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TECHNICAL SPECIFICATION  
FOR THE SUPPLY OF CROSS SUSPENSION  
SLIDE BARS FOR AUTOMATIC WAGON COUPLERS

Amendment		Amendment	
No.	date	No.	date

**NUMERISATION DANS  
L'ETAT DU DOCUMENT**

## 1 - PURPOSE

### 1.1 - Type of parts

This specification defines the characteristics of cross suspension slide bars for automatic wagon couplers. The function of these slide bars is to ensure the coupler head is supported, by sliding over each other without need for lubrication and without any visible wear.

### 1.2 - Classification

The slide bars are classified in 2 categories:

#### *Category 1:*

- fixed slide bars manufactured from plastics with a high resistance to wear and impact and a very low friction coefficient.

#### *Category 2:*

- Movable slide bars manufactured from plastics with a low friction coefficient and self-lubricating properties.

### 1.3 - Reference documents

Reference is made in this specification to the following documents:

- ISO/R 62 : Plastics - Determination of water absorption.
- ISO/R 175 : Plastics - Determination of the resistance of plastics to chemical substances.
- ISO/R 291 : Plastics - Standard atmospheres for conditioning and testing.
- ISO/306 : Plastics - Determination of the VICAT softening temperature of thermoplastics.
- ISO/R 527 : Plastics - Determination of tensile properties.
- ISO/R 868 : Plastics - Determination of indentation hardness of plastics by means of a durometer (Shore hardness).
- ISO/R 1 133 : Plastics - Determination of the melt flow rate of thermoplastics.
- ISO/R 1 183 : Plastics - Methods for determining the density and relative density (specific gravity) of plastics, excluding cellular plastics.

## 2 - PROPERTIES

### 2.1 - Construction materials

The slide bars shall be manufactured from thermoplastic resins.

Thermoplastic resins with differing properties and molecular weights are required to obtain correct friction between the parts.

The melting-points of the individual parts must also vary to avoid the formation of microwelds, should heating occur.

The properties laid down under paragraphs 2.2.3.1 to 2.2.3.8 in this specification shall apply to the high-density polyethylene with heavy molecular weight used for category 1 slide bars, and the polyacetal (polyoxymethylene) used for category 2 slide bars.

Other types of thermoplastic resins may be accepted by the purchasing Railway, providing that their corresponding properties are defined and their mechanical properties are at least as satisfactory as those stipulated in this specification.

## 2.2 - Properties of the material

### 2.2.1 - Appearance

The appearance of thermoplastic parts must be identical to that of the representative samples.

The sides and edges must be straight, smooth and free of snags.

When the parts are examined, the following defects must not be apparent to the eye or to the touch:

- holes, cavities or protrusions,
- cracks or splits,
- faults such as undulation or pitting.

### 2.2.2 - Soundness

The slide bars must have no inconsistencies or internal incongruities such as bubbles or cracks which might impair their normal working.

### 2.2.3 - Dimensional properties

The dimensions of thermoplastic parts must comply with those stipulated in the order or its appended documents.

### 2.2.4 - Physical properties

#### 2.2.4.1 - Hardness

The Shore D hardness of parts in delivery condition must be:

70  $\pm$  5 Shore D for category 1;

85  $\pm$  5 Shore D for category 2.

#### 2.2.4.2 - Density

The mass of parts in delivery condition must be:

0.96 g/cm<sup>3</sup>  $\pm$  0.01 g/cm<sup>3</sup> for category 1 parts;

1.42 g/cm<sup>3</sup>  $\pm$  0.01 g/cm<sup>3</sup> for category 2 parts.

#### 2.2.4.3 - Flow rate

The flow rate must be between 1.2 and 2.5 g/10mn for category 1 parts and between 5 and 12 g/10 mn for category 2 parts, in delivery condition.

2.2.4.4 - Ultimate tensile strength

The ultimate tensile strength and corresponding relative elongation of parts in delivery condition, at a test speed of 100 mm/mn, must comply with the values given below, according to category, unless otherwise stipulated in the order or its appended documents:

	Category 1	Category 2
Minimum ultimate tensile strength in (N/mm <sup>2</sup> ).	25	65
Minimum tensile elongation in %	450	28

2.2.4.5 - Tensile elasticity modulus

The tensile elasticity modulus of parts in delivery condition measured at a test speed of 1 mm/mn must comply with the values given below, according to category:

	Category 1	Category 2
Minimum tensile elasticity modulus at 20° C ie. (N/mm <sup>2</sup> )	500	800

2.2.4.6 - Vicat softening temperature

The Vicat softening temperature of parts in delivery condition under a load of 50 N with a temperature rise of 50 ± 5° C/h must comply with the values given below, according to category:

	Category 1	Category 2
Vicat softening temperature (°C)	100	154

2.2.4.7 - Water absorption

The percentage of water absorption of parts in delivery condition, measured in conformity with the instructions in ISO Recommendation 62, must comply with the values given below, according to category:

	Category 1	Category 2
Maximum % of water absorption	0	0.2

2.2.4.8 - Resistance to chemical substances

In compliance with the conditions laid down in ISO Recommendation 175, parts in categories 1 and 2 must show no notable differences, up to temperatures of 80° C, (loss or gain in volume

and mass, alteration of surface appearance) after immersion in acid or base solutions between pH 5 and 11, fuels (petrol, diesel etc.), or oils and grease of specific grades or composition as agreed between the supplier and the purchasing Railway.

#### 2.2.5 - Manufacturers' markings

Parts in categories 1 and 2 must be indelibly labelled with the markings stipulated in the working documents, and in particular the following:

- the manufacturer's mark
- the date of manufacture (month and last two digits of year)
- the part number
- the category index.

### 3 - MANUFACTURE

#### 3.1 - Preparation of the material

No specific conditions are laid down for the preparation of materials used in the manufacture of thermoplastic parts for the automatic coupler, providing the finished product meets the above requirements. In all events, reground or recycled materials are not acceptable.

#### 3.2 - Manufacture of parts

No conditions are laid down for the manufacture of thermoplastic parts in categories 1 and 2.

#### 3.3 - Retouching

Any retouching intended to hide a defect which may impair normal working is strictly forbidden.

### 4 - INSPECTION

#### 4.1 - Submission

##### 4.1.1 - Condition of the parts on submission

The parts shall be submitted in delivery condition.

##### 4.1.2 - Batches

A batch shall comprise parts of the same type, category and manufacturing series, which are submitted at the same time.

##### 4.1.3 - Advice of submission

The representative of the purchasing Railway shall be advised of the date of submission by written note, signed by the factory Director or his authorised representative. This note must indicate:

- the date of submission
- the order references
- the composition of the batches submitted, stating for each batch:
  - the quantity
  - the type
  - the category of the parts submitted.

4.2 - Type and extent of checks and tests

The parts shall be subjected to the following checks:

Batch size	Test series number
Up to 1 000 parts	1
1 001 to 3 000 parts	2
3 001 to 10 000 parts	3
over 10 000 parts	4

Type of checks and tests	Specification §	Test Standard	Minimum number of test pieces per series of tests	Shape and dimensions of test pieces
Size and appearance	4-4-1 4-4-2	-	at discretion of purchaser minimum of 7	actual parts
Hardness	4-4-3	ISO/R 668	3	An actual part, or test pieces 25 mm wide and 3 mm thick (minimum)
Density	4-4-4	ISO/R 1183	3	Any shape test piece weighing 1-5 grammes
Flow rate	4-4-5	ISO/R 1133	3	Any shape material weighing 4-5 grammes
Check on ultimate tensile strength and corresponding relative elongation	4-4-6	ISO/R 527	3	No 2 dumb-bell shaped test piece as laid down in ISO/R 527
Tensile elasticity modulus check	4-4-7	ISO/R 527	3	No 2 dumb-bell shaped test piece as laid down in ISO/R 527

Check on Vicat softening temperature	4-4-8	ISO 7366	2	Test piece 3 - 6 mm thick with a minimum surface area of 10 x 10 mm.
Water absorption check	4-4-9	ISO/R 62	3	Disc-shaped test piece of $50 \pm 1$ mm diameter, $8 \pm 0.2$ mm thickness, or similar dimensions, as laid down in ISO Recommendation 62.
Check on resistance to chemical substances.	4-4-10	ISO/R 175	2 for each chemical	Rectangular test piece $50 \pm 1$ mm long, taken from the widest section of the part.

#### 4.3 - Selection and preparation of samples and test pieces

The checks and tests listed in this specification shall be carried out on each batch submitted.

The representative of the purchasing Railway shall select the parts to be checked and tested, at random from each batch submitted, and mark them indelibly.

##### 4.3.1 - Selection

Parts in delivery condition shall be selected for tests.

##### 4.3.2 - Processing of test pieces

Processing of test pieces shall be carried out at 23° C and 50 % relative humidity for 24 hours, in accordance with the instructions of ISO Recommendation 291.

#### 4.4 - Check and test procedure

##### 4.4.1 - Appearance check

The conditions described under paragraph 2.2.1 shall be respected.

4.4.2 - *Dimension check*

The dimensions of the parts shall be measured with the usual instruments appropriate to the size of the parts and degree of accuracy required.

4.4.3 - *Hardness check*

The hardness of the different categories of parts in delivery condition must conform to the indications in paragraph 2.2.4.1. This check shall be carried out in accordance with the instructions of ISO Recommendation 868.

4.4.4 - *Density check*

This check shall be carried out on test pieces in delivery condition, in accordance with ISO Recommendation 1183.

The results required are indicated in paragraph 2.2.4.2.

4.4.5 - *Flow rate check*

This check shall be carried out on test pieces in delivery condition, in accordance with ISO Standard 1133.

The results required are indicated in paragraph 2.2.4.3.

4.4.6 - *Check on ultimate tensile strength and corresponding relative elongation*

This test shall be carried out on test pieces in delivery condition, in accordance with ISO Recommendation 527.

The results required are indicated in paragraph 2.2.4.4.

4.4.7 - *Check on tensile elasticity modulus*

This check shall be carried out on test pieces in delivery condition, in accordance with ISO Recommendation 527.

The results required are indicated in paragraph 2.2.4.5.

4.4.8 - *Check on Vicat softening temperature*

This check shall be carried out on test pieces in delivery condition under a load of 50 N with a temperature rise of  $50 \pm 5^\circ$  C/h, according to the instructions in ISO Standard 306.

The results required are indicated in paragraph 2.2.4.6.

4.4.9 - *Determination of water absorption*

This check shall be carried out on test pieces in delivery condition, in accordance with the instructions in ISO Recommendation 62.

The results required are indicated in paragraph 2.2.4.7.



4.4.10 - Resistance to chemical substances

This test shall be carried out up to temperatures of 80° C on test pieces in delivery condition, in accordance with ISO Recommendation 175.

The results required are indicated in paragraph 2.2.4.8.

4.5 - Conclusion of the inspections

Any property which does not comply with the stipulated conditions shall result in rejection of the batch in question.

Further tests may be carried out at the supplier's request only with the prior agreement of the purchasing Railway.

5 - DELIVERY

5.1 - Packaging

The parts shall be delivered in appropriate packaging, which affords protection against damage during transport.

APPLICATION

All Railways in the Union.

RECORD REFERENCES

*Heading under which the question has been dealt with:*

- *Question 5/8/28.* - Automatic coupling

Determination of technical specifications for the supply of elastomers and slide bars for the automatic coupler.

(Sub-Committee for specifications: Paris, January 1977)