

Category 2 Standard

S2534
(Formerly E7503)

Management of signalling wiring and of degraded wire insulation

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1 Purpose

- 1.1 The purpose of this Standard is to define the principal requirements for managing signalling wiring and degraded signalling wire insulation.

2 Scope

- 2.1 This standard applies to all signalling wiring and the management action required when insulation degradation occurs.
- 2.2 This document replaces E7503 A1.

3 Requirements

3.1 Safety considerations

- 3.1.1 The primary purpose of railway signalling and control systems is to ensure that train movements are protected from the dangers of collision with other trains or with fixed structures and from derailment when passing over points.
- 3.1.2 The consequences of such hazards are obviously very severe, and therefore signalling and control systems are designed with numerous safeguards against them. Since the systems rely on interconnecting wiring, the integrity of insulation is a key safeguard. It is essential that, when wiring is inspected, great care is taken not to compromise the security of connections or the integrity of the insulation. If it takes place during traffic hours, the inspection shall be of a visual nature only.
- 3.1.3 When degraded wires are being handled during intrusive works, appropriate precautionary measures shall be taken to mitigate the risk to the staff involved of electric shock and or acid burns from the degradation residue which may be conductive or acidic.

3.2 Environmental considerations

- 3.2.1 There are no special environmental considerations applying to the requirements defined in this document.

3.3 Principles and factors to be considered

3.3.1 Principles

- 3.3.1 1 Each Supplier shall:
- a) maintain a database of wire types used for signalling circuits in equipment rooms, kiosks and all other equipment cases, stating, where possible, the installation dates;
 - b) develop and implement a surveillance regime which ensures that all signalling system wiring insulation is inspected on a routine basis, with the objective of determining whether there are any changes in insulation condition over time.



Note: In addition to the requirements of this standard, E7051, E7160 and E7165 give requirements for inspection records to be reviewed, acted upon and retained for audit purposes.

- 3.3.1.2 Each Supplier shall develop and document a methodology for assessing and controlling the risks presented by degraded wire insulation and have pre-defined measures to manage known modes of wiring insulation degradation.
- 3.3.1.3 In the event of any deterioration in the condition of wire insulation being discovered which could affect the safe operation of the signalling, it shall be escalated in accordance with E7050 and immediate action shall be taken to ensure that the risks are both tolerable and as low as reasonably practicable.
- 3.3.1.4 When considering risk mitigation each Supplier shall establish whether temporary operational or engineering controls are required, with reference to the examples of the factors in subsections 3.1.2 and 3.1.3.

3.3.2 Aggravating Factors

The following shall be considered as some of the factors likely to increase the probability of occurrence of a hazard at a site with degraded wire insulation:

- a) degradation mode known to reduce insulation resistance or exude acidic residue;
- b) sustainability of operational mitigations for prolonged periods;
- c) critical circuits affected;
- d) significant proportion of site wiring affected or extensive degradation on individual wires;
- e) disturbance of degraded wiring due to inspection or replacement techniques;
- f) inadvertent interference with degraded wires during preventative and corrective maintenance, routine change activities or other planned works;
- g) site conditions involving a high level of traffic and a complex layout;
- h) a low level of diverse safety protection arising from, for example, the site pre-dating current design standards;
- i) control of access by other parties, e.g. Operators in IMRs routing trains under degraded conditions.

3.3.3 Mitigating Factors

The following are factors likely to reduce the probability of occurrence of a hazard at a site with degraded wire insulation:

- a) degradation mode known not to affect insulation resistance or exude acidic residue;
- b) critical circuits not affected;
- c) low proportion of site wiring affected or limited degradation on individual wires;