

Category 1 Standard

S1115 Performance and Maintenance of Current Rail Indicator Device (CRID)

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1 Purpose

- 1.1 The purpose of this Standard is to define the design, performance, manufacture, testing and maintenance requirements for a portable, self-testing traction voltage indicating device, referred to as a “CRID” (Current Rail Indicator Device).

Note: The equipment is also known as a “Self Testing CRID” or “ST-CRID”.

2 Scope

- 2.1 This Standard applies to the procurement specification for all new manufacture of CRIDs.
- 2.2 This Standard shall be applicable from the date of issue for new manufacture. LU approved CRIDs manufactured in accordance with earlier designs may be utilised until replaced by CRID in full compliance with this Standard. All CRIDs that do not comply with this Standard shall be withdrawn from use by 30 June 2005 at the latest.
- 2.3 This standard replaces 2-01303-073 A1. The Standard has been re formatted and re-numbered. There were no technical changes.
- 2.4 This Standard supports the following LU Policies:

Note: The identification of Policies shown below shall have no material impact upon Infraco or other Suppliers beyond the obligations already contained in this Category 1 Standard. They are provided for LU reference purposes only.

Number	Title	Version
1-01101-004	Service Operations	A1
1-01102-001	Health and Safety	A1
1-01102-002	Safety Decision Making	A1

3 Requirements

3.1 General

- 3.1.1 Where there are conflicts between LU and British, European or International Standards, the most onerous requirement shall be used to provide the highest safety standard.
- 3.1.2 LU Suppliers shall have processes and appropriate safety management and quality management systems in place to ensure that the technical deliverables which include design, maintenance, testing and use in line with this Standard are adhered to at all times.
- 3.1.3 Manufacturers and Equipment maintainers shall create and maintain comprehensive and detailed records sufficient to satisfy the requirements of this Standard.



3.2 Functional Requirements for CRID

3.2.1 Function and Physical Description

- 3.2.1.1 The Equipment shall consist of two terminal boxes which are placed on the positive conductor rail and either the negative conductor rail or traction return rail as applicable.
- 3.2.1.2 Each rail terminal box shall have an ergonomically designed handle that will allow the operator to place the boxes on the rails with minimum risk of human contact with the rails.
- 3.2.1.3 The construction of the Equipment shall be such as to protect the operator from electric shock, arcing, fire and explosion.
- 3.2.1.4 The rail terminal boxes shall be connected by a length of flexible cable. One of the boxes shall be fitted with visual warning devices consisting of 4 white LED clusters. Indication of an unsafe voltage will be by repetitive energisation and de-energisation of LEDs to produce a continuously flashing effect. The other box shall contain a dedicated self-testing circuit.
- 3.2.1.5 The built-in test facility shall energise the visual warning devices and thereby prove the integrity of the circuitry. This self-test facility shall be powered by an internal battery pack. Operation of the self-test shall be inhibited by effective interlocking in an approved manner if the two boxes are not connected together.
- 3.2.1.6 The self-test shall check the integrity of the complete circuit from the rail terminal plates through to the warning devices.
- 3.2.1.7 The warning devices shall have as a minimum, independent, triple-redundant circuitry with bright LED visual indications, physically arranged so that at least two LED clusters are visible in line of sight from any viewing angle. Each LED cluster shall contain at least one LED connected in each of the three independent circuits. The flashing indications shall have a repetition rate of 78 flashes per minute, ± 15 flashes per minute.
- Note:** This rate is outside of the range known to precipitate neurological abnormalities in susceptible people.
- 3.2.1.8 Audible indication may be provided as a supplement but shall not replace the visual indications.
- 3.2.1.9 In the event that the Equipment is left in position on de-energised rails, the warning devices shall activate within 3 seconds of the return of a voltage within the operating range as per sub-clause 3.3.2.2.
- 3.2.1.10 When the Equipment is used for indicating traction voltages it shall be powered only from the track. Internal batteries shall only be used for the self-test facility.
- 3.2.1.11 The terminal plates that make contact with the rail surface shall not protrude by more than 2 mm from the surface which contain them and shall not protrude outboard of the profiles of the enclosures.
- 3.2.1.12 The rail terminal boxes shall be of a pastel orange self-coloured material to RAL 2003.



3.2.2 Rail Types

The Equipment shall operate correctly on all types of conductor rail and running rail used by LU and Network Rail.

3.2.3 Dimensions and Weight

The dimensions and shape of the Equipment shall be as small as possible so as to aid transportation and operation. As a maximum, each of the boxes shall have dimension no greater than length 122 mm, width 120 mm, and height 125 mm (including handles).

3.2.4 Cable

- 3.2.4.1 The cable joining the two rail terminal boxes shall be a moulded assembly incorporating the glands, with a length of 1.35 metres between box faces and have strength and flexibility to promote ease of use.
- 3.2.4.2 The cable assembly shall be suitably rated and robust, but shall be sufficiently flexible so as to prevent movement of the boxes on the rails.
- 3.2.4.3 The cable shall consist of a minimum of three cores insulated to 1000 Volts. The cores shall be wrapped together and have an overall outer sheath coloured pastel orange to RAL 2003.
- 3.2.4.4 The cable shall be manufactured with text printed in black on the oversheath. The words 'Inspect cable and CRID before use' shall be repeated with a 50 mm gap between each block of text.
- 3.2.4.5 The cable shall have moulded ends with integrated glands for anchorage within the rail terminal boxes to provide a minimum repetitive strain relief of 40 kg.

Note: Particular consideration should be given to the design of the cable assembly due to its safety significance in the overall design of the CRID. A suitable cable was developed for LU prototype CRID. Details are shown on drawing L53004.

3.2.5 Labelling

- 3.2.5.1 The Equipment shall be screen printed with the LU roundel, the letters CRID, the purchaser and manufacturer's part numbers and the manufacturer's name.
- 3.2.5.2 A label detailing a unique serial number and date of manufacture shall be firmly and permanently attached to the enclosure using an approved method.
- 3.2.5.3 A separate durable renewable label, securely attached to the cable, shall show the test expiry date which shall be expressed as a calendar date 12 months from the date of test. This label shall only be applied by the manufacturer or approved Equipment maintainer.
- 3.2.5.4 A label shall be permanently attached to the Equipment stating that the Equipment shall not be used if any security seals are broken.
- 3.2.5.5 Text shall be screen printed onto the Equipment giving user instructions.
- 3.2.5.6 The position and orientation of all labels shall be appropriate to the viewpoint of the operator and shall be agreed with the LU Technical Authority.
- 3.2.5.7 Labelling shall be provided in accordance with the principles illustrated in LU drawing number L53011.



3.2.6 Security Seals

All enclosure fastenings shall have screw heads sealed with an anti-tamper seal. It shall be obvious if any seals have been tampered with.

3.3 Performance

3.3.1 Service Life

3.3.1.1 The Equipment shall be designed and constructed to prevent any loss of performance likely to be caused by the types of mechanical, electrical, chemical, inclement weather conditions and other environmental hazards, which may foreseeably be encountered during its service use and transportation.

3.3.1.2 Service life of the Equipment shall be not less than 10 years. Full operational performance shall be available during service life for duty cycles ranging from 10 Applications, representing an annual check only, to a minimum of 8000 Applications, representing at least two per day.

3.3.1.3 The Equipment shall meet all of the design and operational performance parameters in accordance with this Standard, for a minimum period of 10 years.

3.3.1.4 New Equipment shall be tested within the 30 days immediately prior to despatch to client and have calibration validity of not less than one year from the date of test.

3.3.1.5 After battery replacement or to re-validate the calibration, the Equipment shall be tested in accordance with clause 3.5 of this Standard.

3.3.2 Electrical Properties

3.3.2.1 Insulation

- a) The rail terminal boxes shall be constructed from double or reinforced insulation as defined in BS 2754, with a specified Comparative Tracking Index of ≥ 185 as defined in BS EN 60664-1.
- b) The Equipment shall tolerate, without any failure or degradation, the traction supply transient characteristics given in Table 1.

Voltage Peak (kV)	Duration (ms)	Rise Time (ms)
5.0	1.0	-
4.5	2.5	1.4
4.0	4.4	2.9
3.5	6.3	4.3
3.0	7.6	5.4
2.5	9.7	6.9
2.0	13.0	9.5
1.5	20.0	14.0
1.25	27.0	19.0

Table 1: Peak magnitude, duration and rise time of voltage transients that may exist on the London Underground traction supply.