

UIC CODE

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Translation

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Wagons - Buffers with a stroke of 105 mm

Wagons - Tampons à course de 105 mm

Güterwagen - Puffer mit 105 mm Hub



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Important: the points in this leaflet have been renumbered in the new edition. The first digit of each point has been increased by 1 (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 526-1 specifies the general conditions with which buffers with a stroke of 105 mm must comply. It defines the buffer categories and the governing dimensional, mechanical and elastic characteristics.

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

o 1 - General

1.1 - All wagons built from 1 January 1985 must be fitted with 105 mm stroke buffers as defined in the present leaflet.

Nota : In the case of wagons built before 1 January 1985, use of these buffers is recommended.

Wagon buffers must comply with either:

- the provisions in this leaflet, or
- the provisions in UIC Leaflets 526-2 et 526-3 (see Bibliography - page 28).

1.2 - The different 105 mm stroke buffers are classified according to their performance.

Buffer category	Energy storage capacity (dynamic)
A	≥ 30 kJ
B	≥ 50 kJ
C	≥ 70 kJ

The energy storage capacity is defined in Appendix G - page 19.

1.3 - In service, wagons must always have two identical buffers at each end.

o 2 - Dimensional characteristics common to all categories

- The stroke must be 105^{+0}_{-5} mm.
- Interchangeability dimensions, together with the space to be reserved on the headstock for the base plate, are defined in Appendix A - page 11.
- Appendix B - page 12 shows the envelope for overall dimensions of the side buffer¹. Appendix C - page 13 contains notes on the conditions governing determination of this envelope.
- Buffers of wagons to be built must be fitted with a guiding device for the plunger which prevents the latter from revolving freely around its longitudinal axis. The permitted tolerance for rotation is $\pm 2^\circ$ for buffers when new.
- Buffer-head widths shall be calculated in accordance with the provisions contained in UIC Leaflet 527-1 (see Bibliography - page 28).

1. This envelope shall apply to each of the two side buffers on the same end of a wagon.

o 3 - Mechanical characteristics common to all categories

3.1 - The entire buffer unit fitted to the wagon shall be capable of withstanding the following loads:

- longitudinal force (centred) $F1 \geq 2\,500\text{ kN}$, exerted on the buffer head;
- longitudinal force (off-centre) $F2 \geq 500\text{ kN}$, exerted on the buffer head;
- vertical force $F3 \geq 200\text{ kN}$, exerted on the body of the buffer;
- total longitudinal force $F4 \geq 2\,500\text{ kN}$, exerted by the base plate of the buffer on a test frame.

Conditions governing the application of these forces are set out in Appendix **D - page 16**.

The corresponding test methods are contained in Appendix **E - page 17**.

3.2 - The buffer must be fixed to the wagon headstock by means of 4 M 24 $\varnothing$ fasteners of a quality class which provides a conventional yield strength 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 **J - page 24**. It is recommended to demonstrate their strength using point **J.2 - page 25** in order to enable the buffers to be freely used for all applications.

4 - Elastic characteristics

o 4.1 - Static characteristics

The following static characteristics shall be common to all categories of 105 mm stroke buffers:

- initial force: between 10 and 50 kN
- force following a 25 mm stroke: between 30 and 130 kN
- force following a 60 mm stroke: between 100 and 400 kN
- force following a 100 mm stroke: between 350 and 1 000 kN
- stored energy (W_e) for an effort not exceeding 1 000 kN: $\geq 12\,500\text{ J}$
- absorbed energy (W_a) corresponding to the preceding stored energy: $\geq 0,5\, W_e$

These characteristics shall be measured on a complete buffer, in the state in which it will be fitted to the wagon, at an ambient temperature of approximately 15 °C. In addition to the centric application of force F1 as shown in Appendix D - page 16, the characteristic curve for an off-centre application of force (similar to force F2 in Appendix D) shall be plotted up to a force of 250 kN. 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 compression phase shall be followed immediately by the decompression phase, and the maximum displacement speed of the plunger in both directions must be comprised between 0,01 and 0,05 m/s. Lower speed values shall also be permitted whenever use is made of elastic systems whose characteristics do not depend on the compression speed. When fully released, the buffer must be found to be in the same condition as initially.

In the case of hydro-pneumatic buffers, checks must be made to ensure that the buffer reaction remains virtually constant for 10 minutes with compression values of 30, 60 and 100 mm respectively.

4.2 - Dynamic characteristics

o 4.2.1 - General

Dynamic characteristics are those obtained when a test wagon fitted with the buffers to be tested is impacted by another test wagon.

The values imposed are designed to ensure adequate protection of the wagon structure and the goods carried against buffing impact, particularly in marshalling yards.

The dynamic tests covered by points 4.2.2 et 4.2.5 - page 9, are certification tests and not acceptance tests as part of the quality control process. Railways undertakings (RUs) shall however be free to repeat these tests at their discretion.

4.2.2 - Dynamic tests

4.2.2.1 - Test wagons shall be exclusively of one of the two following types:

- standard high-sided open bogie wagon (*UIC Leaflet 571-2* - see Bibliography - [page 28](#));
- standard high-sided open 2-axle wagon (*UIC Leaflet 571-1* - see Bibliography - [page 28](#)).

At least one of the 4-axle standard high-sided open wagons as per *UIC Leaflet 571-2*, and used as a test wagon should correspond to the buffing wagon as per *ERRI Report B 12/RP 17, Chapter 3.1* (see [Bibliography - page 28](#)). It should be fitted with partitions and reinforced as shown in *ERRI drawings M0003-081* (see [Bibliography - page 28](#)) and loaded with standard UIC ballast.

All the other test wagons should be equipped likewise.

The measuring values:

- impact speed,
- buffer load,
- buffer travel,
- acceleration,

must be determined by reference to *Appendix 10 of ERRI Report B 12/RP 17*.

The acceleration curve $\ddot{X} = f(v)$ should be achieved in the 8 to 12 km/h speed range, and should be incorporated into the test documents.

The load/travel 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 should be filtered for all tests at a standard frequency of 32/40 Hz.

4.2.2.2 - For each test, a test wagon at a standstill with brakes off, shall be subjected to impact from another test wagon on a straight, level track.

[Appendix F - page 18](#) contains definitions of the appropriate dynamic tests for each buffer category, setting out the wagon type, weight on rails and buffer type for each test wagon used.

4.2.2.3 - Test series no. 1 (see [Appendix F](#)), designed to assess protection of the load, is obligatory.

Test series no. 2 (if stipulated in [Appendix F](#)) and no. 3, designed to assess protection of the wagon structure, are also obligatory.

4.2.2.4 - Test series nos. 4 and 5, designed to check that the buffers undergoing testing are compatible with existing category A buffers, are recommended in cases where the buffers being tested are equipped with a new type of resilient system.

4.2.3 - Values for dynamic characteristics

4.2.3.1 - Category A

O 4.2.3.1.1 - The following characteristics must be obtained when the tests referred to in point 4.2.2.3 - page 6 are conducted:

- Test no. 1
With a buffing speed of 7 km/h, no acceleration exceeding 4,0 g must occur.
With a buffing speed of 9 km/h, no acceleration exceeding 6,0 g must occur.
- Test no. 2
With a maximum end-of-stroke force of 1 000 kN and a buffing speed of 12 km/h or over the stored energy W_e must be at least 25 kJ and the absorbed energy W_a must equal at least 0,6 W_e .
- Test no. 3
With a maximum end-of-stroke force of 1 500 kN, the stored energy W_e must be at least 30 kJ and the absorbed energy W_a must equal at least 0,6 W_e .
With a buffing speed of 9 km/h, the buffer load must not exceed 1 000 kN.

4.2.3.1.2 - During the tests referred to in point 4.2.2.4 - page 6, the following characteristics shall be checked:

- Test no. 4
With a buffing speed of 7 km/h, no acceleration exceeding 4,0 g must occur.
With a buffing speed of 9 km/h, no acceleration exceeding 6,0 g must occur.
- Test no. 5
For a maximum end-of-stroke force of 1 500 kN, stored energy W_e must be 30 kJ minimum and the absorbed energy W_a at least 0,6 W_e .
With a buffing speed of 9 km/h, the buffer load must not exceed 1 000 kN.

4.2.3.2 - Category B

O 4.2.3.2.1 - During the tests mentioned in point 4.2.2.3, the following characteristics must be obtained:

- Test no. 1
With a buffing speed of 7 km/h, no acceleration exceeding 4,0 g must occur.
With a buffing speed of 9 km/h, no acceleration exceeding 5,0 g must occur.
- Test no. 3
With a maximum end-of-stroke force of 1 500 kN, the stored energy W_e must be 50 kJ minimum and the absorbed energy W_a at least 0,6 W_e .
With a buffing speed of 10 km/h, the buffer load must not exceed 1 000 kN.

4.2.3.2.2 - However, for test no. 3, it is recommended that the end-of-stroke force should not exceed 1 300 kN.