrosion, hardness, inflammability, finishing etc. to ensure the quality of powder coating.
- 7) Sub vendor once get cleared by RDSO, for outsourcing activity shall not be changed by the vendor without prior approval of RDSO.

B TESTING AND MEASURING INSTRUMENTS

SN	Description	Quantity in number
1	Current injection (1000Amp capacity for power car and 200 Amp capacity for AC/Non AC coaches) loading facility for all other SBC for temperature rise.	1
2	Three Phase Power Analyzer of Fluke or equivalent make for measuring required electrical parameters simultaneously.	1
3	Ammeter- 1000 Volts,5 Ampere	2
4	Voltmeter 1000 Volts	2
5	Wattmeter	1
6	Frequency meter.	2
7	Multi meter & Multifunction meter.	1
8	Variable voltage transformer 3 Phase 0-1000 Volts AC. minimum 5 kVA power rating in each phase.	2
9	Testing set up as per annexure A & B	1
10	Thermal image camera for checking loose connection during load test and general wiring	1
11	Power supplies (Rating 24 V dc, 110 V AC/DC)	1 each
12	Digital temperature measurement & recording system.	Minimum 16 Channel
13	Tongue tester (Range 600 Amp & 200 Amp)	1
14	HV tester, Voltage 5 kV	2
15	Insulation tester (Rating 500V &1000V)	2
16	Power factor meter	1
17	Powder coating thickness checking meter	1
18	Standard measuring gauges/instruments	As required
19	Storage type oscilloscope	1
20	Computerized ferrule printing machine	1

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21	Licensed Computer aided engineering design tool(like Solid works electrical).	1
21	Other hand tools like spanner, pipe bending machine etc.	As required.
22	Fire extinguishers.	As required

NOTE: 1) Test set up on wheels (item-9) to be got approved from RDSO before prototype test. Vendor shall however get detailed structural drawings of power and control schematic (of test set up) approved by RDSO before capacity cum capability clearance.

2) Firm shall submit calibration status of each instrument along with a copy of calibration certificate.

3) All the testing & measuring instruments as mentioned above shall be available in separate test room. Size of test room for temperature rise test shall be as specified in IEC 61439.

C PERSONNEL AND THEIR QUALIFICATION

1. Firm should have at least one Graduate Electrical/Electronics Engineer having not less two-year experience in the field of electrical panel designing, cable layout and full-fledged knowledge of switchgears and protection devices. He shall be able to understand the requirement and importance of the product with relevant standards including electricity rules. The experience details in similar field shall be submitted.
2. There should be Quality Control set up headed by minimum Graduate Engineer of Mechanical/Electrical/Electronics/instrumentation/CS having 5 years experience in similar field. The experience details in similar field shall be submitted.
3. There should be a testing department headed by at least Diploma Engineer in Electrical Engineering with at least 02 year experience in Testing of Electrical Control Panel.
4. There should be one Graduate Mechanical Engineer having experience of minimum 02 years in fabrication of different steel structures. The mechanical engineer shall have full fledged knowledge of welding, brazing and finishing works along with relevant Indian/International standards, required in making structure.
5. Firm should also have well trained manpower conversant with switch gear and protection system. In this regard, firm shall submit details of manpower along with their qualification and experience of personnel.
6. Firm should also have website for logging complaints of their product as after sales service. It shall include details of complaints number, date & time of complaints login and man deputed to attend complaints along with their mobile number etc.
7. Firm shall submit declaration to have their maintenance service engineers at major cities of India to attend the failure within 24 hours at city like Mumbai, New Delhi, Kolkata, Hyderabad, Chennai, Bangalore, Patna, Bhopal etc.

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D ISO AND QUALITY ASSURANCE PLAN

1. The firm should have ISO 9001-2008 or better certification for manufacture & design of Power panel/Control panel/Switch board cabinet or similar item in quality management.
2. Firm should produce their proposed quality assurance plan (QAP) in respect of procurement of raw material, manufacturing and in-house inspection and testing of switch board cabinet/power/control panel.
3. The Quality Assurance Plan shall cover the following:
 - a) Organizational chart clearly bringing out the quality control set up.
 - b) Qualification log sheets of the personnel manning the quality control set up.
 - c) Process flow chart indicating the process of manufacture of an item or a family of items for which the process is same.
 - d) In respect of sub-vendors, following needs to be submitted/confirmed:
 - Name of the item for which sub-vendor is approved.
 - Inspection criteria of the sub-vendor.
 - The sub-vendor has ISO:9001 certification.
 - QAP of the sub-vendor approved by the primary vendor.
 - Sub-vendor has submitted the quality manual to the primary vendor.
 - Sub-vendor has all the requisite infrastructure of manufacturing and testing facilities, preferably under one roof.
 - Periodical inspection schedule for sub-vendor is being followed strictly by the primary vendor.
 - e) Quality Assurance System - Inspection & Testing Plan. This shall cover the following:
 - Incoming material
 - In Process control
 - Final inspection.
 - f) Calibration plan for measuring instruments
 - g) Customer complaint redressal system as per ISO norms.
 - h) Any additional information

Note:-

Firm shall keep all the records related to internal quality control, stage/process inspection and final testing of the product/individual equipment/component for easy traceability of a particular job. The firm shall furnish documentary evidence for information already submitted to RDSO in online application form

E R & D FACILITIES.

The firm should have set up to investigate the various types of line failures of Switch Board Cabinet/Power/Control Panel and evolve necessary remedial measures to avoid failures in future.

F. OTHER FACILITIES

3 Phase, 415V, Diesel Generator set of adequate capacity to conduct temperature rise test at full load as standby power supply shall be available with firm.

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Annexure –A**Details of the testing set up (for guidance only) for SBC**

- **Output A:** Resistance of each contact/pole of Disconnecting & Earthing Device be checked and displayed on milliohm meter (1 pole at a time). On/off status of D&E device shall be indicated through D&ED lamps.
- **Output B:** 3 Phase 750 V Voltage phase control Net 1 & Net 2 (MMR-Measuring & Monitoring Relay) shall be tested for Single phasing, Phase unbalance by Varaiac in at least 2 phases , over voltage, under voltage with tripping time display and indication on test bench panel.
- **Output C:** Operation of feeder selection contactors (for Net 1 & Net2) pick up & drop out voltage and milli volt drop on full load to be displayed on meter.
- **Output D:** Operation of 415 V contactor (for Local main Supply) pickup & drop out voltage and milli volt drop on full load to be displayed on meter.
- **Output E:** 415 V, Voltage phase control relay (Measuring & monitoring Relay -MMR) shall be tested for Phase unbalance, over voltage, under voltage with tripping time display on meter and indication on test bench panel.
- **Output F:** Commercially available MCB/MPCB test Kit of reputed make with load and tripping time display meter and indication on test bench panel.
- **Output G:** 415 V AC V Insulation control (Insulation Monitoring Relay-IMR A7) shall be tested on meter with indication.
- **Output H:** 190 V AC 3 Phase for checking of 16 A Low Voltage Fuse in Non AC Switch Board cabinet.
- **Output I:** 110 V AC Insulation control (Insulation Monitoring Relay-IMR A6) shall be tested on meter with indication.
- **Output J:** Commercially available MCB/MPCB test Kit of reputed make for all voltage grades and output with tripping time to be displayed on meter and indication on test bench panel. Voltage current and tripping time to be noted. DC-DC Converter 110 V DC/24 DC shall be checked for Input Output Voltage.
- **Output K:** Commercially available DC MCB test Kit of reputed make with tripping time display meter and indication on test bench panel.
- **Output L:** Earth leakage test on positive and negative side by resistance method (10 mA to 60 mA) to be checked and output to be displayed on meter and indication on test bench panel.
- **Output M:** (For pick up and drop out) for 110 V DC operated switch gear.

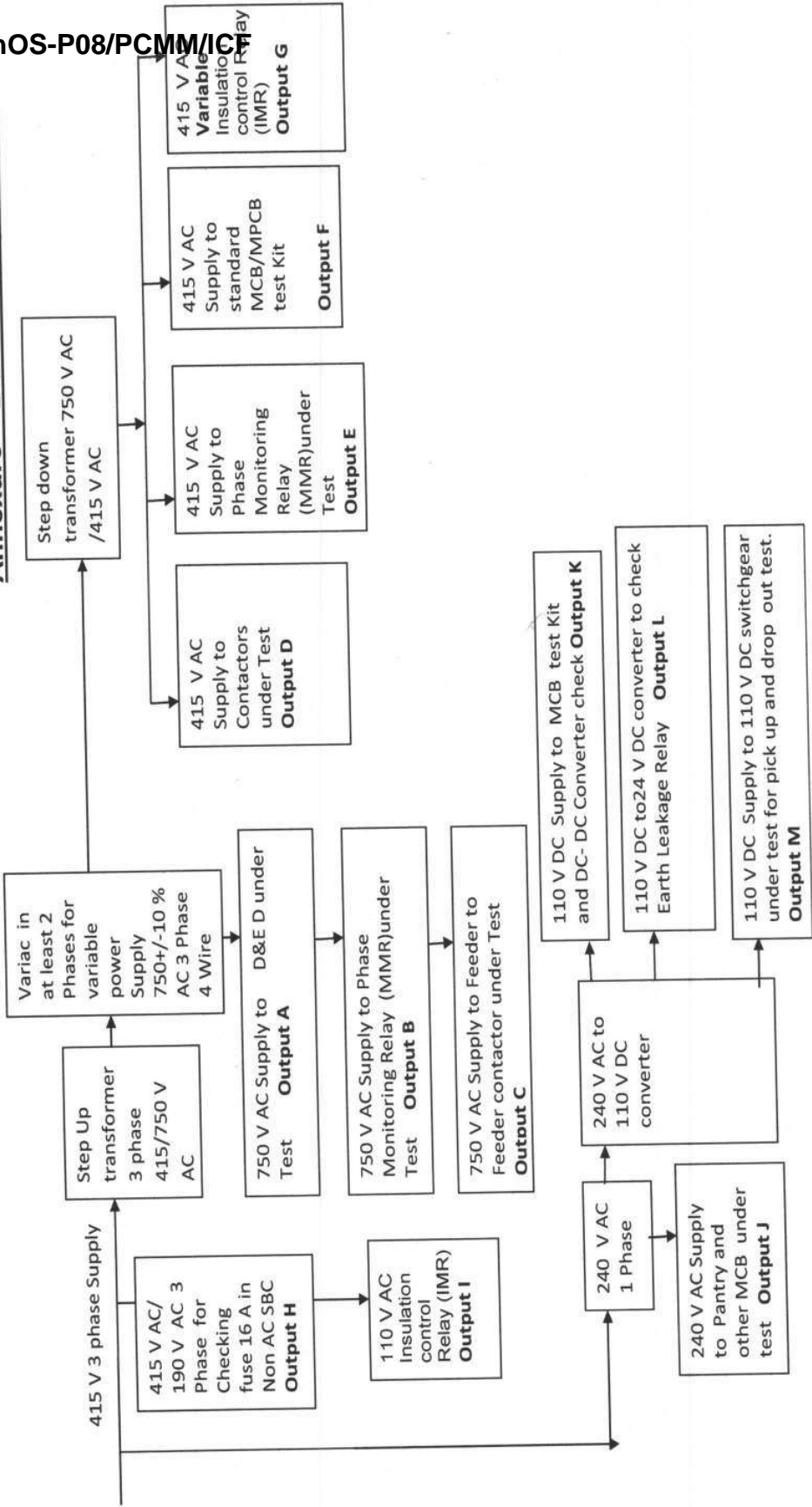
NOTE

1. Standard test bench for measuring Parameters of Switch board cabinet for LHB EOG type AC coaches described above can be used for temperature rise of component of SBC except the temperature rise of disconnecting & Earthing Device, 125 A fuses, K01 & K02 feeder contactors.
2. Temperature rise of 750 V Contactors , 415 V contactors 750 V fuse (125 Amp) 415 V fuse(100 Amp & 80 Amp) , 415 V/110 V AC/DC MCB/MPCB can be carried out with test bench in connection with appropriate load as per rating of component.
3. Electrical connections from panel to test setup to be with clip on (on panel side)& Jack in Connector (test set up side) type arrangements.

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Annexure – B Block diagram of Test Set



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DISTRIBUTION

CHIEF ELECTRICAL SERVICE ENGINEER:	
1.	Northern Railway, Baroda House, New Delhi – 110 001.
2	Central Railway, II Floor, Parcel office, CST Mumbai – 400 001.
3	Eastern Railway, Fairlie Place, Kolkata – 700 001.
4	South Eastern Railway, Garden Reach, Kolkata – 700 043
5	Southern Railway, Park Town, Chennai – 600 003.
6	Western Railway, Churchgate, Mumbai – 400 020.
7	South Central Railway, Rail Nilayam, Secunderabad – 500 371.
8	East Central Railway, Dighi Distt- Vaishali, Hajipur Bihar- 844 101.
9	North Central Railway, Balmiki Crossing, Nawab Yusuf Road, Civil Lines, Allahabad- 211 001.
10	South Western Railway, 1 st Floor, DRM Office, Hubli 580 020
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1	Director, IRIEN, Nasik Road (Maharashtra). - 422101
2	Senior Professor (Elect.), Railway Staff College, Lalbaug, Vadodara. - 390004
3	Director, IRCAMTECH, Maharajpur, Gwalior – 474 020.

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