

**3. DETAILS OF AUXILIARY CONTACTS**

- Contact pressure
- Contact gap
- Thickness, maximum wear limit
- Rating of contact in terms of current, voltage, time constant, and number of operations for the following type of services:
  - a) Continuous duty
  - b) Maximum make duty
  - c) Maximum break duty
  - d) Cyclic duty
- Normal life in terms of on load operations, frequency of operating cycles per hour and load factor for continuous duty and intermittent duty.

**9. DRAWINGS**

- 9.1 General outline dimensional drawing of the contactor and its mounting arrangement shall be furnished with the tender. Details of the main and auxiliary contacts and electrical connection diagram shall also be included.

**10. TECHNICAL DOCUMENTS**

- 10.1 The manufacturer shall supply the technical documents like maintenance instructions, type test reports, test certificates, 'as made' drawings, spare part catalogue, as desired by the purchaser, with the first batch of supply.

**11. TOOLS**

- 11.1 The supplier shall supply one complete set of tools and gauges for maintenance with each batch of 50 sets of equipments supplied. The list of tools to be supplied shall be furnished along with the tenders.

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Specification for  
Electro Pneumatic Contactors  
for use on Electric  
Locomotives.

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DY. C. E. E. (TMD)

CHITTARANJAN LOCOMOTIVE WORKS  
WEST BENGAL, INDIA.

No. 4TES. 110. 001.  
DATE : 30.4.81.



## 12. TESTS

12.1 Tests are classified as "Type tests" and "Routine tests". Type tests shall be carried out to the satisfaction of Railway/RDSO representatives. If type tests have already been successfully completed, photostat copy of the type test report shall be submitted for approval. However, the purchaser shall have the right to ask the supplier to carry type tests on the equipments, to the extent of 2% to ensure compliance with the specification.

The tests shall be generally carried out as per the procedures laid down in ISO-77 - "Rules for Electric traction equipment".

### 12.2 TYPE TESTS

#### 12.2.1 Preliminary checking :

- (i) General inspection of the contactor shall be carried out to check the constructional aspects and quality of materials .
- (ii) Contact alignment - Main and auxiliary contacts shall be examined visually. They should operate correctly.

#### 12.2.2. Contact gap and contact pressure:

The contactor shall be fed at 110V DC and 7 Kg/Cm<sup>2</sup> pneumatic pressure. The contact gap (when the contactor is in OFF position) and the contact pressure of main contacts shall be measured with appropriate gauges and results recorded. Similar measurements shall be made on auxiliary contacts and results recorded.

#### 12.2.3 Checking of mechanical operations :

The tests consist in checking twenty times in succession that the contactor shall operate correctly within limits of supply voltage and pneumatic pressures and the worst possible combinations of the two.

#### 12.2.4 Operating Value test :

Pick up voltage of the contactor shall be determined by gradually increasing the applied voltage to the operating coil until the contactor just operates at its rated pneumatic pressure i.e. 7 Kg /Cm<sup>2</sup>. The contactor shall operate satisfactorily between 70V to 125V under all service conditions. The hot operation at minimum voltage shall be considered to be satisfactory if the contactor when cold, operates normally when it is supplied with a current equal to that which would flow through the contactor after 1 hr. of continuous operation at the minimum voltage and at maximum specified ambient.

#### 12.2.5 Drop-out value test :

The contactor shall be tested for the resulting value by gradually decreasing the DC voltage until the contactor opens out.

#### 12.2.6 Pneumatic operating test :

Pneumatic operating pressure of the contactor shall be determined - the operating coil being energised at 110V DC, the rated voltage by gradually decreasing the pneumatic pressure to the contactor until the main contacts of the contactor just start opening out.

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The minimum operating pneumatic pressure thus determined shall not exceed 5 Kgs/cm<sup>2</sup>.

#### 12.2.7 Air Tightness Test :-

The pneumatic system of the contactor shall be connected to a reservoir having a volume in litres not greater numerically than 0.02 times the diameter of the cylinder in mm with a minimum of 1 litre charged to the maximum pressure. Air tightness shall be considered satisfactory if the pressure in the reservoir does not decrease by more than 10% of the maximum pressure after 10 minutes on test.

#### 12.2.8 Mechanical Endurance Test :-

0.5 millions mechanical operations (closing and opening) on no load at the rate of 20 operations per minute shall be carried out with the operating coil fed at the nominal voltage of 110 V. Operational Values (pickup and dropout) contact pressure, contact gap and wipe of main and auxiliary contacts shall be measured at the commencement of the test, after every 50,000 operations and at the end of the test. At the expiry of the test, the contactors shall be visually examined and it should be able to operate normally without special attention other than cleaning. However lubrication may be provided after 0.25 million operations. The variation in operating values shall not exceed  $\pm 0.5\%$  after 0.5 million operations. These tests are to be carried out on contactors which have already been subjected to the temperature rise and dielectric tests. The condition of the components such as hardware, contacts, springs and other components should not show any abnormal wear or damage.

#### 12.2.9 Test for withstanding vibration and shock :-

The test shall be carried out generally in accordance with the stipulations mentioned in IEC-77, but the vibration limits shall be in accordance with those stipulated in para 3.3 of this specification.

#### 12.2.10 Resistance Measurement :-

Resistance of the operating coil shall be measured and recorded, corrected to 20°C. The value shall not vary by more than  $\pm 8\%$  from the specified value.

#### 12.2.11 Temperature Rise test :-

(i) Temperature rise of the various parts shall be determined at respective maximum continuous rated voltage and current for a period of time sufficient to enable the temperature rise to reach a steady value. The temperature rise shall not exceed the values given in para 6.1

(ii) The value of current passing through the coil at regular intervals shall be recorded.

#### 12.2.12 Breaking capacity test

The test is intended to verify that the contactor is capable of breaking the maximum current at the rated voltage as specified by the manufacturer. The contactors shall perform successfully under its own control, 180 interruptions at 2 minutes intervals. During this test there shall be no permanent arcing, no flashover, no welding, pitting & wear of contacts and any other sign of distress.

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**12.2.13 Electrical Endurance test****(i) Main contacts :-**

180 make and break operations at 2 minutes intervals at rated current and rated voltage shall be carried out with the operating coil fed at nominal voltage of 110 volts D.C. At the expiry of the test the contact shall visually examined and shall be able to operate normally without any special attention.

**(ii) Auxiliary contacts :-**

0.5 million make and break operations at rating current for cyclic duty shall be carried out, the frequency of operations being 1 per second. At the expiry of the test the contacts shall be able to operate normally without any special attention.

**12.2.14. Dielectric Test :-**

Dielectric tests shall be made with alternating current on every contactor in a clean and dry condition. The test shall be carried out at the normal temperature of the test side at the voltages specified hereunder.

**(1) Main circuit****(a) Between main circuit and earth:**

For this test the control and auxiliary circuits which are not normally connected to the main circuit shall be connected to the frame. Test voltage of 5100 volts RMS at 50 Hz A.C. shall be applied for 1 minute between the contacts connected together and the frame of the contactor.

**(b) Between open main contacts with Arc-chute in position.**

A test voltage of 4,250 Volts RMS at 50c/s A.C sinusoidal shall be applied for 1 minute between the main open contacts with archute in position and the frame as above.

**(ii) Control & Auxiliary circuits**

For these tests main circuit shall be connected to the frame. A test voltage of 1500V RMS at 50 C/s AC sinusoidal shall be applied for 1 minute between all control and Auxiliary circuits connected together and the frame of the contactor. Similarly the same voltage shall be applied between each part of the control and Auxiliary circuits which may be isolated from the other parts during normal operation and all other parts connected together.

**12.3.0 Routine Test****12.3.1 Preliminary checking:-**

This shall be carried out as per para 12.2.1

**12.3.2 Checking of contact gap and contact pressure**

This shall be carried out as per para 12.2.2

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**12.3.3 Checking of Mechanical operations :**

This shall be carried out as per para 12.2.3

**12.3.4 Operating value Test**

This shall be carried out as per Para 12.2.4

**12.3.5 Droput value Test**

This shall be carried out as per para 12.2.5

**12.3.6 Pneumatic Operating Test**

This shall be carried out as per para 12.2.6.

**12.3.7 Air tightness test.**

This shall be carried out as per para 12.2.7

**12.3.8 Resistance Measurement**

This shall be carried out as per para 12.2.10

**12.3.9 Dielectric test.**

This shall be carried out as per para 12.2.14

**13. MARKING**

13.1 Each contactor shall be provided with a rating plate carrying the following data, marked in a durable manner and located in a place such that they are visible and legible when the contactor is installed :

- a) the manufacturer's name and trade mark
- b) Type, designation, serial number and year of manufacture
- c) rated voltage
- d) rated current
- e) Rated pneumatic pressure
- f) rated making and breaking capacities
- g) contact arrangement
- h) rated supply voltage of the coil

**14. PACKING**

Individual equipment shall be packed in sealed air-tight polythene cover. Test certificates for the equipment may also be kept along with the equipment. Several equipments may be kept in one packing box but care should be taken that none of the parts gets damaged during air/Sea/ Rail/road transit. Size of these packing boxes shall be restricted to a limit ensuring easy transportation.

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**GUARANTEE**

The supplier shall give a guarantee of replacing free of cost if any defect is noticed on the equipment due to defective material or bad workmanship within a period of 12 months of its commissioning on the locomotive or 24 months of its receipt whichever is earlier.

**NOTE**

1. ~~All the firms should procure individual items reqd. for sub assemblies or complete equipments from regular sources (Part-I). In case where regular source is not mentioned material to be procured from developmental source (Part-II) of respective items as indicated in ASL of CLW.~~ ALT-3
2. ~~All the firms should procure individual items except Hardware items required for subassemblies or complete equipments from regular sources (Pt-I). In case, where regular source is not mentioned material to be procured from developmental source (Pt-II) of respective items. Hardware items as per relevant IS may be purchased from reputed firm.~~ ALT-3

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" 4TMD.111.034, Alt. 1

" 4TMD.113.061, Alt. 2

4.	DY.CEE/TMD	Sheet No. 15 of 15 added. Note 2 in sheet No. 14 of 15 deleted and Note 3 in sheet No. 15 of 15 added vide CLW/TM/17340 dtd. 17.04.2012.	<i>[Signature]</i>	26.4.12
3	DY.CEE/TMD	Note 1 deleted and note 2 added vide CLW/TM/17340 dtd. 14.10.2011.	<i>[Signature]</i>	27.10.11
2	DY.CEE/TMD	NOTE 1 INCORPORATED VIDE CLW/TM/17340 DATED 13.01.11 APPROVED BY CEE/CLW.	<i>[Signature]</i>	03.02.11
1.	DY.CEE/TMD	CLAUSE No. 4.6.1 MODIFIED FOR RATED CURRENT FROM 1000 AMPS. TO 1500 AMPS. <i>Am</i> 11/10/06	<i>[Signature]</i>	11/10/06
ALT NO.	AUTHORITY	DESCRIPTION	INITIAL	DATE

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3. Firms shall make bulk procurement of individual items required for sub assemblies or complete Equipments from Part-I source of CLW/RDSO only. Procurement from Part-II sources can be made up to 15% of total procurable qty or the highest qty of a past order successfully executed in Rlys units /PUs in the preceding three years. Upper limit of qty to be procured from such Part-II source will Not exceeds 25% of the net procurable qty in a given procurement case. In case where Part-I Source is not available, material may be procured from Part-II sources of respective items as Indicated in ASL of CLW/RDSO. Firms shall keep all such procurement records and will submit the same to inspecting agency at the time of inspection to ensure that above procurement procedure is strictly adhered to. (ALT-4)

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DATE: 26.04.2012