

Category 2 Standard

S2505 Train detection (Formerly E7055) systems

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1 Purpose

- 1.1 This standard details the system functions and performance criteria for train detection systems, and describes their complete system lifecycle characteristics.
- 1.2 This standard applies the concepts of the safety signalling philosophy, as described in standard E7001, to train detection systems.

2 Scope

- 2.1 Two major groups of train detection systems are addressed:
 - a) train absence detectors, such as track circuits;
 - b) train presence detectors, such as overlay rail circuits, treadles or wheel detectors.
- 2.2 This standard does not address vehicle configurations, axle numbers and spacing, or the EMI/EMC compatibility between the rolling stock and the train detection system. It is incumbent upon the application engineer to consider these issues when applying this standard. Reference shall be made to the Professional Head of Signalling to ensure that changes to the train detection systems do not invalidate rolling stock approvals.
- 2.3 The business objective of this standard is to support the operation of a safe railway.
- 2.4 The users of this standard are expected to be systems specifiers and designers and application engineers.
- 2.5 This document replaces E7055 A2, which is withdrawn.

3 Requirements

3.1 Safety considerations

- 3.1.1 The users of this standard shall comply with relevant British Standards, notably BS EN 50126, BS EN 50128 and BS EN 50129. These documents define dependability, reliability, availability, maintainability, safety and software protection systems.
- 3.1.2 Procurement specifications shall ensure that the requirements of LU standard 1-526 (the Assessment and Management of Health, Safety and Environmental Risk) are met.

3.2 Materials

- 3.2.1 All materials used in the construction of equipment to be installed in underground or enclosed environments shall comply with the requirements with engineering standard 1-085 (Fire safety performance of materials).

3.3 Functional requirements

3.3.1 General

- 3.3.1.1 The design shall safeguard against the installation of mechanically similar but functionally incompatible components where this could result in an unsafe condition.
- 3.3.1.2 The system shall be earthed in accordance with MR-S-PO-0008, Earthing Management and MR-S-PO-0009 Part 1, Earthing Code of Practice, Part 1; General Principles.
- 3.3.1.3 Train detection systems shall be subjected to an assurance process to demonstrate that they will not compromise or be compromised by any system with which they are required to operate, such as automatic train protection systems, point heaters, DC and AC traction systems.
- 3.3.1.4 The frequencies, modulation and coding mechanisms used in train detection systems shall be agreed by the Professional Head of Signalling.
- 3.3.1.5 Broken rail detection shall be considered within the overall railway system design. Where practicable, the train detection system may contribute to the detection and protection against broken rails.
- 3.3.1.6 Train detection system shall be capable of adjustment for various rail profiles and to cater for rail wear. The effects of rail wear shall be fully understood, and shall not require more than an annual adjustment of the equipment.
- 3.3.1.7 Electronic and computer-based elements of train detection systems shall be mounted in Signalling Equipment Rooms.

3.3.2 Track circuits

- 3.3.2.1 The track circuit shall be capable of detecting the electrical shunt caused by the presence of a single train axle within its boundaries, subject to the exceptions defined in section 3.3.2.2.
- 3.3.2.2 The maximum permitted length of undetected track shall be as follows:
 - a) at the interface between adjacent tuned track circuits a total of 9 metres, being 4.5 metres within the boundary of each track circuit;
 - b) at the interface between a tuned track circuit and un-tuned track circuit a total of 4.5 metres, being entirely within the tuned track circuit;
 - c) between adjacent un-tuned track circuits a total of 3.25 metres;
 - d) within point and crossing areas a maximum of 0.5 metres.
- 3.3.2.3 The implementation of the track circuit system shall be capable of detecting a block-joint failure.
- 3.3.2.4 The output device for the track circuit shall have its track connections made at the entry of the track circuit for the normal direction of traffic.
- 3.3.2.5 The application of the track circuit shall allow for one rail to be earthed to provide a path for traction faults. All bonding and jumper cables used to maintain this earth path shall be capable of conducting the worst case traction fault currents without incurring damage.