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Translation

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Technical specification for the supply of wheelsets for tractive and trailing stock - Tolerances and assembly

*Spécifications techniques pour la fourniture d'essieux montés des matériels roulants moteur et
remorqué - Tolérances et montage*

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Summary

A wheelset is an assembly consisting of an axle with two complete wheels together with other component parts such as brake discs, gear wheels, etc.

This UIC leaflet defines the characteristics of press-shrunk or hot-shrunk assembly of solid-core wheels, wheel plates, tired wheels and other component parts on axles.

It also specifies assembly tolerances as well as inspection and delivery conditions.

1 - Subject and field of application

1.1 - This technical specification defines conditions for the mounting, on wheelsets, by pressed-on or shrunk-on fitting (under the effect of heat), of solid-core wheels, wheel centres, tyred wheels, axle-mounted brake discs, generator pulleys, gear wheels, chain wheels and other components specified by the purchasing railway for wheelset assemblies¹.

It also stipulates assembly tolerances as well as inspection and delivery conditions.

1.2 - This technical specification defines the characteristics for wheelsets for tractive and trailing stock; it applies to the following wheelset elements:

- Axle types:
 - inner or outer axle journals,
 - cylindrical or conical² wheel seats,
 - straight axles or axles with seats for gear wheels, chain wheels, generator pulleys, brake discs, traction-motor suspension bearings, etc.
- Wheel types:
 - solid-core wheels, forged and rolled,
 - tyred wheels with rolled tyres and forged or cast wheel centres.
- Axle-box type:
 - plain bearing or roller bearing.
- Traction-motor bearing type:
 - plain bearing or roller bearing.

These characteristics are based on *ISO Standard 1005/7* (see Bibliography - page 33).

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1. A wheelset is defined to be the whole assembly consisting of an axle with two complete wheels together with gear wheels, generator pulleys, chain wheels, brake discs as required by the purchasing railway.
 2. Axles with conical wheel seats are the subject of special provisions in derogation of this technical specification. These provisions must be indicated in the purchase order or its associated documents.

2 - Literature references

(see - Bibliography - page 33):

- *ISO 286*: ISO System of limits and fits - Part 1: Bases of tolerances, deviations and fits
- *UIC Leaflet 510-2*: Trailing stock - Conditions concerning the use of wheels of various diameters with running gear of different types
- *UIC Leaflet 810-1*: Technical specification for the supply of rough rolled non-alloy steel tyres for tractive and trailing stock
- *UIC Leaflet 810-2*: Technical specification for the supply of rough tyres for tractive and trailing stock - Tolerances
- *UIC Leaflet 810-3*: Technical specification for the supply of non-alloy flat and sectional steel for tyre retention spring rings
- *UIC Leaflet 811-1*: Technical specification for the supply of axles for tractive and trailing stock
- *UIC Leaflet 811-2*: Technical specification for the supply of axles for tractive and trailing stock - Tolerances
- *UIC Leaflet 812-1*: Technical specification for the supply of rolled or forged wheel centres for tyred wheels for trailing stock - Quality requirements
- *UIC Leaflet 812-2*: Solid wheels for tractive and trailing stock - Tolerances
- *UIC Leaflet 812-3*: Technical specification for the supply of solid wheels in rolled non-alloy steel for tractive and trailing stock
- *UIC Leaflet 812-4*: Technical specification for the supply of tyred wheels for tractive and trailing stock - Type fitting and tolerances
- *UIC Leaflet 812-5*: Technical specification for the supply of rolled or forged steel wheel centres for tractive and trailing stock - Tolerances and surface roughness

3 - Information to be supplied by the purchasing railway

The following information must be supplied by the purchasing railway when calling for tenders and placing an order:

3.1 - The number of this technical specification.

3.2 - Wheelset type:

1. driving wheelset,
2. carrying wheelset for tractive vehicle,
3. carrying wheelset for passenger trailing stock,
4. carrying wheelset for freight trailing stock.

3.3 - Maximum speed range of use:

	$V \leq 100 \text{ km/h}$
100 km/h	$< V \leq 120 \text{ km/h}$
120 km/h	$< V \leq 160 \text{ km/h}$
160 km/h	$< V \leq 200 \text{ km/h}$
	$V > 200 \text{ km/h}$

3.4 - Types of other components to be fitted to the wheelset (see points [1.2 - page 2](#) and [4.1.1 - page 6](#)), fitting methods and any specific technical specifications to be applied.

3.5 - Mechanical burnishing, if any, to be applied to certain seats indicated on the axle drawing. Burnishing of certain seats should be limited to axle seats made of A1 steel governed by *UIC Leaflet 811-1* ([see Bibliography - page 33](#)).

3.6 - Chemical burnishing, if any, to be applied to the journals or the suspension seats of traction motors, if the axle is to be provided with plain-bearing axle-boxes or motor suspensions.

3.7 - Method of fitting wheels, wheel centres or wheel centres with tyres to the axle ([see point 5.2.3.2 - page 9](#)).

3.7.1 - If pressed-on fitting is specified:

Tightening range between seat and bore ([see point 4.1.2 - page 6](#)), range of pressure P_F ([see point 5.2.3.3.5 - page 10](#)) and type of lubricant.

3.7.2 - If shrunk-on fitting (under the effect of heating) is specified:

3.7.2.1 - Tightening range between seat and bore (see point [4.1.2](#)) and value of counter-pressure P_p ([see point 6.4.3.1 - page 14](#)).

3.7.2.2 - Indicate whether the counter-pressure test does not need to be carried out at all or only on part of the wheelset batch (see Table 4, Footnote **d** - [page 26](#)).

3.8 - In the case of tyred wheels, indicate the method of marking any displacement of the wheel centre in relation to the tyre ([see point 5.3 - page 12](#)).

3.9 - Indicate whether machining of the running surfaces is required ([see point 5.5 - page 12](#)).

3.10 - Identification markings to be applied (see point 4.2.5.1, items [1 - page 7](#), [5 - page 8](#) and [6 - page 8](#) and their location ([see point 4.2.5.2 - page 8](#)).

3.11 - Indicate who is to be responsible for inspections (see point [6.1 - page 13](#) and Table [4 - page 26](#), Column 5).

3.12 - Indicate whether the electrical resistance is to be measured (see point [4.2.2 - page 6](#) and Table [4](#)).

3.13 - When out-of-balance needs to be corrected (see points [4.2.3 - page 7](#), [5.6 - page 12](#) and Table [4](#)), and if applicable, indicate the permitted value for out-of-balance (see points [4.2.3.2 - page 7](#) and [4.2.3.3 - page 7](#)).

3.14 - Specify additional dimensional tolerances or those differing from tolerances given in Table [3 - page 25](#), ([see point 4.2.4 - page 7](#)).

3.15 - If a final coat of paint or permanent protection against corrosion is required, details must be specified (see points [5.4 - page 12](#) and [5.8 - page 12](#)).

4 - Classification

4.1 - Components

4.1.1 - General

In the "ready for fitting" state the components must fulfil all conditions required for sound behaviour of the wheelsets in service. The corresponding characteristics must be determined by reference to the appropriate technical specifications set out in Table 1 - page 23.

4.1.2 - Tightening between wheel seats and wheel bores

As regards the tightening between wheel seats and bores, a range shall be specified by agreement between the purchasing railway and the manufacturer. Unless agreed otherwise, this range shall be such that, with the fitting conditions indicated in point 5.2 - page 9, the requirements of the counter-pressure test shall be fulfilled (see point 4.2.1 - page 6, Table 4 - page 26 and point 6.4.3.1 - page 14), and that the margin selected shall lie between the limiting curves of Figs. 1 - page 19 and 2 - page 20.

4.1.3 - Tightening between seats and bores of other ancillary components

The tightening between seats and bores of other ancillary components of the wheelset shall be specified in the purchase order or its associated documents. In the absence of special provisions their values shall be selected from a range between the limiting curves of Figs. 1 and 2.

Notes:

1. In Figs. 1 and 2 certain tolerance levels and deviations are shown, in accordance with ISO R 286 (see Bibliography - page 33) and satisfy the necessary conditions shown in point 4.1.2 - page 6. The values are listed in Table 2 - page 24.
2. The choice of a suitable tightening value from the ranges given in Figs. 1 and 2 to meet conditions set for the fitting-on pressure depends partly on the yield limits of the two assembled materials, the lubricant used, the design of the assembled components, the roughness of contact faces, the press-fitting speed, etc. The specification of tighter tolerance ranges for both the tightening and the fitting-on pressure can cause difficulties in assembly.

4.2 - Wheelset

4.2.1 - Mechanical characteristics

In the counter-pressure test (see table 4 - page 26) the wheels must not incur any displacement on the axle.

4.2.2 - Electrical resistance

The electrical resistance of each wheelset shall not exceed 0,01 Ω .

4.2.3 - Out-of-balance

4.2.3.1 - The dynamic out-of-balance of carrying wheelsets in each equilibrium plane must be less than the values indicated in the table below, following *UIC Leaflet 510-2* (see Bibliography - page 33).

Maximum permitted wheelset speed km/h	Maximum dynamic out-of-balance gm
$100 < V \leq 120$	125 ^a
$120 < V \leq 200$	75 (all vehicles)
$V > 200$	50 (all vehicles)

a. If laid down in the purchase order.

4.2.3.2 - For driving wheelsets, values for the dynamic out-of-balance can be agreed when calling for tenders and placing the purchase order.

4.2.3.3 - Values for the static out-of-balance can also be agreed when calling for tenders and placing the purchase order. However, for carrying wheelsets the value for the static out-of-balance of the wheelset shall not exceed twice the amount of the values shown in point 4.2.3.1 - page 7.

4.2.4 - Dimensions

The dimensions of the wheelsets must satisfy the specifications of the purchase order and its associated documents.

Tolerances are specified in Table 3 - page 25.

4.2.5 - Manufacturing markings

4.2.5.1 - The components of the wheelset shall bear the manufacturing markings indicated in the particular specification for the component. The markings below shall be cold-punched with stamps with rounded edges bearing characters 5 to 10 mm high to provide the following information:

1. the serial number:

The purchasing railway or else the manufacturer shall define the type of serial number to be used and shall allocate groups of numbers for this purpose.

2. the date of acceptance:

Two digits for the month (e.g. 02 = February) and the last two digits of the year of acceptance shall be punched. However, marking of the acceptance date may be omitted when the month and year of acceptance are the same as the month and year of manufacture of the axle shown on its end faces.

3. the inspection mark,