

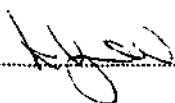
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Issue	2
Date	December 2005

Business Process Document

Specification for design of return conductor systems for a.c. electrified lines

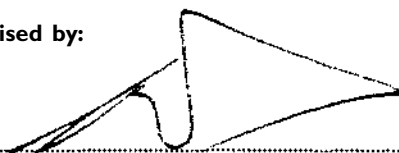
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Endorsed by:



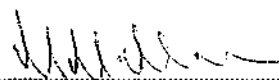
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1	March 1998	RT/E/S/21078 (<i>Supersedes EHQ/SP/D/133</i>)
2	December 2005	Re-issued as a SAF3 Business Process Document

Implementation

3 December 2005

Compliance

This Network Rail specification is mandatory and must be complied with by Network Rail and its contractors from 3 December 2005.

When this specification is implemented, it is permissible for all projects, which have formally completed GRIP Level 4, to continue to comply with the Issue of any relevant Network Rail standards current when GRIP Level 4 was reached and not to comply with requirements contained herein unless the head of electrification and fixed plant has stipulated otherwise in the accompanying briefing note.

Where the head of electrification and fixed plant has specified that all projects will comply with the requirements, specific authority not to comply can be sought in the usual manner using the appropriate non-compliance authority processes described in Network Rail standard, [NR/SP/STP/045](#) Managing the process for non-compliance authority (formerly RT/LS/P/045).

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I Purpose

This specification states the requirements for the design of the spatial arrangement of return conductor systems, with or without booster transformers, for the suppression at source of electromagnetic interference on A.C. Electrified Lines in order to reduce the level of interference induced into adjacent signalling and telecommunication circuits.

The document is to be read in conjunction with the relevant procurement specification.

2 Scope

This specification applies to the design of all new suppression systems utilising return conductors, with or without booster transformers, installed on A.C. Electrified Lines.

3 Reference documentation

	AGREEMENT (Re: Electromagnetic interference between Railway and Telecommunications system) Between NETWORK RAIL PLC and BRITISH TELECOMMUNICATIONS plc
EN ISO 9001	Model for quality assurance in design, development, production, installation and servicing

4 Definitions

Bare feeder	A bare 25 kV conductor, forming a connection between a switching station and the overhead line equipment, running alongside the track for more than the length of a span.
British Standard	A standard published by the British Standards Institution. Its alphanumeric identity is prefixed by BS.
Equipment	Equipment including all component parts and accessories.
European Standard	A standard published by the European Committee for Standardisation or by the European Committee for Electrotechnical Standardisation. Its alphanumeric identity is prefixed by EN.
International Standard	A standard published by the International Electrotechnical Commission. Its alphanumeric identity is prefixed by IEC.
Procurement Specification	The contract specific Network Rail documentation, such as, Invitation to Tender or Technical Worksopce.

Network Rail Business Process Document

A collective term for a Business Process Specification, Procedure, Work Instruction or a Guidance Note, published by a directorate of Network Rail PLC.

Switching station

The site of lineside equipment arranged together for the purpose of providing remote switching of the power supply to the overhead line equipment. This can include feeder stations, and track sectioning cabins/locations.

SCADA

Supervisory control and data acquisition

5 Description of the a.c. traction system

The a.c. electrification traction supply system forms part of the railway infrastructure owned and operated by Network Rail. The system consists of feeder stations, track sectioning cabins/locations, a 25 kV overhead line contact system and associated SCADA systems.

Some lines are dual equipped with both a.c. and d.c. traction systems or are adjacent to other administrations' traction systems. Where appropriate further details are provided in the procurement specification.

5.1 The high voltage network

The power supply is obtained at 25 kV, single phase, from the Electricity Supply Industry at feeder stations spaced at intervals of about 40 km along the railway. These supplies may be derived from different phases and therefore may have a phase displacement of up to 120°.

Electrical feeding and isolation of the overhead line are effected by operation of circuit breakers and manual or motorised overhead line switches.

One pole of each 25 kV supply is connected to the running rails at the feeder stations and since the overhead line supporting structures are also connected to the running rails, this results in a multiple earth system having an overall resistance to earth of less than 1 Ω.

Trains draw traction current from the overhead line contact system by means of a pantograph. The current is returned to the feeder station by way of the running rails and earth, or, where this would give rise to unacceptable inductive interference, by way of the running rails and return conductors which may also be equipped with booster transformers.