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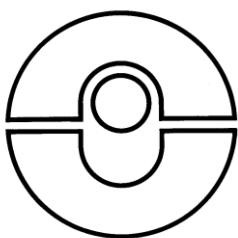
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1st edition, 1.7.94

Powered and trailing stock

Bogies - Running gear

"Tests for axle-boxes"



International Union of Railways

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Leaflet to be classified in volume:

V - Transport stock

Amendments

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Preliminary remarks:

A double vertical line (||) in the margin denotes amendments introduced on the date shown at the foot of the page.

Enforcement of this Leaflet is governed by the provisions listed under "Application" at the end of the document.

Note

This leaflet is part of a series which also includes:

- Leaflet 508-1 : Interaction between passenger rolling stock and fixed installations
- Leaflet 515 : Coaches - Running gear
- Leaflet 515-0 : Passenger rolling stock - Bogies - Running gear
- Leaflet 515-1 : Passenger rolling stock - Trailer bogies - Running gear - General provisions applicable to the components of trailer bogies
- Leaflet 515-3 : Rolling stock - Bogies - Running gear - Axle design calculation method
- Leaflet 515-4 : Passenger rolling stock - Trailer bogies - Running gear - Bogie frame structure strength tests

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1 - Introduction

Tests carried out on axle-boxes of all types of rolling stock are designed to check that they are suitable for providing the service required, i.e. that:

- the assembly formed of an axle-box body, bearings, seals and grease is well suited to the service requirements.
- the bearings are correctly and durably lubricated.
- the axle-boxes are water-tight.

This set of tests is made up of 3 stages:

- the first comprises rig tests to check the water-tightness,
- the second comprises rig tests to check the satisfactory function of the assembly during a long simulated journey,
- the third comprises monitoring of a fairly large sample of bearings over a high mileage, on vehicles in service. For obvious reasons of safety, this third stage of tests is only undertaken if satisfactory results have been obtained during the first two stages.

This series of tests must be carried out on new axle-boxes for high-speed stock ($V > 200$ km/h) or for stock whose maximum operating speed and wheel diameter produce a high speed of rotation (equivalent to that of high-speed stock with wheels of approx. 900 mm diameter: > 1200 revolutions per minute).

A new axle-box shall be understood as an axle-box that is distinct from an existing, already-tested axle-box, as a result of changes to the bearings, lubricant, or axle-box body, or a change of manufacturer for one of these parts.

In cases other than those listed above, the set of tests may be dispensed with if proof can be given that the envisaged axle-box or its component parts have already been successfully used on stock that has seen major service (mileage worked and number of boxes) under service conditions that are at least as severe as those in the application case considered (speed, load). The manufacturer must then submit a file giving proof of the satisfactory behaviour of these axle-boxes.

This set of tests, designed to obtain type approval (homologation) of an axle-box, shall only to be applied if the box is made up of elements (axle body, bearings, grease) which come from factories previously approved and which have been manufactured in accordance with a previously approved process.

These tests are time consuming and costly - it is recommended, therefore, that they should only be undertaken if the manufacturer can demonstrate by calculations or preliminary tests that the design and manufacture of the axle-box to be tested are likely to give successful results.

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If the axle-box uses a bearing and a grease already tested for the same conditions (speed, forces, etc.) placed in a different body, a simplified procedure may be applied, as indicated in chapter 5.

2 - First stage: Water-tightness tests

2.1 - Test principle

The tests consist in putting an axle-box on a test bench and subjecting it to water spray when stopped or subjected to rotational speeds corresponding to various commercial speed levels.

This axle-box, fitted with bearings and seals absolutely identical to those which are specified for the service, is placed at the end of a dummy axle that is rotated by an electric motor.

During the tests, seal performance can be checked by means of a dummy front cover permitting any water penetrating the axle-box to be collected.

2.2 - Description of test bench

The test bench, (see sketch in Appendix 1), includes principally:

- an axle, of which one end (journal) enables an axle-box to be mounted and the other end permits rotation by means of pulleys,
- a rotation mechanism which, by means of a combination of pulleys, permits simulation of commercial speeds of 30, 100, 160, 200, 300 and 350 km/h,

Note: the number of revs per minute of the test axle will be equal to:

$$N_{(\text{revs/min})} = \frac{100 \times V_{\text{max.}} (\text{km/h})}{6 \times \pi \times D_{\text{min}} (\text{m})}$$

with:

- D_{min} : wheel diameter of wear
- V_{max} : commercial speed