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Translation

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Technical specification for the supply of helical compression springs, hot or cold coiled, for tractive and trailing stock

Spécification technique pour la fourniture de ressorts en hélice de compression formés à chaud ou à froid pour matériel roulant moteur et remorqué

Technische Lieferbedingungen für warm- oder kaltgeformte Druckschraubenfedern für Triebfahrzeuge und Wagen



UNION INTERNATIONALE DES CHEMINS DE FER
INTERNATIONALER EISENBAHNVERBAND
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Leaflet to be classified in Volumes:

V - Rolling Stock

VIII - Technical Specifications

Application:

With effect from 1 July 1974, except:

- point 6, 1st paragraph (guarantee period) (1.10.75)

All members of the International Union of Railways

Record of updates

4th edition, July 1974

with its erratum dated 1.10.74 and its Amendments dated 1.10.75 and 1.1.85

5th edition, November 2003

Retyped in FrameMaker and up-date of references to ISO standards following changes made between 1974 and 2003:

- ISO/R 79:1968: Brinell hardness test for steel (standard withdrawn on 1.9.1981) and

- ISO/R 80:1968: Rockwell hardness test (B and C scales) for steel (standard withdrawn on 1.11.1986)

are mentioned in the 4th edition of UIC Leaflet 822 dated 1.7.1974. SC03 of the CTR suggests ISO Standards ISO 6506-1:1999 and 6508-1:1999 respectively as replacement documents.

The person responsible for this leaflet is named in the UIC Code

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Summary

This specification governs the supply of helical compression springs, hot or cold coiled, intended particularly for use as suspension, buffing or draw gear for tractive and trailing stock.

It also applies to all springs which are comparable to the above by virtue of their functional or dimensional characteristics.

1 - Purpose

1.1 - Nature of the parts

This specification governs the supply of helical compression springs, hot or cold coiled, intended particularly for use as suspension, buffing or draw gear for tractive and trailing stock.

It also applies to all springs which are comparable to the above by virtue of their functional or dimensional characteristics.

1.2 - Classification

There shall be three categories of springs (1 - 3), taking account of the severity of the conditions to which they are subjected in service (see table in point [4.2.2.2 - page 10](#)).

The contract or the order and their appended documents must give all the relevant details necessary for the satisfactory execution of the supply in question, and in particular to enable the following paragraphs of this technical specification to be applied.

[2.1](#), [2.2.1.2](#), [2.2.1.3](#), [2.2.2 - page 3](#), [2.2.3.1](#), [2.2.3.2 - page 4](#), [2.2.3.3](#), [2.2.3.4](#), [2.2.3.5](#), [2.2.3.6 - page 5](#), [3.1 - page 7](#), [3.2.3](#), [3.2.5 - page 8](#), [4.1 - page 9](#), [4.2.2.2 - page 10](#), [4.2.2.3.2](#), 1st paragraph, [4.2.2.4.1](#), [4.2.2.4.3 - page 11](#), [4.2.2.4.5](#) and [4.2.2.4.8 - page 12](#), 1st paragraph,

Drawings of springs must specify:

- the nature of the metal and the reference number of the document governing the supply,
- the surface condition of the bars,
- the category of the spring,
- the characteristics of the spring, especially the loading deflection requirements,
- reference to this specification.

1.3 - List of reference documents

In this specification, reference is made to the following documents:

- *ISO Standards 683-14, 6506-1 and 6508-1.*

2 - Characteristics

2.1 - Material

The bars of steel used for the manufacture of springs to this technical specification must possess the chemical, physical, mechanical and geometrical characteristics indicated by International Standard *ISO 683-14* for the type of steel required in the drawings.

In particular, the shape and dimensions of the section and condition of the surface of the bars (as rolled or turned) shall be such that all the characteristics required of the finished spring can be obtained.

If required on the drawing, special guarantees as to the purity of the steel and the decarburisation depth shall be given by the supplier.

2.2 - Springs

2.2.1 - Physical characteristics

2.2.1.1 - Appearance

The surface of the springs shall not show any trace of scale or lack of material, or any defects which would prove detrimental in use.

No trace of arc burns or spots on the springs due to the passage of electric current following magnetic crack detection, shall be permitted.

The tapered ends of the coils shall be carefully deburred, have no sharp edge, and shall be finished by a curve to a radius sufficient to avoid accidental damage during manipulation. The deburring operation must be effected without damaging the adjacent coils.

2.2.1.2 - Soundness

The springs shall be sound throughout.

The indication obtained in the course of magnetic crack detection (or dye penetrant test), made after final shot peening where applicable, shall not show any straight or sinuous lines formed by accumulation of powder or dye.

2.2.1.3 - Protection against corrosion

Any protective coating which is required by the drawing shall at all points conform to the specification.

2.2.2 - Geometrical characteristics

The shape, dimensions and direction of coiling shall conform to the drawing. When it is not stated, the direction of coiling shall be to the right.

In the absence of a contrary indication on the drawing, the extremity of the end coil shall not have a thickness greater than 0,25 of the nominal diameter of the wire or bar after setting of the base of the spring.

Under compression, particularly in the load deflection test, the contact between the tapered end of each coil and the next turn shall be made over a length at least equal to one-third of the mean diameter of the coil of the spring in order to avoid localised contact likely to damage the surfaces.

The base of the spring shall be perpendicular to the axis of the imaginary cylinder concentric with the external surface of the coils, to the tolerances indicated in the drawing.

When these latter are not indicated, the tolerance to be applied is that indicated in the following table.

Dimensions	Tolerances
Cross section	Given in the National Standards of the purchasing Railway
Height of a spring under a load equal to 0,1 P ^a	$\pm 2,5\%^b$
Interior diameter	$\pm 1,5\%$
Exterior diameter	$\pm 1,5\%$
Departure from perpendicularity of the base to the axis	$\leq 2\%$ for springs ≤ 150 mm in height, $\leq 1\%$ for springs > 150 mm in height
Parallelism of one base compared with the other	$\leq 3\%$

a. The height is measured after subjecting a spring to the compression shown in point 4.2.2.4.3.

b. When the drawing indicates a tolerance on the height of the spring when loaded, the tolerance on free heights indicated above is not applicable.

2.2.3 - Mechanical characteristics

The mechanical characteristics as defined below shall be obtained on the springs in delivered condition, i.e. after shot peening or application of protective coating against corrosion, and after each spring has been submitted by the supplier to the test of short duration elasticity as described in point 4.2.2.4.3 - page 11 but before application of the protective coating required in point 5 - page 14.

2.2.3.1 - Compressive residual stresses obtained by shot peening

The compressive residual stresses obtained by shot peening, as required on the drawing for springs in type 1, shall comply with the conditions given in the latter.

In the absence of this information, shot peening shall be carried out so as to satisfy the requirements given in Appendix A - page 16.

2.2.3.2 - Hardness

The hardness values measured on springs shall conform to those indicated on the drawing.

2.2.3.3 - Elasticity test (short or long duration)

The springs shall be able to support, without cracking, two successive compressions effected in accordance with the indications in points 4.2.2.4.3 - page 11 or 4.2.2.4.4 - page 12, depending on whether the drawing prescribes the short duration or the long duration elasticity test.

No difference shall be observed between the height of the spring measured under 0,1 P after the first compression and that measured with the same load after the second compression, P being the load deflection characteristic given by the drawing.

The free height of the spring after the elasticity test shall be within the tolerances prescribed by the drawing, or those in point 2.2.2 - page 3.

2.2.3.4 - Load deflection characteristics

These shall conform to the drawings.

When they are not given, the load deflection characteristics shall be as follows:

1st case: tolerance on the height which the spring assumes under load P is not given on the drawing.

Ratio $\frac{L_{0,1 P} - L_P}{0,9 P}$, defines the flexibility of the spring per unit load, when $L_{0,1 P}$ and L_P are the heights measured respectively under these loads, and shall be within a tolerance of $\pm 8\%$ of the theoretical deformation under these loads.

2nd case: tolerance on the height taken up by the spring under load P is indicated on the drawing.

Ratio $2 \frac{(L_{0,4 P} - L_{0,9 P})}{P}$ or, in the case of the suspension spring, ratio $2 \frac{(L_{0,9 P} - L_{1,4 P})}{P}$, defining the deflection of the spring per unit load in which the heights $L_{0,4 P}$, $L_{0,9 P}$ and $L_{1,4 P}$ are the figures measured respectively under these loads, and shall be within a tolerance $\pm 5\%$ as compared with the theoretical deformation under load P.

2.2.3.5 - Endurance

The springs shall be able to support, without cracking, a series of deformations of which the amplitude, number and the frequency of application are indicated on the drawing, and then satisfy the short duration elasticity test (see points 2.2.3.3 - page 5 and 4.2.2.4.3 - page 11) and the load deflection test (see points 2.2.3.4 and 4.2.2.4.5 - page 12).

2.2.3.6 - Lateral deflection or bowing

When prescribed in the order, the lateral deflection shall be checked by means of a device approved by the purchasing Railway.