

Technical Specification

T0406 Track: Conductor rail and associated components



**Please read the Written Notices
attached to this standard**

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Contents

1	Purpose	3
2	Scope	3
3	Requirements	3
3.1	General	3
3.2	Conductor rails	4
3.3	Ramps	4
3.4	Conductor rail fishplates, bolts, nuts and washers	5
3.5	Conductor rail anchors	5
3.6	Anchor struts for steel conductor rail	5
3.7	Insulators	6
3.8	Caps for porcelain insulators	8
3.9	Clips for porcelain insulators	8
3.10	Coachscrews, plugs and washers for use with insulators	8
3.11	Shims	8
3.12	Pads and packings for conductor rail	8
3.13	Safety blocks, anti-attrition pads and coachscrews	9
3.14	Negative pedestals	9
3.15	Protection planking	10
3.16	Quality assurance	11
4	Competence	11
5	Supporting information	12
5.1	Safety considerations	12
6	References	13
6.1	References	13
6.2	Abbreviations	14
6.3	Definitions	15
6.4	Technical content manager	15
6.5	Document history	15
7	Attachments	16
7.1	Attachment 1 - Train loading and environmental performance criteria	16
8	Current Written Notices attached to this standard are:	16



1 Purpose

- 1.1 The purpose of this Specification is to specify the requirements for conductor rail and associated components.

NOTE: This document has been reclassified and reformatted as a Technical Specification. The requirements are unchanged.

2 Scope

- 2.1 This Specification applies to conductor rail (both steel and other materials) and the following associated components:
- a) ramps;
 - b) fishplates;
 - c) anchors and anchor struts;
 - d) insulators, caps, clips and coachscrews;
 - e) shims, pads and packings;
 - f) safety blocks, pads and coachscrews;
 - g) negative pedestals;
 - h) protection planking.
- 2.2 The scope of this specification does not include material for upside-down bull head rail but does include material for certain associated components.
- 2.3 This specification is renumbered from S-TR-0019, which superseded TE-DS-0326-A2, TE-DS-0327-A2, TE-DS-0328-A2, TE-DS- 0329-A2, TE-DS-0330-A2, TE-DS-0331-A2, TE-DS-0335-A2 and TE-DS-0351-A2.

3 Requirements

3.1 General

- 3.1.1 Several of the components covered in this specification are specified by reference to LU drawings showing prescribed materials and dimensions. Acceptance of alternative designs will be subject to demonstration of:
- a) conformance with any component-specific performance criteria in this specification;
 - b) conformance with the train loading and environmental performance criteria in attachment 1;
 - c) fitness for purpose within the electrical criteria described in LU Category 1 Standard 1-107;
 - d) conformance with fire-related criteria in LU Category 1 Standard 1-085;
 - e) ability to interface satisfactorily with other components of the track system;
 - f) performance at least equal to that of existing designs.

- 3.1.2 Two of the BSs referenced in this specification have been superseded by multiple replacement documents: BS 4360 has been replaced by five BS ENs and one BS, and BS 4466 has been replaced by one BS EN ISO and one BS. In addition BS 1449 has been partially superseded by multiple documents. BS 1449 and the particular (dated) editions of BS 4360 and BS 4466 listed in clause 6.1 may continue to be used, but suppliers may, subject to LU's approval, use relevant replacement specifications.

3.2 Conductor rails

3.2.1 General

- 3.2.1.1 Conductor rail shall withstand the thermal effects arising from a let-through I^2t value of 1.22×10^9 , where I is current and t is duration in seconds. For further explanation see LU Category 1 Standard 1-107.

3.2.2 Steel

- 3.2.2.1 Steel conductor rail shall be manufactured in accordance with BS 7865.

Note: Several steel conductor rail sections are present in the LU network. However, the two BS 7865 sections used for new work are Section 65 (65kg/m rectangular) for Tube applications and Section 75 (75kg/m flat bottom) for Open and Sub-surface applications.

- 3.2.2.2 Where required by the purchaser, holes for fishplates shall be dimensioned and located in accordance with Network Rail drawing RE/PW/010.

3.2.3 Other materials

- 3.2.3.1 Conductor rail manufactured from material other than steel shall satisfy the following requirements:
- a) the electrical resistance of a 1m length of the rail shall not exceed 7 microhms at a rail temperature of 15C (though LU may require a lower resistance for certain applications);
 - b) any wear-resistant capping layer applied to the rail shall be securely attached, such that there is no risk of separation from the body of the rail during normal service;
 - c) the rail shall be sufficiently stiff in the vertical plane to maintain hogging and sagging within limits which ensure satisfactory current collection, when supported at intervals of 4.5m.

3.3 Ramps

3.3.1 General requirements

- 3.3.1.1 The principal material used in the construction of ramps for steel conductor rail shall be mild steel strip fabricated from grade 43A steel plate complying with BS 4360, and Section 65 or Section 75 conductor rail complying with BS 7865.

3.3.2 Standard ramps for steel conductor rail

- 3.3.2.1 Standard conductor rail ramp types which shall be used comprise:
- a) rectangular 65 kg/m in accordance with drawings T925454, P50508 and T055447;
 - b) flat bottom 75 kg/m in accordance with T055339, T055347 and P48054.

3.3.3 Ramps for other conductor rails

3.3.3.1 Ramps for other than steel conductor rail shall satisfy the following requirements:

- a) the longitudinal top profile shall be comparable with that of the standard steel types (clause 3.3.2);
- b) the method of connection to the conductor rail shall provide for mechanical characteristics as close as practicable to the conductor rail itself;
- c) the method of connection to the conductor rail shall provide for electrical characteristics in accordance with standard LU Category 1 Standard 1-107.

3.4 Conductor rail fishplates, bolts, nuts and washers

3.4.1 Fishplates and associated fastenings shall provide, as far as practicable, mechanical characteristics equivalent to the conductor rail itself, and electrical characteristics in accordance with standard LU Category 1 Standard 1-107. If necessary, where the fishplates alone do not provide adequate electrical continuity, their design may be on the basis that they will be supplemented by, for example, bonding across the joint or electrically conductive gel between the plates and the rails.

3.4.2 Fishplates for steel conductor rails shall be manufactured to the material, dimensions, tolerances and finish specified on the LU standard conductor rail fishplate drawings.

3.4.3 Bolts, nuts and washers for fishplates for steel conductor rails shall be manufactured in accordance with the requirements of LU Technical specification T0409.

Note: Joints in steel conductor rails are normally welded.

3.4.4 Fishplate fastenings for use with non-ferrous conductor rail may be of the multi-groove locking pin type, subject to compliance with clause 3.4.1.

3.5 Conductor rail anchors

3.5.1 Anchors, and their connections to the conductor rail and the track structure, shall be designed to resist longitudinal creep of the conductor rail.

3.5.2 Anchors and their associated components for steel conductor rail shall be manufactured to the material, dimensions, tolerances and finish specified on the LU standard conductor rail anchor drawings.

3.6 Anchor struts for steel conductor rail

3.6.1 Materials and manufacturing shall be according to drawing T040859.

3.6.2 Materials used in the construction of conductor rail anchor struts shall consist of the following components.

a) Timber

Timber used for conductor rail anchor struts for hardwood-sleepered track shall be an approved hardwood. Timber used for conductor rail anchor struts on softwood-sleepered track shall be an approved softwood. In any location the timber used shall be new or cut from serviceable used sleepers and shall conform to LU specification T0403

b) Coachscrews

Coachscrews used to secure conductor rail anchor struts shall be 12.5 mm diameter, 100 mm long, galvanised and according to drawing T008821.

c) Anchor strut baseplates

Anchor strut baseplates shall be 680 mm x 80 mm x 12 mm black mild steel flat to BS 4360 grade 43A according to drawing T040859.

3.6.3 Conductor rail anchor struts shall be cut from hardwood sleepers to the dimensions and tolerances as shown on drawing P40859 where:

- a) length is as required, tolerance 25 mm;
- b) width is 255 mm, tolerance + 18 mm - 0 mm;
- c) depth is 125mm, tolerance + 12 mm - 0 mm.

3.6.4 Conductor rail anchor struts shall be coated with a properly applied hot petroleum coating of an approved type, e.g. "Timberseal" or "Flintcote". Care shall be taken to ensure that the coating is also applied on each end face of the strut and that the coating is made good if the strut length is adjusted during installation.

3.7 Insulators

Note: Unless otherwise stated, the clauses in this section refer to insulators supporting conductor rail and to insulators contained within conductor rail anchors.

3.7.1 General

3.7.1.1 Insulators shall be manufactured from either porcelain or other material approved by LU.

3.7.1.2 Insulators shall be non-porous, self-cleaning, fire-resistant and resistant to diesel fuel, weedkiller, grease, de-icing fluids and atmospheric pollution.

3.7.1.3 Insulators shall be resistant to ultraviolet light, temperature cycling and weather erosion.

3.7.1.4 Insulators shall be capable of functioning satisfactorily throughout a temperature range of -25C to +80C.

3.7.1.5 Insulators shall be capable of withstanding fault currents and mechanical stresses associated with the following:

- a) a fault current of 90 kA at the point of connection of the traction feeder cables to the conductor rails;
- b) a rise time of this fault current of 20 milliseconds;
- c) a duration of this fault current of 150 milliseconds;

Tests using these criteria shall be carried out three times, each repeat application occurring as soon as practicable after the previous application. After the tests there shall be no damage to, or permanent deformation or loss of functionality of, the insulator.

3.7.1.6 As an alternative to the electrical testing described in clause 3.7.1.5, tests may be carried out by an equivalent mechanical method. The detailed method shall be subject to agreement with LU.

3.7.1.7 Insulators shall provide for the correct relationship between running and conductor rails for the types of sleeper in use.