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Leaflet to be classified in Volumes:

V - TRANSPORT STOCK
VIII - TECHNICAL SPECIFICATIONS

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TECHNICAL SPECIFICATION
FOR THE SUPPLY OF VOLUTE SPRINGS
FOR VEHICLES

Article 1
SCOPE

This Specification governs the supply of volute springs intended for use in the suspension, buffer gear or running gear of vehicles. It is applicable also to bogie tension springs.

CHAPTER 1

CONDITIONS OF MANUFACTURE

Article 2
MATERIALS

Steel bars of rectangular section, non-grooved, used for the manufacture of volute springs, must comply with the conditions of Leaflet No. 820 and have satisfied the acceptance tests prescribed in this document.

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Article 3
MANUFACTURE

a) The springs should be manufactured in accordance with the indications given on the drawings, standards or orders, which specify dimensions, direction of coiling, elasticity and flexibility characteristics, tolerances and the nature of the tests (See Article 9).

The ends of the bars should be prepared before coiling in accordance with the indications shown on the drawings.

The springs should be hot coiled.

After coiling, the springs should be left to cool slowly sheltered from draughts or in a place where cooling is controlled. They should then be subjected to heat treatment including an obligatory hardening in water or oil, according to the category of steel, and tempering.

The heating of the bars and springs shall be carried out in such a manner as to avoid any overheating, extensive superficial decarbonisation and any extensive formation of calamine.

The heating temperatures, before hardening and tempering should be controlled by means of standard registering apparatus; the temperature readings should be placed at the disposal of the inspector; if the supplier provides adequate guarantees in respect of the quality of his manufacture, this check may be waived.

The feet of the springs should be trued up before or after the heat treatment so as to effect a plane set perpendicular to the axis of the spring. All burrs produced by the truing up should be removed and the end of each terminal coil should have its crests slightly radiused in order to avoid accidents during handling operations.

Each finished spring should be subjected by the manufacturer to a short duration elasticity test under complete compression or with a test load, and should satisfy this test.

b) It is recommended, in addition, that the following procedure be adopted to ensure a well manufactured produce:

- Fixing of the heating temperature, before hardening and after tempering, in relation to the chemical composition of the steel. For hardening, the temperature should not exceed, at the most by 100° C, the upper transformation point of heating of the steel; in practice for type 50.S.7. steel, this is between 850 and 900° C.
- Heating of the springs before hardening, to an effective temperature not varying from the stipulated temperature by more than 10° C.
- Adoption, for the quenching bath, of temperatures between :
20° and 40° C for hardening in water,
40° and 80° C for hardening in oil,
the capacity and feed supply of the bath being fixed so as to effectively maintain the temperature of the quenching liquid round the springs within these limits.
- After tempering, gradual cooling of the springs sheltered from draughts.

Article 4

MANUFACTURER'S BRANDS

The brands shall be prescribed on the drawings.

Each spring shall be hot stamped on the outer face of the end of the coil forming the large foot, by means of blunt edged stamps, with the manufacturers' brands and, in particular :

- the trademark ;
- the last two figures of the year of manufacture.

Example : XX - 54

Article 5

APPEARANCE

The springs shall show no crack, flaw, burr, lack of metal, fold or defect whatsoever likely to affect their use adversely.

The surface of the coiled bar shall be free from calamine.

The coiling of the springs shall be in the direction indicated on the drawing.

The generators of the spring coils shall be fairly rectilinear and perpendicular to the feet, and within the tolerances prescribed by article 7.

Article 6

REMOVAL OF SURFACE DEFECTS

Removal of defects is forbidden.

Article 7

DIMENSIONAL TOLERANCES

The dimensions stipulated by the documents necessary to manufacture and the tolerances on these dimensions shall be rigorously respected.

Unless otherwise stated on these documents, the following tolerances shall be respected:

Height of the spring (1).....	{ + 4%
	{ - 2%
Verticality of one foot in relation to the other.....	≤ 2%
Distance between the surfaces in relation to each coil	{ + 0.5 mm
	{ - 0.5 mm

(1) The height shall be measured after having subjected the spring to compression in accordance with the conditions shown under Article 12.

CHAPTER 11

ACCEPTANCE CONDITIONS

Article 8

LAYING OUT FOR ACCEPTANCE

The springs shall be submitted for acceptance grouped in batches consisting only of springs of the same type.

Article 9

TYPE AND EXTENT OF TESTS

No. of springs per batch of	10 to 50	51 to 150	151 to 300	301 to 500	501 to 800	801 to 1300	1301 to 2000	2001 to 3000
In all cases	Short duration elasticity test							
	5	8	12	17	23	30	38	47
Only if requested by the Purchasing Railway on ordering	Flexibility test							
	3	4	5	7	9	11	14	17
	Long duration elasticity test							
	3	4	6	9	12	15	19	24
	Endurance test							
	3	4	5	7	9	11	14	17

These tests shall be carried out at the mill.

Article 10

ADDITIONAL TESTS

Any characteristic not complying with the required conditions and observed on one only of the springs submitted for test may entail rejection of the corresponding batch.

However, when the purchasing Railway considers that it can accept check tests, the number of springs to be submitted to these further tests shall be defined by special agreement between the manufacturer and the Railway.

Article 11

TEST SAMPLES

The inspector shall select, at random, from each batch submitted, the springs intended for testing and shall stamp them.

The springs submitted to the following tests :

- flexibility,
- long duration elasticity, and
- endurance,

shall be selected from among those having undergone the short duration elasticity test.

Article 12

SHORT DURATION ELASTICITY TEST

a) Test method

The spring, placed on a flat and rigid metal support, shall receive 2 successive compressions :

- complete compression, i.e. bringing it to its minimum height,
- or, when specified on the drawing, by application of a test load determined by this document.

The complete compression or the application of the test load required by the drawing is effected progressively and maintained for a period of 2/3 minutes. After each compression, the spring shall be released and its height measured.

b) Results

The spring shall show no fissure.

There must be no difference between the first and second measurements.

The retained height must be within the tolerances shown on the drawing.

Article 13

FLEXIBILITY TEST

a) Test method

The spring, placed on a flat and rigid metal support, shall be subjected to compression by application of a load equal to the flexibility load shown on the drawing.

The application of this load shall be effected progressively and maintained for a period of 2/3 minutes.

The height of the spring under this load shall be measured.

b) Results

The flexibility of the spring shall be within the tolerances shown on the drawing.

Article 14

LONG DURATION ELASTICITY TEST

a) Test method

The spring, placed on a flat and rigid metal support, shall undergo 2 successive compressions under the conditions stipulated by Article 12:

- one of short duration
- the other of a duration of 48 consecutive hours, the device maintaining the compressed spring being sealed with a lead seal by the inspector.

After each compression, the spring shall be released and its height measured.

b) Results

See Article 12.

Article 15

ENDURANCE TEST

a) Test method

The spring, placed on a flat and rigid metal support, shall be subjected :

- firstly, to a series of flexions whose amplitude, number and rate shall be indicated on the drawing ;
- then to the short duration elasticity test (Article 12) ;
- then to the flexibility test (Article 13).

A device shall make it possible to verify that the spring under test cannot be changed during the test period.

b) Results

The spring shall show no fissure.

It must satisfy the results required from the flexibility test and shall retain, in its free state, a height equal to that recorded after the short-duration elasticity test.

Article 16

PROTECTION FROM RUST

Except where otherwise directed, after acceptance and stamping by the inspector and before storage or despatch, the springs shall receive a protective coating against rust, acceptable to the purchasing Railway.

CHAPTER III

GUARANTEE

Article 17

The springs shall be guaranteed by the manufacturer, for one year against any defect imputable to manufacture and not revealed upon acceptance at the factory.

In the case of springs being fitted to new stock, the date of delivery of the vehicles on which they are assembled shall be considered as the date of delivery of the springs provided, however, that the springs are used within a period not exceeding two years.

Springs which, during the guarantee period, reveal defects rendering them unsuitable for service or such as to reduce their service life, shall be rejected.

The rejected components shall be placed at the disposal of the manufacturer with a view to their replacement or reimbursement.

APPLICATION

With effect from 1 January 1956, except :

- Article 17, paragraph 1 (guarantee period) 1-10-1975.

All Railways in the Union. However, a derogation is granted to the BR.

RECORD REFERENCES

Headings under which the question has been dealt with :

- Preparation of standard technical specifications.

(5th Committee - R.S. : Amsterdam, June 1955).

- Completion of existing UIC Specifications in order to take into account new factors.

(5th Committee - R.S. - : Budapest, June 1958).

- Examination of proposals submitted by Industry concerning Specifications for springs (Leaflets Nos. 820, 821, 822, 823 and 824).

(5th Committee - U.O. - : Leipzig, May 1965).

- Revision of existing Specifications :

a)

b) Harmonisation of guarantee clauses.

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