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TECHNICAL SPECIFICATION

FOR THE SUPPLY OF
ROLLER BEARING AXLE BOX CASES MADE OF
SPHEROIDAL GRAPHITE CAST IRON

SECTION 1

SCOPE

Article 1

PURPOSE

This specification governs the supply of roller bearing axle box cases made of spheroidal graphite cast iron.

Article 2

MATERIALS

The roller bearing axle box bodies shall be made of cast iron, in which the graphitic carbon exists in spheroidal form in a ferritic matrix.

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SECTION II
CHARACTERISTICS

Article 3

1. Chemical characteristics

Unless otherwise stated on the order, the supplier shall be authorised to decide the composition of the material himself.

2. Mechanical characteristics (1)

- a) Tensile strength $R \geq 38 \text{ kg/mm}^2$
- b) Elastic limit at 0.2 % $\geq 26 \text{ kg/mm}^2$
- c) Elongation % A = 15 %

on a test-piece with

$$L = 5,65 \sqrt{S}$$

(L = is the gauge length serving as a guide for measuring the elongation at yield point,

S = Cross-sectional area of the gauge length of the test-piece).

3. Physical characteristics

a) Soundness and appearance

The axle boxes shall be sound throughout and show no defects liable to impair their use. They must be free from burrs, scaling, grinding dust, moulding sand and any other impurities.

b) Oiltightness

The axle boxes must be oiltight.

4. Geometrical characteristics

The axle boxes shall be manufactured in accordance with the information given in the standards or drawings relating to the shape, dimensions and dimensional tolerances.

(1) Note - If it is considered desirable to use spheroidal graphite cast iron with a ferrite-perlite matrix, the cast iron must comply with the following characteristics :

$$R \geq 52 \text{ kg/mm}^2$$

$$E \text{ at } 0,2 \% \geq 35 \text{ kg/mm}^2$$

$$A \geq 7 \%$$

on a test-piece with $L = 5,65 \sqrt{S}$.

Article 4

MANUFACTURER'S BRAND MARKS

Each axle box case shall be identified by the manufacturing marks stipulated in the standards or drawings, particularly:

- the manufacturer's mark,
- the mark of the owning railway,
- the last two figures of the year of manufacture,
- the number of the cast (at the request of the purchasing railway).

The required marks shall be applied during the casting process, in relief, and in the places indicated on the drawings.

SECTION III

MANUFACTURE

Article 5

Unless otherwise stated in the order, the choice of the manufacturing process (preparation of the melt, casting) shall be left to the manufacturer.

The axle boxes shall be cleaned and trimmed, and all gates, risers and feeding heads removed.

After casting, the axle box cases shall undergo a suitable heat treatment (annealing).

In addition, if so stipulated on the order by the purchasing railway, the supplier shall submit all the axle box cases to the oiltightness test described in Article 11-3.

Article 6

REPAIR OF CASTING DEFECTS

Surface defects may be eliminated by removing metal (by cold-chiselling, filing, machining or other approved methods), provided the dimensional tolerances are maintained.

The purchasing railway may agree to small repairs being carried out by the supplier, who may propose the addition of metal by welding.

In order to eliminate any residual stresses due to chiselling or welding, tempering at a temperature not exceeding 550°C can be stipulated by agreement with the railway.

Any treatment carried out without the agreement of the railway or with the object of hiding a defect, is strictly forbidden and shall result in the rejection of the complete order.

SECTION IV

CONDITIONS OF ACCEPTANCE

Article 7

SUBMISSION FOR ACCEPTANCE

The roller bearing axle boxes shall be submitted for acceptance in batches, each batch being cast from a single melt, subjected to the same inoculation treatment and given the same heat treatment.

Article 8

NATURE AND PROPORTION OF TESTS

at the manufacturer's works	{ Tensile test	{ 2 axle box cases per batch of up to 100 cases
	Oiltightness test	{ 3 axle box cases per batch of more than 100 cases 5 per cast
at the laboratory of the purchasing railway	{ Micrographical examination	{ 1 axle box case per batch of up to 100 cases
		{ 2 axle box cases per batch of more than 100 cases
at the manufacturer's works or at the purchasing railway's laboratory	{ Chemical analysis (1)	{ 1 analysis per batch

(1) When the chemical composition is stipulated by the purchasing railway.

Article 9

INTERPRETATION OF TESTS - ADDITIONAL TESTS

Any characteristic which does not comply with the required conditions may result in the rejection of the corresponding batch.

If the purchasing railway agrees to additional tests, the number of axle box cases to be submitted to these tests shall be defined by special agreement between the supplier and the railway.

Article 10

SELECTION AND PREPARATION OF THE SAMPLES AND TEST PIECES

1. Selection of axle box cases or sample ingots for testing

The accepting inspector shall select, at random, from each cast submitted, the axle box cases or sample ingots intended for testing, and shall stamp them.

2. Preparation and position of the test pieces

a) Tensile test

The tensile test shall be carried out on test pieces which, in accordance with the instructions given by the purchasing railway are obtained from test bars attached to boxes or cast separately.

Unless otherwise stipulated, the test blocks shall not be less than 200 mm in length, and not less than 25 mm in thickness at the place from which the test pieces are taken.

The cast on test blocks shall remain attached to the axle box until the heat treatment is completed; unless otherwise stated in the order, the point of attachment to the main casting shall be left to the choice of the supplier.

Test bars cast separately shall be cast at the same time and from the same batch of metal as that used for the moulds for the corresponding batch of castings (to be stated on the order). They shall also undergo the same heat treatment as the batch of axle boxes which they represent.

Unless otherwise stipulated on the order, the position from which the test pieces are cast in the test blocks shall be left to the choice of the supplier.

b) Micrographical examination

The sections intended for the micrographical examinations shall be cut from pieces of metal obtained from the test blocks defined above.

The micrographical examination can be carried out, however, at the request of the receiving inspector, on a section obtained from an axle box before machining, subject to the stipulation that the inspector may not select more than one box from every 500 manufactured.

c) Chemical analysis

Unless otherwise stated on the order, the sample selected shall weigh at least 50 g.

3. Cutting-up of the test blocks and machining of test-pieces

The cutting-up and machining operation shall be carried out in the cold state after the heat treatment defined in Article 5.

Article 11

CARRYING OUT OF THE TESTS

1. Tensile test

The test-piece and the method of testing shall be in accordance with ISO Recommendation R 82.

The gauge length shall be calculated by means of the formula :

$$L = 5.65 \sqrt{S}$$

Results to be obtained : see Article 3-2.

2. Micrographical examination

The sections shall be polished before examination takes place.

Results to be obtained : see Article 2. A small proportion of graphite in non-spheroidal form shall not constitute grounds for rejection however ; the same shall apply to a small proportion of perlite in the matrix.

3. Oiltightness test

The test piece shall consist of one axle box case.

The external surfaces of the axle box case shall be covered with a thin layer of powdered chalk, and the internal surfaces brushed over with petroleum.

The axle box casings for testing shall be kept for 3 hours in this condition.

Results to be obtained: No discolouring of the layer of calcium carbonate must be apparent.

4. Chemical analysis

In accordance with the instructions on the order.

Article 12

PROTECTION AGAINST CORROSION

After acceptance and stamping by the receiving inspector, and before storing or forwarding, the axle box cases may receive, at the request of the purchasing railway, a protective coating acceptable to the latter.

Article 13

GUARANTEE

The axle box cases shall be guaranteed by the supplier for a period of 5 years expiring at the end of the calendar year following that during which delivery took place, against any defect imputable to the manufacture and not revealed during acceptance at the works or on final acceptance.

In the case of axle box cases for new stock, the delivery date of the vehicles to which they are fitted shall be regarded as the date of delivery of the boxes, subject to the stipulation, however, that the latter are fitted within two years of their delivery.

Parts which, during the guarantee period, reveal defects rendering them unsuitable for service or likely to reduce their useful life, shall be rejected.

Rejected parts shall be made available to the supplier with a view to their replacement or reimbursement.

APPLICATION

All railways in the Union.

RECORD REFERENCES

Headings under which the question has been dealt with:

- Preparation of a specification for spheroidal graphite cast iron axle-boxes for roller bearings.
(5th Committee - J.Q. - : Leipzig, May 1965).

- Finalising of existing specifications.

a)

b) Harmonization of guarantee clauses.

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

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