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VIII -TECHNICAL SPECIFICATIONS

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**TECHNICAL SPECIFICATION
FOR THE SUPPLY OF ELASTOMER HOSES
FOR COMPRESSED AIR BRAKE COUPLINGS**

REVISIONS

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Amendment		Amendment	
No.	Date	No.	Date
1	1-10-83		
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1 - PURPOSE

1.1 - Type of parts

This specification governs the supply of hoses in reinforced elastomer for compressed air brake couplings between vehicles.

It applies to hoses with a nominal inside diameter of 28 mm, but it can be used for the supply of hoses in reinforced elastomer of other diameters. In this case, the Railway shall specify the test conditions for these hoses.

All necessary particulars for the carrying out of the contract, particularly those concerning the implementation of the following paragraphs :

2.1 - 2.1.1 - 2.1.2 - 2.2.2 - 2.2.3 - 2.2.4 and 4.3.2

must be indicated in the order and its appended documents.

1.2 - Classification

Only one category of hoses.

1.3 - Reference documents

This specification refers to the following documents :

ISO/R	36	:Test method for the adhesion strength of vulcanised rubbers to textile fabrics.
ISO/37		:Vulcanised rubbers - Determination of tensile stress - strain properties.
ISO/188		:Vulcanised rubbers - Accelerated ageing resistance tests.
ISO/1431		:Vulcanised elastomers - Determination of resistance to ozone cracking under static conditions.
ISO/2285		:Vulcanised rubbers - Determination of tension set under constant elongation at normal and high temperatures.

2 - CHARACTERISTICS

2.1 - Composition of the hoses

The hoses shall consist of an internal layer and an external layer of elastomer, with a wound textile reinforcement between the two, made in accordance with the indications shown on the drawing, in order to ensure a satisfactory performance in service.

2.1.1 - Internal and external layers of the hose

The type of elastomer shall be left to the choice of the supplier, who will supply relevant particulars to the purchasing Railway upon request.

2.1.2 - Reinforcement

The type of textile fabric used for the reinforcement (polyamide or polyester) shall be left to the choice of the supplier, who will supply relevant particulars to the purchasing Railway upon request. When placing the order, the purchasing Railway may request an adequate resistance to mineral oils.

2.2 - Physical characteristics

2.2.1 - Appearance

The hoses shall have clean-cut edges, with no burring : the end sections shall be perpendicular to the longitudinal axis of the hose. The surfaces shall be smooth, with no cracking or other apparent defects likely to affect their use.

2.2.2 - Geometrical characteristics

The dimensions of the hoses, on delivery, shall be those stated on the order and its appended documents.

Unless otherwise indicated in the order, the lip of the internal layer of the hose must be reamed to an angle of 30° to 45° in relation to the longitudinal centre line, at each end, in order to facilitate joining up of the connections.

When so requested by the purchasing Railway a polymerisable coating may be applied on the end parts.

Unless otherwise stipulated, the following tolerances shall be complied with as regards :

- length $\pm$ 5 mm
- internal diameter $\pm$ 0.5 mm
- thickness of the hose material $\pm$ 1 mm
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2.2.3 - Mechanical characteristics

2.2.3.1 - Bending

It must be possible to bend the hose to form approximately a torus of internal diameter equivalent to about 4 times the external nominal diameter of the hose, without using a force greater than 130 N for this operation, without folds appearing on the peripheral surface and without the maximum flattening recorded amounting to more than 16% of the nominal external diameter of the hose.

2.2.3.2 - Pressure test

After being subjected to an internal pressure of 13 bars for a period of five minutes, there shall be no apparent leak, swelling, or tear on the hose. The dimensional variations admitted under pressure conditions shall be as follows :

- variation in external diameter. . . . $\pm$ 10%
- variation in length $\leq$ 3.5%
- twist. $\leq$ 150 °/m.

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In addition, after discontinuation of the test pressure, no permanent deformation of the hose must be apparent, after a waiting period of 3 minutes.

2.2.3.3 - Bursting pressure

The bursting pressure, measured on the hose in delivery condition, must not be less than 70 bars.

2.2.3.4 - Adhesion of the reinforcement

The mean value of the forces needed to separate the reinforcement and each of the layers must not be less than :

- 70 N for hoses tested in delivery condition,
- 55 N for hoses tested after ageing for 7 days at 70° C.

2.2.3.5 - Resistance of the internal and external layers of the hose to repeated tensile loads

The internal and external layers of the hose, when subjected to successive repeated tensile loads must, in accordance with the conditions defined in paragraph 4.3.4.5, withstand :

- 400 tensile loadings for hoses tested in delivery condition,
- 350 tensile loadings for hoses tested after ageing for 7 days at 70° C.

2.2.3.6 - Residual deformation through static tensile loading of the internal layer of the hose :

After tensile loading, the test piece taken from the internal layer of the hose and tested after ageing for 7 days at 70° C, must not be more than $L_0 + 12\%$ in length.

2.2.3.7 - Impact test

After being subjected to the impact of a weight of 10 kg dropped from a height of 1 m, the bursting pressure of the hose must be at least 70 bars.

2.2.3.8 - Resistance to ozone cracking of the external layer of the hose under static conditions

The external layer of the hose, after exposure to an ozone-enriched atmosphere, must not show signs of cracking visible with a magnifying glass with a magnifying power of 7 X.

2.2.3.9 - Deflection at low temperature

Deflection of the hose as measured at the end of a length of 250 mm, 3 seconds after application of a load of 20 N at -30°C must not be less than 20 mm.

2.2.3.10 - Ease of assembly and resistance to uncoupling of connections on the hoses (when stipulated in the order)

It must be possible for the connections to be easily mounted on the hoses under the conditions stipulated in 4.3.4.10, so that the end of the hose makes clean contact with the shoulder of the connection. The centre-lines of the hose and connection must be in alignment after assembly.

Uncoupling of the hose connection, under the conditions defined in 4.3.4.11, must not occur when the pressure is less than 20 bars.

2.2.3.11 - Flare test (when stipulated in the order)

After the test provided for in 4.3.4.12, the linings and layers must neither tear nor become detached. The inspection shall cover the visible outer surfaces : it shall be performed with the naked eye, under normal viewing conditions and at a reference viewing distance.

Moreover, the residual widening shall not exceed 2% after a period of rest.

2.2.3.12 - Resistance of hoses to dynamic stresses (when stipulated in the order)

After the test stipulated in 4.3.4.13, the hose must not show any trace of visible damage such as cracks or residual deformation. The bursting pressure, as measured on a hose subjected to the test according to 4.3.4.13, must be at least 70 bars.

2.3 - Manufacturer's marks

Each hose shall be marked during the vulcanisation process, in the actual material of the hose, with the embossed markings shown on the order and its appended documents.

In the absence of any indications, the hoses shall be marked as follows :

- the manufacturer's mark,
- the last two figures of the year of manufacture,
- the batch number.

3 - APPROVAL AND MANUFACTURE

3.1 - Approval of manufacturers

Hoses in reinforced elastomer for compressed air brake couplings may only be ordered from manufacturers approved by the purchasing Railway.

3.2 - Approval of the finished product

Any supply must, beforehand, be approved by the purchasing Railway in accordance with the conditions laid down in § 4.2.

The approval must be renewed each time a modification to the design of the hose, the type of its constituent parts or its manufacturing process is likely to change the characteristics of the hose.

3.3 - Mass production of hoses

For the mass production of hoses the manufacturer shall be compelled to make no alterations in the choice of constituent parts and manufacturing processes he had selected for the manufacture of the hoses which have undergone successfully the approval process.

4 - INSPECTION

4.1 - Inspection of the manufacturing process

As regards mass production, the purchasing Railway shall reserve its right to check, by any means which he deems necessary, that the manufacturer did not make any alteration to the manufacture and composition of the hoses, in relation to the approved sample.

4.2 - Approval inspection

4.2.1 - Formation of a batch to be subjected to the approval procedure

When the approval procedure is to be carried out, a batch comprising at least 10 hoses of the model to be approved, manufactured according to the normal mass production methods, shall be made available to the representative of the purchasing Railway.

4.2.2 - Condition of the hoses subjected to the approval procedure

The hoses shall be submitted in finished condition.

- **4.2.3 - Approval tests**

The tests to which the hoses must be subjected are indicated in the table of § 4.3.2.

4.3 - Acceptance inspection**4.3.1 - Submission****4.3.1.1 - Condition of the hoses on submission**

The hoses shall be submitted for acceptance in delivery condition.

4.3.1.2 - Batches

The hoses shall be submitted in batches of 1 000 or fraction of 1 000 comprising only hoses of the same type, manufactured at the same time.

Each batch shall be numbered consecutively without omissions or repetition, in a single continuous series, recommencing at 1 (one) at the beginning of each year.

The number of a rejected batch shall not be used again during the current year.

4.3.1.3 - Notification of readiness for inspection

The representative of the purchasing Railway shall be advised of the date of readiness for inspection by a written notification signed by the Works Manager or his authorised representative ; this notification must state the number of hoses forming each batch, together with the references of the order by which they are covered.

4.3.2 - Nature and proportion of the tests and inspections

The hoses shall be subjected to the tests and inspections indicated in the table shown below and carried out either at the time of approval of the process, or on submission, or during manufacture. In both cases the cost of inspections and tests shall be borne by the supplier, and all tests and inspections shall be performed at the supplier's works.

Moreover, the representative of the purchasing Railway shall have the right, at any time, to take sample hoses from the works for testing either in the works laboratory or in that of the purchasing Railway, in order to verify all or any of their characteristics.