

3rd edition, October 2008

Translation

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Wagons - Buffers with a stroke of 130 and 150 mm

Wagons - Tampons à course de 130 et 150 mm

Güterwagen - Puffer mit 130 und 150 mm Hub



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

3 - Mechanical characteristics

3.1 - The buffer unit as a whole should be able to withstand the following loads:

- longitudinal force $F_1 \geq 2\,500$ kN exerted centrally on the buffer head;
- longitudinal force $F_2 \geq 500$ kN exerted off-centre on the buffer head;
- vertical force $F_3 \geq 200$ kN exerted on the body of the buffer;
- total longitudinal force $F_4 \geq 2\,500$ kN exerted by the supporting base plate surface of the buffer on a test frame.

The conditions under which these forces shall be applied are set out in Appendix [D - page 16](#).

Appendix [E - page 18](#) indicates the conditions under which the corresponding tests are to be conducted.

3.2 - The buffer should be mounted on the end cross member of the wagon by means of 4 bolts each with a diameter of M 24 and of a category offering an apparent yield point of at least 350 N/mm^2 .

3.3 - The strength of buffer casings and their fastenings to headstocks must be demonstrated in accordance with Appendix [I - page 23](#). It is recommended to demonstrate their strength using point [I.2 - page 24](#) in order to enable the buffers to be freely used for all applications.

Leaflet to be classified in Volume:

V - Rolling stock

Application:

With effect from 1 October 2008

All members of the International Union of Railways

Wagons buffers must comply with either:

- the prescriptions of this leaflet
- or the prescriptions of leaflets 526-1 and 526-2

Record of updates

1st edition, July 1992

First version with amendment

2nd edition, July 1998

3rd edition, October 2008

Computerization of the leaflet with consecutive additions to the publication of report B 12/RP 74.

Important: the points of 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, etc.). 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

UIC Leaflet 526-3 specifies the general conditions with which buffers with a stroke of 130 mm and 150 mm must comply. It defines the buffer categories and the governing dimensional, mechanical and elastic and dynamic characteristics.

The leaflet also defines the static, dynamic and endurance tests to be performed on buffers, buffer boxes and their headstock fastenings.

1 - General

1.1 - Wagons to be used to carry commodities vulnerable to impact may be fitted with 130 or 150 mm stroke buffers to keep the acceleration affecting the commodities as low as possible whilst complying with the minimum requirements of *UIC Leaflet 577* (see Bibliography - page 28).

These buffers may be designed for wagons with total weights of between 12 and 45 tonnes (two-axle wagons) and between 20 and 90 tonnes (4 axles) or alternatively between 12 and 90 tonnes (two and four axle wagons).

With this objective in mind, the possibilities for using buffers of hydrodynamic design have been set out in *Report B 36/RP 30* (see Bibliography - page 28).

1.2 - 130 and 150 mm stroke buffers shall bear the reference "L"; they are classified in the following table according to the weights for which they are designed¹ :

Weight range	Sub-category	
	130 mm	150 mm
12 - 90 t	L ₀	L ₀
12 - 45 t	L ₂	L ₂
20 - 90 t	L ₄	L ₄

1.3 - In service wagons fitted with L buffers should always have 4 identical buffers (spring system, stroke, sub-category) with the same design features.

1. L = Long buffer stroke

2 - Dimensions

Stroke should be:

- either 130 ± 5 mm
- or 150^{+0}_{-5} mm

130 mm stroke buffers shall always be fitted on the headstock and protrude beyond it.

150 mm stroke buffers may be slightly inset into the headstock.

The dimensions required for interchangeability and the space to be left on the headstock for the buffer support plate are shown in points [A.1](#) (buffers with a stroke of 130 mm) and [A.2 - page 10](#) (buffers with a stroke of 150 mm).

Points [B.1 - page 11](#) (buffers with a stroke of 130 mm) and [B.2 - page 12](#) (buffers with a stroke of 150 mm) show the overall envelope required for the side buffer. Appendix [C - page 13](#) explains the conditions under which this envelope was established.

Buffers should have a plunger guide to prevent the plunger from revolving freely round its longitudinal axis. The permissible rotation tolerance shall be $\pm 2^\circ$ for buffers in new condition.

The buffer plates shall have dimensions in accordance with the provisions of *UIC Leaflet 527-1* ([see Bibliography - page 28](#)).

4 - Elasticity

4.1 - Static characteristics

- Hydrodynamic spring systems (see Glossary - page 27):

Force	130 mm stroke buffers	150 mm stroke buffers
Initial	35 - 60 kN	65 - 90 kN
after 25 mm	45 - 60 kN	70 - 105 kN
after 60 mm	60 - 100 kN	100 - 140 kN
after 100 mm	140 - 250 kN	150 - 210 kN
after 125 mm	340 - 600 kN	200 - 400 kN
after 145 mm	-	420 - 880 kN

- Hydrostatic spring systems (see Glossary - page 27):

Force	130 mm stroke buffers	150 mm stroke buffers
Pre-stressed	30 - 60 kN	15 - 90 kN
after 25 mm	50 - 75 kN	60 - 130 kN
after 60 mm	170 - 220 kN	160 - 220 kN
after 100 mm	350 - 450 kN	250 - 390 kN
after 125 mm	450 - 650 kN	300 - 520 kN
after 145 mm	-	350 - 750 kN

Work stored (W_e)¹ :

- buffer with a stroke of 130 mm ≥ 13 kJ for $F \leq 600$ kN
- buffer with a stroke of 150 mm ≥ 18 kJ for $F \leq 880$ kN

Work absorbed (W_a) : $\geq 0,50 W_e$

These characteristics shall be measured on a complete buffer as it is to be fitted on the vehicle at an ambient temperature of approximately 15 °C. In addition to the centric application of force F_1 as shown in Appendix D - page 16, the characteristic curve for an off-centre application of force (similar to force F_2 in Appendix D) shall be plotted up to a force of 250 kN.

- The work stored (W_e) by a buffer for a given spring stroke is shown in the force-stroke diagram by the area between the compression curve, the x-axis and the straight line perpendicular to this axis corresponding to the particular stroke.

At this force, for an equivalent stroke, the stress level recorded must not exceed the stress produced by the centric application of the force by more than 25 % (< 12 % recommended) over the entire service life of the buffer. The decompression phase immediately following the compression phase and the maximum speed of movement of the plunger in either direction shall be between 0,01 and 0,05 m/s. Once the load has completely ceased to be applied on the buffer, the buffer should return to its initial condition.

In addition, it will be necessary to check that buffer reaction remains virtually constant over a period of 10 minutes for the following compression values, in other words when compression is re-applied, the reaction must recommence at the value recorded immediately prior to the 10 minute stopping period.

- 130 mm stroke buffer: 30, 60, 125 mm
- 150 mm stroke buffer: 30, 100, 145 mm

4.2 - Dynamic characteristics

4.2.1 - General

The dynamic characteristics shall be those obtained when a test wagon fitted with the buffers is undergoing tests impacts with another test wagon.

4.2.2 - Values of dynamic characteristics

The minimum conditions with which the buffers must comply are set out in Appendix **F** - page 19 and should be demonstrated by means of tests (see point 4.2.3 - page 7). Tests 1 to 5 in Appendix **F** are mandatory.

- Test 1 is to assess the protection afforded the load in the event of buffing impact between two wagons both fitted with group L buffers.
- Tests 2 and 3 are designed to assess the protection afforded the vehicle structure in the event of buffing impact between two wagons both fitted with group L buffers (Test 2 is for L₀ and L₂ buffers and Test 3 is for L₀ and L₄ buffers).
- Test 4 is to assess the protection afforded the load in the event of buffing impact when the wagon delivering the impact is fitted with the type of buffer under investigation and the wagon receiving the impact has group A buffers in accordance with *UIC Leaflet 526-1* (see Bibliography - page 28).
- Test 5 is to assess the protection afforded the vehicle structure in the event of buffing impact when the wagon delivering the impact is fitted with the type of buffer under investigation and the wagon receiving the impact has group A buffers in accordance with *UIC Leaflet 526-1*.

The spring element must be able to resist standard loads corresponding to a force exerted on the buffers of $\geq 2\,000$ kN without damage or interference with its normal functioning capacity.

The energy absorbed by the spring element should include at least 60 % of the absorption capacity (W_e)¹. The dynamic storage capacity shall be the value established in Test 3 (see Appendix **F**).

1. See note on page 5

4.2.3 - Test conditions

4.2.3.1 - Test wagons

Buffing tests to be carried out with the wagons must provide proof that the values set out in Appendix F - page 19 are adhered to.

In each test a wagon (buffing wagon) shall be shunted against another wagon (buffed wagon) which is standing stationary and not braked on a straight section of track.

For the buffing wagon, it is advisable to use the wagon to be fitted in service with the buffers to be tested.

For the buffed wagon a standard high-sided open bogie wagon in accordance with *UIC Leaflet 571-2* (see Bibliography - page 28) shall be used.

This wagon should therefore be in compliance with *Report B 12/RP 17, chapter 3.1* (see Bibliography - page 28) and should have partitions corresponding to drawing *M0003-0081* (see Bibliography - page 28). It should also be loaded with standard UIC ballast.

The other test wagons should be fitted out in similar fashion.

The measurement values:

- impact speed;
- force at buffer;
- buffer stroke;
- acceleration

shall be decided taking account of *Appendix 10 to Report B 12/RP 17*.

The acceleration curve $\ddot{X} = f(v)$ shall be recorded in the 8 to 12 km/h speed range and the result appended to the test documents.

The force/stroke diagrams for the buffers to be examined shall be carried out at speeds of 9 km/h and 12 km/h, or up to the maximum speed that corresponds to an individual load on the buffer of 1 500 kN (categories A and B) or 1 300 kN (category C).

The measuring signals for acceleration are to be measured for all tests in standard fashion at 32/40 Hz.

The buffing wagon shall be loaded with commodities representative of those commonly shipped in this type of wagon.