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भारत सरकार
रेल मंत्रालय

**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

डीजल इलेक्ट्रिक लोकोमोटिव (एलको) के लिए डी.सी. जनरल परपस रिले के लिए विशिष्ट एवं
टेस्ट शेड्यूल

**SPECIFICATION AND TEST SCHEDULE FOR DC GENERAL PURPOSE
RELAY FOR DIESEL-ELECTRIC LOCOMOTIVE (ALCO)**

विशिष्ट संख्या एम.पी. 0-400-03 (संशो.-02)

जुलाई 2010

**SPECIFICATION NO. MP.0.400.03 (Rev. 02),
July 2010**

अनुसंधान अभिकल्प एवं मानक संगठन

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Specification and Test Schedule of DC General Purpose Relays for Diesel Electric Locomotives (ALCo)

1.0 SCOPE

This specification covers the design and test procedures of following Relays all with ratings of 5 A and 74V DC.

Sr. No.	Relay	DLW Drg. No.	Coil Reistance at 20+7°C in ohm	Pick Up Volt/A (max)	Contact			Armature Gap (mm)	Moulding details
					Pressure (g/cm2)	Gap (min in mm)	Over travel (mm)		
1.	General Purpose	EL/PT/0642 (PT. NO. 12141045)	445	48 V DC	180-185	2.7	1.6	4.7-6.6	4 way
2.	Ground Relay (Manual Reset)	EL/PT/0643 (PT. NO. 12141057)	66.5	0.2-0.3 A	180-185	2.7	1.6	4.7-6.55	4 way
3.	Ground Relay (Electrical Reset)	Do (with provision of electrical reset)	66.5	0.2-0.3 A	180-185	2.7	1.6	4.7-6.55	5 way

2.0 TECHNICAL REQUIREMENTS

- Manufacturers shall get their drawings, parts/modified parts drawings approved by RDSO.
- Climatic and environmental conditions as per clause No. 4.1 to 4.6 of Specification No. ELRS/SPEC/SI/0015, Oct 2001.
- Clearances and creepage distances shall be as per IEC: 60255-5 (2000-12).
- Hardwares used shall be of standard quality, zinc plated and procured from reputed sources.
- Insulation materials for terminals, arms, and other components shall be FR4 class or higher.
- Springs shall be procured from M/s. Stumpp Schuele & Somappa Pvt Ltd., Bangalore or BCC springs, Aurangabad.
- Material of Interlock springs shall be beryllium copper or ASTM630/455 (S.S).

3.0 TESTS

The general guidelines for this test shall be as per clause Nos.12.3 to 12.9 of spec no. ELRS/SPEC/SI/0015, Oct 2001. Tests listed from Sr. No. 3.1 to 3.6 shall be conducted during routine test and all during type test.

3.1 Visual inspection, workmanship & dimension

3.2 Performance test

Contact pressures, contact gaps, over travel, pick up voltage, Drop out voltage, resistance of coil and Insulation resistance shall be checked.

3.3 Di- Electric test

An AC sine wave voltage of 2000V rms value shall be applied for one minute as under Between

- (a) Open Contacts.
- (b) Contacts & Metal parts.

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(c) Adjacent contacts.

(d) Coil and Earth.

3.4 Checking of mechanical operations

The test consists of checking twenty times in succession the proper operation of relays within the supply voltage range 50 V to 80 V.

3.5 Operating Value Test

Pickup voltage 48V DC (max) of the relay shall be determined by gradually increasing the applied voltage, until the relay just operates and wipes. The relay shall operate satisfactorily between 50V to 80V under all service conditions.

Operation in hot condition at maximum voltage shall be considered satisfactory if the relay in cold state operates normally with a current equal to that which would flow through the relay after 1 hour of operation at the minimum voltage and maximum specified ambient.

3.6 Drop out value (Reset) Test

The relay shall be tested for the drop out (reset) value by gradually decreasing the characteristics quantity of the relay supply voltage until the relay feature to unoperated position.

3.7 Mechanical Endurance Test

10,00,000 mechanical operations (closing & operating) shall be carried out with magnet coil fed at the nominal voltage of 72V DC. Operational values (pickup & dropout), contact pressure and contact gap shall be measured at the end of the test.

At the completion of the test, the relay shall be visually examined and it should be able to operate normally without special attention other than cleaning. The variation in operating values (pick up voltage) shall not exceed $\pm 5\%$ after 1 million operations.

3.8 Test for withstanding Vibration and shock

.1 The vibration, shock and bump test shall be subjected to the tests defined in IEC 61373 (as per clause 10.2.11 of IEC 60571).

.2 At the end of test, following shall be verified

- Screw or nut for tightness.
- The elastic inserts, if any, have correctly fulfilled their purpose.
- Distortion or corrosion of any components.
- Resistance value.
- Insulating blocks for cracks or breaks.
- Firmness of coil tags and other terminals of relays and mechanical failures, if any..
- Proper functioning of the complete unit without any attention or maintenance.

3.9 Temperature rise

- Temperature rise of various parts shall be carried out at rated voltage and current for a period of time sufficient to enable the temperature rise to reach a steady value. Temperature rise shall be recorded at main contacts, coil and terminals.
- The maximum temperature rise permissible on the various components shall not exceed the following values:
 - i. Coil : 90°C for class F Insulation
 - ii. Contacts - Pure copper or copper alloy not forming spring : 45°C
 - iii. Solid silver or silver plate : 85 °C

3.10 Making and Breaking capacity test

The apparatus under test is to be connected in a circuit equal to the maximum breaking capacity of the relay at a time constant $L/R=40\pm 5$ ms. The apparatus shall perform successfully under its own control, 180 operations at 2 minutes interval. After the test, contacts shall be checked for erosion. There shall not be any appreciable erosion on contacts.

3.11 Electrical Endurance Test

2,00,000 make and break operations at rated breaking current for cyclic duty shall be carried out with the magnet coil fed with 72V. At the completion of the test, the relay contacts shall be visually examined for any appreciable erosion and its operation.

3.12 Inspection and Weight after type tests

Following shall be checked at the end of the tests:

- Contact Pressure.
- Contact Gap
- Contact Alignment.
- Operational values (Pickup and dropout)
- Weight

Values observed shall be within the tolerance of $\pm 5\%$.

Any deviations from this specification to improve performance/ reliability and efficiency of the equipment, proposed by the manufacturer, will be given due consideration.

4. Type tests shall normally be carried out before execution of the first development order. In addition, RDSO may require to conduct fresh type test, should a need arise based on performance feedback.

5. DOCUMENTS

As per clause Nos.13 of spec no. ELRS/SPEC/SI/0015, Oct 2001.

6. TOOLS

The supplier shall supply one complete set of tools and gauges for maintenance with each batch of 20 sets of equipments supplied. Then list of tools to be supplied shall be furnished along with the tender.

7. PACKAGING

The equipment should be packed as per specification no. WDG4/EL/PS/9.

8. **WARRANTY:** As Per IRS condition.