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Translation

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Technical specification for the supply of elastomer flange connections for intercommunicating gangways

Spécification technique pour la fourniture des raccords d'intercirculation à bourrelets en élastomère
Technische Lieferbedingungen für Elastomerwülste für Wulstübergänge

UNION INTERNATIONALE DES CHEMINS DE FER
INTERNATIONALER EISENBAHNVERBAND
INTERNATIONAL UNION OF RAILWAYS

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V - Transport Stock

VIII - Technical Specifications

Application:

With effect from 1 July 1975
All members of the International Union of Railways

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Contents

Summary

This technical specification governs the supply of elastomer flange connections for the intercommunicating gangways of rolling stock.

1 - Purpose

This technical specification governs the supply of elastomer flange connections for the intercommunicating gangways of rolling stock.

1.1 - Carrying out of the contract

All necessary particulars for the carrying out of the contract, in particular those concerning point 2.2.7 - page 4, must be stipulated in the order or its appended documents.

1.2 - Classification

One quality only.

1.3 - List of documents referred to in this specification

ISO 37, *ISO 48*, *ISO 188*, *ISO 1431* (see Bibliography - page 15).

2 - Characteristics

2.1 - Appearance of the flange connections

The surface of the flange connections shall be even, without cracks, pitting or burrs. There shall be no blistering.

2.2 - Physical characteristics of the elastomer

Characteristics required

2.2.1 - Hardness in delivery condition

The flange connections shall have a hardness in accordance with that shown in the order or its appended documents.

In the absence of any indication, the hardness shall be 70 degrees IRH or SHORE type A, with a tolerance of $\pm$ 5.

2.2.2 - Tensile characteristics

2.2.2.1 - In delivery condition

Yield strength > 1 600 N/cm^2.

Elongation percentage > 350.

2.2.2.2 - After ageing for 7 days at 70°C

The characteristics recorded after ageing shall not differ by more than 20% from those recorded before ageing.

2.2.3 - Resistance to tearing in delivery condition

> 300 N/cm thickness.

2.2.4 - Flexibility in submission condition

The diameters of the rings, shaped by means of the device defined in point 5.4.4 - page 9 and then compressed and subjected to a temperature of:

- firstly, + 20°C,
- secondly, - 30°C,

shall be respectively D_1 and D_2.

After compression is discontinued, D_1 and D_2 must be such that:

$$100 \times \frac{D_1}{D_0} \geq 85\ \%$$

$$100 \times \frac{D_2}{D_0} \geq 70\ \%$$

D_0 being the initial diameter of the ring.

2.2.5 - Resistance to abrasion in submission condition

Abrasive wear < 150 mm^3.

2.2.6 - Resistance to ozone

After being placed in an ozone-enriched atmosphere under the conditions specified in point 5.4.6 - page 13, the test-piece shall not reveal any fissure or crack visible with a lens magnifying 7 times.

2.2.7 - Resistance to fire

The characteristics concerning resistance to fire are those defined by the national standards of the purchasing Railway or, failing these, by those included in the order or its appended documents.

3 - Marks

The flange connections shall be stamped indelibly with the following marks:

- the manufacturer’s mark,
- the date of manufacture (number of the month and last two figures of the year of manufacture).

4 - Manufacture

4.1 - Preparation of the material

No conditions are stipulated concerning the kind and quality of the elastomer to be used, provided it has a very high resistance to ageing and to weathering, and that the characteristics required in point 2.2 - page 3 are complied with.

4.2 - Manufacture of the flange connections

The flange connections shall be manufactured either by direct moulding, or by shaping and assembly, followed by vulcanising.

4.3 - Removal of surface defects

Any treatment carried out with the object of hiding a defect likely to be detrimental to the use of the flange connections shall be forbidden.

5 - Inspection

5.1 - Readiness for delivery

The flange connections shall be submitted ready for delivery in batches.

5.1.1 - Composition of batches

The flange connections shall be submitted in batches of pieces of similar type and dimensions.

5.1.2 - Notification of readiness for delivery

The representative of the purchasing Railway shall be informed of the date of inspection by a written notification signed by the works manager or his authorised representative. This written notification must indicate the number of flange connections submitted in each batch, together with the references of the order concerning them.

5.2 - Nature and proportion of the checks and tests

At the time of submission, each batch of flange connections shall be subjected to the number and type of inspections and tests shown in the following table.

Unless otherwise stated by the purchasing Railway, the checks and tests shall be carried out at the place of production.

Nature of the inspections and tests	**Number of inspections and tests according to the size of the batch**		
	≤ 1 000	**between 1 000 and 3 000**	**> 3000**
Verification of hardness	1	2	3
Test for resistance to tearing	1	2	3
Flexibility test	1	2	3
Tensile test			
- in delivery condition	1	2	3
- after accelerated ageing	1	2	3
Abrasion test	1	2	3
Test for resistance to ozone	1	2	3
Test for resistance to fire	in accordance with the stipulations of the national standards of the purchasing Railway or, failing these, with those in the order or its appended documents.		

5.3 - Method of selection and preparation of test-pieces

The acceptance inspector shall inspect at random from each batch submitted the flange connection from which the test-pieces are to be taken, and shall mark them indelibly.

One flange connection shall be selected for each series of tests.

5.3.1 - Number, shape and dimensions of test-pieces

The number, shape and dimensions of test-pieces are laid down in the following table:

Nature of the inspections and tests	Number of test-pieces	Shape and dimensions of the test-pieces
Verification of the Shore hardness in delivery condition	At the discretion of the acceptance inspector	The part itself
Tensile test: - in delivery condition - after accelerated ageing	 3 3	Dumb-bell shaped test-pieces in accordance with *ISO Standard 37, type 2*.
Test for resistance to tearing	3	test-pieces as defined in point 5.4.3 - page 9
Flexibility test	1	test-piece in the shape of a parallelepipede 500 mm x 50 mm x 8 mm
Abrasion test	1	Disc 16 mm ± 0,2 mm in diameter and 6 mm in thickness
Test for resistance to ozone	1	Dumb-bell shaped test-pieces in accordance with *ISO Standard 37, type 2*.
Test for resistance to fire	in accordance with the stipulations of the national standards of the purchasing Railway or, failing these, with those in the order or its appended documents.	

5.3.2 - Preparation of the test-pieces

After cutting up, the test-pieces for testing after accelerated ageing are baked at 70°C for 7 days. The operations shall be carried out in accordance with the standards of the purchasing Railway or, failing these, in accordance with *ISO Standard 188*.

The other test-pieces shall be tested in delivery condition.

5.4 - Tests

5.4.1 - Hardness test

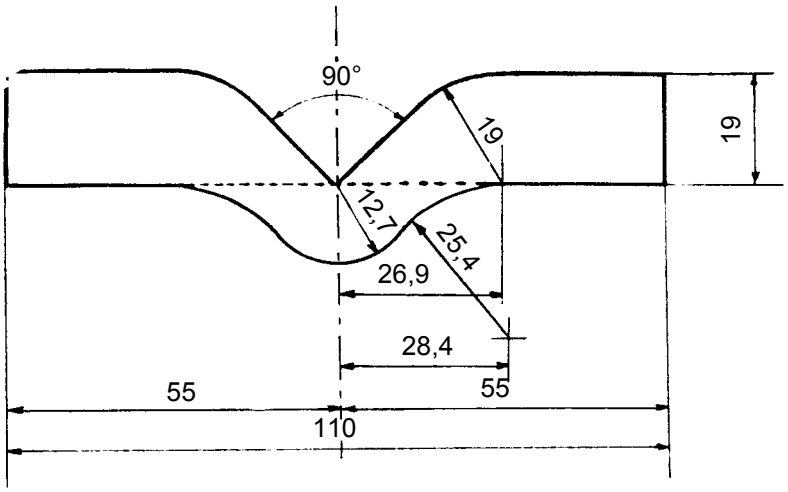
The test shall be carried out in accordance with *ISO Standard 48*.

5.4.2 - Tensile test

The test shall be carried out in accordance with *ISO Standard 37*.

5.4.3 - Test for resistance to tearing

The test shall be carried out on the test-piece shown below:



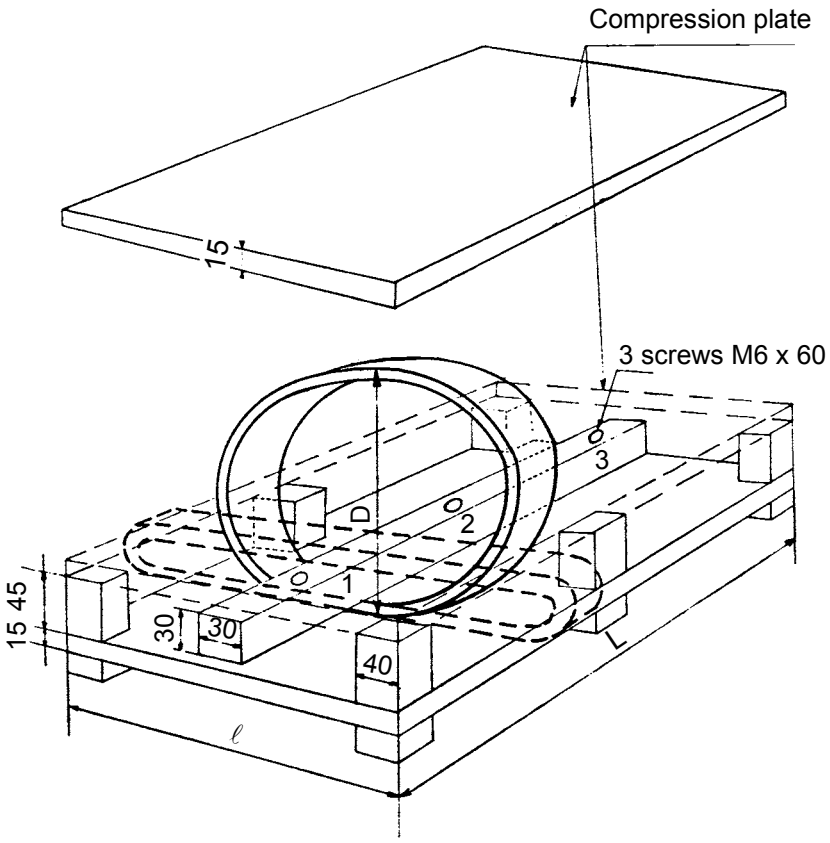
Tolerances ± 0,05 mm

The test shall be carried out by means of a dynamometer with movable jaws acting at a constant speed of 50 ± 5 cm per minute until breakage of the test-piece occurs.

The test-piece cutter used shall be of heat-treated steel with sharp cutting edges; the top of the angle of 90° must be ground in order to produce a sharp edge (without rounding).

5.4.4 - Flexibility test

The test-piece, maintained at a temperature of 20°C ± 5°C, shall be arranged in accordance with the indications given in the diagram shown below and the vertical diameter D_0 of the ring thus formed shall be measured and recorded. The ring is then flattened in the position shown by the dotted lines in the diagram.



After 10 minutes, the flattening pressure is removed, and the external vertical diameter D_1 is again measured and recorded after a further period of 1 minute.

The apparatus, with the same test-piece still in position, is then placed in a chamber, the temperature of which is maintained at - 30°C ± 2°C.

Three hours after the placing of the apparatus in the chamber, the ring is again flattened, without being withdrawn from the chamber and under similar conditions to those stated for flexibility at a temperature of 20°C. The external vertical diameter of the ring D_2 is also measured and recorded.

The ratios of the diameters $\frac{D_1}{D_0}$ and $\frac{D_2}{D_0}$ are calculated and expressed as a percentage.

5.4.5 - Test for resistance to abrasion

The abrasion test shall be carried out on an apparatus which includes:

- a rotating cylinder, with its centre line positioned horizontally, and over which an abrasive material is stretched,

- a test-piece holder.

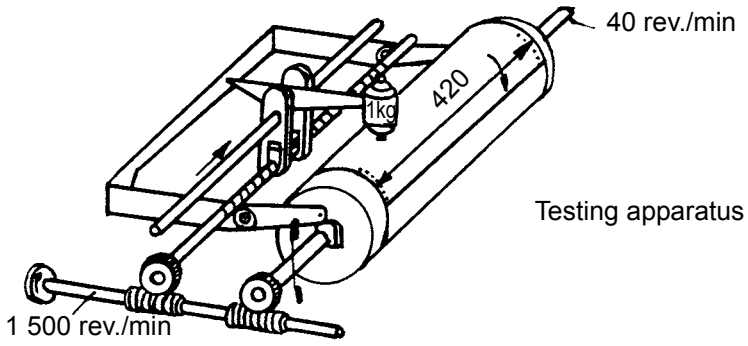
The cylinder shall have a diameter of 150 mm and be driven by a motor by means of an endless screw.

The speed of rotation of the cylinder shall be 40 ± 1 revolutions per minute.

The test-piece holder shall be fixed to a bar hinged to a sliding block.

When the test-piece is placed in position, the test-piece holder shall be situated directly opposite to the longitudinal axis of the cylinder and be perpendicular to the latter. The weight of the bar and that of the test-piece holder shall be such that the test-piece is applied to the abrasive surface with a force of 1 kg. The bar shall operate without vibrating.

During the test, the sliding block shall move evenly laterally and parallel to the axis of the cylinder. The lateral progression shall be 4,2 mm for each revolution of the cylinder, and the direction of rotation of the cylinder shall be that shown by the direction of the arrow in the drawing below.



At each revolution of the cylinder, the test-piece is raised from the abrasive surface for a certain period suddenly but without jerking, and then brought into contact again with the latter. The lifting movement shall be regulated so that the test-piece is subjected to wear by the abrasive surface over a length of 400 mm for each revolution of the cylinder.

The test-piece shall protrude from the test-piece holder by 2 mm. To enable this requirement to be satisfied with test-pieces of variable thickness, the test-piece holder can be adjusted by means of a micrometric screw.

When no test-piece is inserted, it shall be possible for the lower edge of the test-piece holder to fit exactly against the abrasive surface.

The test-piece shall be applied automatically to the abrasive surface at the beginning of the test and must stop automatically after 100 revolutions.

The total distance during which friction is applied to the test-piece shall be 40 m. For the purpose of carrying out the test, the test-piece shall be weighed to the nearest mg and then placed in the test-piece holder. The micrometric screw is then adjusted so that the test-piece protrudes 2 mm from the holder; after an abrasive run of 40 m, the test-piece is withdrawn and re-weighed to the nearest mg.

The wear is expressed as loss of volume in mm^3, calculated from the formula:

$$\text{Wear} = \frac{\text{Loss in weight}}{\text{Specific gravity}} \times \frac{200}{K}$$

in which the coefficient K represents the loss in weight, expressed in mg, obtained for a sample of standard elastomer during the calibration of the abrasive material used.

For the purpose of calibrating the abrasive material, an elastomer mixture with the following characteristics is recommended:

Specific gravity of the mixture	1,28
Sheet (or leaf) (value DEFO 1600)	100,00
Anti oxygen 4010	0,30
Anti oxygen PBN	0,30
Anti oxygen DOD	0,30
Lamp black (anacarbon 40498)	36,00
Zinc oxide RS (Syndicat LINDGENS)	36,00
Sulphur	3,00
Vulkacit D	1,60

A mixture of 25 kg is thus prepared and vulcanised for 80 minutes at 138°C under 2,5 bars. The DEFO value of the finished mixture shall be about 900. Pads 200 mm x 60 mm x 8 mm, from which the test-pieces are taken, are moulded under a heating press within 24 hours of manufacture.

Testing of the abrasive material shall include at least three tests carried out in accordance with the conditions set out above, using test-pieces made with the mixture in question. The three tests shall give a wear of between 180 mg and 200 mg for each test-piece. The coefficient K used for calculating the wear shall be equivalent to the average of the wear values thus obtained.

5.4.6 - Test for resistance to ozone

The test shall be carried out in accordance with the stipulations of *ISO Standard 1431* with the following additional information:

The test-pieces stretched to an elongation of 20% shall be placed for 24 hours in a chamber where the ozone concentration is 200 ± 20 parts per 100 millions by volume, the temperature being maintained at 30°C ± 2°C throughout the test.

The test-pieces shall be examined, in the stretched condition, by means of a lens magnifying 7 times.

5.4.7 - Test for resistance to fire

The tests for resistance to fire shall be carried out in accordance with the stipulations of the national standards of the purchasing Railway or, failing these, with those in the order or its appended documents.

5.5 - Conclusions of the tests

Any characteristic which, as a result of a series of tests, is found not to comply with the required conditions can result in the rejection of the corresponding batch.

If the purchasing Railway agrees to additional tests, the kind and number of these latter shall be decided by special agreement between the supplier and the purchasing Railway.

6 - Guarantee

The elastomer flange connections shall be guaranteed by the supplier for 3 years against any defect imputable to manufacture and not revealed during acceptance at the factory.

In the case of components for new vehicles, the delivery date of the vehicles to which they are fitted shall be regarded as the date of delivery of the fittings.

Flange connections which, during the guarantee period, show defects making them either unfit for service or reducing their period of service, shall be rejected.

Before being finally rejected, the defective flange connections may, however, be subjected to a check inspection by the purchasing Railway and the supplier, if the latter so requests.

When the check inspection confirms that the defects are definitely ascribable to manufacture, the defective flange connections shall be finally rejected.

Should the results of the check inspection not enable an agreement to be reached between the purchasing Railway and the supplier, experts approved by both parties shall be appointed to settle the dispute. The costs of arbitration shall be borne by the party held responsible for the defects.

Rejected flange connections shall be placed at the disposal of the supplier for replacement or reimbursement at their value in new condition at the time of rejection.

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2. International standards

International Organization for Standardization (ISO)
ISO 37:1994 : Rubber, vulcanized or thermoplastic -- Determination of tensile stress-strain properties, 1994

ISO 48:1994 : Rubber, vulcanized or thermoplastic -- Determination of hardness (hardness between 10 IRHD and 100 IRHD), 1994

ISO 188:1998 : Rubber, vulcanized or thermoplastic -- Accelerated ageing and heat resistance tests (available in English only), 1998

ISO 1431-1:1989 : Rubber, vulcanized or thermoplastic -- Resistance to ozone cracking -- Part 1: Static strain test, 1989

Warning

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