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Translation

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Technical specification for the supply of screw couplings for tractive and trailing stock

*Spécification technique pour la fourniture des tendeurs d'attelage pour le matériel roulant moteur et
remorqué*

Technische Lieferbedingungen für Schraubenkupplungen für Triebfahrzeuge und Wagen



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Standards withdrawn and replacement documents suggested by SC03 of CTR:

- ISO R/79:1968, withdrawn on 1.9.1981 -
suggested replacement document: ISO 6506-1:1999
- ISO R/82:1974, withdrawn on 1.7.1984 -
suggested replacement document: ISO 6892:1998

Standards withdrawn and replaced by ISO:

- ISO R/85:1959, withdrawn on 1.7.1985 -
replaced by ISO 7438:1985
- ISO R/286:1962, withdrawn on 1.9.1988 -
replaced by ISO 286-1:1988
- ISO R/942:1969, withdrawn on 1.4.1981 -
replaced by ISO 5922:1981
- ISO R/943:1969, withdrawn on 1.4.1981 -
replaced by ISO 5922:1981

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

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Summary

This leaflet contains the technical specification for screw couplings for railway vehicles as well as the requirements for standard screw couplers.

1 - Purpose

1.1 - Type of stock

This specification governs the supply of screw couplings for rolling stock with reinforced coupling.

The specific provisions applicable to standard screw couplers are given in Appendix B - page 21.

All details relevant to the performance of the contract, especially those concerning the application of the following points of this specification:

2.1.1 - page 3, 2.1.2 - page 3, 2.2.2 - page 5, 2.2.3 - page 6, 2.2.4 - page 7,
3.2.2 - page 9, 3.2.4 - page 10,
4.2.1.1 - page 11, 4.2.2 - page 12, 4.2.2.1.1 - page 12, 4.2.4 - page 13
5.1 - page 18.

must be indicated in the order and its appended documents.

1.2 - Classification

There shall be one type of 850 kN coupling screw only, comprising all the main parts listed below:

- 1 shackle,
- 2 links,
- 1 screw,
- 1 trunnion nut (shackle fitting),
- 1 trunnion nut (link fitting),
- 1 pin,
- 1 operating lever or handle.

1.3 - List of reference documents

Reference is made in this technical specification to the following documents:

Leaflets from UIC Code: 520, 583, 840-2 (see Bibliography - page 30).

ISO Standards: ISO 6506-1, ISO 6892, ISO 83, ISO 7438, ISO 286-1, ISO 377, ISO 5922 (see Bibliography - page 30).

2 - Characteristics

2.1 - Constituent materials

2.1.1 - List of materials

The component parts shall be manufactured from the materials mentioned in the order and its appended documents.

The steels used shall be carbon steels or low alloy steels of the same grade and quality indicated in the order and its appended documents.

NB : Steels with alloy element content not exceeding the following values:

Nickel 0,30% - Chromium 0,30% - Molybdenum 0,05% - Vanadium 0,05% - Copper 0,30% -

$$\text{Cr} + \text{Mo} + \text{Ni} + \text{Cu} \leq 0,60$$

Failing any indication, the materials defined in point 2.1.2 - page 3 shall be used.

When it is necessary for the shackles and trunnions to be hardened and tempered after assembly, the steels of which they are made shall be of the same grade.

2.1.2 - Properties of the materials

The physical, geometric, chemical and mechanical properties of the materials used shall be as prescribed in the order and its appended documents.

Failing any indication on these documents, the materials used shall have the same properties as those shown in table below, which shall be regarded as minimum values.

Component parts	Metallurgical condition or process	On the product (in %)						Re (in N)	Rm (in N)	A % on 5 d	K U ^a in joules	Bending at 180°
		C	Mn	Si	Cr	S ≤	P ≤					
Screw	Normalised	≤ 0,60	≤ 1,00	≤ 0,50		0,050	0,050	430	750/860	12	15	3,5 e
	Hardened and tempered ^{bc}	0,52/0,60 0,38/0,45	0,60/0,90 0,50/0,80	0,15/0,40 0,15/0,40	0,90/1,20	0,045 0,035	0,0450, 035	430 550	710/860 800/950	15 14	25 25	
Schackle and schackle nut	Normalised	≤ 0,50	0,40/0,80	≤ 0,40		0,045	0,045	350	600/720	18	20	
	Hardened and tempered ^{bc}	0,57/0,65 0,38/0,45	0,60/0,90 0,50/0,80	0,15/0,40 0,15/0,40	0,90/1,20	0,045 0,035	0,045 0,035	460 550	750/900 900/1050	14 14	30 25	
Link	Normalised	≤ 0,50	0,40/0,80	≤ 0,40		0,045	0,045	350	600/720	18	20	
	Hardened and tempered ^c	0,57/0,65	0,60/0,90	0,15/0,40		0,045	0,045	460	750/900	14	30	
Link nut	Normalised	≤ 0,50	0,40/0,80	≤ 0,40		0,045	0,045	350	600/720	18	20	
	Hardened and tempered ^c	0,57/0,65	0,60/0,90	0,15/0,40		0,045	0,045	460	750/900	14	30	
Pin	Normalised	≤ 0,61	0,40/0,80	≤ 0,40		0,045	0,045	390	700/850	15	20	
	Hardened and tempered ^c	0,57/0,65	0,60/0,90	0,15/0,40		0,045	0,045	460	750/900	14	30	
Washer		≤ 0,17				0,060	0,050	220	370/450	24		1,5 e
Lever	Forged	≤ 0,19				0,050	0,050		370/450	26		
	Cast	Steel A 40 M 1 <i>Leaflet 840-2</i>										
Lever support	Cast	Steel A 40 M 1 <i>Leaflet 840-2</i>										
		White malleable cast iron grade A Quality 36-10/ISO Standard 5922 (see Bibliography - page 30)										
		Black malleable cast iron grade A Quality 35-12/ISO Standard 5922 (see Bibliography - page 30)										

- a. To be checked on a series of 2 test pieces neither of which must give a result less than the value prescribed - test carried out at 20 °C.
b. Steel with the following properties may also be used: C 0,35%, Mn 1,5%, Ni 1%.
c. Hardening temperature: 800 to 850°C - Tempering temperature: 550 to 600°C.

2.2 - Component parts

2.2.1 - Physical characteristics

2.2.1.1 - Appearance

Parts or components in the as-forged, as-stamped or as-cast condition must have smooth surfaces, carefully trimmed and be completely free of oxides and any foundry sand. In particular, the lever and ball must be free from burring, unevenness or other defects likely to make it dangerous to operate.

The surface condition of parts for which machining is laid down must conform to that prescribed in the order and its appended documents or to that of the specimens or standards previously approved by the Railway. No lack of material, sharp angles or accidental tool marks shall be accepted, particularly on parts or components subject to tensile or bending stresses.

Connecting radii, whether machined or not, must be correctly formed and free from scoring.

2.2.1.2 - Soundness

The component parts of the screw couplings must be sound throughout and show no defect such as laps, seams or cracks, irrespective of their size.

2.2.1.2.1 - Macroscopic examination

The macroscopic examination carried out after straightforward polishing of the cross-sections of the screws, pins, links and trunnions shall not show any cavity or discontinuity.

2.2.1.2.2 - Macrographic examination

After testing, the macrographic image obtained on the sections indicated in point 2.2.1.2.1 above must be of uniform colour and free from any marked segregation.

2.2.2 - Geometric characteristics

The shapes, dimensions and their tolerances must be those fixed, for each category of component parts, in the order and its appended documents. Failing any indication to this effect, the following tolerances must be complied with:

2.2.2.1 - Dimensions limited either by 2 unmachined or rough-machined surfaces or by one unmachined or rough-machined surface

1. Transverse dimensions:

Shackles and links:

- Dimensions determining the section of the parts subject to tensile stress:

Shackles: (burned portion between the 2 parallel arms): h 15

(other parts): js 15

Links: k 15

- Other dimensions:..... Js 16 or js 16

- Other parts:..... Js 16 or js 16

2. Longitudinal dimensions (all parts):..... Js 16 or js 16

NB : The tolerances js 15, js 16, Js 16, h 13, h 15, H 13, k 15, are those specified by *ISO Standard 286-1* (see Bibliography).

2.2.2.2 - Dimensions limited by two machined surfaces

1. Linear dimensions:

- Bores (internal diameters): H 13
- Shafts (external diameters): h 13

2. Angular dimensions: $\pm 2^\circ$

2.2.3 - Mechanical characteristics

Heat treatment

At the time of delivery, the screws, shackles, links, trunnion nuts and pins must be in the metallurgical condition, either normalised or hardened or tempered, required by the order and its appended documents which, for hardened parts, must also specify the area of hardening.

NB : Normalising treatment is taken to mean an operation consisting of:

- either, after having left the part to cool sufficiently slowly after forging or rolling down to ambient temperature sheltered from draughts, preferably in a covered trench or under a frame, then bringing it uniformly up to a temperature above the transformation zone and maintaining it at that temperature for a long enough period of time before placing it to cool in still air;
- or, after having left the part to cool after forging or rolling down to a temperature of between 540°C and 250°C, increasing it uniformly to a temperature above the transformation zone, maintaining it at that temperature for a long enough period of time and placing it to cool slowly sheltered from draughts, preferably in a covered trench or beneath a frame.

Subject to the agreement of the purchasing Railway, the slow cooling need not be carried out when the steel has been effectively de-gassed by other means, the object of the operation being to avoid the formation of hydrogen flakes.

No heat treatment of the levers, washers and rivets is required.

2.2.3.1 - Hardness

For each of the categories of component parts of the screw coupling, the hardness values recorded after execution of the heat treatment laid down shall conform to those prescribed in the order and its appended documents.

Failing any indication, these must be within the limits laid down in Table below:

Component parts	Metallurgical conditions		Brinell Hardness HB
Screw coupling	Normalised		210 to 250
	Hardened, tempered	carbon steel	210 to 260
		alloy steel	235 to 305
Shackle and trunnion nut	Normalised		170 to 220
	Hardened, tempered	carbon steel	225 to 275
		alloy steel	260 to 325
Trunnion nut (link fitting)	Normalised		170 to 220
	Hardened, tempered		225 to 275
Pin	Normalised		195 to 240
	Hardened, tempered		225 to 275

2.2.3.2 - Resilience

The energy absorbed to fracture in the impact tests on the screws, shackles, trunnions, links and pins having undergone the heat treatment prescribed must not be less than the value fixed, for each category of parts, in the order and its appended documents or, failing any relevant indication, than that shown in table [page 4](#).

2.2.4 - Manufacturers' marks

The component parts of the screw coupling shall be marked in the manner and position specified in the order and its appended documents.

Failing any relevant indication, each part shall bear the following marks:

- all parts: the manufacturer's mark,
- the screws, shackles, trunnion nuts, links and pins: the date of manufacture (last two figures of the year of manufacture),
- mark of ownership (on the lever).

In addition, the screw couplings shall bear the characteristic marks for interchangeability as defined in *UIC Leaflet 583* ([see Bibliography - page 30](#)).

In the case of forged parts, the marks shall be embossed when hot, during the stamping operation. In the case of the screws and exceptionally the trunnion nuts and pins, the marks may be applied when cold by means of rounded-edge stamps at the end of the screws, trunnions or pins.