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TECHNICAL SPECIFICATION FOR THE SUPPLY OF WELDED COMPONENTS FOR BUFFERS (Plungers or spindles and casings)

CHAPTER 1

SCOPE OF APPLICATION

Article 1

OBJECT

This Specification governs the supply of steel plungers or spindles and casings for buffers, including cylindrical components in ferruled plate or tubular form, assembled by autogenous welding.

It does not apply to springs and accessories for buffer assembly, which must comply with the existing UIC Leaflets, or falling that, with the national standards or designs of the Purchasing Railway.

(Revised on 1-1-1984)

**NUMERISATION DANS
L'ETAT DU DOCUMENT**

CHAPTER 1)

DEFINITION OF THE MATERIALS AND PARTS

Article 2

PROPERTIES REQUIRED

1. Steel

a) Mechanical properties - The mechanical properties of the steel when normalised (1), and perpendicular to the rolling direction in the case of plates, shall be as follows :

- Tensile strength R : 37 to 50 kg/mm²
- Ductility index : C > 100.

The ductility index C shall be defined, in relation to the gauge length L of the test-piece for tensile testing whose cross-sectional area in the gauge length is S, by the following table :

Values of L	C
$8.16 \sqrt{S}$	R + 2.5 A
$5.65 \sqrt{S}$	R + 2.2 A
4	R + 2 A

where A is the % elongation of L at the breaking load.

When national standards are available, the Purchasing Railway must choose therefrom a standard grade contained within the above limits.

For the heads of plungers or spindles, a grade with a tensile strength (R) higher than 50 kg/mm² can be used, provided that the connection between the head and the cylindrical body of the plunger or spindle can be accomplished by riveting or setting.

b) Physical properties. - The plates and tubes used shall be sound throughout and shall in particular be free from laminations. Their surfaces shall be smooth, free from loose scale, cracks, flaws, fins, depressions, laps, or any other defect which would be harmful to their use.

(1) Condition of steel which has undergone normalising treatment, a process which consists of bringing the steel evenly to a temperature above the transformation zone, keeping it so for an adequate length of time, and then placing it in still air to cool.

c) Chemical composition - In the event of there being no indication in the standards or drawings, the chemical purity shall be as follows :

Phosphorus	0.055% max.
Sulphur	0.055% max.

2. Parts

- a) Geometrical properties. - The plungers or spindles and casings shall be constructed in accordance with indications given in the standards or drawings as regards shape, position of welds, dimensions and agreed tolerances for these dimensions.
- b) Mechanical and physical properties - The bodies of the plungers or spindles and casings shall be capable of being expanded to a diameter 15% greater, without causing any cracks, tendency to fracture, or separation of the welded joints.

The welded joints shall be free from blowholes, inclusions, there shall be no distortion of the metal in the adjacent zones.

The welded joints shall especially satisfy the welded joint inspection test defined in Article 10 below.

Article 3

BRANDING

Each part shall be branded with the trade-marks as defined by the standards or drawings, notably :

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

CHAPTER III

MANUFACTURE

Article 4

METHOD OF MANUFACTURE OF THE PLATES AND TUBES

Except when the Purchasing Railway stipulates the process of steel manufacture, this shall be left to the choice of the manufacturer.

The steel tubes shall be produced either by hot rolling, or by butt welding, especially by electric arc, in accordance with the standards or drawings.

Article 5

MANUFACTURE OF THE PARTS

The various component parts shall be cut by shearing, stamping or slicing either hot or cold, cleanly and without unevenness or burring of the edges.

The preparation and process of welding by gas or arc, shall be left to the choice of the manufacturer. The Purchasing Railway can, however, require details to be submitted for its approval.

The welding operations shall be carried out carefully in such a way as to avoid any fault likely to be adverse to the parts when in service, especially any malformation or distortion in the region of the welds, or any irregularity of the welding metal.

Stress relief annealing (1) shall be carried out after completion of welding, unless waived by the Purchasing Railway.

The surfaces of the machined parts shall be in accordance with the indications given in the standards or drawings; they shall exhibit no tool marks likely to prove adverse to their use.

Article 6

PERMISSIBLE REPAIRS

Superficial faults may be eliminated by removal of the metal when cold (chiselling, grinding, machining or other approved methods) provided the dimensional tolerances are observed.

Slight building-up by welding may be authorised by the Purchasing Railway at the responsibility of the manufacturer.

Any repair carried out without the Railway's agreement or intended to hide a fault, shall be strictly forbidden and can incur the rejection of the complete supply.

(1) Stress relief annealing shall be understood as the procedure which consists of bringing the parts evenly to a temperature of 600/650°C, keeping them so for a sufficiently long period, and then placing them in still air to cool.

CHAPTER IV

ACCEPTANCE CONDITIONS

Article 7

SUBMISSION FOR ACCEPTANCE

The plungers or spindles and casings shall be submitted prior to any paintwork being carried out, and shall be grouped into batches made up of items in the same category and of similar type. Components included in the same submission for acceptance shall form a batch irrespective of their number.

Article 8

NATURE OF INSPECTIONS AND NUMBER OF TESTS TO BE MADE

1. On the steel.

At the mill

At the mill or the laboratory of the Purchasing Railway, depending on the choice of the latter.

Tensile test.

Chemical analysis.

Acceptance in accordance with the national standards of the Purchasing Railway's country.

2. On the components.

At the mill

Expansion test for plungers or spindles and casings made up of butt-welded plates or tubes.
Welding inspection test

Per batch of N parts
1 for 50 N
2 for 50 N
3 for 100 N
4 for 250 N
5 for 500 N

Article 9

METHOD OF SELECTION AND PREPARATION OF THE SAMPLES

AND TEST PIECES

1. Steel

The selection of the samples and the preparation of the test

pieces for the acceptance of the steel shall be carried out in accordance with "ISO Recommendations" or failing that, with the national standards of the country of the Purchasing Railway.

2. Parts

The acceptance inspector shall choose, at random, from each batch submitted, the parts intended for testing and stamp them.

From each part, whether plunger or spindle, or casing, after the expansion test where the latter is applicable, an L-shaped portion whose arms are of equal length and 50 mm wide shall be removed by cutting when cold. The position of this portion in the part shall contain no reinforcement or longitudinal welding of the cylindrical body. One of the arms shall be taken from the cylindrical body parallel to the axis, and the other shall be taken from the head of the plunger or spindle or the base of the casing in such a way that its centre line passes through the centre of the head or the base.

The arms of equal length shall be as long as possible.

The parts intended for testing, and also the test-pieces, shall retain the stamp marks of the acceptance inspector.

Article 10

TESTS

1. Steel

Tensile test

a) The tensile tests must be in accordance with "ISO Recommendations". They may be:

- long, if $L = 8.16 \sqrt{S}$
- medium, if $L = 5.65 \sqrt{S}$
- short, if $L = 4$

b) Testing method

The tensile tests must be conducted in accordance with "ISO Recommendations". Tensile strength R and the coefficient of quality C shall be determined.

c) The results to be obtained are shown in Article 2 (1a).

Chemical analysis

a) The sample shall weigh at least 50 gr.

b) Testing method

Chemical analysis shall be carried out in accordance with the national standards of the Purchasing Railway, and shall consist of determining the phosphorus and sulphur contents.

c) Results to be obtained : see Article 2 (1 c).

2. PartsExpansion test

- a) The test-piece shall consist of one part
- b) Testing method

The part having been placed vertically on its head or base, a polished steel mandrel of adequate hardness, in the shape of a truncated cone with an angle of 30° at the top and dimensioned appropriately, shall be inserted in the cylindrical portion of the part. Sufficient pressure shall be applied to the mandrel to bring about, by gradual penetration not exceeding 50 mm a minute, a 15% increase in the external diameter of the section of the test-piece.

- c) The results to be obtained are given in Article 2 (2b - subparagraph 1).

Welding inspection test

- a) The test-piece shall be the L-shaped portion removed from the part as indicated in Article 9.

b) Testing method

The test-piece shall be broken by means of repeated deformation during which the two arms are alternately opened to 160° and closed one upon the other.

- c) The fracture obtained shall satisfy the conditions laid down in Article 2 (2b - subparagraph 2).

Article 11INTERPRETATION OF THE TESTS

Any characteristic not in accordance with the required conditions which is confirmed during a series of tests, may entail the rejection of the relevant batch.

In cases where the Purchasing Railway decides to permit re-tests, the nature and number of these shall be determined by special agreement between the manufacturer and the Railway.

CHAPTER VPROTECTION - GUARANTEEArticle 12PROTECTION AGAINST RUST

Unless otherwise stated in the order, after acceptance and stamping by the acceptance inspector and before storing or despatch, the plungers or spindles and casings shall be treated with a thick layer of paint on the rough portions, and with a protective coating authorised by the Purchasing Railway on the machined portions.

Article 13GUARANTEE

The plungers or spindles and casings shall be guaranteed by the supplier, for 1 year, against any defect imputable to manufacture and not revealed on acceptance at the factory.

When it is a question of parts used on new rolling stock, the delivery date of the vehicles on which they are assembled shall be considered as the delivery date of the buffers.

Parts which are found during the guarantee period to possess faults rendering them unfit for service, or such as would detract from their length of service, shall be rejected.

Rejected parts shall be retained at the manufacturer's disposal for replacement or reimbursement.

APPLICATION

With effect from 1 January 1960, except :

- Article 13, paragraph 1 (guarantee period).....1-10-75

All Railways in the Union.

RECORD REFERENCES

Headings under which the question has been dealt with :

- Initial research into the conditions of manufacture and testing to ascertain whether joint specifications can be produced for :

- a) ... b) ...
- c) Buffers in ferruled and welded sheets.

(5th Committee - R.S. - : Budapest, June 1958. - 5th Committee J.O. Prague, June 1959).

- Revision of existing Specifications.

- a) ...
- b) Harmonisation of guarantee clauses.

(Sub-Committee for Specifications : Paris, January 1975).