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Passenger rolling stock - Trailer bogies - Running gear

Matériel pour le transport de voyageurs - Bogies - Organes de roulement
Reisezugwagen - Drehgestelle - Laufwerke

Union Internationale des Chemins de fer
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UIC

Leaflet to be classified in Section :

V - Transport stock

Application :

With effect from 1st January 2001
All members of the International Union of Railways

This leaflet applies to standard gauge lines

Record of updates

1st edition, January 1994	with 1 Amendment
2nd edition, April 2001	Retyped in FrameMaker, addendum to point 1.8 and addition of Appendix A

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

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Summary

This leaflet sets out the general conditions to be met by trailer bogies for passenger rolling stock.

It defines the minimum conditions which guarantee compatibility between the various vehicles.

The minimum conditions also cover compatibility with the existing infrastructure. For this reason, only bogies for lines with a track-gauge of 1435 mm are taken into consideration.

1 - General conditions

O **1.1. -** This leaflet sets out the general conditions to be met by trailer bogies for passenger rolling stock.

It defines the minimum conditions which guarantee compatibility between the various vehicles, but does not define the maintenance rules that must be observed to ensure that the bogies perform well throughout their service life and which are essential for type approval to be obtained.

The minimum conditions also cover compatibility with the existing infrastructure: loading gauge, track gauge, hot box detectors, etc. For this reason, only bogies with outside-axle journals for lines with a track-gauge of 1435 mm are taken into consideration.

O **1.2. -** All *UIC leaflets in the 515-series* deal with conventionally designed, solid-axle bogies. They also apply to conventional bogie parts and components incorporating major design innovations. The leaflets do not claim to cover all areas of major innovation, for example the design and choice of materials, where suitability has to be proved through tests and in-service performance in accordance with arrangements agreed between the manufacturer and the operating railway.

O **1.3. -** In addition to these general conditions for bogies, the bogies themselves, their component parts and their assemblies shall meet the conditions set out in the leaflets below (in course of preparation), which deal with the following subjects:

- *UIC Leaflet 515-1*: General provisions applicable to trailer-bogie components.
- *UIC Leaflet 515-3*: Method of axle design calculation.
- *UIC Leaflet 515-4*: Bogie-frame structure strength tests.
- *UIC Leaflet 515-5*: Axle-box tests.
- *UIC Leaflet 518*: Acceptance-testing of railway vehicles in terms of Dynamic performance - Safety - Track fatigue - Ride quality.

O **1.4. -** The conditions specified in this and the above leaflets apply to all new types of bogie for passenger rolling stock, as well as all existing types of bogie whose design or use has been modified (e.g. fitted to a different type of body frame or run under different operating conditions: speed, load, etc.). If the design or use of a bogie is modified, only those conditions affected by these changes shall be reexamined.

O **1.5. -** The bogies shall be designed in such a way that, when fitted to the body frames for which they were intended, the vehicles thus formed satisfy braking and load gauge requirements.

O **1.6. -** The bogies shall be designed to enable the vehicles to which they are fitted to run at the maximum speed indicated in the box to the left of the RIC sign, while fulfilling the stipulated safety and ride-quality conditions.

O **1.7. -** The bogies shall enable:

- vehicles to negotiate 150 m radius curves when coupled normally in a train;
- an individual vehicle to negotiate 80 m radius curves when empty;

- vehicles used for train-ferry traffic to negotiate 150 m radius curves with a vertical ramp angle of ± 2,5°.

1.8. - It is recommended that the wheel-base of the bogies be as short as possible, bearing in mind stability requirements and the clearance needed under the body. For a wheel-base of between 2,50 and 2,60 m, it is recommended that the bogie dimensions lie within the envelope shown in Appendix B - page 8.

The general conditions to be met when calculating bogie envelopes are set out in Appendix A - page 6 and the recommended standard envelope is given in Appendix B.

O **1.9. -** The mass of the bogies shall be as low as possible.

1.10. - For traffic on lines with many curves, there may be an advantage in using bogies with radially adjustable axles in order to limit wear on wheels and rails. There are various design options for this type of bogie.

If the axle is resiliently steered, the bogie is considered to be radially adjustable when the wheel/rail angle of attack in a 300 m curve at the speed required to offset cant deficiency is ≤ 4 mrad.

If the axle has forced steering, the bogie is considered radially adjustable when the wheel-rail angle of attack under the same conditions does not exceed 0,5 mrad.

2 - Type-approval procedure for bogies

The special conditions applicable to bogie type approval are described below. The procedure extends from the design phase until the bogie finally enters revenue service.

The design, construction and operating objectives set for the bogie are usually contained in the following documents:

- specification containing the parameters defined by the operator (area of use, characteristics of use, minimum TBO, maintenance costs, ride quality, minimum lifetime, maximum axle load, etc.) and the calculations to be made;

- national and international standards (ISO, CEN, CENELEC, etc.);

- international regulations (UIC, RIC, etc.).

o 2.1 - Design

Before the bogie is built, the manufacturer shall demonstrate to the operator, by means of calculations, that the bogie meets the necessary requirements.

The manufacturer shall carry out an analysis of the effects of failures, taking into consideration manufacturing tolerances, maintenance tolerances, the slow deterioration in the characteristics of components, as well as their sudden failure, paying particular attention to parts and systems for which an element of innovation has been introduced and for which results of in-service operation under similar conditions are not available.

The calculations shall be made for the least favourable cases arising from this analysis.

As far as possible, practical verification of these figures shall be carried out by means of bench tests and/or trial runs.

o 2.2 - Tests required for provisional type approval to be awarded

Before the bogie is placed in service, the following tests must be carried out:

- bench tests to demonstrate the strength of the component parts of the bogie, e.g. axle boxes, bogie frame, etc. Depending on the outcome of the failure analysis, other parts, such as springs, dampers, articulation system, rubber elements, etc., may also need to be bench-tested;

- trial runs to demonstrate the sound dynamic behaviour of the bogie: running safety and ride quality, comfort, track fatigue, special tests resulting from the failure analysis, etc.

These tests shall be carried out in accordance with existing international regulations and standards (UIC, CEN, etc.).

Provisional type approval shall be awarded if the results of the tests are satisfactory.

o 2.3 - Type approval

Type approval shall be awarded when sufficient in-service experience has been obtained and when the corresponding maintenance rules have been established. These maintenance rules, which are necessary for type approval to be obtained, are specific to the bogie in question and its use.

Appendix A - Specification for the envelopes

A.1 - Definition of the envelopes

The term "envelope" in this context applies to the bogie clearance gauge including vertical clearances resulting from load and wear as well as horizontal clearances resulting from side play of the primary and secondary suspensions.

A.2 - Dimensional conditions - Vertical dimensions

A.2.1. Upper limiting face - All the vertical dimensions must correspond to a nominal buffing height of 1060 mm (coach empty).

These dimensions are defined when new, with no wear, and refer to the nominal wheel diameter.

A.2.2. Lower limiting face - All the vertical dimensions must be specified in accordance with the provisions of *UIC Leaflet 505-1* (with stops for the vertical and lateral suspensions).

The lower line of the envelope is determined either by the coach under full load, taking into account all the wear and play of the springs until the stop is reached, or by the gauge of the vehicle.

A.3 - Dimensional conditions - Width dimensions

The width dimensions must refer to the axle itself. The side play of the primary suspension (including the side play of the axle boxes) shall be added to the width dimensions of the frame and the components forming one with the latter.

The side play of the secondary suspension (including the elasticity of the stops) shall be added to the width dimensions of the bogie bolster or upper cross bar and the components forming one with the latter.

Explanation:

Since the envelope of the bogies must refer to the gauges defined in *UIC Leaflet 505-1* which, in their turn, refer to the track centre, the width dimensions (track, axle, bogie frame, coach body) must be qualified from the bottom upwards.

A.4 - Representation of envelopes

A.4.1. - Side view for horizontal track with all vertical and longitudinal dimensions.

A.4.2. - Side cross-sectional view through the longitudinal axis of the bogie for horizontal track, with details of additional dimensions.

A.4.3. - Horizontal view, possible in the form of a half-section for symmetrical bogies, accompanied by all the lateral and longitudinal dimensions.

A.4.4. - Half-sectional view in the running direction through the supporting plane, with additional dimensions.

A.4.5. - Part sections and additional dimensions for specific purposes.

A.4.6. - Details in accordance with the information in points A.2 - page 6 and A.3 - page 6 shall be displayed above the panel.

A.5 - Envelopes to be complied with

The basic envelope is shown in Appendices B - page 8 and C - page 9.

Appendix B - Standard envelope of bogies to be fitted to passenger stock

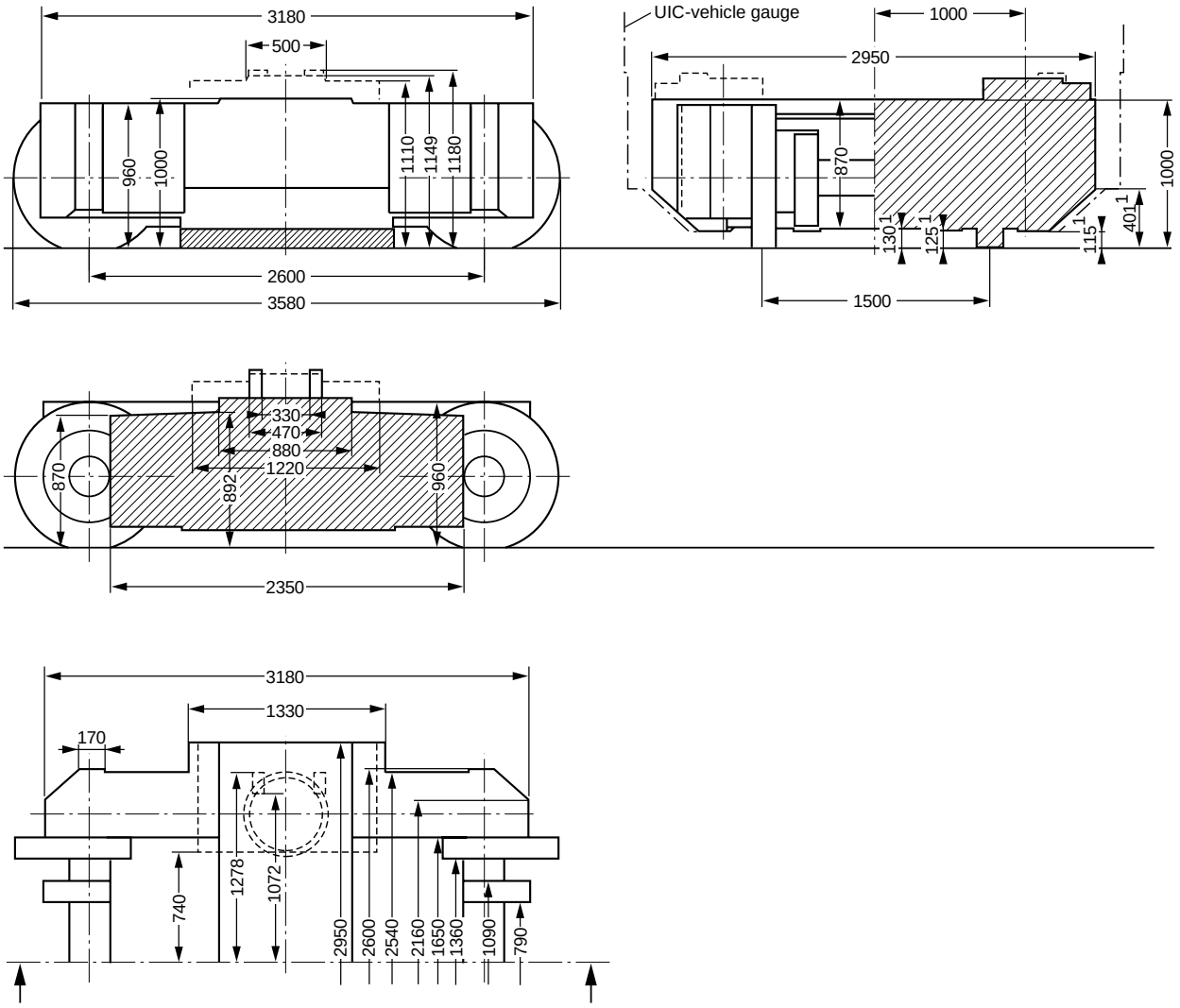

Fig. 1 - Standard envelope of bogies to be fitted to passenger stock

Dimensions with the Index [1] relate to a stationary coach with all maximum wear as per the provisions of *UIC Leaflet 505-1* and spring strokes taken up as far as the stop.

Height dimensions not indexed apply to a stationary empty coach with new components and no wear for a normal buffer height of 1060 mm.

All width dimensions are shown as from the middle of the axle and include the cross play in the various spring stages.

Appendix C - Perspective view of envelope

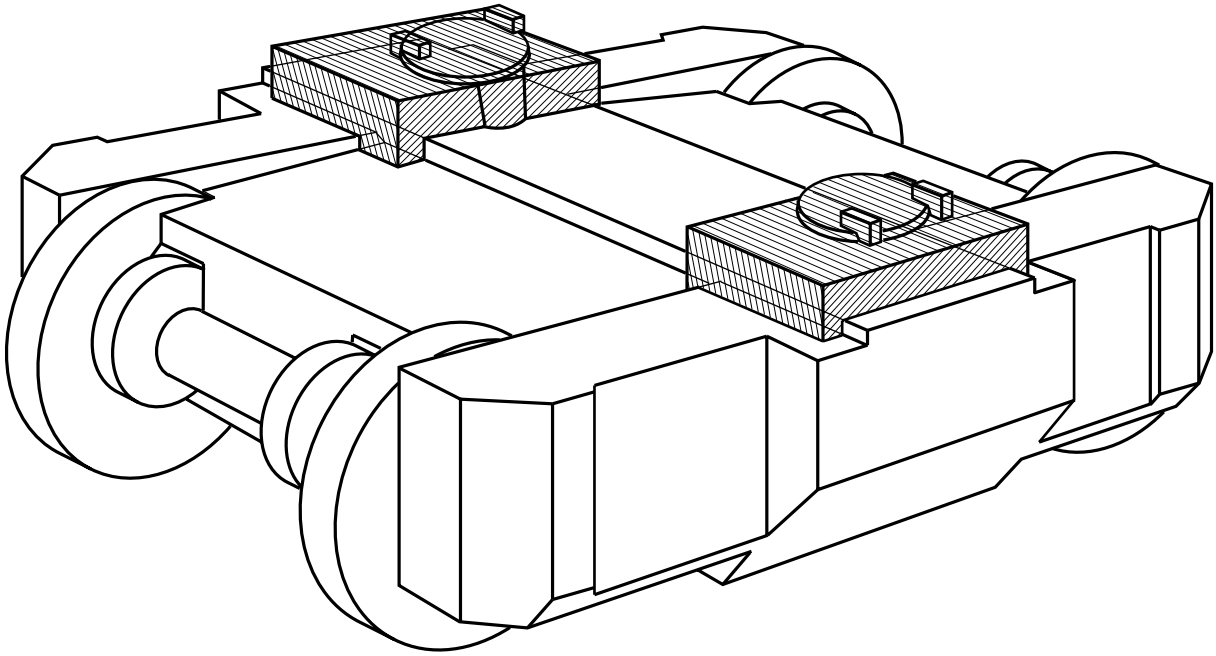

Fig. 2 - Perspective view of envelope

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