

EU RO Mutual Recognition Technical Requirements

EXPANSION JOINTS	Version	0.4
	Adoption Date	1 January 2023
	Application Date	1 July 2023
	Tier	2
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1. PRODUCT DESCRIPTION

1.a General description of the product

- a) Expansion joints made of composite construction, utilizing metallic material (e.g. steel, stainless steel, or equivalent material wire braid) with rubberized/elastomeric coatings inside and/or outside or similar arrangements;
- b) External fire-resistant sleeves may be accepted, if needed, to ensure fire-resistant characteristics;
- c) Full-metal bellow-type expansion joints are covered by a different set of Rules and therefore cannot be considered within this specific technical requirement.

1.b Application limitations

These rules are intended for use in Class III oil piping systems only. Not to be used on chemical or liquefied gas cargo systems

1.c Intended use

Primarily intended for use in fuel, lubricating and hydraulic oil piping systems. Other services (e.g. exhaust gas or water systems) might be considered in connection with different requirements regarding *inter alia* fire resistance.

1.d System context

Oil or other piping systems

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2. DESIGN EVALUATION

2.a Engineering evaluation requirements

2.a.i. Technical Requirements

- a) Materials (with particular regard to non-metallic ones) shall be suitable for the intended medium and service. The Manufacturer shall specify qualification tests for cover ozone resistance, cover wear behaviour, liner resistance to intended fluids;
- b) Pressure-Temperature rating, as well as allowable movement range, shall be suitable for the intended service;
- c) Hydrostatic burst pressure shall be minimum 4 times the Maximum Allowable Working Pressure;
- d) To be fire-resistant type when used for flammable fluid service (regardless of flashpoint), and for sea water/bilge service where failure may result in flooding.

2.a.ii. Technical documents to be submitted

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

- a) Technical specifications, drawings, installation sheets and type test reports, describing the type and range of expansion joints for which approval is requested, and showing compliance with the relevant requirements;
- b) Copy of ISO 9001 certificate or industry equivalent for production place.

2.b Type testing requirements

- a) Test specimens shall be taken from the production line or from stocks†.
- b) Tests shall be carried out in the presence of the EU RO Surveyor. In cases where the tests are conducted at Nationally Accredited Laboratories, the presence of the EU RO surveyor may be omitted†.
- c) Visual inspection;
- d) Pressure test to 1.5 times the intended MAWP, 5 min holding time (test procedure in substantial agreement with IACS UR P2.11.5.5.1.a);

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- e) Hydrostatic burst test to 4 times the intended MAWP;
- f) Fire test as per ISO 15540 and ISO 15541 (minimum pressure 10 bar);
- g) Elastic deformation test as follows: the samples, complete with all the accessories as in the operating conditions, shall be hydrostatically tested at a pressure twice the maximum design pressure, and no appreciable permanent deformation shall occur.

Note:

For a given range of joints of same design and rating, burst-, elastic deformation- and fire-tests shall be satisfactorily carried out on at least 3 specimens, one of which to be the smallest size in the range, one the largest, and one of an intermediate size (possibly close to mid-range size).

End of Note

- h) Endurance test as follows.
 - The rubber compensator shall be installed in a rig where the following conditions apply:
 - The temperature shall be maintained at $+75^{\circ}\text{C} \pm 5^{\circ}\text{C}$;
 - One end of the flexible pipe assembly or bellow shall be rigidly fixed to the rig;
 - The other end shall be fixed to a device producing sinusoidal vibration;
 - The flange bolts shall be tightened to the manufacturer's recommended torque;
 - Pressurise the bellow with test fluid to the design pressure. The vibration shall act along an angle 90° on the centreline of the bellow. The vibration shall impart lateral movement to the bellow. The amplitude shall be ± 1.25 mm around the bellow's centreline with a frequency of 3000 cycles per minute for 10^7 cycles. No leakage or other defects are allowed at the end of the test.
- i) Oil resistance test as follows:
 - The materials in the inner tube and the cover of bellow to be type approved for hydrocarbons or mineral oil based hydraulic fluids shall be subject to an oil absorption test. At least 3 test samples from each type of rubber (3 from the inner tube material and 3 from the cover material if different materials are used) shall be prepared for this test. The test specimens shall be rectangular blocks with dimensions (length

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× width × thickness) = 50 mm × 25 mm × 1.6 mm. The test samples shall be immersed in ASTM oil no. 3 or equivalent at the hose maximum design temperature for 70 hours. The average volume change of all 6 test samples shall be between 0% and 60%. Test procedure according to ISO 1817;

- j) The following documentation shall be submitted:
- documentation of the said prototype testing ;
 - an assembly and detail drawing of all parts vital for the integrity of the product (3 copies);
 - catalogue;
 - operational conditions (working temperature, pressure, medium etc.).

† 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 <http://www.euomr.org/Guidance%20for%20Mutual%20Recognition>)

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

Every expansion joint shall be certified by the Manufacturer, subject to satisfactory performance of routine test(s) as per applicable standard or specification. Some EU ROs might request individual certificates.

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:

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- a) Manufacturer's name;
- b) Month and year of manufacture;
- c) Product designation, DN, pressure/temperature rating;
- d) Inspection certificate (on flange) when so required by the EU RO.

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.

The following information is specifically applicable to products relevant to this technical requirement and shall be included on the relevant EU RO MR Type Approval Certificate:

- a) Intended service;
- b) Description, including basic details such as type of reinforcement and elastomer manufacturing process (e.g. hot vulcanizing, injection moulding, cast polymerization etc.);
- c) Rating(s);
- d) Comments and service restrictions.

6. APPROVAL DATE AND REVISION NUMBER

Date	Revision	Comment
2013-04-30	0.0	Accepted by Advisory Board
2014-01-31	0.1	CRF008 - Reference to EU RO Framework Document for the Mutual Recognition of Type Approval added.
2015-01-31	0.2	CRF018 – Revision to par. 2.a.ii - Test results to be in English; CRF020 – Revision to par. 5 - 'Type Approval Certificate Content'.
1 April 2016	0.3	CRF025 – Updated to new MR TR document format incl. par. 8; RF026/026a – Witness testing & control of test specimen; CRF028 – addition of 6 month application clause.
1 Jan 2023	0.4	Added para 2.c Added para 9 (ref 21030_)

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7. BACKGROUND INFORMATION / REFERENCES

- a) ISO 9001;
- b) IACS UR P2.11.5.5.1.a;
- c) ISO 15540;
- d) ISO 15541;
- e) 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: <http://www.euomr.org/Guidance%20for%20Mutual%20Recognition>

9. LEGAL PROVISIONS / COPYRIGHT

- a) Underlying legal provisions in accordance with EU RO Framework Document for the Mutual Recognition of Type Approval;
- b) Copyright © 2022. All EU RO MR Group rights reserved. For a list of EU RO MR Group members please see <https://www.euomr.org/about-us>.
(The year is either the year of the inclusion of the copyright notice, 2022 for existing TRS, or the year of the adoption of any new TR.)

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