

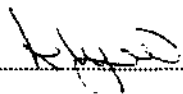
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Business Process Document

Product specification for high voltage cables and accessories for traction supplies

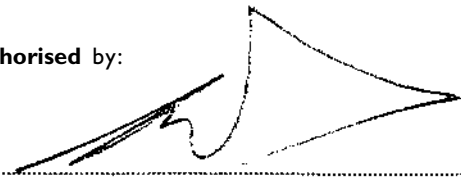
Endorsement & Authorisation

Endorsed by:



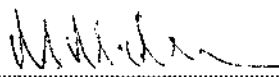
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3	December 2005	Re-issued as a SAF3 Business Process Document

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 Product Specification states the requirements for the design, manufacture, testing at works and at site, and delivery ex works of:

- a) 6.35/11 kV, 12.7/22 kV and 19/33 kV single and three core polymeric cables;
 - b) 25 kV two core concentric and single core, polymeric cables;
- and associated complete terminations, lugs and joints (termed accessories).

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

2 Scope

On the D.C. Electrified Lines, this specification applies to all new single and three core polymeric insulated cables.

On the A.C. Electrified Lines, this specification applies to all new single and two core polymeric insulated 25 kV cables and associated accessories.

3 Reference documentation

BS 6622	Specification for cables with extruded cross-linked polyethylene or ethylene propylene rubber insulation for rated voltages from 3800/6600 V up to 19000/33000 V
IEC 502	
BS 6360	Specification for conductors in insulated cables and cords
BS 6234	Specification for polyethylene insulation and sheath of electric cables
BS 7215	Specification for separable insulated cable connector system above 1 kV up to 36 kV
IEC 60840	Power cables with extruded insulation and their accessories for rated voltages above 30 kV ($U_m = 36$ kV) up to 150 kV ($U_m = 170$ kV) Test methods and requirements
BS 7454	Calculation of thermally permissible short-circuit currents, taking into account non-adiabatic heating effects
IEC 60060	High voltage test techniques
IEC 60230	Impulse tests on cables and their accessories
IEC 60229	Tests on cable oversheaths which have a special protective function and are applied by extrusion
EN 60811	Insulating and sheathing materials of electric cables - Common test methods

4 Definitions

For the purpose of this Product Specification the following definitions shall apply:

British Standard	A standard published by the British Standards Institution. Its alphanumeric identity is prefixed by BS.
Cable	Line containing insulated conductors and including all component and material parts.
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 Company Standards	A collective term for a specification or procedure published by a directorate of Network Rail.
SCADA	Supervisory control and data acquisition.

5 General clauses

5.1 Safety

Measures shall be taken to ensure the safety of persons concerned in its installation, operation, maintenance, repair and its eventual disposal.

5.2 Design, manufacture and workmanship

The cable and associated accessories shall be designed and manufactured in accordance with best practice, taking cognisance of the system and environment in which it will operate. All material shall be of the quality and of the type most suitable for working under the conditions specified for the full service life of the cable.

5.3 Delivery

The cable shall be supplied on non metallic cable drums, and together with associated accessories shall be suitably packed to withstand, without damage, the method of transport, delivery, cramage, storage and positioning stated in the procurement specification. The cable drums shall be compatible with the cable laying equipment specified in the procurement specification. The cable and associated accessories shall be suitably weatherproofed.

Overall dimensions of the cable when packed for transport shall not exceed those stated in the procurement specification.

5.4 European, International and British Standards etc.

The cable and associated accessories shall comply with relevant European Standards whether or not reference is made to them.

In the absence of European Standards, International Standards or national standards having currency within the European Community shall apply subject to the prior agreement of the purchaser.

The editions of standards current at the date of tender shall apply.

5.5 Specific cable and accessory standards

The cable shall be designed, manufactured and tested at works in accordance with [BS 6622](#) and as supplemented by IEC 60840, as appropriate to the rated voltage, and [BS 6360](#) and all other relevant standards.

Cable joints and terminations shall be tested in accordance with IEC 60230 and IEC 60060

6 Performance requirements

The cable and associated accessories shall be fit for their intended purpose when connected in service.

6.1 Environmental, service and installation conditions

The cable and associated accessories shall be suitable for their rated characteristics when installed at locations in close proximity to railway tracks.

The service conditions are:

- a) the minimum ambient air temperature shall be -25°C;
- b) the maximum ambient air temperature shall be +40°C;

- c) the cable and associated accessories are subject to strong magnetic fields emanating from adjacent electrical equipment and to vibration caused by passing trains;
- d) hand-held portable radio transmitter and/or receiver apparatus will be used near the installation;
- e) the cable and associated accessories may be subjected to ground conditions containing contaminants including mineral and fuel oils;
- f) any additional conditions as stated in the procurement specification.

For the purposes of assigning a nominal continuous current rating to the cable and associated joints they shall be assumed to be installed in still air at a maximum ambient temperature of +25 °C within a cable trough.

6.2 Compatibility with cable routes

The cable and associated accessories shall be suitable for use in cable routes detailed in the procurement specification and shall also be suitable for use in the installations described in Appendix E.

6.3 Bending radius

The cables shall be capable of being bent to a minimum radius, in accordance with [BS 6622](#) or IEC 60840, as appropriate.

6.4 Current rating

The cables and associated accessories shall be suitable for the continuous current, load cycle, fault current and fault duration stated in the procurement specification without sustaining damage or deleterious effects. Cable screens shall be capable of conducting the earth fault current.

The short circuit current of the cable including conductor(s) and screen shall be determined in accordance with [BS 7454](#).

6.5 Current rating (a.c. electrified lines)

Concentric cable shall be capable of conducting the specified current simultaneously through the concentric and phase conductors.

6.6 Rated voltage

The cable shall be suitable for use under the voltage conditions as specified in the procurement specification.