

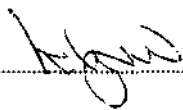
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Business Process Document

Specification of voltage testing electrical distribution equipment (including cables) on a.c. and d.c. electrified lines

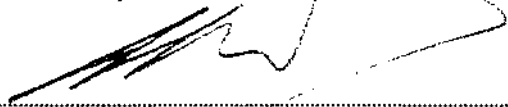
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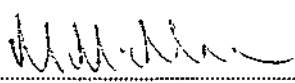
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Issue record

Issue	Date	Comments
2	December 2005	Updated and 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 on-site voltage testing (pressure testing) of major items of electrical distribution equipment, including cables, in the range 3.3 kV to 66 kV, 50 Hz, on A.C. and D.C. Electrified Lines when the performance of insulation has been affected by refurbishment, modification, repair or relocation. The specification provides guidance on the selection of test voltage values and durations applicable to the equipment as it ages.

The voltage testing is to establish whether the electrical insulation properties of the equipment are acceptable for return to service.

2 Scope

This specification applies to the major items of electrical distribution equipment (switchgear, transformers and cables) in the range 3.3 kV to 66 kV, 50 Hz on A.C. and D.C. Electrified Lines.

This specification does not apply in cases where equipment is removed from site for major refurbishment, modification or repair.

3 Reference documentation

BS 2918	Methods of test for electric strength of solid insulating materials Part I - Tests at power frequencies
BS 171	Power transformers
EN60076	
BS 5227	A.C. metal-enclosed switchgear and controlgear for rated voltages above 1
IEC 298	kV and up to and including 52 kV
BS 6622	Cables with extruded cross-linked polyethylene or ethylene propylene
IEC 502	rubber insulation for rated voltages from 3800/6600 V up to 19000/33000 V
BS 6480	Impregnated paper-insulated lead or lead alloy sheathed electric cables of
	rated voltages up to and including 33000 V
BS 5311	High voltage alternating-current circuit-breakers
IEC 56	

4 Definitions

For the purpose of this specification the following definitions shall apply:

British Standard	A standard published by the British Standards Institution. Its alphanumeric identity is prefixed by BS.
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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.
Network Rail Company Standards	A collective term for a specification or procedure published by a directorate of Network Rail.
Procurement Specification	The contract specific Network Rail documentation, such as, Invitation to Tender or Technical Workslope.
Tester	The organisation and/or the person(s) who by experience, qualifications and training is competent to carry out the tests and to comply with all relevant safety precautions and instructions.
SCADA	Supervisory control and data acquisition.
XLPE	Cross-linked polyethylene.

5 General clauses

5.1 Safety

At all times the test apparatus and methods employed shall be safe. Measures shall be taken to ensure the safety of persons concerned.

6 Verification of performance and quality

The tester shall demonstrate to the responsible engineer or appointed maintenance contractor, as appropriate, that the work carried out complies with the requirements of this specification.

6.1 Calibration and condition of test apparatus

All test apparatus shall be in proper working order, suitably calibrated and/or certified by an independent certification authority for the scope of testing to be undertaken.

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6.2 Reporting and records

A record of the tests carried out together with the results shall be made and shall include the data listed in Appendix A. Copies shall be provided to the responsible engineer and to the appointed maintenance contractor where appropriate. Records shall be retained throughout the life of the equipment.

7 Technical requirements for tests

7.1 Specific standard

The tests and testing apparatus shall comply with the relevant requirements of BS 2918.

7.2 Equipment to be tested

Voltage testing shall be carried out on equipment when the performance of insulation has been affected by refurbishment, modification, repair or relocation.

7.3 Disconnection of equipment to be tested

Wherever practicable, the equipment to be tested shall be completely disconnected from all other equipment. Where such disconnection is not practicable and other equipment has to remain connected, then the lowest test voltage and shortest duration applicable to the individual equipments shall be selected.

Components intended to be tested at a lower voltage shall be disconnected and, if necessary, tested separately at an appropriate reduced test voltage.

7.4 Test apparatus

The voltage test apparatus shall be capable of providing a constant sustained test voltage when connected to the equipment under test.

7.5 Interference with other equipment

Measures shall be taken, where necessary, to ensure that the testing does not interfere with the correct functioning or operation of any other equipment.

7.6 Insulation resistance test

An insulation resistance test shall be carried out at 1000 V before and after the voltage test. Low readings or a significant difference between the values obtained before and after the voltage test shall be investigated.