

EU RO Mutual Recognition Technical Requirements

CONNECTING SYSTEMS FOR CABLE REPAIR (CABLE SPLICES)	Version	0.3
	Adoption Date	1 January 2023
	Application Date	1 July 2023
	Tier	3
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1. PRODUCT DESCRIPTION	1
2. DESIGN EVALUATION	2
3. PRODUCTION REQUIREMENTS	4
4. MARKING REQUIREMENTS	4
5. TYPE APPROVAL CERTIFICATE CONTENT	4
6. APPROVAL DATE AND REVISION NUMBER	5
7. BACKGROUND INFORMATION / REFERENCES	5
8. MAINTENANCE / CLARIFICATION OF TECHNICAL REQUIREMENTS	5
9. LEGAL PROVISIONS / COPYRIGHT	6

1. PRODUCT DESCRIPTION

1.a General description of the product

- a) Cable splices shall consist of a conductor connector, replacement insulation, replacement cable sheath, and where applicable, replacement of armour and shielding;
- b) Heat-shrinkable tubing shall mean tubing that will reduce in diameter from an expanded size to a predetermined size by the application of heat.

1.b Application limitations

- a) These rules shall apply only to cable splices using heat-shrinkable tubing. Other types of cable splices, e.g., cold shrink, moulding compounds and tape shall not be considered within this specific product.
- b) These technical requirements are not applicable to cable splices used for propulsion units, high voltage circuits or used in dangerous spaces, e.g., Zone 0, Zone 1 and Zone 2 dangerous spaces, except for intrinsically safe circuits;
- c) Cable splices shall have the original electrical, mechanical, flame-retardant and, where necessary, fire resistant properties of the cables.

1.c Intended use

Cable splices approved using these technical requirements are intended for use under the following conditions:

- a) Joint of cables installed in structural sub-assemblies;
- b) Joint of cable circuits extended or shortened by modifying cable arrangement;

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- c) To replace damaged section of cables;
- d) Joint of special type cable, e.g. submersible cable, and shipboard cable.

1.d System context

See 1.c above.

2. DESIGN EVALUATION

2.a Engineering evaluation requirements

2.a i. Technical Requirements

- a) Cable splices shall be in accordance with IEC60092-352, ASTM F1835-97 and ASTM D2671-09;
- b) The Conductors shall be connected using a compression type butt connector. In such case, a one-cycle compression tool and proper dies shall be used. Long barrel butt connectors with conductor stops shall be used for conductor sizes of 6mm² or larger;
- c) The cable splices for multi conductor cables shall be staggered in such a way that the connectors for each conductor shall not be contiguous to the connector of an adjacent conductor. In addition, the conductor insulation shall be removed no more than necessary to accept the connector;
- d) For screened cables, replacement screenings shall be provided and such screenings shall be secured by a method that does not exert more pressure than necessary to establish an adequate electrical contact. Screened cables shall have at least a 13mm overlap between any replacement shielding material and the original screening material;
- e) Replacement cable sheath materials shall have physical properties that are the same as, or equivalent to, the cable length. Replacement cable sheaths shall be centred over the splices and shall overlap the existing cable sheaths by at least 51mm. Replacement cable sheaths shall be installed so that a watertight seal with the existing cable sheath(s) is created.

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2.a.ii. Technical documents to be submitted

IMPORTANT: The English Language shall be used for all submitted documents.

- a) The types and temperature range of heat-shrinkable tubing for which approval is requested;
- b) Data sheet or specification of heat-shrinkable tubing;
- c) Instruction manual how to repair the cables;

2.b Type testing requirements

The following tests shall be carried out for cable splices in accordance with ASTM D2671-09 in the presence of an EU RO surveyor. In cases where the tests are conducted at Nationally Accredited Laboratories, the presence of the EU RO surveyor may be omitted†. Test specimens shall be selected from production line or at random from stock†:

- a) Dimensions;
- b) Restricted Shrinkage;
- c) Dielectric Breakdown Voltage and Dielectric Strength;
- d) Heat Shock;
- e) Storage Life;
- f) Low-Temperature Properties;
- g) Tensile Strength and Ultimate Elongation;
- h) Heat Resistance;
- i) Colour;
- j) Colour Stability;
- k) Fluid Resistance;
- l) Flammability;
- m) Volume Restivity;
- n) Water Absorption;
- o) Secant Modulus;
- p) Stress Modulus;
- q) Corrosion Testing;
- r) Thermal Endurance;
- s) Adhesive Peel Strength;
- t) Melting Point.

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† For further clarification of witnessing of tests and sampling the test specimen(s), refer to paragraphs 6, 7 and 8 of the EU RO "Design Evaluation Scheme" procedure (Appendix V of EU RO Framework Document for the Mutual Recognition of Type Approval found on <https://www.euomr.org/technical-requirements>)

2.c Type testing requirement for certificate renewal

The manufacturer is to notify the RO of any modification or changes to the manufacturing specifications that may affect the MR TA to be renewed.

3. PRODUCTION REQUIREMENTS

Refer to EU RO "Product Quality Assurance (PQA)" procedure (Appendix VI of EU RO Framework Document for the Mutual Recognition of Type Approval).

4. MARKING REQUIREMENTS

Manufacturers of the approved equipment are, in principle, to mark the product before shipment for identification of approved equipment as per referenced standard. In addition, and as a minimum, the following items to be marked at the suitable place:

- a) Manufacturer's name or equivalent;
- b) Type No. or symbol;
- c) Serial No. and date of manufacture;
- d) Particulars or ratings.

5. TYPE APPROVAL CERTIFICATE CONTENT

The EU RO MR Type Approval Certificate shall contain the minimum information as defined in the "EU RO Framework Document for the Mutual Recognition of Type Approval" - see Appendix I EU RO MR Type Approval Certificate Information.

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6. APPROVAL DATE AND REVISION NUMBER

Date	Revision	Comment
31 January 2014	0.0	Accepted by Advisory Board
31 January 2015	0.1	CRF018 – Revision to par. 2.a.ii - Technical documents to be submitted in English; CRF020 – Revision to par. 5 - 'Type Approval Certificate Content'
1 April 2016	0.2	CRF025 – Updated to new MR TR document format incl. par. 8; CRF026/026a – Witness testing & control of test specimen; CRF028 – addition of 6 month application clause.
1 January 2023	0.3	Added para. 2.c. Added para. 9. Copyright (ref 21030_)

7. BACKGROUND INFORMATION / REFERENCES

- a) IEC60092-352 "Choice and installation of electrical cables";
- b) ASTM F1835-97 "Standard Guide for Cable Splicing Installations";
- c) ASTM D2671-09 "Standard Test Methods for Heat-Shrinkable Tubing for Electrical Use";
- d) EU RO Framework Document for the Mutual Recognition of Type Approval.

8. MAINTENANCE / CLARIFICATION OF TECHNICAL REQUIREMENTS

Anyone wishing to propose changes to this document or request clarification of technical issues should contact the EU RO MR Group Secretariat in the first instance: Secretariat@euomr.org.

Review and approval of change requests shall follow the EU RO MR Maintenance Process detailed in the EU RO Framework Document for the Mutual Recognition of Type Approval: <https://www.euomr.org/technical-requirements>.

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9. LEGAL PROVISIONS / COPYRIGHT

- a) Underlying legal provisions in accordance with EU RO Framework Document for the Mutual Recognition of Type Approval;
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