

1st edition, May 2004

Translation

O R

Wagons. Operation between 1 435 mm gauge and 1 520 mm gauge networks. Technical provisions and approval conditions

Wagons. Circulation entre des réseaux à écartement de 1 435 mm et des réseaux à écartement de 1 520 mm. Prescriptions techniques et conditions d'homologation

Güterwagen. Verkehr zwischen Bahnen der Spurweite 1 435 mm und Bahnen der Spurweite 1 520 mm. Technische Vorschriften und Zulassungsbedingungen



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

Reference of the corresponding OSJD leaflet:

OSJD Leaflet 516

Application:

With effect from 1 January 1999

All members of the International Union of Railways and the Organisation for the Collaboration between Railways

Leaflet published jointly by UIC and OSJD.

This leaflet was completed by the UIC/OSJD Joint Group on 10.9.1998 and approved by the C5 Rolling Stock Committee on 15.12.1998

Record of updates

1st edition, May 2004

First issue.

In the corresponding OSJD Leaflet 516, the appendices are indicated using numbers instead of letters.

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

Contents

Summary	1
1 - Provisions applicable to all wagons	2
2 - Approval conditions	15
Appendix A - Loading gauges	17
Appendix B - Gravity hump profile.....	20
Appendix C - List of train ferry lines	21
Appendix D - Securing rings for use on train ferries	22
Appendix E - Rapid connecting device for pulling rods	23
Appendix F - Buffing and drawgear.....	24
Appendix G - Cable hook	25
Appendix H - Position of spark arrestors	26
Appendix I - Marking for wagons equipped with automatic couplers.....	27
Appendix J - Customs authorisation plate for wagons worked on 1 520 mm gauge railways	28
Appendix K - Markings to indicate the bogie overhaul dates on interchangeable bogies for the 1 435 mm gauge	29
Appendix L - Markings for wagons equipped with gauge-adjustable axles for 1 435 mm and 1 520 mm gauges	30
Appendix M - Markings for bogies equipped with gauge-adjustable axles.....	31
Appendix N - Mechanical strength conditions for wagons.....	32
List of abbreviations	35
Bibliography	36

Summary

The technical provisions and technical approval conditions set out in this leaflet apply to new wagons that are to be operated in traffic without transshipment between railways with a track gauge of 1 435 mm and railways with a track gauge of 1 520 mm. These wagons must be built in accordance with the regulations of UIC and OSJD leaflets and the standards of the 1 520 mm gauge railways.

The provisions in this leaflet shall apply to new wagons to be used in this type of traffic with effect from 1.1.1999.

Matters relating to the approval and operating conditions of wagons the design of which does not conform to the provisions of this leaflet but which are built to comply with only the regulations of UIC and OSJD leaflets for the 1 435 mm gauge or only the standards of railways with a 1 520 mm gauge shall be handled on the basis of bi- or multilateral contracts between the railway undertakings (RU) concerned.

1 - Provisions applicable to all wagons

o 1.1 - Strength conditions

The conditions governing the strength of wagons, wagon assemblies and component parts shall conform to the regulations of "1 520 mm gauge railway standards" and to UIC leaflets for the 1 435 mm track gauge. In this connection, the more stringent requirements shall take precedence.

R 1.2 - Exchangeable and unified parts

Wagons should be fitted wherever possible with exchangeable, unified parts. For manufacturers and customers from countries with a 1 435 mm gauge, these must conform to the provisions of UIC leaflets and be marked in accordance with *UIC Leaflet 583*. For manufacturers and customers from countries with a 1 520 mm gauge, they shall conform to 1 520 mm gauge standards.

When a specific case arises, a list of standard components and assemblies for 1 520 mm gauge parts shall be drawn up.

o 1.3 - Bogie wagons

Wagons shall be designed as bogie wagons.

The following options are possible for effecting the transition from a 1 435 mm gauge track to a 1 520 mm gauge track:

- changing the wheelsets,
- changing the bogies,
- using gauge-adjustable wheelsets.

o 1.4 - Climatic zones - Temperature ranges

Wagons that are to be used on the 1 520 mm gauge network shall be designed for working temperatures of between + 45°C and - 50°C.

Individual wagon components (main load bearing parts of the underframe and the body, coupling components, wheelsets, braking parts, rubber elements, etc.) must be suitable for a temperature range of + 55°C to - 55°C.

Wagons, assemblies and parts that are to be used on the European part of the 1 520 mm gauge network only (with the exception of the territory of the October and Northern Railway to the cities of Archangelsk, Murmansk and Vorkuta and the Sverlovsk Railway to the city of Perm) must be designed for a working temperature range of + 40°C to - 40°C.

o 1.5 - Maximum speed

Wagons shall be so designed that they can run at a maximum operating speed of at least 120 km/h when either empty or loaded.

○ 1.6 - Vehicle loading gauge

1.6.1 - The loading gauge shall be calculated in accordance with the provisions of the joint UIC/OSJD (see [List of abbreviations - page 35](#)) leaflet.

Until such time as the joint UIC/OSJD leaflet comes into force, the following rules shall apply:

- The loading gauge shall be calculated in accordance with the provisions of *UIC Leaflet 505-1*.
- For wagons that are to be used freely in international traffic, the loading gauge shown in point [A.1 - page 17](#) shall apply (equivalent to *UIC Leaflet 505-1, point 5.1, Fig. 6* and/or *OSJD Leaflet OR 500*).
- For wagons with bodies, the loading gauge shown in point [A.2 - page 18](#) may be used subject to bi- or multilateral agreement (equivalent to *UIC Leaflet 505-1, Appendix D, Fig. 2* and/or *OSJD Leaflet OR 500*).
- For the lower parts of the wagon, the loading gauge shown in point [A.3 - page 19](#) shall apply (equivalent to *UIC Leaflet 505-1, point 5.3, Fig. 8* and/or *OSJD Leaflet OR 500*).

1.6.2 - Wagons with gauge-adjustable wheelsets must be able to run on straight track through the corresponding gauge-changeover installations with broken suspension and in a worn state.

○ 1.7 - Negotiation of curves, shunting humps and ferry ramps - coupling and uncoupling

1.7.1 - Individual wagons must be able to negotiate curves with a radius of 60 m when empty and loaded.

1.7.2 - On lines with a 1 435 mm track gauge, wagons of all types must be able to negotiate the following track configurations when they are part of a train, empty or loaded:

- S-curves with a radius of 190 m and no intermediate straight section,
- S-curves with a radius of 150 m and a 6 m intermediate straight section,
- S-curves with a radius of 120 m and a 20 m intermediate straight section.

1.7.3 - On lines with a 1 520 mm track gauge, wagons must be able to negotiate the following track configurations when part of a train, empty or loaded:

- transition from straight track to a curve of radius 80 m without transition radius,
- S-curves with a radius of 120 m and no intermediate straight section.

1.7.4 - On lines with a 1 520 mm track gauge, long wagons (bogie centre distance > 16 m, length over couplings > 21 m) must be able to negotiate the following track configurations when part of a train, empty or loaded:

- transition from straight track to a curve of radius 110 m without transition radius,
- S-curves with a radius of 160 m and no intermediate straight section.

1.7.5 - When coupled together, vehicles must be able to negotiate shunting humps with a profile as per *UIC Leaflet 522* and Appendix B - page 20 without the risk of becoming uncoupled.

1.7.6 - Couplings must be designed and fitted in such a way that coupled vehicles are able to negotiate ferry ramps at an angle of 2°30' and a maximum twist of 5° over a length of 24 m without difficulty.

1.7.7 - Wagons fitted with automatic couplers must be able to be coupled when empty or loaded under the following conditions:

- without manual assistance:
 - on straight track,
 - on a transition from straight track to curve of radius 135 m without transition radius,
 - on curves of radius 150 m;
- with manual assistance:
 - in S-curves with a radius of 190 m and no intermediate straight section,
 - in S-curves with a radius of 150 m and a 6 m intermediate straight section.

1.7.8 - Long wagons (bogie centre distance > 16 m, length over couplers > 21 m) that are fitted with automatic couplers must be able to be coupled when empty or loaded under the following conditions:

- without manual assistance:
 - on straight track,
 - on a transition from straight track to curve of radius 135 m without transition radius,
 - on curves of radius 150 m;
- with manual assistance:
 - in S-curves with a radius of 190 m and no intermediate straight section,
 - in S-curves with a radius of 150 m and a 6 m intermediate straight section.

o 1.8 - Conditions for conveyance on train ferries

1.8.1 - Wagons must be suitable for conveyance on train ferries with the track gauge specific to such craft. Wagons that are to be handed over without special agreements must be able to negotiate the curves and ramp angles specified for the ferry in question (Appendix C - page 21 and/or *UIC Leaflet 507*).

1.8.2 - For the purposes of securing wagons on train ferries, each side of the wagon must be fitted with at least 4 securing rings. The rings at either end must be located no more than 2 000 mm away from the headstock. Rings should be arranged at equal intervals wherever possible.

The design of each securing ring must conform to the drawing in Appendix D - page 22. Failing this, rings must have at least the same inner diameter, a cross-section that is subject to no more than the equivalent stress and the same arrangement on the underframe.

Rings should be painted yellow to make them easily visible.

1.9 - Bogies

- **1.9.1** - The theoretical axleload shall be at least 22,5 tonnes.
- **1.9.2** - The wheelbase of 2-axle bogies may range from 1 800 to 2 400 mm.
- **1.9.3** - The actual design of the bogie shall depend on the way the transition from one track gauge to the other is effected:
 - on wagons where the wheelsets are interchanged, the design must be able to accommodate the use of wheelsets with a distance between axlebox centres of 2 036 mm;
 - on wagons where the bogies are interchanged, standard wheelsets for the 1 435 and 1 520 mm track gauges shall be used;
 - on wagons with automatic gauge changeover facility, bogies with gauge-adjustable wheelsets shall be used.
- **1.9.4** - On wagons where the wheelsets or bogies are interchanged, the wheelsets used must conform to the provisions of UIC leaflets or to the standards for the 1 520 mm track gauge.
 On wagons with automatic gauge changeover equipment, the gauge-adjustable wheelsets used must conform to the provisions of UIC leaflets and to the standards for the 1 520 mm track gauge.
- **1.9.5** - The electrical resistance of the wheelset must allow track circuits to function reliably. The provisions of *UIC Leaflet 512* and the standards for the 1 520 mm track gauge shall be observed.
- **1.9.6** - Axleboxes must be of the roller bearing design and shall meet the requirements of *UIC Leaflet 515-5* and the standards for the 1 520 mm track gauge.
- **1.9.7** - It must be possible to read the temperature of the axleboxes using fixed hot axlebox detection equipment while the train is moving.
- **1.9.8** - Bogies that cross from one track gauge to another by interchange of wheelsets or automatic gauge changeover must meet the strength conditions set out in *UIC Leaflet 510-3* and the standards for the 1 520 mm track gauge.
 On wagons where the bogies are interchanged, the strength of the bogie frame for the 1 435 mm track gauge must meet at least the conditions of *UIC Leaflet 510-3* and the bogie for the 1 520 mm track gauge the requirements of the standards for 1 520 mm track gauge railways.
- R **1.9.9** - To prevent derailments on twisted track, the wheelset should have a two-stage suspension such that the static spring deflection on an empty wagon is approximately 35% to 40% that of a loaded wagon.
- R **1.9.10** - To attenuate vertical and horizontal vibrations, oscillation dampers with force-proportional damping should be used.
- **1.9.11** - The exchangeability of wagon bogies with 1 435 mm and 1 520 mm track gauge shall be guaranteed by the bogie design. The use of additional adapters or special bogies that are kept in readiness at border stations is permissible. In this case, the provisions of the UIC leaflets and the documentation of 1 520 mm gauge railways must be observed.

- R 1.9.12** - The connection between components in the bogie or between bogie and vehicle body may be designed in such a way that the wagon can be lifted together with the bogie.
- R 1.9.13** - To facilitate bogie interchange, the unlocking of the bogie pivots and the pulling rods needs to be simplified. The rapid coupling mechanism shown in Appendix E - page 23 is recommended for the pulling rods.
- O 1.9.14** - For wagons with wheelset interchange or gauge-adjustable wheelsets, the brake block arrangement in the bogie must be such that the blocks can be adjusted to the respective track gauge either manually or automatically. Any unintentional axial displacement of the brake blocks must be prevented and they must be firmly fixed in their final position.
- O 1.9.15** - The bogies must have a safety device to prevent bogie parts falling onto the track.
- 1.9.16** - Inspection, wear and overhaul of bogies
 - O 1.9.16.1** - Bogies must be designed and their assemblies and component parts so arranged as to allow for simple inspection and overhaul.
 - R 1.9.16.2** - It is recommended that parts subject to natural wear be manufactured from wear-resistant materials.
- R 1.9.17** - Bogies should satisfy the indices for reliability and ease of repair set out in the standards for 1 435 and 1 520 mm track gauges.
- O 1.9.18** - Bogies must satisfy the tests set out in the UIC leaflets and the standards for 1 520 mm gauge railways.
- O 1.9.19** - On completion of the tests, regulations must be drawn up for bogie overhaul and maintenance during operation.

1.10 - Buffing and drawgear

O 1.10.1 - Wagon fitment

Wagons shall be fitted with one of the following buffing and drawgear variants:

1.10.1.1 - Configuration A

Wagons are fitted with an automatic coupler at each end.

It is acceptable for the automatic couplers to be exchanged for conventional buffing and drawgear (screw coupler and side buffers) as per the UIC/OSJD Code (or vice versa) when the wagon makes the transition from a 1 520 mm gauge railway to a 1 435 mm gauge railway (or vice versa).

1.10.1.2 - Configuration B

Wagons are fitted with an automatic coupler at each end, with side buffers as per *UIC Leaflet 526-1* and with a hybrid draw coupler.

An SA-3/SK hybrid coupler combining the characteristics of the automatic coupler described in point 1.10.3 - page 7 with the possibility of connecting up to the screw coupler under the conditions set out in point 1.10.4 - page 8 is permitted.

In the event of damage, it must be possible to replace this SA-3/SK hybrid coupler on the gauge-adjustable wagon with a standard SA-3 coupler with a length of 1 000 mm to 1 010 mm from the end surface of the coupling arm to the coupling centre.

1.10.1.3 - Configuration C

Wagons are fitted at either end with an automatic coupler and side buffers (as per *UIC Leaflet 526-1*) with two positions on the headstock (short position = buffer retracted, long position = buffer extended). The buffers are fastened to additional fittings that are welded onto the headstock (Appendix F - page 24).

Wagons are fitted with spring devices that satisfy both the provisions of *UIC Leaflet 520* (parameters) and the requirements of 1 520 mm gauge railways.

When the buffers are in the retracted (short) position, the buffer heads on wagons coupled with the automatic coupler must not come into contact with one another under any operating conditions.

With the buffers extended (long position - 620 mm), it must be possible to use wagons coupled with the hybrid draw coupler (AMT) (see List of abbreviations - page 35) or the screw coupler.

The spring device must also accommodate the fitting of the SA3/SK hybrid coupler and the UIC screw coupler with a wedge connection.

1.10.2 - Fitting of the buffing and drawgear

○ 1.10.2.1 - The height of the coupler centreline above rail level when stationary shall be:

- between 1 040 and 1 060 mm for a new, empty wagon.

The height of the side buffer centreline above rail level when stationary shall be:

- maximum 1 065 mm for a new, empty wagon,
- at least 950 mm for a fully-laden wagon at the wear limit.

1.10.2.2 - The automatic coupler that is fitted to wagons under configuration B, including the spring device, must be able to work with side buffers.

The coupling centre of the automatic coupler must lie in front of the buffer head end surfaces. Depending on the longitudinal dimensions of the wagon, the coupling conditions and the bracing forces that arise, a dimension of 25 to 60 mm is recommended between the coupling centre and the buffer plane.

○ 1.10.3 - Requirements to be met by the automatic coupler

1.10.3.1 - General requirements

The automatic coupler to be used shall be a type SA-3 in semi-rigid configuration.

The basis for the requirements to be met by the automatic coupler shall be formed by the standards for the 1 520 mm track gauge.

Automatic couplers and spring devices on wagons must conform to the current state of the art of the 1 520 mm gauge railways and be approved by them.

Derogations from these requirements must be agreed between the RUs involved.

The free space stipulated in *UIC Leaflet 521* to be left for the person coupling the wagon (Bern rectangle) must be observed if possible.

It must be possible to discharge goods from open wagons fitted with the automatic coupler on wagon tipping installations.

1.10.3.2 - Automatic coupler unlocking device

The unlocking device must be arranged in such a way that the shunter can step on and off the end step safely whatever the position of the unlocking handle, even when the vehicle is moving.

The automatic coupler unlocking device must be designed such that the unlocking operation is possible without having to enter the space between two wagons.

1.10.3.3 - Additional requirements for dangerous goods consignments

Tank wagons for dangerous goods consignments must be fitted with spring devices with a high absorption capacity:

- dynamic absorption capacity: at least 130 kJ.
- ultimate end compression force under quasi-static load: at least 1 000 kN.

1.10.4 - Requirements to be met by the hybrid coupler

1.10.4.1 - The hybrid coupler is used on 1 435 mm gauge railways to couple wagons of configurations B (see point 1.10.1.2 - page 6) and C (see point 1.10.1.3 - page 7) with vehicles that are fitted with screw couplers and side buffers.

1.10.4.2 - The following requirements shall be met by the hybrid coupler:

- the hybrid coupler shall transmit tensile forces only. Compression forces shall be absorbed by the side buffers;
- the hybrid coupler must not restrict the free formation of trains and sets of wagons on 1 520 mm gauge railways;
- the hybrid coupler must not prevent two vehicles with the same coupling systems (e.g. UIC/OSJD designs, designs of the SA-3 coupler) from being coupled together;
- it must be possible for one person to carry out safely all the operations necessary for the hybrid coupler. The time necessary to do this should be no greater than for the current screw coupler system;
- the free space stipulated in *UIC Leaflet 521* to be left for the person coupling the wagon (Bern rectangle) must be observed if possible. Limited encroachment of this space may be authorised after testing;

- the hybrid coupler must have a simple, lightweight design;
- when coupled or after uncoupling, the hybrid coupler must not assume a position that makes it liable to be damaged or cause damage to other vehicles and their parts, even when the buffers are fully compressed;
- it must be possible for vehicles fitted with the hybrid coupler to be coupled and uncoupled and negotiate curves, shunting humps and ferry ramps under the same conditions as for the screw coupler (e.g. it must be possible to separate them on the shunting hump);
- the hybrid coupler must not release unintentionally (including during shunting impacts);
- the hybrid coupler must allow for vehicles to be short-coupled with buffer heads close for train operations and long-coupled for safe negotiation of tight curves and in preparation for the separation of vehicles;
- the breaking strength of the hybrid coupler must be at least 1000 kN, except at the specially-designed breaking point. A breaking point of this kind must be provided, with a breaking strength of 850 kN;
- the hybrid coupler must not have an adverse influence on vehicle running or lead to damage to the vehicle, the track or the load;
- it must be possible to fold down the end boards of flat wagons without affecting the functioning of the buffing and drawgear.

1.10.4.3 - In its non-active position, the hybrid coupler must not complicate the technical wagon preparation and overhaul processes normally practised by the 1 520 mm gauge railways, nor prevent the use of the necessary equipment and installations.

o **1.11 - Brake equipment**

1.11.1 - General requirements

The wagon's brake equipment must meet the technical braking requirements of both the 1 520 mm gauge and the 1 435 mm gauge railways. Switching over the brake equipment in the gauge changeover station must take minimum time and effort and handling operations on the non-active braking system must not trigger unwanted reactions.

1.11.2 - Climatic zones - Temperature ranges

The brake equipment must be able to function safely within a temperature range of + 55°C to - 55°C, if the components in question are used in the 1 520 mm gauge zone.

In the European zone, on the 1 520 mm gauge railways (except for the territory of the October and Northern Railway to the cities of Archangelsk, Murmansk and Vorvuta and the Sverdlovsk Railway to the city of Perm) all components must be able to function safely within a temperature range of + 40°C to - 40°C, but must be able to withstand temperatures ranging from + 45°C to - 50°C in their non-active state.

1.11.3 - Compressed air systems

1.11.3.1 - Distributors

The braking system can be configured in two ways:

- | | |
|----------|--|
| Option 1 | Fit 2 distributors with a changeover device |
| | - for the 1 435 mm gauge: distributor as per <i>UIC Leaflet 540</i> |
| | - for the 1 520 mm gauge: type 483 distributor |
| Option 2 | Fit a standard distributor or an approved KE/483 distributor combination on the wagon that meets the technical braking requirements of both 1 435 mm and 1 520 mm gauge railways, with a changeover device allowing the system to switch to the respective operating regime. |

Under option 1, the wagon's brake equipment must include "brake on/off" and "freight/passenger" changeover devices as well as an "empty/loaded" device if there is no automatic load-proportional braking facility as per *UIC Leaflet 541-1* and a "brake on/off" and "empty - partly loaded - loaded" device as per the standards for the 1 520 mm gauge and the "Technical Requirements for the Brake Equipment of Wagons built in RF Workshops".

Each distributor must have its own release valve with a pull chord with handles on both sides of the wagon.

For braking option 2, a distributor should preferably be used in combination with an automatic load-proportional braking system. When the braking position is switched over manually in accordance with the load, there must be at least two graduated positions for the braking force.

1.11.3.2 - Load-proportional braking, brake power and brake performance

The wagon's brakes must ensure that the prescribed values for the braked weight and the theoretical brake force coefficients are guaranteed for operation on both 1 435 mm and 1 520 mm gauges at the respective maximum speeds.

For operation on the 1 435 mm gauge, wagons shall be fitted with either a hand-operated load-changeover device or an automatic load-proportional braking system meeting the requirements of *UIC Leaflet 543*.

For operation on the 1 520 mm gauge, wagons shall be fitted with either an automatic load-proportional braking system or a hand-operated load-changeover device with at least two positions. Use of the automatic system and its configuration for the 1 520 mm track gauge shall give due consideration to the bogie design used and the type of transition from one gauge to the other.

Brake performance shall be calculated on the basis of the "Standard Braking Calculation for Freight and Refrigerator Wagons". Here, the theoretical coefficient calculated for the wagon brake block force when the brake system is switched on to the 1 520 mm gauge shall satisfy the following values:

- for K (composite) brake blocks: at least 0,14 up to a maximum of 0,31 for a fully-laden wagon and at least 0,22 up to a maximum of 0,37 for an empty wagon;
- for GG (cast-iron) brake blocks: at least 0,36 up to a maximum of 0,70 for a fully-laden wagon and at least 0,62 up to a maximum of 0,81 for an empty wagon.

The different wagon braking forces specified in the standards for operation on 1 435 mm and 1 520 mm track gauges can be accommodated by an appropriate adjustment to the brake rigging or the brake cylinder.

1.11.3.3 - Changeover device for switching from 1 435 to 1 520 mm track gauges

The changeover from one distributor system to another shall take place during the gauge changeover operation using the 1 435 mm/1 520 mm changeover device. Actuation of this device must require minimum effort and must lock reliably into its final position. The final position selected must correspond to one braking system only and must render the second braking system non-operational. When one braking system fails, the other must remain operational, assuming the wagon has two separate distributors.

The switch from one braking system to another may only be effected in the gauge changeover station either manually (by means of a special device) or automatically.

The braking system selected must be clearly indicated, even when the changeover takes place automatically.

NB : where the changeover takes place automatically, an automatic load-proportional braking system should preferably be used.

1.11.4 - Air pipes

1.11.4.1 - Main brake pipe

Wagons shall be fitted with a standard 5/4" main brake pipe. There shall be a stop cock and an air connector at each end of the wagon. This arrangement must conform to *UIC Leaflet 541-1*. On wagon ends featuring an automatic coupler and side buffers, a forked main brake pipe is necessary.

The brake connector cocks for wagons in configuration A shall be placed at an angle of 60° to the vertical plane running through the longitudinal centreline of the connector cock and fixed in position.

Air stop cocks shall be painted red.

1.11.4.2 - Main air supply pipe

Wagons fitted with an additional air pipe, e.g. for pneumatic discharge, shall have symmetrically arranged brake coupler heads as specified in *UIC Leaflet 541-1* for this main air supply pipe. These must be designed to prevent the main brake pipe and air supply pipe hoses being mistakenly connected. The main air supply pipe shall have no connection to the vehicle's main brake pipe.

1.11.5 - Screw brake

1.11.5.1 - Depending on their conditions of use, wagons shall be fitted with a screw brake functioning independently of the design of the operational air brake system. The screw brake shall meet the requirements of *UIC Leaflet 535-3 and 543* and the standards of the 1 520 mm gauge. It must be able to hold the wagon when loaded on a downhill gradient of at least 30‰.

1.11.5.2 - It must be possible to operate the air and screw brakes independently of one another. Wagon units must meet the same conditions as individual wagons.

1.11.6 - Brake rigging adjustment

The braking system must automatically adjust the clearances between brake blocks and wheels as wear takes place.

o 1.12 - Lifting points

1.12.1 - Points shall be provided near the main pivot beams of the wagon underframe for lifting the wagon when empty or loaded. The wagon must be designed so that when empty it can be lifted diagonally by the ends of the main pivot beams.

1.12.2 - To re-rail the wagon when empty or loaded, two lifting points must be provided on each headstock close to the buffer fastening plane, as shown in *UIC Leaflet 581*.

o 1.13 - Steps, handrails and connecting gangways

1.13.1 - Wagons must be fitted with steps and handrails as specified in *UIC Leaflet 535-2* and/or *OSJD Leaflet 535*. The steps and handrails for shunters at the wagon ends shall be arranged in accordance with these leaflets. The surface of the steps shall be made of an antislip metallic grating as specified in *UIC Leaflet 535-2* and/or *OSJD Leaflet 535*.

In addition to this, a shunting step and handrail shall be fitted on each side of the wagon on the right-hand diagonal, as specified in the standards of the 1 520 mm gauge railways.

1.13.2 - It must not be possible for the screws and nuts used to fasten the handrails, steps and other fittings to come loose of their own accord.

1.13.3 - Wagons that are fitted with connecting gangways in keeping with the operational requirements of 1 435 mm gauge railways shall conform to the provisions of *UIC Leaflet 535-3*.

o 1.14 - Signal brackets

Wagons must be fitted with signal brackets on both ends in the positions specified in *UIC Leaflet 532*.

o 1.15 - Cable hooks

Wagons must be fitted with cable hooks for marshalling using cables and winches as per Appendix **G - page 25**. The cable hooks shall be located as shown in *UIC Leaflet 535-2* and/or *OSJD Leaflet 535*.

Each cable hook and its fastening to the underframe must be able to withstand a tensile force of 100 kN at an angle of 30° outwards from the track centreline.

o 1.16 - Spark arrestor plates

Wagons that have tread brakes and floors made from combustible material shall be fitted with spark arrestor plates. This requirement also applies to flat wagons without a floor or with a floor that is discontinued in the region of the brake blocks, except for wagons that are exclusively intended for the conveyance of iron and steel products.

The dimensions of the spark arrestor plates shall conform to Appendix **H - page 26**. Spark arrestor plates shall be located as specified in *UIC Leaflet 543*.

o 1.17 - Protective earthing of metal vehicle parts

The wagon design must prevent the formation of static electricity and must conduct electricity in the event of overhead lines coming down on electrified track sections. The provisions of *UIC Leaflet 533* shall be observed for the protective earthing of metal wagon parts.

o 1.18 - Markings and inscriptions

1.18.1 - Wagons shall carry the markings and inscriptions specified in *the RIV § 34, the PPW Appendix 5, Section 12, the RID and the SMGS* (see [List of abbreviations - page 35](#)).

The load limits for wagons shall be calculated for the 1 435 mm track gauge as per *UIC Leaflet 700* based on the tare of a new wagon with its equipment.

1.18.2 - Wagons shall carry the special marking [E] in white on a black background, at the right end of each side of the vehicle. (The [E] marking indicates that the wagon is suitable for operating between RUs with 1 435 mm and 1 520 mm track gauges).

1.18.3 - Wagons that are fitted with automatic couplers on 1 435 mm gauge lines shall carry an additional marking as shown in [Appendix I - page 27](#).

1.18.4 - A customs authorisation plate as shown in [Appendix J - page 28](#) shall be affixed to the wagon in a clearly visible position.

1.18.5 - An overhaul plate as shown in [Appendix K - page 29](#) shall be affixed to the gauge-adjustable bogies for the 1 435 mm track gauge.

1.18.6 - Wagons with automatic gauge-adjustable wheelsets for passing from one gauge to another shall be marked as shown in [Appendix L - page 30](#) (see also point [1.18.2 - page 13](#)). Each side of each bogie of these wagons shall receive an additional marking ([Appendix M, Fig. 17 - page 31](#), as per *UIC Leaflet 510-4* for wagons registered on 1 435 mm gauge railways and [Fig. 18 - page 31](#), as per *PPW* for wagons registered on 1 520 mm gauge railways).

o 1.19 - Proof of strength and testing

1.19.1 - The requirements of the standards for 1 435 mm and 1 520 mm gauge railways shall be taken into account when wagons are being designed and tested.

Proof of strength must be provided through calculations and testing. Parts for which clear calculations cannot be made using recognised calculation procedures shall undergo specific tests.

1.19.2 - When designing wagons for the conveyance of dangerous goods, the provisions of the *RID Regulations* and the *SMGS* shall also be observed.

1.19.3 - A compilation of the strength conditions to be met by all wagon designs is given in [Appendix N - page 32](#).

o **1.20 - Materials**

1.20.1 - When selecting the materials to be used, account should be taken of the working temperature ranges indicated in point **1.4 - page 2**.

1.20.2 - The minimum notched bar impact strength value must be proven for plain and low-alloy steels used for high-stress components with plate thickness > 4 mm at - 40°C.

2 - Approval conditions

2.1 - Technical approval conditions

○ 2.1.1 - General preconditions

Wagons require technical approval from the authorised public or otherwise approved body or authorities in the countries in which the wagons are to run. Acceptance of wagons for international traffic is the responsibility of the owning or registering RU. The decision taken by this technical approval body is valid also for other RU companies.

The technical approval bodies shall determine the requirements for technical approval.

Compliance with the obligatory provisions listed under the preceding points during the planning, design, testing and manufacture of the wagons to which this leaflet applies is a precondition for their technical approval. For international traffic, the wagons must conform to the safety-related provisions of the UIC and OSJD Code, the standards of the 1 520 mm gauge railways and other applicable international regulations (e.g. RID, SMGS).

Wagons for which technical approval has yet to be obtained in full must file an application for technical approval with the relevant approval authorities of those RUs on which the wagons are to run.

○ 2.1.2 - Approval of the wagon manufacturer

The wagon manufacturer's and supplier's plants must hold production approval from a recognised certification body for the 1 435 mm and 1 520 mm gauges.

2.1.3 - Testing of wagon designs or prototypes

○ 2.1.3.1 - Tests on new wagon designs or prototypes must be carried out by approval test centres in accordance with the generally-applicable provisions for both track gauges.

R 2.1.3.2 - It is possible for the tests for the 1 520 mm and 1 435 mm gauges to be carried out by a single test centre approved for both gauges.

Where this is the case, the running tests (dynamic strength tests, brake tests and testing of the stresses imposed on the infrastructure) shall be conducted separately for 1 435 mm and for 1 520 mm gauge lines.

○ 2.1.3.3 - Compliance of the test results with the applicable provisions shall be certified by the test centre that carried out the series of tests for the respective track gauge.

The certificates shall be submitted to the respective approval bodies and to the owning or registering RU for confirmation.

o 2.1.4 - Wagon acceptance

2.1.4.1 - Design acceptance

The certificates prepared by the approved test centres shall form the basis for the acceptance of the wagon design and its series production.

Design acceptance shall follow the procedures laid down for 1 435 mm and 1 520 mm gauge railways.

2.1.4.2 - Series acceptance

Acceptance of wagons during series production shall take place according to the procedures used by the RU or acceptance body in question.

o 2.2 - Approval for international traffic

2.2.1 - The approval documents from the national technical approval bodies shall serve as the basis for authorising wagons to run on 1 435 mm or 1 520 mm gauge rail networks.

2.2.2 - The approval documents shall be submitted by the technical approval bodies of the owning or registering RU. The owning or registering RU shall send the approval documents to RUs of other gauges on whose networks the wagons are also to run. These RUs shall henceforth be referred to as the "approving RU".

2.2.3 - The agreement of the approving RU is deemed to have been secured on receipt of copies of the approval documents carrying the approval marking at the owning or registering RU.

2.3 - Other provisions

R 2.3.1 - Arrangements differing from points **2.1 - page 15** and **2.2 - page 16** may be adopted as part of bi- or multilateral agreements, provided the traffic involving the wagons in question takes place exclusively on the network of the RUs signatory to the agreement.

o 2.3.2 - Wagons with automatic gauge-adjustable wheelsets require special agreements and may not carry the RIV sign.

Appendix A - Loading gauges

A.1 - Loading gauge of the kinematic loading gauge for wagons in unrestricted use

NB : Appendix A corresponds to Appendix 1.1 in the OSJD leaflet.

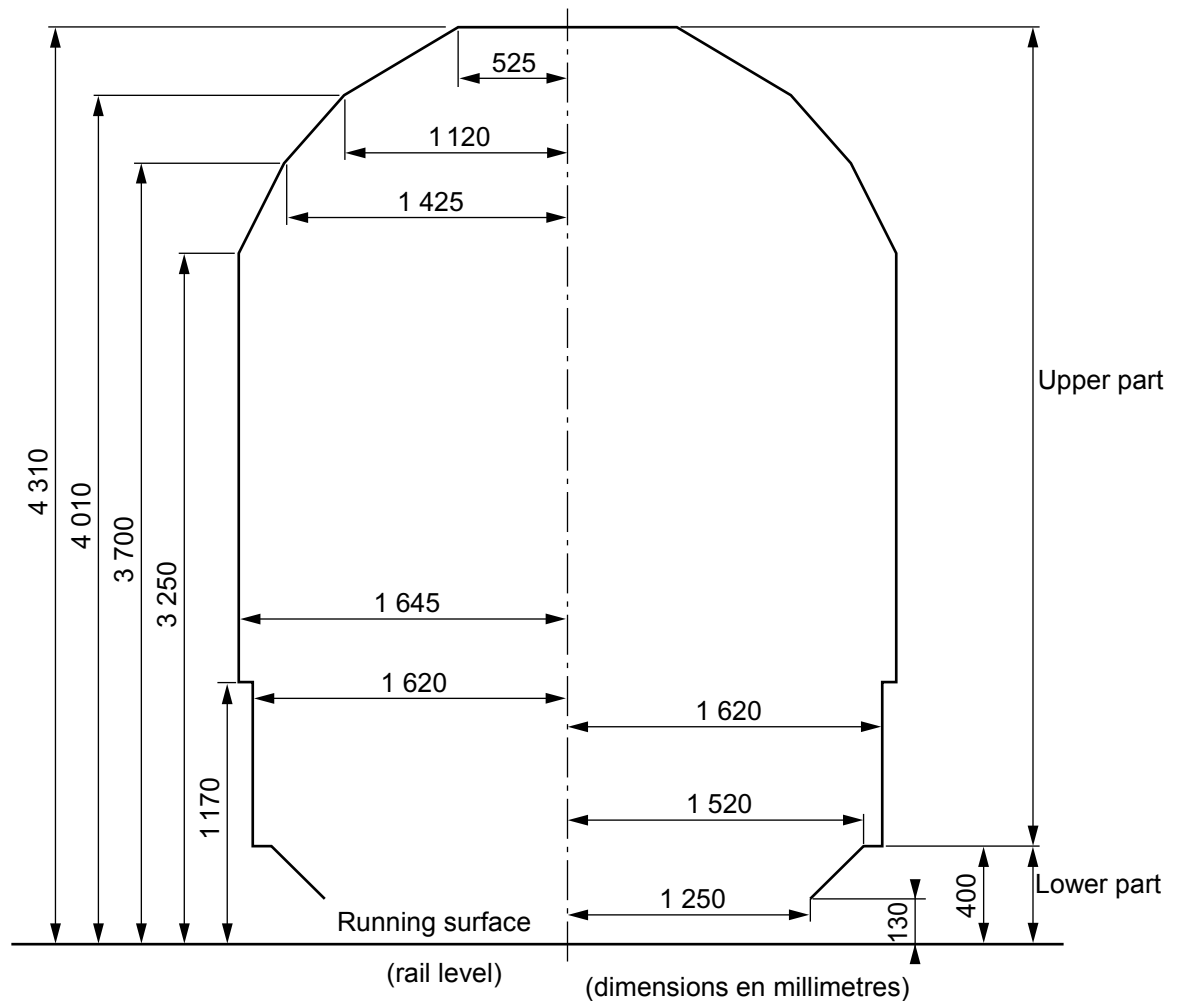


Fig. 1 - Loading gauge of the kinematic loading gauge for wagons in unrestricted use

Point **A.2 - page 18** contains an example of a loading gauge enlarged in the upper part.

A.2 - Loading gauge with upper part enlarged

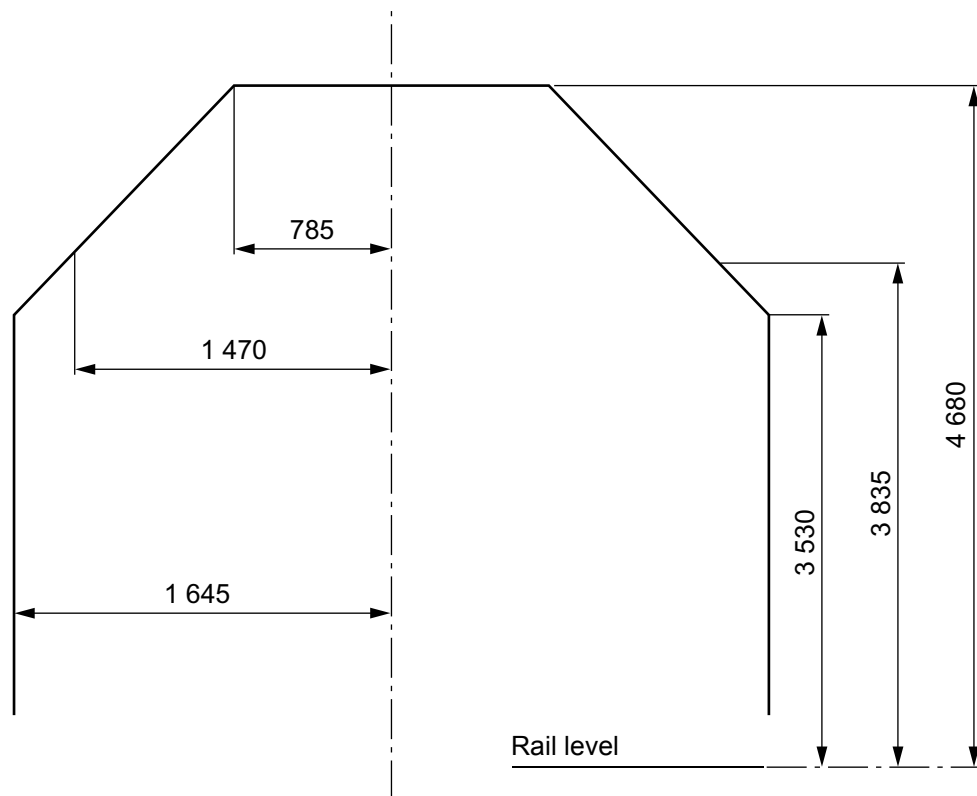


Fig. 2 - Loading gauge with enlarged upper part, for use on the basis of bi- or multilateral agreements

A.3 - Loading gauge of the kinematic loading gauge for the lower parts of the wagon

Parts located less than 130 mm above rail level for vehicles allowed to be shunted over gravity humps, rail brakes and other braking and marshalling equipment in the active position

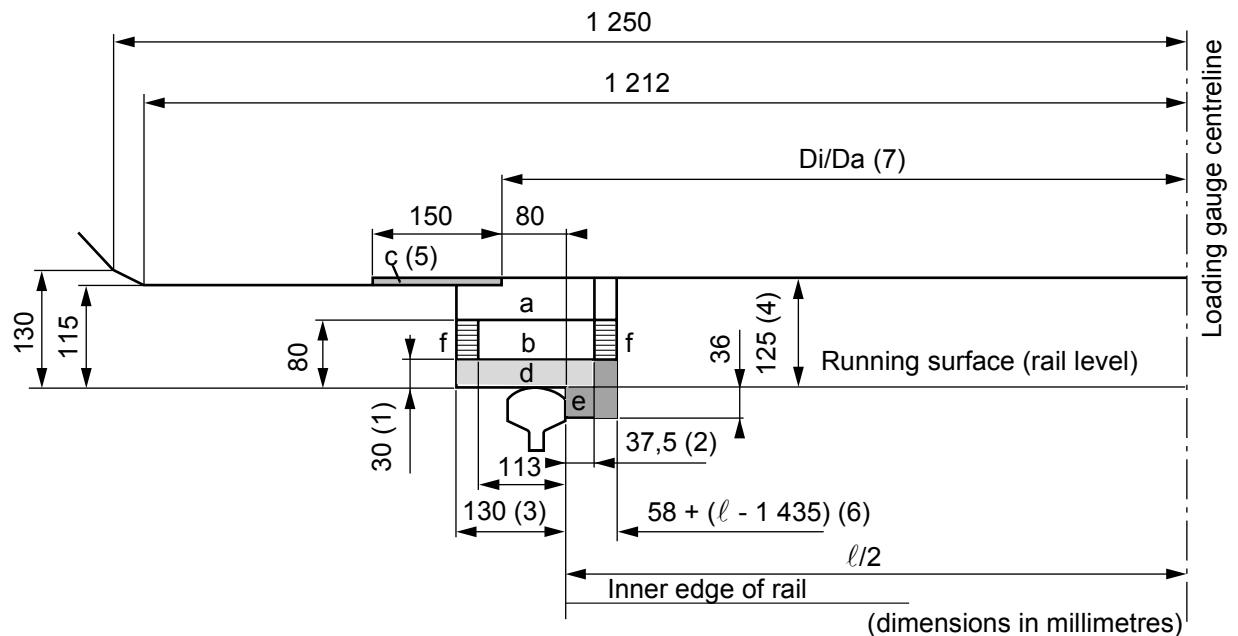


Fig. 3 - Loading gauge of the kinematic loading gauge for the lower parts of the wagon

a	Space for components located further away from the wheels
b	Space for components located in the immediate vicinity of the wheels
c	Space for ejection of standard drag shoes (see <i>UIC Leaflet 505-5, point 3.5.2</i>)
d	Space for wheels and other components coming into contact with the rails
e	Space to be occupied by the wheels only
f	Space for rail brakes in released position

1	Gauge limit for components lying outside the end axles (rail guards, sanders, etc.) to guarantee running over detonators.
2	Assumed maximum width of the wheel flange in the presence of check rails.
3	Actual extreme position of the outer face of the wheels and of components connected to the wheels (for lower components see <i>UIC Leaflet 505-5, point 3.5.3</i>).
4	This dimension also corresponds to the maximum height of standard drag shoes, that are used to secure and/or brake vehicles.
5	No vehicle component may encroach this space.
6	Actual extreme position of the inner face of the wheels when the axle is in contact with the opposite rail. This dimension is dependent on the track gauge widening.

Appendix B - Gravity hump profile

NB : Appendix B corresponds to Appendix 2 of the OSJD leaflet.

Schematic representation to be used for calculating the height and longitudinal profile of the gravity hump.

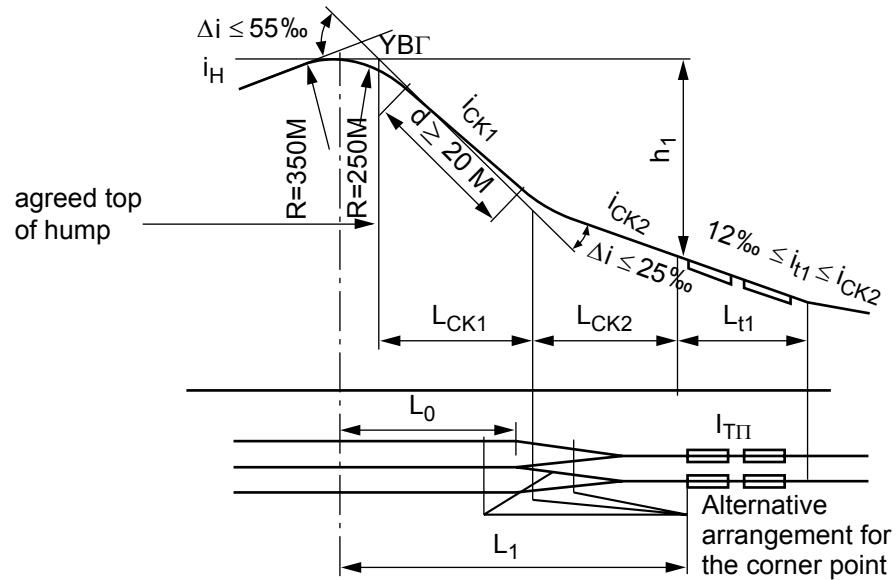


Fig. 4 - Positioning of the first retarder before the separation points

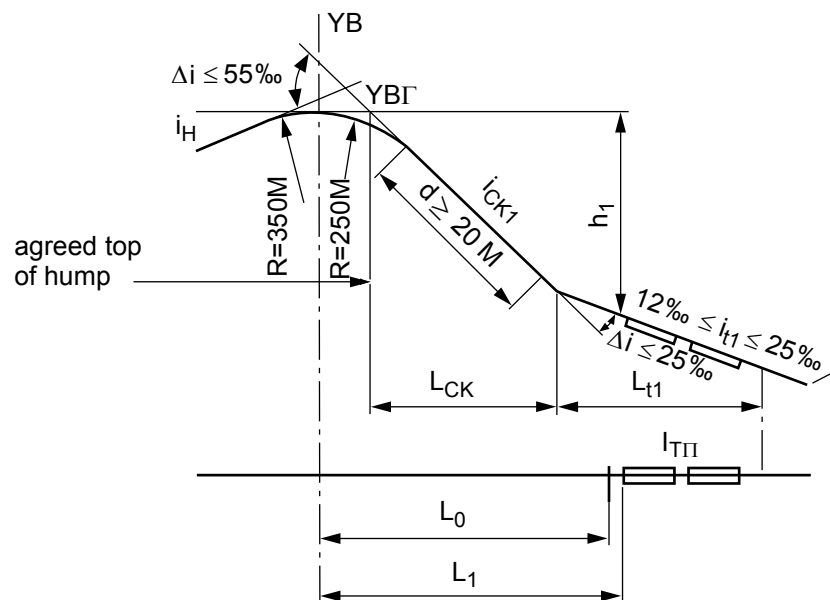


Fig. 5 - Positioning of the first retarder after the separation points

$I_{T\Pi}$ - retarder	i_{CK1}, i_{CK2} - down gradient of hump
L_0 - length of the gravity hump	h_1 - height of the hump cross-section profile between the top of the hump and the start of the first retarder
L_1 - length of the hump cross-section	

Appendix C - List of train ferry lines

Table 1 : List of train ferry lines

1	Route	Saßnitz Mukran - Klaipeda	Iljitschewsk - Warna	Iljitschewsk - Poti
2	Gauge specific to the ferry in mm	1 520	1 520	1 520
3	Number of tracks on the ferry	10	10	10
4	S-curves - radius in m	190	130	130
5	S-curves - length of intermediate straight section in m	-	58	58
6	S-Curves - radius in m	500	130	130
7	Maximum ferry ramp angle in relation to the horizontal α	2°	4°	4°
8	Ramp angle on the upper deck of the ferry β	1,6°	-	-

Appendix D - Securing rings for use on train ferries

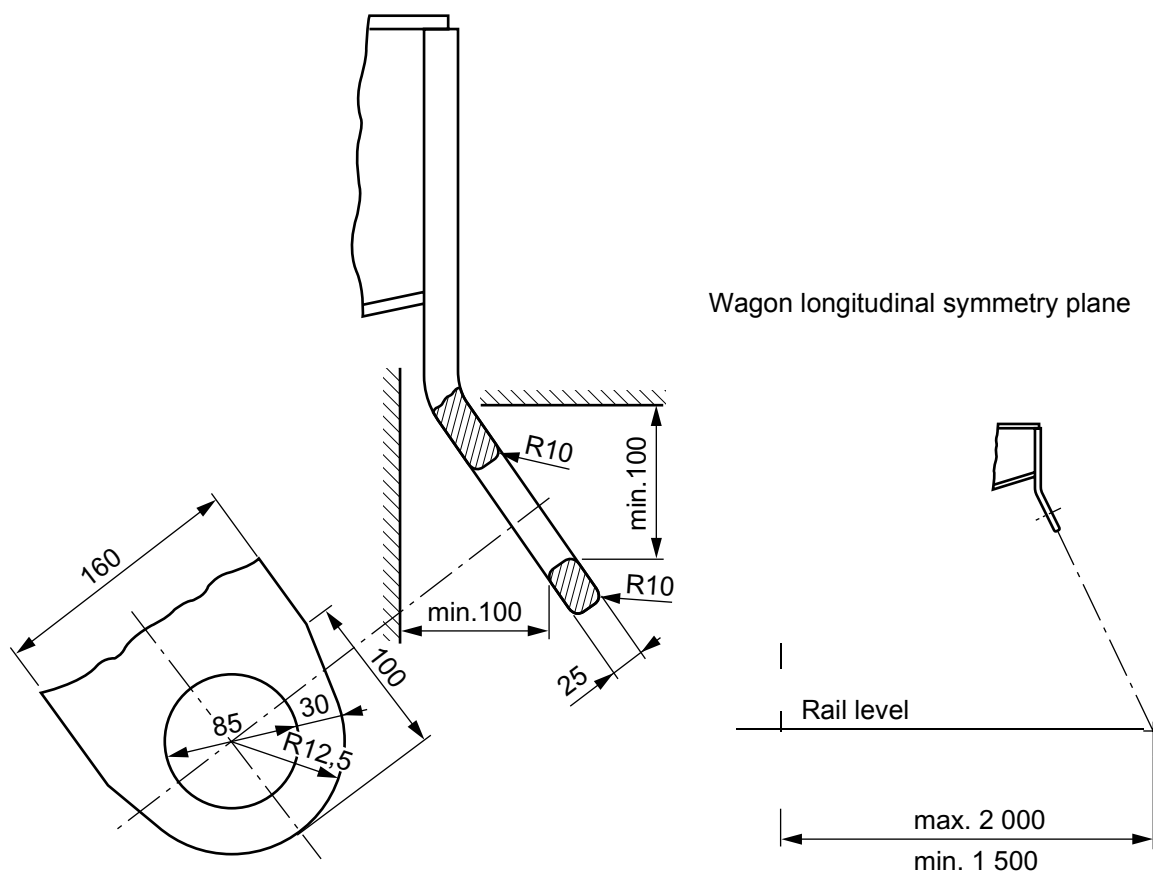
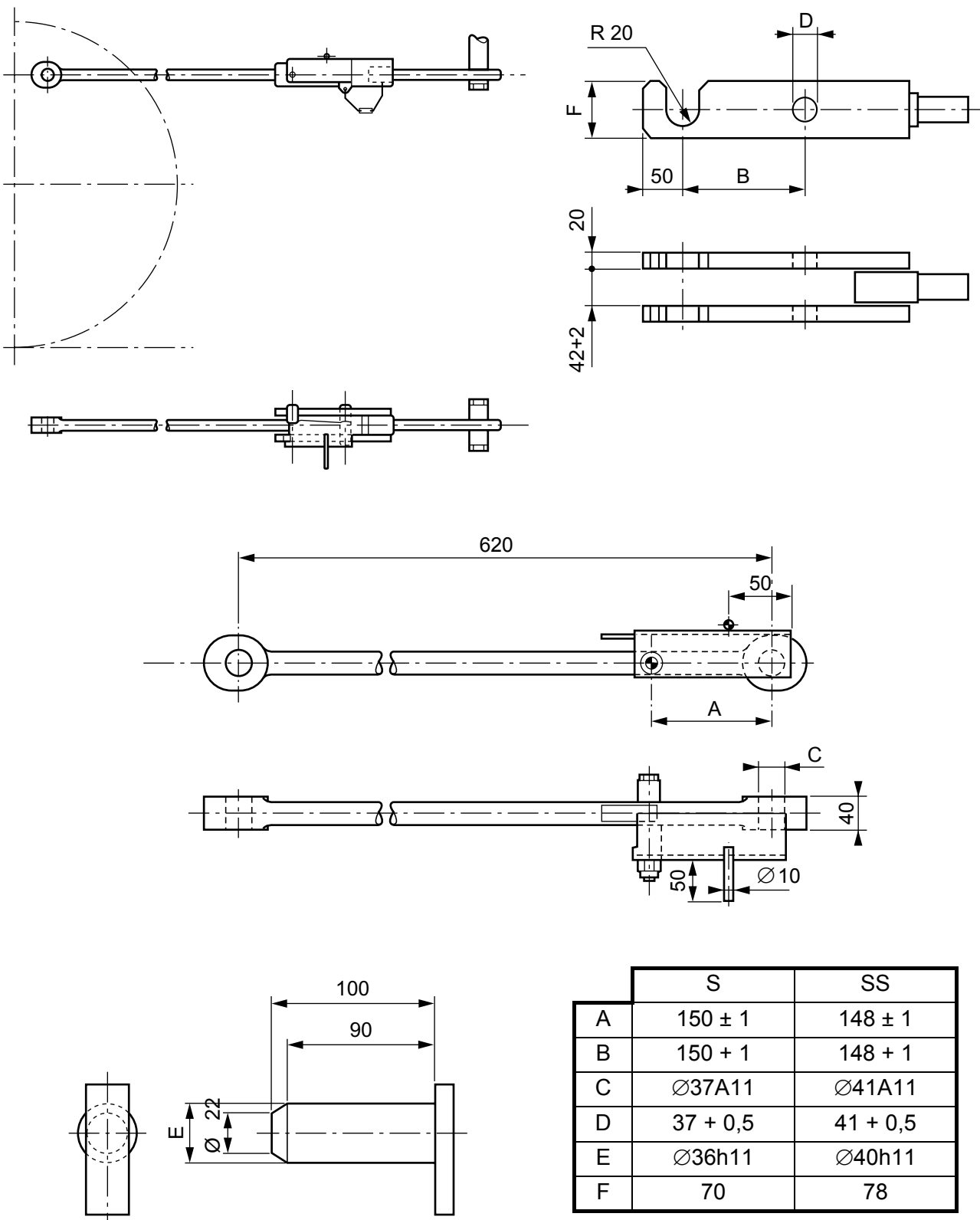


Fig. 6 - Securing rings for use on train ferries

Securing rings of other designs or shapes are permitted provided they are equally strong and have a hole in the same position as the shaded portion of the diagram.

Limit of elasticity of the steel $\geq 240 \text{ N/mm}^2$.

Appendix E - Rapid connecting device for pulling rods



Appendix F - Buffing and drawgear

Configuration C as per point 1.10.1.3 - page 7.

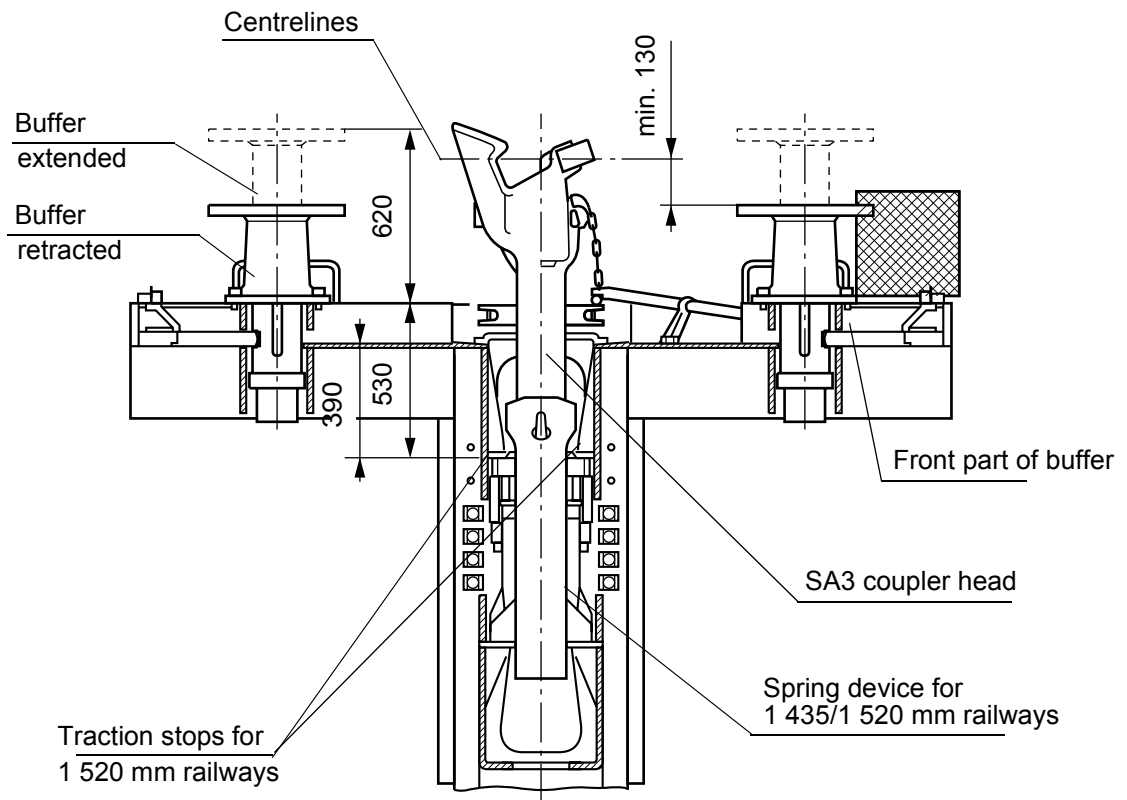


Fig. 7 - Buffing and drawgear - Configuration C

100



Appendix H - Position of spark arrestors

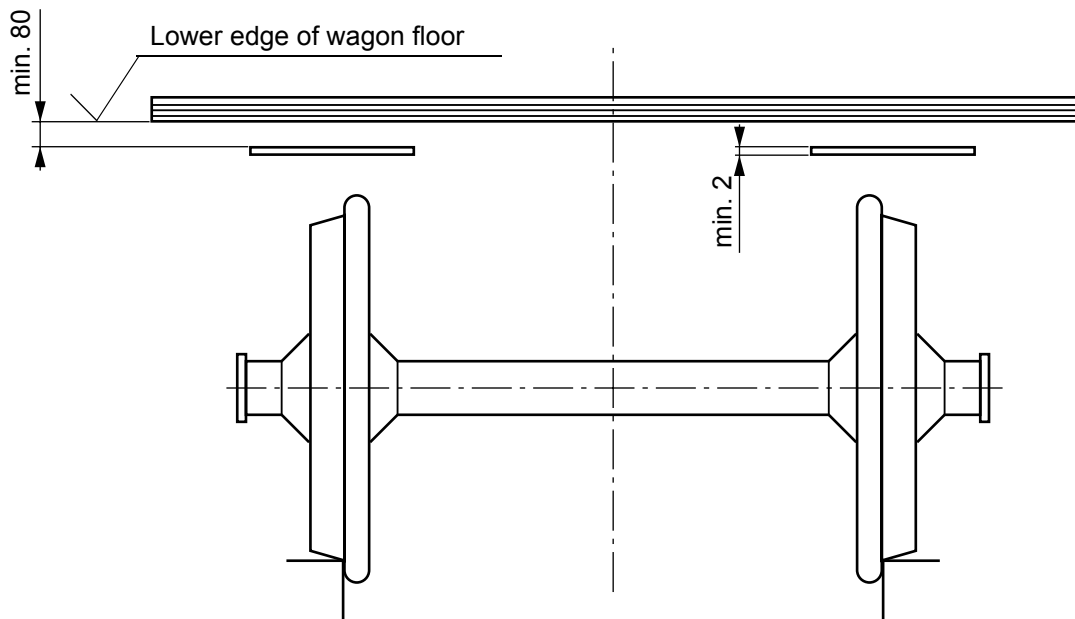


Fig. 12 - Spark arrestors: end view

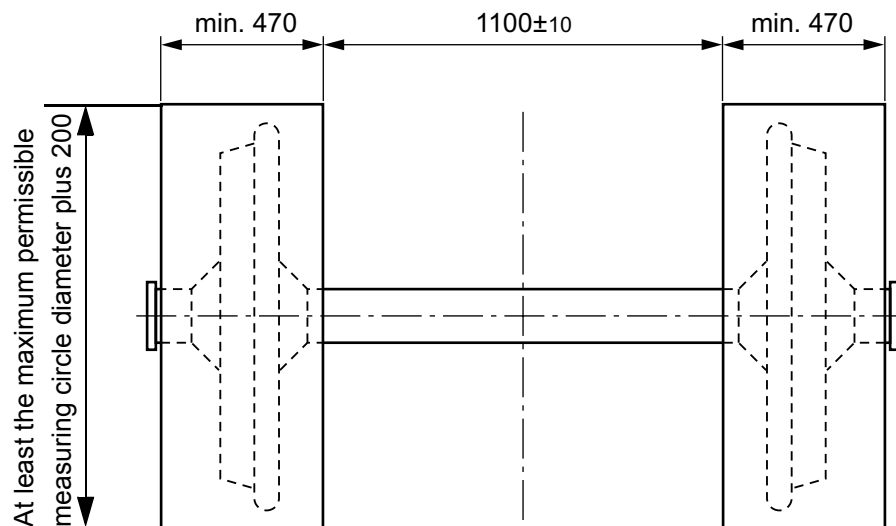


Fig. 13 - Spark arrestors: top view

Appendix I - Marking for wagons equipped with automatic couplers

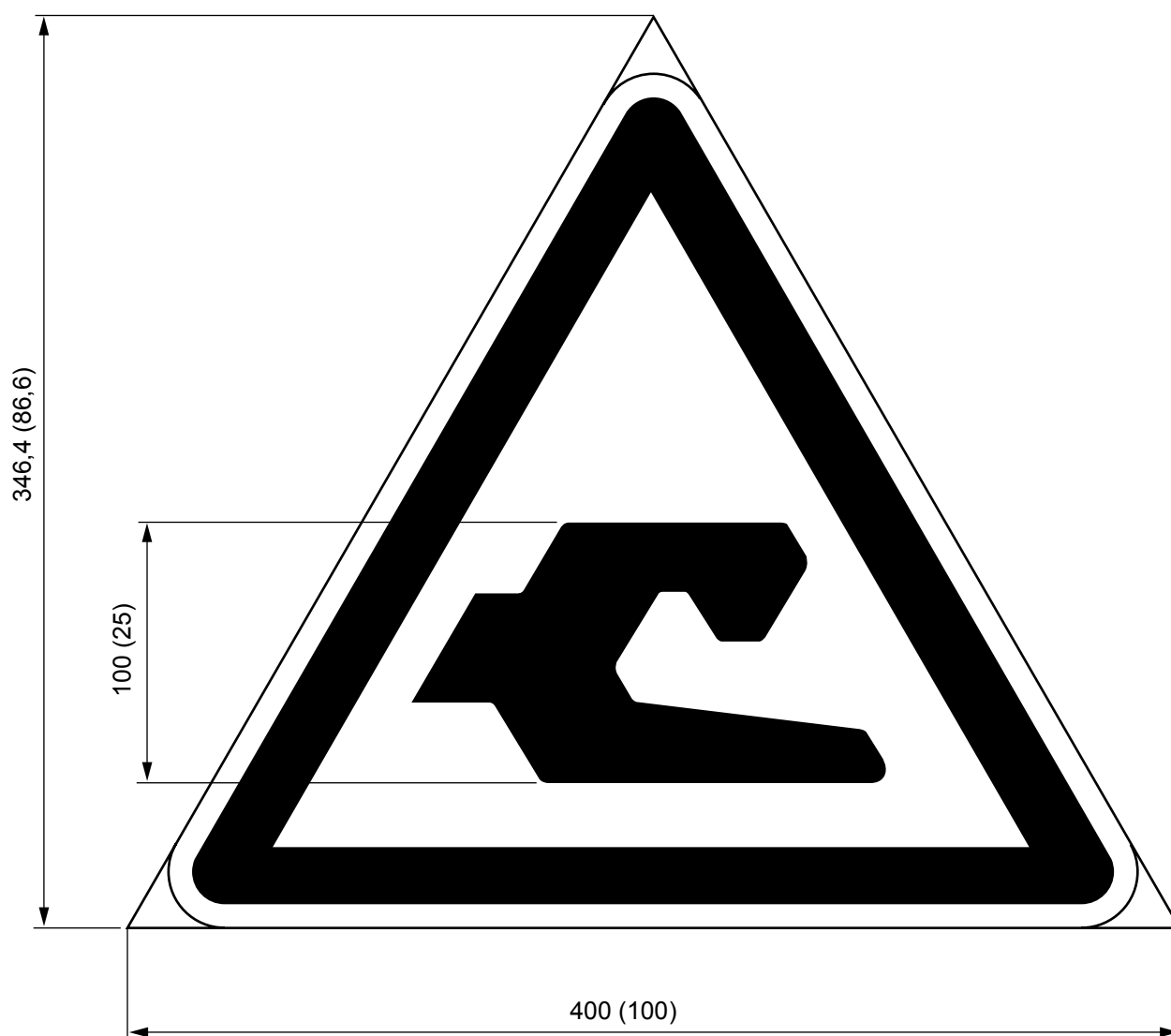
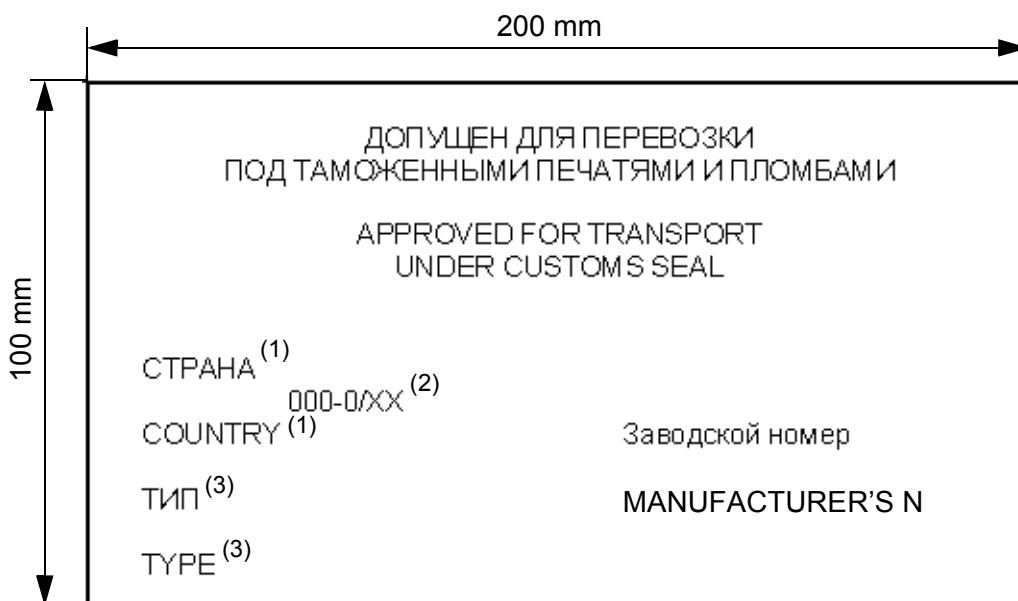


Fig. 14 - Marking for wagons equipped with automatic coupler

NB : Values in brackets apply to flat wagons.

Appendix J - Customs authorisation plate for wagons worked on 1 520 mm gauge railways

A plate must be affixed securely on a clearly visible part of the wagon to show that it has been approved to run on 1 520 mm gauge lines. A metal plate measuring 20 x 10 cm should be used for this purpose. The following inscriptions should be clearly and durably engraved or embossed in Russian and English or applied by some other means.



(1) Name of the country that granted customs authorisation

(2) 000-0/XX: Authorisation certificate number:

- first three digits: code of the customs bureau that issued the authorisation certificate
- next digit: authorisation certificate record number
- XX: year of authorisation

(3) For design approval only

Appendix K - Markings to indicate the bogie overhaul dates on interchangeable bogies for the 1 435 mm gauge

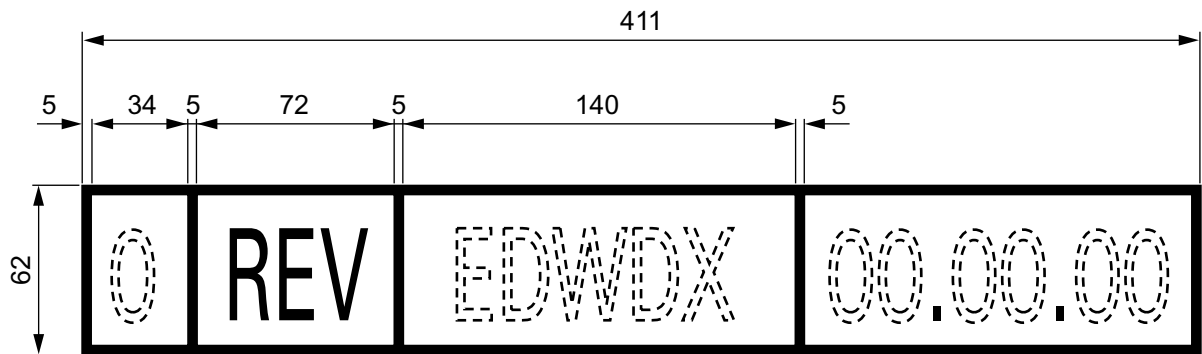


Fig. 15 - Overhaul plate for interchangeable bogies (1 435 mm gauge)

Appendix L - Markings for wagons equipped with gauge-adjustable axles for 1 435 mm and 1 520 mm gauges

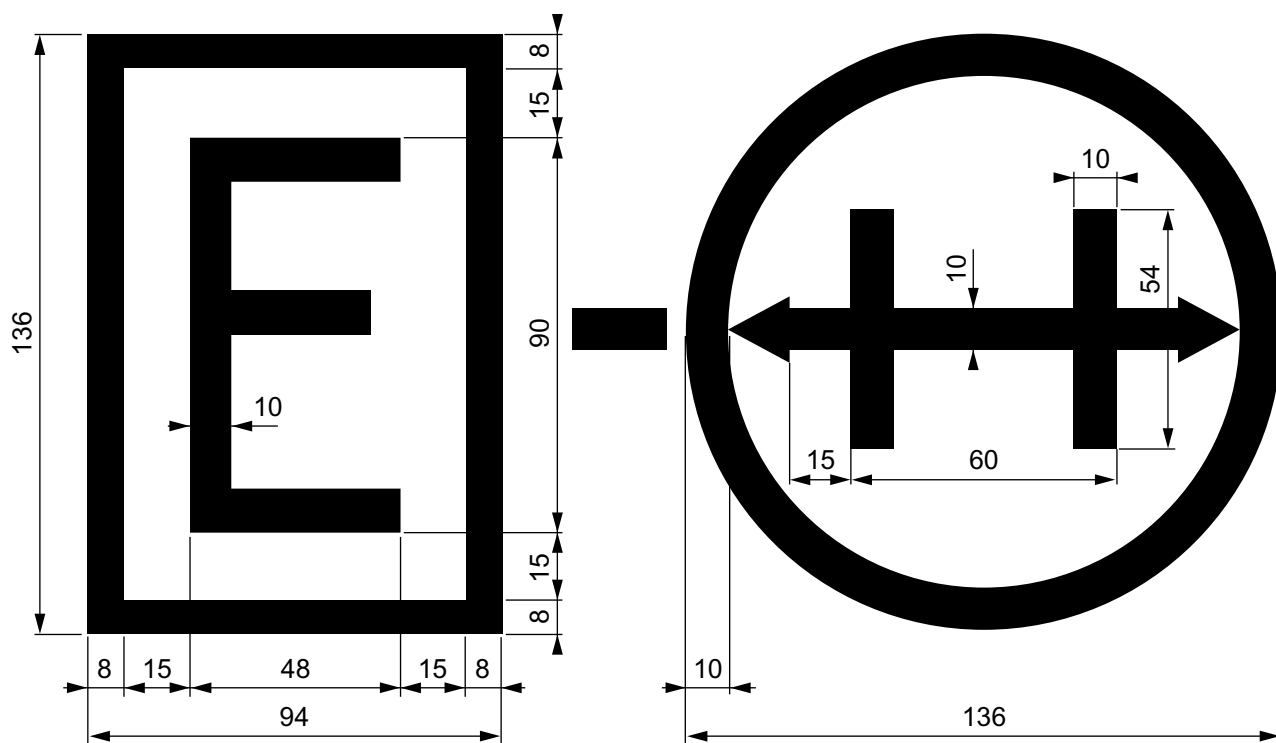


Fig. 16 - Marking for wagons with gauge-adjustable axles

Appendix M - Markings for bogies equipped with gauge-adjustable axles

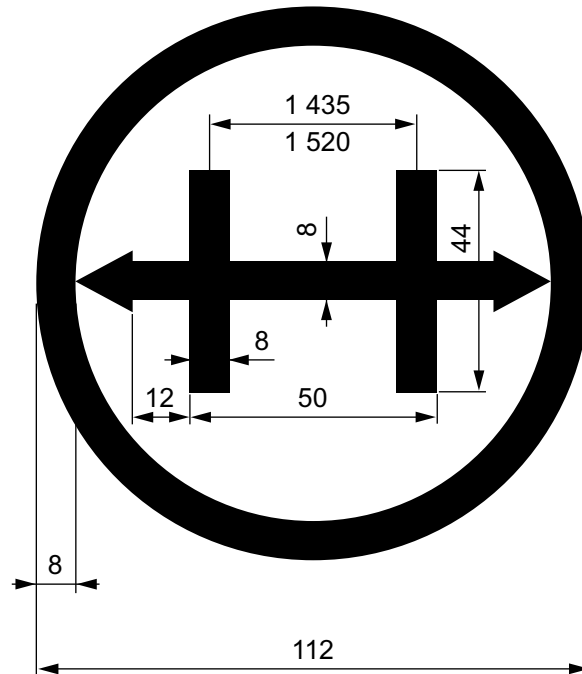


Fig. 17 - Marking to be used for wagons registered on 1 435 mm gauge railways
(sign as per UIC Leaflet 510-4)

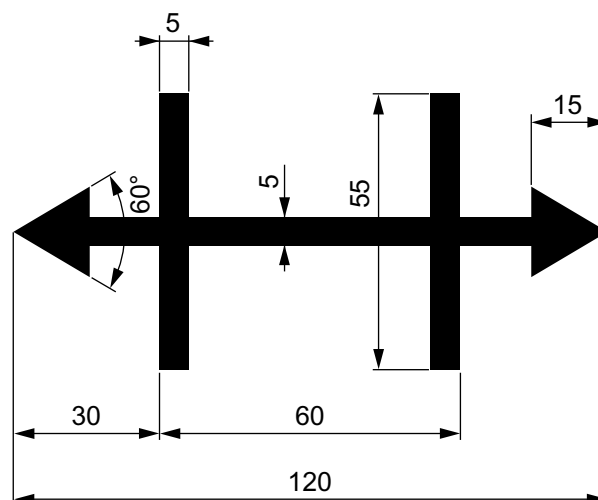


Fig. 18 - Marking to be used for wagons registered on 1 520 mm railways
(sign as per PPW)

Appendix N - Mechanical strength conditions for wagons

N.1 - General requirements

For all wagons, strength conditions are based on their design and conditions of use.

N.2 - Static strength conditions

N.2.1 - Horizontal stresses on the underframe

The underframe must be designed to withstand the following forces without residual deformation:

- compressive forces of 3 000 kN on the compression stops of the automatic coupler,
- tensile forces of 2 500 kN on the traction stops,
- compressive forces of 1 000 kN in the centreline of each side buffer and of 750 kN, 50 mm below the centreline of each side buffer,
- diagonal forces of 400 kN in the centreline of the side buffers.

N.2.2 - Vertical stresses due to the load

The wagon must be designed to withstand one and a half times the least favourable loadings provided for in technical standards and conditions without residual deformation.

The deflection of the underframe in the stationary position must not exceed 3 ‰ of the distance between bogie centres, inclusive of counter-deflection.

N.2.3 - Combined loadings

The least favourable case of vertical stresses due to the load shall be combined with the compressive forces of 3 000 kN on the automatic coupler compression stops and the forces in the centreline of each side buffer.

During calculations, a vertical dynamic increment should be included to take account of the effect of the inertial force of the load and wagon body and of horizontal forces acting perpendicular to the track.

For tank wagons, the calculations should include the internal pressure, the vacuum and the pressure resulting from hydraulic impact, in addition to the forces referred to above.

N.2.4 - Stresses due to lifting of the wagon

The wagon must be designed to withstand the forces that result from it being lifted without residual deformation. The lifting points are specified in *UIC Leaflet 581* and in the standards of the 1 520 mm gauge.

N.2.5 - Stresses on the wagon floor exerted by industrial trucks and road vehicles

The wagon floor must be able to withstand the following stresses without residual deformation:

- Industrial trucks
Simultaneous loadings of 30 kN on each of the two front wheels of the industrial truck with a wheel contact surface of 150 x 150 mm and an average distance of 650 to 1 000 mm between the two front wheels of the industrial truck.
- Road vehicles (only for flat wagons and hybrid open/flat wagons)
Loading of 65 kN for each wheel pair, with a wheel contact surface of 700 cm² for a width of approx. 200 mm.

N.3 - Dynamic strength conditions for wagons

For the dynamic strength conditions, two possible ways for the forces to be applied shall be considered:

- through the side buffers,
- through the automatic coupler.

N.3.1 - Forces applied through the side buffers

For forces applied through the side buffers, only the provisions of *UIC Leaflet 577* shall be observed.

N.3.2 - Forces applied through the automatic coupler

N.3.2.1 - General

The wagons to be tested must, when standing on a level, straight track, be capable when empty and loaded of withstanding the impact from a buffer wagon, the total weight of which must be greater than or equal to the total weight of the wagon to be tested. When testing 4-axle wagons, it is recommended that a buffer wagon with a total weight of 100 ± 3 t be used.

The buffer wagon must be equipped with the SA-3 automatic coupler and a spring device approved by the 1 520 mm gauge railways. The height difference between the respective centrelines of the automatic couplers on the buffer wagon and the wagon to be tested must not exceed 50 mm.

During the tests, the wagon to be tested must firstly be positioned on its own on the track with its brakes released and secondly in a held position. The wagon can be held by a group of 3 to 4 loaded wagons with a total weight of at least 300 t.

The maximum force to be exerted shall be 3 000 kN + 10%.

The wagon group shall be prevented from rolling away by using a handbrake or drag shoes.

N.3.2.2 - Buffing impacts on empty vehicles

The buffing impact shall be 12 km/h unless otherwise indicated in the specification.

The wagon brakes must be released.

The loads applied must not give rise to any residual deformation. A record should be taken of stresses arising at certain critical points in the connections between bogie and underframe, underframe and vehicle body and in the superstructure.

N.3.2.3 - Buffing impacts on loaded vehicles

The wagon to be tested shall be loaded to its maximum capacity limit.

The maximum buffing speed shall be 12 km/h. Buffing tests should begin at a speed of 2 or 3 km/h and be raised until the maximum specified buffing speed is reached.

The tests shall be conducted in three speed ranges:

- up to 5 km/h,
- from 5 to 10 km/h,
- over 10 km/h.

At least 5 buffing impacts shall be carried out in each speed range. Three impacts shall also be carried out with the impact force of 3 000 kN that is significant for the wagon's design calculations.

During impact testing, the permissible impact force of 3 000 kN may be exceeded by a maximum of 10%. If the limit of 3 000 kN + 10% is already reached at buffing speeds < 12 km/h, the speed shall not be increased beyond this value. The wagon shall be fitted with improved suspension springs.

To demonstrate resistance to wear and tear, 40 buffing impacts shall be conducted either at a speed of 12 km/h or with an impact force of 3 000 kN. If the limit of 3 000 kN is already reached at buffing speeds < 12 km/h, the speed should not be increased beyond this value.

Loadings from these impacts must not result in any residual deformation.

N.4 - Dynamic strength conditions during wagon running

Wagons shall be designed to withstand longitudinal compressive and tensile forces of 1 000 kN at a running speed of 120 km/h.

N.5 - Permissible stresses on materials

For all static and dynamic strength conditions, the permissible stresses on materials set out in *UIC Leaflet 577* and the standards for the 1 520 mm track gauge shall apply.

List of abbreviations

AA	Attelage Automatique (automatic coupler)
AMT	Attelage Mixte de Traction (hybrid draw coupler)
OSJD	Organisation for Collaboration between Railways
PPW	Regulations governing the Use of Wagons
RID	Regulations covering the International Carriage of Dangerous Goods by Rail
RIV	Agreement governing the Exchange and Use of Wagons between Railway Undertakings
SMGS	Agreement on International Freight Transport by Rail

Bibliography

1. UIC leaflets

International Union of Railways (UIC)

UIC Leaflet 422: Products to be used and methods to be applied for the ordinary disinfection of wagons, 2nd edition of 1.1.67

UIC Leaflet 429: Operating conditions for complete trains or sections of trains formed of road semi-trailers running on rail bogies, 2nd edition, December 2000

UIC Leaflet 430-3: Freight wagons. Technical conditions for freight wagons capable of running on both standard gauge and Finnish broad gauge systems, 2nd edition of 1.7.95

UIC Leaflet 431-1: Carriage of goods in wagons and large containers under controlled temperature conditions, 10th edition of 1.7.89

UIC Leaflet 431-2: Provisions applicable to the forwarding of dangerous goods (Appendix 1 to the CIM-RID) in international traffic, Cancelled on 1.9.89

UIC Leaflet 432: Wagons. Running speeds - Technical conditions to be observed, 9th edition, January 2002

UIC Leaflet 433: Standard General Conditions (SGC) for the introduction into service and operation of privately owned wagons, 20th edition, September 2003

UIC Leaflet 438-2: Identification marking for freight rolling stock, 6th edition of 1.1.87, reprint dated 1.7.94 (7th edition under preparation)

UIC Leaflet 471-2: Technical inspections at and inland from frontiers for the exchange of wagons in international traffic, 1st edition of 1.1.83 and 2 Amendments

UIC Leaflet 500: Standardisation of transport stock and components - Principles, procedures, results, 2nd edition, December 2000

UIC Leaflet 502: Special consignments - Provisions concerning the preparation and conveyance of special consignments, 4th edition of 1.7.74. Reprint dated 1.1.93 and 4 Amendments

UIC Leaflet 505-1: Railway transport stock - Rolling stock construction gauge, 9th edition, November 2003

UIC Leaflet 505-5: Basic conditions common to Leaflets 505-1 to 505-4 - Notes on the preparation and provisions of these leaflets, 2nd edition of 1.1.77 and 4 Amendments

UIC Leaflet 506: Rules governing application of the enlarged GA, GB and GC gauges, 1st edition of 1.1.87 and 4 Amendments (2nd edition under preparation)

UIC Leaflet 507: Wagons - Conditions governing wagons conveyed on ferries, 1st edition of 1.7.89. Reprint dated 1.7.97

UIC Leaflet 510-1: Wagons - Running gear - Normalisation, 9th edition of 1.1.78 and 14 Amendments

UIC Leaflet 510-2: Trailing stock - Conditions concerning the use of wheels of various diameters with running gear of different types, 3rd edition of 1.1.98 (4th edition under preparation)

UIC Leaflet 510-3: Wagons - Strength testing of 2 and 3-axle bogies on test rig, 1st edition of 1.1.89. Reprint dated 1.7.94

UIC Leaflet 510-4: Wagons - Variable-gauge running gear for 1 435 mm/1 520 mm and 1 668 mm. Recommendations for bilateral agreements, 2nd edition, April 2002

UIC Leaflet 511: Trailing stock - Wheelbase, 7th edition of 1.7.87 and 1 Amendment

UIC 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

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

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

UIC Leaflet 517: Wagons - Suspension gear - Standardisation, 6th edition of 1.7.79. Reprint dated 1.1.89 and 10 Amendments

UIC Leaflet 518: Testing and approval of railway vehicles from the point view of their dynamic behaviour - Safety - Track fatigue - Ride quality, 2nd edition, April 2003

UIC Leaflet 520: Wagons, coaches and vans. Draw gear - Standardisation, 7th edition, December 2003

UIC Leaflet 521: Coaches and vans, wagons, tractive stock - Clearance to be provided at vehicle extremities, 1st edition of 1.1.87 and 1 Amendment

UIC Leaflet 526-1: Wagons. Buffers with a stroke of 105 mm, 2nd edition of 1.7.98

UIC Leaflet 526-3: Wagons. Buffers with a stroke of 130 and 150 mm, 2nd edition of 1.7.98

UIC Leaflet 527-1: Coaches, vans and wagons. Dimensions of buffer heads - Track layout on S-curves, 2nd edition of 1.1.81 and 4 Amendments

UIC Leaflet 530-2: Wagons - Running safety, 4th edition of 1.7.85. Reprint dated 1.7.97

UIC Leaflet 532: Trailing stock - Signal lamp brackets - Coaches - Fixed electric signal lamps, 9th edition of 1.1.79. Reprint dated 1.1.91 and Amendment 2

UIC Leaflet 533: Protection by earthing of metal parts of vehicles, 2nd edition of 1.1.77 and 4 Amendments (3rd edition under preparation)

UIC Leaflet 535-1: Standardisation of steps and handrails on wagons, 5th edition of 1.1.72 and 2 Amendments

UIC Leaflet 535-3: Equipping of wagons with devices for passing from one to the other and with screw brakes, 1st edition of 1.1.76. Reprint dated 1.7.95

UIC Leaflet 536: Coupling hooks for wagons - Standardisation, 3rd edition of 1.1.67. Reprint dated 1.1.96

UIC Leaflet 537: Pipe connections for wagons equipped for pneumatic discharge, 2nd edition of 1.7.86

UIC Leaflet 538: Safety regulations for wagons equipped with machines operated independently or from an external source of energy, 1st edition of 1.7.79

UIC Leaflet 540: Brakes - Air brakes for freight trains and passenger trains, 4th edition, June 2002

UIC Leaflet 541-04: Brakes - Regulations concerning the manufacture of brake components - Self-adjustable load-proportional braking system and automatic "empty-loaded" control device, 1st edition of 1.7.92 and 3 Amendments (2nd edition under preparation)

UIC Leaflet 541-1: Brakes - Regulations concerning the design of brake components, 6th edition, November 2003

UIC Leaflet 541-3: Brakes - Disc brakes and disc brake pads - General conditions governing bench tests, 4th edition of 1.7.93 and 5 Amendments (5th edition under preparation)

UIC Leaflet 541-4: Brakes - Brakes with composition brake blocks, 2nd edition of 1.10.90 and 3 Amendments

UIC Leaflet 542: Brake parts - Interchangeability, 4th edition of 1.1.82 and 4 Amendments

UIC Leaflet 543: Brakes - Regulations governing the equipment of trailing stock, 12th edition, June 2003

UIC Leaflet 544-1: Brakes - Braking power, 3rd edition of 1.1.66. Reprint dated 1.3.79 and 9 Amendments (4th edition under preparation)

UIC Leaflet 545: Brakes - Inscriptions, marks and signs, 7th edition, April 2002

UIC Leaflet 547: Brakes - Air brake - Standard programme of tests, 4th edition of 1.7.89

UIC Leaflet 554-1: Power supply to electrical equipment on stationary railway vehicles from a local mains system or another source of energy at 220 V or 380 V, 50 Hz, 3rd edition of 1.1.79

UIC Leaflet 570: Wagons - Interchangeable parts, 6th edition of 1.1.81. Reprint dated 1.1.95

UIC Leaflet 571-2: Standard wagons - Ordinary bogie wagons - Characteristics, 6th edition, February 2001

UIC Leaflet 571-3: Standard wagons - Special-purpose wagons - Characteristics, 5th edition of 1.1.79. Reprint dated 1.1.96 (6th edition under preparation)

UIC Leaflet 571-4: Standard wagons - Wagons for combined transport - Characteristics, 3rd edition of 1.7.97 (4th edition in preparation)

UIC Leaflet 573: Technical conditions for the construction of tank wagons, 5th edition of 1.1.99

UIC Leaflet 574: Insulated, refrigerator and mechanically-refrigerated wagons and containers - Procedure to be followed for the determination of the thermic transmission coefficient of the body, 3rd edition of 1.7.71

UIC Leaflet 575: Wagons - Label holders (interchangeability) and hazard identification panels, 4th edition of 1.1.95

UIC Leaflet 576: Wagons doors and securing devices (interchangeability), 5th edition of 1.7.75 and 6 Amendments

UIC Leaflet 577: Wagon stresses, 2nd edition of 1.7.98

UIC Leaflet 578: Stanchions and bolsters - Standardisation, 5th edition of 1.1.95

UIC Leaflet 579-1: Wagons - Periodic overhaul - Methods for establishing its frequency and nature, 3rd edition, March 2003

UIC Leaflet 579-2: Conditions for the technical transfer inspection of wagons, 2nd edition of 1.1.97 (leaflet cancelled in 2003)

UIC Leaflet 581: Wagons - Lifting - Rerailing, 1st edition of 1.1.83 and 1 Amendment

UIC Leaflet 583: Wagons - Application of a special mark on interchangeable parts, 5th edition of 1.1.86. Reprint dated 1.7.95

UIC Leaflet 700: Classification of lines and resulting load limits for wagons, 9th edition of 1.7.87 and 2 Amendments (10th edition under preparation)

International Union of Railways (UIC) /

Organisation for Collaboration between Railways (OSJD)

UIC Leaflet 522, OSJD Leaflet 522-1: Technical conditions to be fulfilled by the automatic coupler of the UIC and OSJD Member Railways, 4th edition of 1.1.90

UIC Leaflet 524, OSJD Leaflet 528-1: Wagons - Technical specifications governing spring devices for wagons fitted with automatic couplers belonging to the UIC and OSJD Member Railways, 1st edition of 1.1.78 and 6 Amendments

UIC Leaflet 530-1, OSJD Leaflet 530-1: Constructional conditions for wagons to be observed with a view to fitting the automatic coupler of the Member Railways of UIC and OSJD respectively, 2nd edition of 1.4.82 and 3 Amendments

UIC Leaflet 535-2, OSJD Leaflet 535: Standardisation and positioning of steps, end platforms, gangways, handrails, tow hooks, automatic coupler and brake valve controls on wagons in connection with the fitting of the automatic coupler of the UIC Member Railways and OSJD Member Railways, 3rd edition of 1.1.78 and 7 Amendments (4th edition under preparation)

UIC Leaflet 541-2, OSJD Leaflet 536: Dimensions of hose connections (brake hoses) and electric cables; types of pneumatic and electric connections and their positioning on wagons and coaches equipped with automatic couplers of the UIC and OSJD Member Railways, 1st edition of 1.7.81 and 2 Amendments

UIC Leaflet 541-5, OSJD Leaflet 540-1: Brakes - Electropneumatic brake (ep brake) - Electropneumatic emergency brake override (EBO), 3rd edition, May 2003

2. Miscellaneous

Organisation for Collaboration between Railways (OSJD)

Leaflet 500: Vehicle clearance gauge and obstacle gauge reference profiles,

Leaflet 500/1: Recommendations for the production and management of line capacity catalogues based on gauge and permissible axleload and load per linear metre,

Leaflet 500/2: Standard guidelines for the application of the 1-WM and 0-WM vehicle gauge profiles,

Leaflet 500/3: Standard guidelines for the application of the static vehicle gauge profile of the OSJD railways with a 1 435 mm track gauge,

Leaflet 500/4: Kinematic vehicle gauge profile based on the 1-WM and 2-WM profiles of OSJD railways,

Leaflet 500/5: Kinematic calculation methods for the vehicle gauge profile and track centre distance,

Leaflet 501: Principal requirements to be met by wagons in international traffic,

Leaflet 501/1: Parameters and basic requirements to be met by wagons for high speeds,

Leaflet 512: Unification of wagon wheelsets to be used in international traffic under SMPS/SMGS conditions,

Leaflet 512/1: Decision on the unification of coach and wagon wheelsets fitted with roller bearing axleboxes,

Leaflet 512/2: Recommendations for the use of small-diameter wheels for wagons,

Leaflet 514: Decision. Unification of wagon axlebox casings and roller bearings,

Leaflet 514/2: Decision on the unification of design and principal dimensions of roller bearings on wagons used in international traffic,

Leaflet 521/2: Technical and operating conditions for a hybrid air connector for railway vehicles of OSJD member railways and UIC member railways,

Leaflet 522: Basic provisions for the OSJD type automatic coupler on railways with the 1 435 mm track gauge,

Leaflet 522/2: Technical and operating conditions to be met by the operating device for the automatic coupler and air stop cocks,

Leaflet 522/3: Provisional conditions for the construction of joints with horizontal and vertical stabilisation for the automatic couplers of OSJD member railways and UIC member railways with a 1 435 mm track gauge,

Leaflet 522/4: Technical conditions to be met by the automatic coupler of OSJD member railways and UIC member railways to ensure coupler interaction,

Leaflet 522/5: Automatic coupler for rail vehicles. Terminology,

Leaflet 523: Technical conditions for the manufacture, acceptance and delivery of automatic couplers on the OSJD member railways and UIC member railways,

Leaflet 526: Buffing gear for wagons with a 1 435 mm track gauge,

Leaflet 530: Constructional measures for wagons with a view to the introduction of the automatic coupler on OSJD member railways and UIC member railways,

Leaflet 530/2: Recommended procedure for determining rolling stock categories (wagons and coaches) fitted with foldaway legs for the automatic coupler,

Leaflet 530/3: Equipment approved for international traffic for wagons during the period of introduction of the automatic coupler,

Leaflet 536/1: Supplement to Leaflet 536: dimensions of the hose connections (brake hoses) and electrical connections, the types of air and electric connections and their positioning on wagons and coaches with automatic couplers on OSJD and UIC railways,

Leaflet 537: Technical conditions for the development, design and manufacture of a safety switch system for the coupling electrics of the OSJD automatic coupler,

Leaflet 538/1: Technical requirements to be met by the thermal properties of insulation and thermal coefficients for the bodies of passenger coaches and refrigerator wagons,

Leaflet 538/2: Method to determine the unwanted exchange of air as a result of faulty air-tightness in coach and refrigerator wagon bodies,

Leaflet 540: Technical requirements for brakes on vehicles operating in freight trains at speeds up to 120 km/h and passenger trains up to speeds of 160 km/h,

Leaflet 540/2: Brakes. Electropneumatic brakes. Test programme for freight and passenger trains,

Leaflet 540/3: Brakes. Electropneumatic brakes. Technical requirements for the additional equipment and changeover devices (direct and automatic designs) and programme for testing such devices,

Leaflet 541: Recommendation. Cast iron for brake blocks,

Leaflet 542: Dimensions of brake blocks,

Leaflet 543: Conditions based on braking force standards (braked weight percentages) for coaches running on 1 435 mm and 1 520 mm gauge railways, during operation on the 1 520 mm gauge,

Leaflet 544: Recommendations for the choice of brake block forces. Braking of a cast-iron tread-braked railway wagon (double-sided wheel braking),

Leaflet 544/1: Calculating the parameters for type GPR and GPR-A coach braking systems,

Leaflet 544/2: Coefficient for converting the theoretical braking force of 1 520 mm gauge vehicles to braking force for 1 435 mm gauge vehicles and vice versa,

Leaflet 544/3: Brake calculation rules for the 1 435 mm gauge,

Leaflet 544/4: Braking charts for signal headways of more than 1 000 m on 1 520 mm gauge railways,

- Leaflet 545: Requirements for the use of brake system diagnostics on vehicles and trains in operation,*
- Leaflet 547: Recommendations for the technical conditions for brake manometers on railway vehicles,*
- Leaflet 549: Recommendation on the brake tests to be carried out when handing over and accepting trains at border stations,*
- Leaflet 549/1: Recommendations for adjusting the brakes of coaches and wagons when changing over the bogies from the 1 435 mm gauge to the 1 520 mm gauge and vice versa,*
- Leaflet 570: Decision on how to calculate the extended interval between two periodic wagon overhauls,*
- Leaflet 571: Principal parameters and technical requirements for 4-axle container carrying wagons for the 1 435 mm track gauge without shock absorbers to protect the containers from longitudinal impacts,*
- Leaflet 572: Decision on the unification of 4-axle flat wagons,*
- Leaflet 572/1: Amendment to the leaflet on parameters and technical conditions for the design of the type A unified 4-axle flat wagon for the conveyance of containers and long, bulky goods,*
- Leaflet 572/2: Parameters and technical conditions for the design of the type B 4-axle flat wagon for the conveyance of containers and bulky goods,*
- Leaflet 572/3: Parameters and technical conditions for 4-axle flat wagons of unified design without side walls and with an axleload of 22,5 t for the 1 435 mm track gauge (wagon length over headstocks 22 350 mm),*
- Leaflet 572/4: Parameters and technical conditions for 4-axle flat wagons of unified design without side walls and with an axleload of 22,5 t for the 1 435 mm track gauge (wagon length over headstocks 14 040 mm),*
- Leaflet 572/5: Parameters and technical conditions for 4-axle flat wagons of unified design without side walls and with an axleload of 22,5 t for the 1 435 mm track gauge,*
- Standards for the 1 520 mm gauge**
- OST 24.050.67: Ladders, steps and handrails for wagons. Dimensions and general technical requirements,*
- OST 24.050.63: Railway vehicles for main lines with a gauge of 1 520 mm. Inspections,*
- OST 24.290.1: Operation of the handbrake on main line railway wagons. Principal parameters and technical requirements,*
- OST 24.290.16: Tap cocks for railway vehicles. General technical conditions,*
- OST 24.290.17: Brake cylinders for railway vehicles. General technical conditions,*
- R 50-601-10-89 and R 50-601-12-89: Recommendations. Product development and production launch system,*
- OST 24.052.5: Bogie pivot and pivot bearings on 1 520 mm gauge railway wagons. Technical conditions,*

GOST 10674: Tank wagons of main line 1 520 mm gauge railways. General technical conditions,

GOST 9.032-74: Standard system for protection against corrosion and ageing. Painting. Groups, technical requirements and inscriptions,

GOST 9.402-80: Standard system for protection against corrosion and ageing. Painting. Preparation of metallic surfaces prior to application of paint,

GOST 1561-87: Compressed-air reservoirs for automatic vehicle brakes,

GOST 2593-82: Compressed-air reservoirs for railway vehicle brakes. Technical conditions,

GOST 5267.3-90: Z-profile for central longitudinal bearers,

GOST 5520-79: Alloyed and low-alloy carbonaceous sheet steel for pressurised tanks and reservoirs,

GOST 9246-79: Two-axle bogies for wagons on main line railways with gauge of 1 520 (1 524) mm. Technical conditions,

GOST 19281-89: Low-alloy steel and steel profiles,

GOST 22235-76: Wagons for 1 520 mm gauge main line railways. General requirements for loading, unloading and marshalling,

GOST 19433-88: Dangerous goods. Classification and marking,

GOST 2.602-95: Unified system for design documents. Documents for repairs,

GOST 2.114-95: Unified system for design documents. Technical conditions,

GOST 26685-85: Covered multipurpose wagons on main line railways with 1 520 mm gauge. General technical requirements,

GOST 9238-83: Clearances between buildings and railway vehicles for the 1 520 (1 524) mm track gauge,

GOST 15.001-88: Product development and production launch system. Products intended for operational use,

Rules for the construction and safe operation of pressurised containers,

Safety regulations for the carriage of dangerous goods by rail,

Standard brake calculation for wagons and refrigerator wagons,

Standards for the calculation and design of new and modernised vehicles (not self-propelled) for the 1 520 mm gauge,

Technical requirements for the braking equipment of wagons built in RF workshops.

Warning

No part of this publication may be copied, reproduced or distributed by any means whatsoever, including electronic, except for private and individual use, without the express permission of the International Union of Railways (UIC). The same applies for translation, adaptation or transformation, arrangement or reproduction by any method or procedure whatsoever. The sole exceptions - noting the author's name and the source - are "analyses and brief quotations justified by the critical, argumentative, educational, scientific or informative nature of the publication into which they are incorporated".

(Articles L 122-4 and L122-5 of the French Intellectual Property Code).

© International Union of Railways (UIC) / Organisation for Collaboration between Railways (OSJD) - Paris, 2004

Printed by the International Union of Railways (UIC)
16, rue Jean Rey 75015 Paris - France, May 2004
Dépôt Légal May 2004

ISBN 2-7461-0128-9 (French version)
ISBN 2-7461-0129-7 (German version)
ISBN 2-7461-0130-0 (English version)