

# UIC CODE

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*Translation*

# OR

## **Tractive units - Bogies and running gear - General conditions applicable to component parts**

*Engins moteurs - Bogies et organes de roulement - Dispositions générales applicables aux organes  
constitutifs*

*Triebfahrzeuge - Drehgestelle und Laufwerke - Allgemeine Vorschriften für die Bestandteile*



UNION INTERNATIONALE DES CHEMINS DE FER  
INTERNATIONALER EISENBAHNVERBAND  
INTERNATIONAL UNION OF RAILWAYS

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## Leaflet to be classified in Volumes :

V - Rolling stock

VI - Traction

VIII - Technical specifications

## Application :

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All members of the International Union of Railways

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Important: the articles (points) in this leaflet have been renumbered in the new edition. The first digit of each point has been increased by one (i.e. 0 becomes 1, 1 becomes 2, and so on). Please take account of this when using cross-references from other leaflets.

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

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## Summary

This leaflet forms part of a series covering the official testing and approval of motor bogies. It defines the conditions with which motor-bogie component parts must comply.

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## o 1 - Scope

This leaflet forms part of a series covering the official testing and approval of motor bogies.

In addition to the provisions laid down in *UIC Leaflet 615-0, 615-4, 513, 515-3 and 515-5* (see [Bibliography - page 14](#)), it defines the conditions with which the motor-bogie component parts must comply.

## 2 - Conditions relating to wheelsets

### 2.1 - Wheelset

The electrical resistance of the wheelset, as measured between the running treads of the two wheels, shall comply with *UIC Leaflet 813-0 and 512* (see Bibliography - page 14).

### 2.2 - Wheels

The wheel rim profile shall comply with the conditions specified in *UIC Leaflet 510-2* (see Bibliography - page 14).

### 2.3 - Axle

Axle dimensions and design profiles shall comply with the conditions laid down in *UIC Leaflet 515-3* (see Bibliography - page 14).

The diameter and length of axle journals shall permit compliance with the following two conditions:

- mechanical strength as prescribed by *UIC Leaflet 515-3*,
- bearings to function correctly in accordance with *UIC Leaflet 515-3*.

### 2.4 - Axle-boxes - Bearings - Lubricant

Axle-boxes shall have roller bearings and comply with *UIC Leaflet 515-5* (see Bibliography - page 14).

The lower part of axle-boxes shall be visible to hot-box detectors located along the track. Where such visibility cannot be obtained, axle-boxes shall be fitted with a temperature monitoring device providing data to the driving cab.

Where systems are fitted to the ends of axles (e.g. current return, recorders measuring speed of rotation), they shall not have any effect on the operation of the bearings, even in cases of failure or malfunction.

Bearings shall be electrically insulated to prevent currents passing through them. In order to ensure current return to the rail, part of the bogie axle-boxes shall be fitted with suitable systems for earthing to rail.

Where necessary, the axle-box shall be designed in such a way as to facilitate wheel re-profiling on underfloor wheel lathes. If the use of a wheel-centering device is required, the casing of the bearings of the axle must be adapted accordingly.

The grease used shall comply with the conditions prescribed in *UIC Leaflet 814 et n° 515-5* (see Bibliography - page 14).

## 2.5 - Connections between wheelsets and bogie frame

The mechanical strength of the components connecting axles and bogie frame shall comply with the conditions laid down in *UIC Leaflet 615-4* (see Bibliography - page 14).

The components connecting axles with bogie frame shall be such that they ensure compliance with running safety and comfort requirements.

In case of axle-box overheating, the linkage components connecting wheelsets and bogie frames must have sufficient mechanical strength to prevent the wheelsets becoming detached from the bogie. The linkage components shall also be capable of assuring the necessary wheelset guide functions.

The components connecting axles and bogie frames must allow the wheelsets plus the bogie frame to be lifted in complete safety.

The design and assembly of the bogie shall ensure that wheelsets are in correct alignment when on straight track.

## 3 - Conditions relating to suspension gear

### 3.1 - General conditions

- 3.1.1 - Vehicle height above rail level shall be maintained within the limits prescribed by the appropriate constructional arrangements:
  - in cases where there is uneven distribution of the vehicle weight over the bearing points of the bogies,
  - in order to correct variations occurring in the height of component parts during use (wheel wear, spring deflection, ...).
- 3.1.2 - In the case of vehicles fitted with pantographs, the movement allowed by the suspension system shall be compatible with current-collection requirements . The coefficient of flexibility shall be  $\leq 0,225$  (*UIC Leaflet 505-5*).
- R 3.1.3 - For speeds of 250 km/h and above, it is recommended that bogies be fitted with a device using accelerometer readings taken at bogie-frame level to indicate any incidence of unstable running.
- R 3.1.4 - It is recommended that this device also be designed to provide readings which can be useful for preventive maintenance purposes.
- 3.1.5 - The lateral movement allowed by the suspension gear shall comply with vehicle-gauge requirements.

### ○ 3.2 - Metal springs

Measures shall be taken to avoid incidents arising in the event of a broken spring.

Measures shall be taken to protect springs from corrosion.

### 3.3 - Pneumatic springs

- 3.3.1 - The pneumatic suspension system shall be designed to reduce air consumption to a minimum.
- 3.3.2 - The state of the suspension (inflated - deflated) shall be easily recognisable by operating and maintenance staff.
- 3.3.3 - The necessary conditions for running safety shall be met even in case of failure of the pneumatic suspension system. If necessary, emergency suspension gear shall be provided.
- R 3.3.4 - It is recommended that if one spring on a bogie becomes deflated, the other should deflate as well. If the springs are not designed to deflate at the same time, proof must be given that this does not present a safety risk.
- 3.3.5 - The air reservoirs shall comply with the legal safety requirements in force in the country where the vehicle is registered.
- 3.3.6 - Measures shall be taken to limit vertical movement of the suspension system in cases where the level regulator valves are inoperative.



**O** 3.3.7 - Where a vehicle is fitted with an automatic load-proportional brake system regulated by the pneumatic suspension springs, it shall be possible, in the event of one of these springs becoming defective, to provide the minimum braking required for an empty vehicle under conditions which are compatible with the rules prescribed in *UIC Leaflet 543 and 546* (see Bibliography - page 14).

**O** 3.4 - **Rubber springs**

Suspension components of this type shall undergo a programme of acceptance tests, the content of which shall be agreed by the bogie designer, its manufacturer and the purchasing railway.

**R** 3.5 - **Shock absorbers**

Where yaw dampers are necessary, it is recommended that these be located as far as possible outside the bogie frame in order to be clearly visible and easy to dismantle. These yaw dampers shall also be used in pairs in order to avoid non-symmetrical behaviour in service.

## ○ 4 - Conditions relating to bogie frames

### 4.1 - Bogie frame

The mechanical strength of the bogie frame shall comply with the requirements of *UIC Leaflet 615-4* (see [Bibliography - page 14](#)).

### 4.2 - Connections between bogies and vehicle body

The mechanical strength of the connections between vehicle body and bogie frames shall comply with the conditions laid down in *UIC Leaflet 615-4*.

In addition, the body-bogie connecting gear must be able to withstand a longitudinal force equal to the bogie weight multiplied by  $30 \text{ m/s}^2$  <sup>(1)</sup>, without permanent deformation. (For a value of  $50 \text{ m/s}^2$ , no failure of the body-bogie shall be tolerated. Only permanent deformations are allowed).

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1. Recommended value:  $50 \text{ m/s}^2$ .

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## 5 - Conditions relating to brake gear

Brake gear shall be manufactured in accordance with the conditions set out in *UIC Leaflet 541, 544-1 and 546* (see [Bibliography - page 14](#)). It shall be designed for the maximum running speed.

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## 6 - Transmission of tractive forces

Transmission of tractive forces to the wheels shall be designed to accommodate sudden variations in torque caused by malfunctions in the electrical control sequence. The design shall also ensure that the failure of one or more components does not affect running safety.

## 7 - Lifeguard

- R** 7.1 - It is recommended that the leading bogie of the locomotive or first vehicle be fitted with a lifeguard in front of the wheels of the first wheelset.
- O** 7.2 - The height of the lower edge of the lifeguard above rail level shall comply with the absolute minimum prescribed in *UIC Leaflet 505-1* (see [Bibliography - page 14](#)). During normal running of the vehicle, this height shall in no case exceed the maximum value of 130 mm above rail level.
- O** 7.3 - Breakage or deformation of the lifeguard shall not result in damage to the bogie or endanger running safety.

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## **R 8 - Flange lubricator**

It is recommended that the wheelsets of end bogies be fitted with appropriate flange lubricator systems.

The position of the nozzles and the directionally-sensitive control logic shall avoid any upward projection of the lubricant.

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## 9 - Protection from environmental damage

Effective and durable protection shall be applied on bogie component parts in order to counter the possible corrosive effects of ambient air, corrosion due to rain and products used in washing machines, ...

Measures shall be taken to prevent rain, snow or dust from penetrating into bogie component parts and adversely affecting bogie performance or reducing its service life.

The performance of the bogie and its component parts shall be satisfactory within an external temperature range of - 25 °C to + 40 °C, except where more stringent requirements are specified.

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## ◦ 10 - Environmental protection

Bogies and their component parts shall not release any emissions harmful to health into the environment .

Vibrations and noise produced by the vehicle shall be as low as possible and comply in all cases with national and international standards.



# Bibliography

## 1. UIC leaflets

### International Union of Railways

*Leaflet 505-1: Railway transport stock - Rolling stock construction gauge*, 9th edition under preparation

*Leaflet 510-2: Trailing stock - Conditions concerning the use of wheels of various diameters with running gear of different types*, 4th edition under preparation

*Leaflet 512: Rolling stock - Conditions to be fulfilled in order to avoid difficulties in the operation of track circuits and treadles*, 8th edition of 1.1.79 and 2 Amendments

*Leaflet 513: Guidelines for evaluating passenger comfort in relation to vibration in railway vehicles*, 1st edition of 1.7.94

*Leaflet 515-3: Rolling stock - Bogies - Running gear - Axle design calculation method*, 1st edition of 1.7.94

*Leaflet 515-5: Powered and trailing stock - Bogies - Running gear - Tests for axle-boxes*, 1st edition of 1.7.94

*Leaflet 518: Testing and approval of railway vehicles from the point of view of their dynamic behaviour - Safety - Track fatigue - Ride quality*, 2nd edition under preparation

*Leaflet 541: Brakes - Regulations concerning manufacture of the different brake parts - Driver's brake valve*,

*Leaflet 543: Brakes - Regulations governing the equipment of trailing stock*, 11th edition, December 2001

*Leaflet 544-1: Brakes - Braking power*, 3rd edition of 1.1.66 - Reprint dated 1.3.79 incorporating 9 Amendments

*Leaflet 546: Brakes - High power brakes for passenger trains*, 5th edition of 1.1.67 - Reprint dated 1.1.80 incorporating 5 Amendments

*Leaflet 552: Electric power supply for trains - Standard technical characteristics of the train bus*, 9th edition of 1.1.97

*Leaflet 566: Loadings of coach bodies and their components*, 3rd edition of 1.1.90 plus addenda and 1 Amendment

*Leaflet 569: Regulations to be observed in the construction of coaches and vans suitable for conveyance by train ferry*, 2nd edition of 1.7.79 and 2 Amendments

*Leaflet 615-0: Tractive units - Bogies and running gear - General provisions*, 2nd edition, February 2003

*Leaflet 615-4: Motive power units - Bogies and running gear - Bogie frame structure strength tests*, 2nd edition, February 2003

*Leaflet 651: Layout of driver's cabs in locomotives, railcars, multiple-unit trains and driving trailers, 4th edition, July 2002*

*Leaflet 811-1: Technical specification for the supply of axles for tractive and trailing stock, 4th edition of 1.1.87 with sulphur prints*

*Leaflet 811-2: Technical specification for the supply of axles for tractive and trailing stock - Tolerances, 1st edition of 1.1.88*

*Leaflet 812-2: Solid wheels for tractive and trailing stock - Tolerances, 1st edition of 1.1.86*

*Leaflet 813: Technical specification for the supply of wheelsets for tractive and trailing stock - Tolerances and assembly, 1st edition of 1.1.89*

*Leaflet 814: Technical specification for the official testing and supply of greases intended for the lubrication of railway vehicle roller-bearing axle-boxes, 2nd edition of 1.7.88*

## **2. Minutes of meetings**

### **International Union of Railways**

*Traction and Rolling Stock Committee (Question 5/A/7 - Item 2.2 - Requirements of motor bogies), May 1993*

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