

1. SCOPE

This document defines the requirements for third party low voltage cable jointing systems (where such systems form part of contestable works within the competitive connections market) for adoption by SP Energy Networks.

2. ISSUE RECORD

This is a **Controlled** document. The current version is held on the EN Document Library.

It is your responsibility to ensure you work to the current version.

Issue Date	Issue No.	Author	Amendment Details
July 2001	1	R H Bracey	Initial issue: 4 page document
Nov 2014	2	Paul Cunningham	General Update
Nov 2019	3	Adam Merrilees	General update to bring in line with purchasing specification. Worm drive clip requirements and impact test added.
Nov 2022	4	Adam Merrilees	General update to bring in line with purchasing specification. Sustainability requirements added.

3. ISSUE AUTHORITY

Author	Owner	Issue Authority
Name: Adam Merrilees Title: Senior Engineer	Name: Frank Berry Title: Circuits Manager, Engineering Design and Standards	Name: Fraser Ainslie Title: Head of Engineering Design and Standards

4. REVIEW

This is a **Controlled** document and shall be reviewed as dictated by business / legislative change but at a period of no greater than 3 years from the last issue date.

5. DISTRIBUTION

This document is not part of a Manual maintained by Document Control and does not have a maintained distribution list. It is published on the SP Energy Networks website.

6. CONTENTS

1. SCOPE.....	1
2. ISSUE RECORD.....	1
3. ISSUE AUTHORITY	1
4. REVIEW	1
5. DISTRIBUTION.....	1
6. CONTENTS	2
7. REFERENCE DOCUMENTS.....	2
8. DEFINITIONS	3
9. JOINT/TERMINATION KIT.....	4
10. SUSTAINABILITY	6
11. ASSESSMENT PROCESS.....	6
11.1 Evidence	6

7. REFERENCE DOCUMENTS

The following documents are referred to within this document. It is important that all users of the related documents are in possession of the current issue together with any amendments.

British Standards (BS)

BS EN 50393	Test methods and requirements for accessories for use on distribution cables of rated voltage 0,6/1,0 (1,2) kV
BS 5315	Hose clamps (worm drive type) for general purpose use (metric series)
ISO 9001	Quality management systems. Requirements.
ISO 45001	Occupational health and safety management systems. Requirements with guidance for use.
ISO 14001	Environmental management systems. Requirements with guidance for use.
ISO 14025	Environmental Labels and Declarations - Type III Environmental Declarations - First Edition

ENA Engineering Recommendations (ER)

ENA ER C93	Type approval tests for mechanical connections to metallic sheaths of cables
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ENA Technical Specifications (TS)

ENA TS 12-23	Reference to an Impact Resistance type test within: Plastics warning tape, polyethylene protection tape, polyethylene protection tiles, and cable route marker posts for buried electricity supply cable
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IEC Standards (IEC)

IEC 61238-1-1	Compression and mechanical connectors for power cables – Part 1-1: Test methods and requirements for compression and mechanical connectors for power cables for rated voltages up to 1 kV (Um = 1,2 kV) tested on non-insulated conductors
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IEC 61238-1-2 Compression and mechanical connectors for power cables – Part 1-2: Test methods and requirements for insulation piercing connectors for power cables for rated voltages up to 1 kV ($U_m = 1,2$ kV) tested on insulated conductors

SP Energy Networks Documents

Approved Equipment Register The Approved Equipment Register is published on the SP Energy Networks' website under Policies, Procedures and Specifications: Documentation ([Link](#)).

Legislation

Health and Safety at Work Act 1974

Electricity at Work Regulations 1989

Provision and Use of Work Equipment Regulations 1998

8. DEFINITIONS

SPEN SP Energy Networks, the brand name for the division of the ScottishPower group of companies that encompasses SP Transmission plc, SP Distribution plc, SP Manweb plc, SP Power Systems Ltd and ScottishPower Energy Networks Holdings Ltd.

SP Transmission plc The Transmission Licence Holder for the transmission service area formerly known as ScottishPower.

SP Distribution plc The Distribution Licence Holder for the distribution service area formerly known as ScottishPower.

SP Manweb plc The Distribution Licence Holder for the distribution service area formerly known as Manweb.

Approved Equipment approved in accordance with SPEN's Equipment Approvals Procedure and which is considered suitable for use and/or installation on SPEN's networks. Approval shall be given in writing by the Engineer.

Engineer Person nominated by SP Energy Networks having responsibility and authority for all technical matters relating to this document.

Joint Design The overall joint requirements (e.g. encapsulation, connectors, moisture barriers, etc)

Termination Design The overall termination requirements (e.g. encapsulation, connectors, moisture barriers, etc)

Joint Type The four generic joint types – mains only (straight or branch), mains/service, service straight and stop-ends

Termination Type Cut out, indoor LV busbar and outdoor pole terminations

9. JOINT/TERMINATION KIT

The Joint/Termination Design shall comply with the following requirements:

- It shall be Approved and listed in the Approved Equipment Register.

or

- The complete joint kit shall be type tested to meet in full the requirements of BS EN 50393 with independent witnessing and have a service history (minimum of 500 joint-years) with a Distribution Network Operator on the same types of cable that are used by SPEN.
- All connectors used in the Joint Design shall be type tested to meet in full the requirements of IEC 61238-1-1 and IEC 61238-1-2.
- All worm drive clips used in armour bond kits or earth bond kits shall meet in full the requirements of the current edition of BS 5315. Alternative worm drive clips may be acceptable if the manufacturer can produce and submit an acceptable QA testing regime. This QA testing regime shall demonstrate the quality of production and breaking torque of the worm drive clips. SPEN shall also be provided with evidence of random and batch testing over the course of the past year of production to prove the worm drive clips consistently have a minimum break torque of >10Nm.
- All mechanical connectors to metallic sheaths of cables shall be type tested to meet in full the requirements of ENA ER C93.
- The Joint Design and Termination Design and their components shall meet the requirements of the Health and Safety at Work Act 1974, the Electricity at Work Regulations 1989 and the Provision and Use of Work Equipment Regulations 1998, for the maximum safety of all personnel.
- The impact test detailed in ENA TS 12-23 Annex A for cable protection tiles has been modified by SPEN to be carried out on LV joints. In addition to the impact at ambient temperature test detailed in BS EN 50393, the Joint Design shall meet the requirements detailed in ENA TS 12-23 Appendix A with the additions, exceptions and modifications given below.
 - **Test Apparatus (A.1)**
 - (Modification): In Figure A2 the test specimen shall be a complete joint filled with SPEN's current Approved resin(s).
 - (Addition): d) The completed joint may be supported to prevent it from rolling during the test. The support shall not enhance the test specimen's impact resistance in any way.
 - **Test Procedure (A.2)**
 - (Modification): Reference to "protection tile" shall be read "completed joint filled with SPEN's current Approved resin".
 - (Addition) Paragraph 1: The resin shall be fully cured.
 - (Addition) Paragraph 2: The tup shall not be allowed to strike the filling port cap.
 - ❖ Where L is the length of the joint shell, the first and second strike shall be at the same location at a third of the shell length from the shell's midpoint, Point X, as shown in Figure 1.
 - ❖ Where L is the length of the joint shell, the third and fourth strike shall be at the same location at a third of the shell length from the end of the shell opposite to the first and second strike, Point Y, as shown in Figure 1.

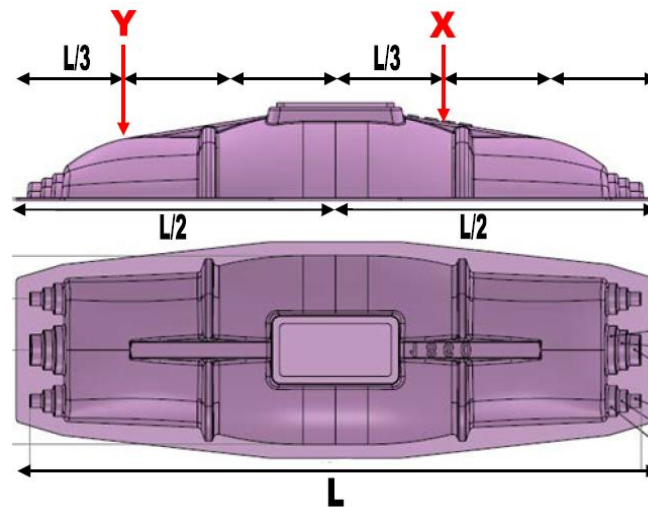


Figure 1: Position of Impacts on Test Specimen

- **Acceptance Criteria (A.3)**

- (Modification): Disregard Class 1 and Class 2 acceptance criteria.
- (Addition):
 - ❖ After the first strike, penetration of the test specimen shall be recorded when measured from the outer layer of the shell to the bottom of the tup.
 - ❖ After the second strike, penetration of the test specimen shall be recorded when measured from the outer layer of the shell to the bottom of the tup.
 - ❖ After the third strike, penetration of the test specimen shall be recorded when measured from the outer layer of the shell to the bottom of the tup.
 - ❖ After the fourth strike, penetration of the test specimen shall be recorded when measured from the outer layer of the shell to the bottom of the tup.
 - ❖ The full joint shell shall be visually inspected at the end of the impact resistance test and any signs of damage or stress away from the impact locations shall be recorded.
 - ❖ All recorded results shall be detailed in a report with pictures.
- Service cable to service cable connectors shall be made of brass.
- All connectors within the joint shall have a double shear-bolt connection.
- The manufacturer shall be certified and operate a Quality Management System which complies with the requirements of ISO 9001 or a comparable Quality Management System for the manufacture of the products contained within the Joint Design/Termination Design.
- The manufacturer shall be certified and operate an Occupational Health and Safety Management System which complies with the requirements of ISO 45001 or a comparable Occupational Health and Safety Management System for the manufacture of the products contained within the Joint Design/Termination Design.
- The manufacturer shall be certified and operate an Environmental Management System which complies with the requirements of ISO 14001 or comparable environmental management system for the manufacture of the products contained within the Joint Design/Termination Design.

SPEN welcomes innovation and alternatives to traditional designs that still meet the functional requirements of this document, although acceptance of such variations remains at the discretion of the Engineer.

10. SUSTAINABILITY

SPEN has a vision of being a sustainable business and embedding the principles of sustainability in its decision making, the equipment installed on its network and the environmental impact of its supply chain.

The manufacturer of the Joint/Termination Design shall provide the following information:

- Embodied Carbon
 - Environmental Product Declarations aligned to ISO 14025 for significant materials streams and products. The manufacturer shall use the UK Government GHG Conversion Factors for Company Reporting under Scope 3 (other indirect) emissions, material use and waste disposal to calculate the embodied carbon dioxide equivalent (CO₂e) in kilograms (or tonnes) per tonne of material within the product and packaging, splitting by different material.
- Supply Chain Sustainability Knowledge
 - Register as members of the Supply Chain Sustainability School and undertake training requested by SPEN. Free registration and membership can be obtained using the following link <https://www.supplychainschool.co.uk/>.
- Periodic Reporting
 - Provide monthly reports on sustainability aspects and environmental compliance requirements directly related to installation (Smartwaste tool).

11. ASSESSMENT PROCESS

Any third party wishing to have their low voltage jointing system assessed to determine its acceptability for adoption by SPEN shall provide full details of the jointing system including dimensioned drawings, parts lists, jointing instructions, etc, together with the appropriate evidence referred to in Section 9 of this document.

All relevant information should be forwarded to Engineering Design and Standards within SPEN to enable the assessment to proceed. A charge will be made for the assessment service by SPEN.

Engineering Design and Standards shall agree timescales with the third party, depending on the information submitted for the assessment process to be completed. The third party will then be notified in writing as to whether their LV jointing system has been accepted or rejected. In the latter case, the reasons for rejection will be stated. No further technical correspondence or discussion will be entered into following the notification.

11.1 Evidence

The following evidence shall be submitted with the assessment application:

- All type test reports of the complete joint kit, all connectors and mechanical connectors to metallic sheaths of cables as detailed in Section 9 of this document.
- Evidence of service history. The service history must relate to the Joint Design offered and Joint Types proposed for use. The history must demonstrate that no significant change has been made to the Joint Design/Joint Type during the service period evidenced.