ANALYSIS OF THE BASIC PARAMETERS FOR MAINTAINING THE TECHNICAL AND OPERATIONAL COMPATIBILITY OF THE 1520 MM AND 1435 MM GAUGE RAIL SYSTEMS AT THE COMMONWEALTH OF INDEPENDENT STATES (CIS)/EUROPEAN UNION (EU) BORDER.

SUBSYSTEM: ROLLING STOCK. PASSENGER CARRIAGES

(including translation from Russian to English to use while drafting TSI)

The document drawn up by the OSJD-ERA Contact Group

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REVISIONS AND AMENDMENTS

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	5.7. 5.8.	Proposals to remove norms not applicable to the passenger rolling stock. (Highlighted in yellow)	ERA
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1 AREA OF APPLICATION OF THE DOCUMENT

The present document was prepared by the joint contact working group of experts (hereinafter the CONTACT GROUP) of the ORGANISATION FOR COOPERATION BETWEEN RAILWAYS (hereinafter the OSJD) and the EUROPEAN RAILWAY AGENCY (hereinafter the ERA) as part of cooperation between these organisations in analysing the interoperability of rail systems both inside and outside of the EU with a track gauge of 1520 mm (1524 mm for Finland) pursuant to a Memorandum of Understanding signed in 2008 and subsequent years.

The OSJD performed this work pursuant to its plan of action for 2008 and subsequent years.

The ERA performed this work pursuant to section 4.10 (Interconnection to a 1520/1524-mm Rail System) of the Mandate received by the Agency for Drafting a Third Group of Technical Specifications for Interoperability (TSI).

The contact group performed an analysis of the existing technical specifications for the Passenger carriages subsystem of the 1520 mm gauge rail system and identified the basic parameters for maintaining the compatibility of the 1520 mm gauge rail system at the CIS-EU border. The analysis was confined to technical and operational aspects of the railway system. This analysis does not include high-speed traffic (speed higher than 200 kilometres (km) per hour) as well as gang carriages.

This document contains the technical requirements for the aforementioned parameters established by the regulatory acts currently applicable within the 1520 space and draws a comparison between these requirements and the target values established for the basic parameters of a 1435-mm gauge rail system by the TSI Locomotives and Passenger Rolling Stock pursuant to the Directive on the Interoperability.

The language of this document is intended to reflect and to generalise, insofar as possible, the technical requirements currently in effect in different nations. The terms used in this document are not for service as regulatory references. The documents cited in tables of reference documents for each technical parameter concerned should be used for more precise statements of the requirements.

The materials (technical information) in this document may serve as the basis for reflecting the 'basic parameters' of the 1520 mm system in the EU TSI for the purpose of preserving the existing technical compatibility of the 1520 mm system at the CIS-EU border.

2 НОРМАТИВНЫЕ (БАЗОВЫЕ) ДОКУМЕНТЫ (REFERENCE DOCUMENTS)

Lists of reference (basic) documents are being provided in tables of respective subtitles in Chapter 5.

3. ОПРЕДЕЛЕНИЯ И СОКРАЩЕНИЯ (DEFINITIONS AND ABBREVIATIONS)

Сокращение	Abbreviation	Definition
ВНТП	VNTP	Industry-specific standards of process engineering
ГДК	TLV	Threshold limit values
ГОСТ	GOST	Interstate standard
ГОСТ Р	GOST-R	National standard of the Russian Federation
ДСТУ	DSTU	National Standardisation System of Ukraine
КМ	KM	Cabinet of Ministers
ЛДЗ	LDZ	Latvian Railways
МПС	MPS	Ministry of Railways
НТП	NTP	Standards of process engineering
ПТЭ	TOR	Technical operational regulations
СК ДБН	SK DBN	National construction standards for structures
СН	SN	Construction standards
СНБ	SNB	Construction standards of Belarus
СНиП	SNiP	Construction standards and regulations
СТН	STN	Construction requirements and standards
СТБ	STB	National standard of the Republic of Belarus
СТ РК	ST RK	National standard of the Republic of Kazakhstan
СТП	STP	Company standards
СЦБ	STsB	Signalling, interlocking and blocking
ТСИ	TSI	Technical Specification for Interoperability
УИ	IM	Infrastructure Manager
ЦНИИ	TsNII	Central Science and Research Institute
ЦП	TsP	Department of Tracks and Structures (Russian Federation); Chief Track Maintenance Administration (Ukraine)
ЦПТ	TsPT	Technical Service of the Department of Tracks and Structures (Russian Federation)
ЦРБ	TsRB	Traffic Safety Department (Russian Federation); Chief Administration of Traffic Safety and Environmental Protection (Ukraine)
ЦСЖТ	TsSZhT	Council for Rail Transport of the CIS States; the Republic of Latvia, the Republic of Lithuania, and the Republic of Estonia

Сокращение	Abbreviation	Definition
ADV	ADV	Train Traffic Regulations
EN	EN	European standard
ĮST	ĮST	Lithuanian company standard
LHS	LHS	Broad Gauge Metallurgy Line (PKP Linia Hutnicza Szerokotorowa)
LG	LG	Lithuanian Railways
LVS	LVS	Latvian National Standard
PN	PN	Polish standard
STR	STR	Technical construction regulations (Lithuania)
HN	HN	Hygiene standards (Lithuania)
DTR	DTR	Dokumentacja Techniczno Ruchowa (Maintenance documentation)
ISO	ISO	Quality management systems – Requirements
UIC	UIC	Międzynarodowe Zrzeszenie Kolei (International Union of Railways)
UTK	UTK	Urząd Transportu Kolejowego (Office of Rail Transport)
WTO	WTO	Warunki Techniczne Odbioru (Technical Conditions of Acceptance)

4 СПИСОК ОПРЕДЕЛЯЮЩИХ ПАРАМЕТРОВ (LIST OF BASIC PARAMETERS)

The list contains the basic parameters for maintaining the technical and operational compatibility of the 1520 mm gauge subsystem "Rolling stock. Passenger carriages" at the Commonwealth of Independent States (CIS)/European Union (EU) border. This list has been developed based on the TSI "Rolling stock. Locomotives and passenger rolling stock" and supplemented and adapted taking into account the nature of the 1520 mm track gauge subsystem.

Note: The lines of the table not related to the passenger rolling stock have been left empty to preserve the overall structure of the Locomotive and Passenger carriages subsystem tables.

№	Русское наименование (Title in Russian)	Английское наименование (согласно проекту ТСИ) (Title in English (taken from the draft TSI))	Номер главы проекта ТСИ (draft TSI chapter's number)
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2.2	Статическая осевая нагрузка	Static axle load	4.2.3.2
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5 ANALYSIS OF BASIC PARAMETERS

5.1 КОНСТРУКЦИЯ И МЕХАНИЧЕСКОЕ ОБОРУДОВАНИЕ *(STRUCTURE AND MECHANICAL PARTS)*

5.1.1 Общие положения *(General)*

Russia, Belarus:

This section contains the requirements for the structural strength of the rolling stock bodies and mechanical couplers between the rolling stock units.

Most of these requirements are intended to ensure the mechanical integrity of a train during its operation and in emergency situations and to ensure the protection of people inside passenger and staff compartments in case of a collision or train derailment.

Methods of compliance assessment: Expert inspection of the engineering documentation, tests.

These requirements have been approved by the following documents:

Belarus	GOST 12.2.003-91. Occupational safety standard system. Production equipment. General safety requirements Informative – GOST R 51690–2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Latvia	TOR of Latvian Railway
Lithuania	ADV-001 Regulations on the technical operation of railways
Poland	Technical specifications of manufacturer
Russia	GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	Regulations of the Slovak Republic on the protection from noise and vibration Service directive Sm 50. Additional provisions to the regulations on the operation of transport on broad-gauge line Matovce – Haniska pri Košiciach TP – 10-28/1345/73 Technical conditions for electric double-section locomotives 67E1 (125.8)
Ukraine	TsRB-0004. Technical operation regulations of the Ukrainian Railways Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) TsTECH – 0068 16.01.2012. "Guidelines for organisation of accelerated passenger train traffic on Ukrainian railways and the requirements for the infrastructure and rolling stock."

	DSTU 4049-2001. Locomotive-hauled passenger carriages for main lines. Safety requirements
Estonia	Informative – GOST 12.2.056-81. 1520 mm gauge electric locomotives and diesel locomotives. Safety requirements

5.1.2 Механические сцепные устройства *(Mechanical interfaces)*

5.1.2.1 Общие положения и определения *(General and definitions)*

Russia, Belarus:

The carriages shall be equipped with automatic flexible and semi-rigid couplers with the main installation dimensions to GOST 3475 (Russia) and contour line to GOST 21447.

Currently, automatic coupler SA-3 is used on the rolling stock, and BSU-3 for coupling the carriages in train sets.

The train set carriages (where recomposition en route is not allowed) can be equipped with both couplers and automatic couplers. Automatic couplers are allowed for installation on all types of railway rolling stock.

On the carriages intended for operational speeds over 160 km/h, installation of only rigid type automatic couplers (which do not allow relative vertical shifts after engagement) is allowed.

On the carriages intended for operational speeds up to 160 km/h, the automatic couplers shall only be of rigid or semi-rigid type with bracket (vertical movement limiter).

Couplers shall only be of rigid type irrespective of the carriage travel speed.

The couplers shall be slack-free and ensure engagement with the contour line to GOST 21447 via an adapter.

Methods of compliance assessment: Expert inspection of the engineering documentation, tests.

These requirements have been approved by the following documents:

Belarus	TOR of Belarusian Railway NB ZhT TsV-TsL 022-2000. Safety standards on railway transport. Automatic couplers for rolling stock of railways OST 32.193-2002. Slack-free couplers of locomotive-hauled passenger carriages and passenger carriages of multi-unit rolling stock for 1520 mm gauge railways. Coupler contour line and setting dimensions GOST 21447-7. Automatic coupler contour line. Dimensions GOST 3475–2000. Automatic coupler for the rolling stock of 1520 (1524) mm track gauge main railway lines. Setting dimensions Informative – GOST R 54749-2011. Coupler and automatic coupler of railway rolling stock. Technical requirements and rules of acceptance
Kazakhstan	
Latvia	TOR of Latvian Railway p. 395–397 Guidelines for repairs and maintenance of automatic coupler of

	railway rolling stock DR-41-2002 Informative – GOST 21447-7. Automatic coupler contour line. Dimensions
Lithuania	ADV-001 Regulations on the technical operation of railways 60/V Automatic coupler of rolling stock, repairs and technical maintenance GOST 21447-7. Automatic coupler contour line. Dimensions
Poland	GOST 3475–81. Automatic coupler for the rolling stock of 1520 (1524) mm track gauge main railway lines. Setting dimensions GOST 88-55. Automatic coupler SA-3
Russia	GOST 3475–2000. Automatic coupler for the rolling stock of 1520 (1524) mm track gauge main railway lines. Setting dimensions Regulations for technical operation of the railways of the Russian Federation approved by the order of the Ministry of Transport of Russia No. 286 of 21/12/2010, Appendix 5 paragraph 19 GOST 21447-7. Automatic coupler contour line. Dimensions NB ZhT TsV-TsL 022-2000. Safety standards on railway transport. Automatic couplers for rolling stock of railways OST 32.193-2002. Slack-free couplers of locomotive-hauled passenger carriages and passenger carriages of multi-unit rolling stock for 1520 mm gauge railways. Coupler contour line and setting dimensions GOST R 54749-2011. Coupler and automatic coupler of railway rolling stock. Technical requirements and rules of acceptance
Slovakia	GOST 3475–81. Automatic coupler for the rolling stock of 1520 (1524) mm track gauge main railway lines. Setting dimensions GOST 88-55. Automatic coupler SA-3
Ukraine	GOST 3475–81. Automatic coupler for the rolling stock of 1520 (1524) mm track gauge main railway lines. Setting dimensions TsRB-004. Technical operation regulations of the Ukrainian Railways TsV-TsL-TsT-0014. Guidelines for the repair and maintenance of automatic couplers of rolling stock of the Ukrainian railways. GOST 21447-7. Automatic coupler contour line. Dimensions DSTU 4049-2001. Locomotive-hauled passenger carriages for main lines. Safety requirements NB ZhT TsV-TsL 022-2000. Safety standards on railway transport. Automatic couplers for rolling stock of railways
Estonia	TOR of Latvian Railway. Order No. 39 09.07.1999 Informative – GOST 21447-7. Automatic coupler contour line. Dimensions

5.1.2.2 Внутрисекционное сцепное устройство *(Inner coupling)*

Not used on 1520 mm system passenger carriages.

5.1.2.3 Концевое сцепное устройство *(End coupling)*

Russia, Belarus:

Railway rolling stock shall be equipped with automatic couplers.
Automatic coupler centreline height above the rail shall be:
– for locomotives, empty passenger carriages and freight wagons: not exceeding 1080 mm;
– for locomotives and passenger carriages with people: not exceeding 980 mm;
for special rolling stock:
– when empty: not exceeding 1080 mm;
– when loaded: not exceeding 980 mm.
For railway rolling stock coming out of repairs, the automatic coupler centreline height above the rail shall comply with the standards and regulations and ensure operation at maximum wear and loads.
The difference in the longitudinal centreline heights of the automatic couplers shall not exceed:
- for a passenger train travelling at up to 120 km/h: 10 mm;
- for a passenger train travelling at 121–140 km/h: 50 mm;
- between the locomotive and the first carriage of a passenger train: 100 mm;
- between the locomotive and the carriages of a special rolling stock: 100 mm.

Russia:

Automatic couplers shall ensure:

a) automatic coupling with automated coupler longitudinal centreline height difference from 0 to 140 mm, relative horizontal shift of the said centrelines from 0 to 160 mm and horizontal turn angle from 0° to 4.5°, as well as at 8° at relative horizontal shift 40 mm, which correspond to carriage coupling in standard curves;

b) maintaining coupling of the rail rolling stock in travel, including on rated circular and S-curves, change of gradient 55‰ provided in Table 1 of GOST 54749, OST 547, compound by vertical 250 m radius curve;

c) uncoupling of the railway rolling stock units in compressed and free state remotely via an uncoupling arrangement;

d) automatic maintaining the uncoupled state until the separation of the units of the railway rolling stock;

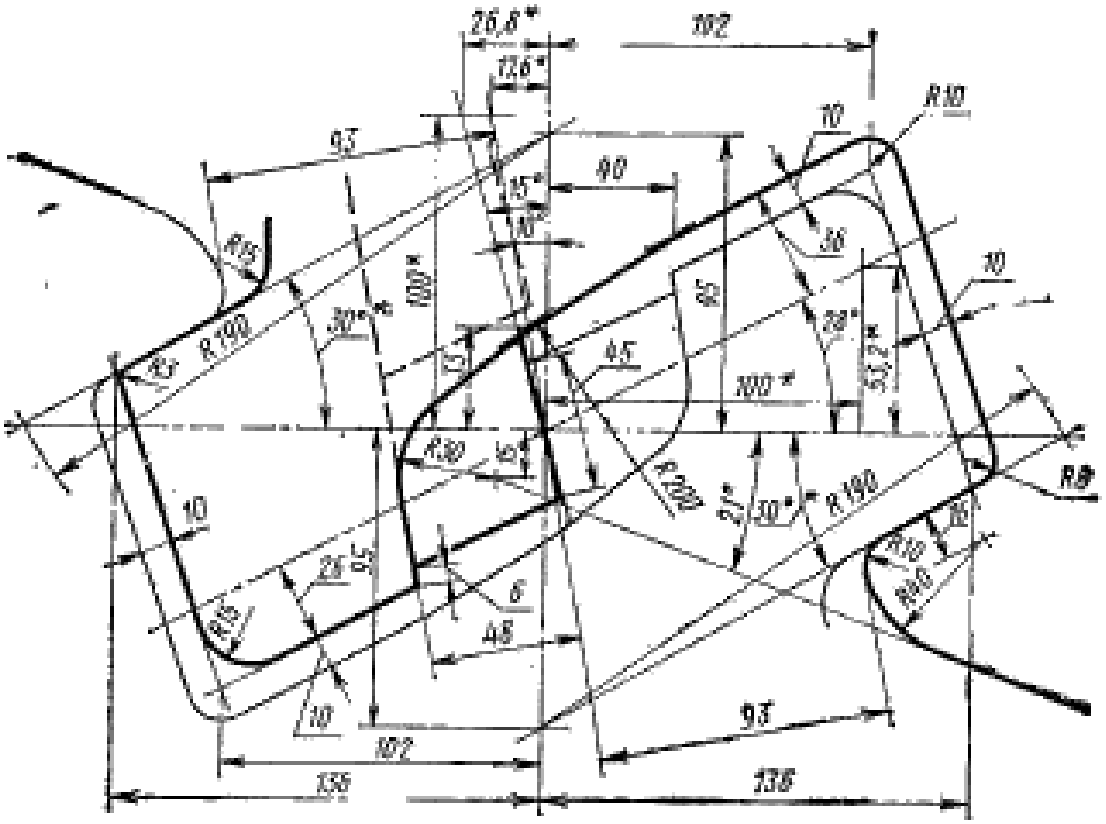
e) automatic restoration of the ready for coupling state after the separation of the disengaged automatic couplers;

f) remote restoration of the coupling of erroneously uncoupled carriages without their separation;

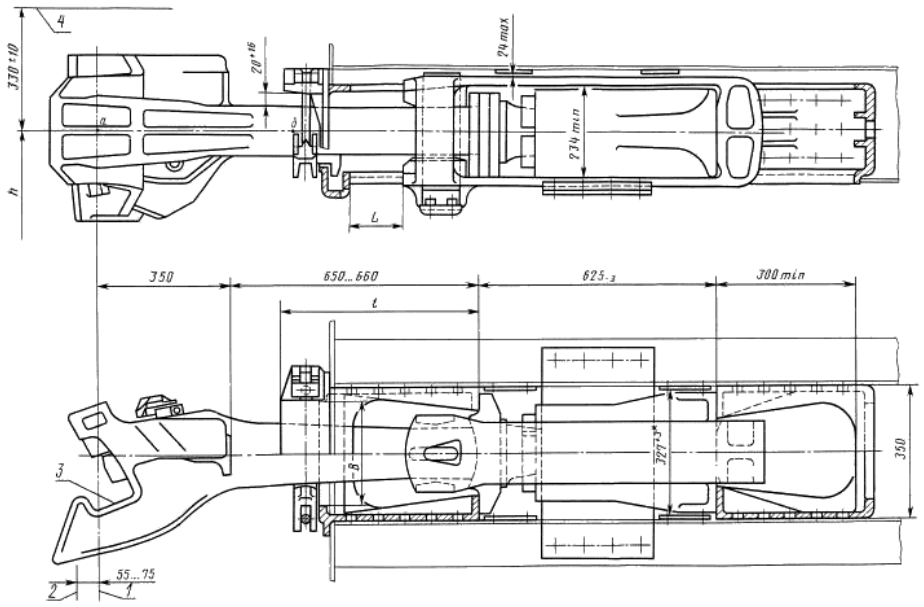
g) possibility of visual monitoring of the coupling mechanism without a person coming between the units of the railway rolling stock;

h) possibility of limiting vertical shifts.

Automatic coupler contour line



Basic coupler dimensions (with coupler shank contact with the follower). The drawing does not define the arrangement of the assembly elements and automatic coupler parts.



1 — плоскость зацепления автосцепки; *2* — упорная поверхность буферов пассажирских вагонов; *3* — контур зацепления автосцепки по ГОСТ 21447; *4* — линия приближения к автосцепке переходной площадки пассажирских вагонов

* Для вагонов значение равно: для пассажирских 327 ± 3, для грузовых $327^{+4.5}_{-1.5}$

1 – плоскость зацепления автосцепки 2 – упорая поверхность буферов пассажирских вагонов 3 – контур зацепления автосцепки по ГОСТ 21447 4 – линия приближения к автосцепке переходной площадки пассажирских вагонов Для вагонов значение равно: для пассажирских 327 ± 3, для грузовых $327^{+4.5/-1.5}$	1 – automatic coupler contact plane 2 – support surface of passenger carriage buffer 3 – automatic coupler contact plane to GOST 21447 4 – line of approach to automatic coupler of passenger carriage connecting gangways For carriages, the value equals: 327 ± 3 for passenger carriages, $327^{+4.5/-1.5}$ for goods wagons

Compliance assessment: instrument measurements, visual inspections and experimental testing.

These requirements have been approved by the following documents:

Belarus	Technical operational regulations of the Belarusian Railway GOST 21447-7. Automatic coupler contour line. Dimensions GOST 3475–81. Automatic coupler for the rolling stock of 1520 (1524) mm track gauge main railway lines. Setting dimensions Guidelines OSJD O-522/1. Technical conditions for automatic couplers of the members of the Organisation for Cooperation between Railways and the International Union of Railways Informative – GOST R 54749-2011. Coupler and automatic coupler of railway rolling stock. Technical requirements and rules of acceptance

Kazakhstan	TOR of railway transport
Latvia	TOR of Latvian Railway p. 398 OSJD O-522.1. Technical conditions for automatic couplers of the railways-members of the Organisation for Cooperation between Railways and the International Union of Railways.
Lithuania	ADV-001 Regulations on the technical operation of railways 60/V. Guidelines for the repair and maintenance of automatic couplers of rolling stock. OSJD O-522/1. Technical conditions for automatic couplers of the railways-members of the Organisation for Cooperation between Railways and the International Union of Railways.
Poland	GOST 22703-91. Cast parts of automatic coupler for the rolling stock of 1520 mm track gauge railways. General technical conditions. With possibility to replace with screw type coupler 6D hook in accordance with OSJD O 521. Leaflet OSJD O 521.
Russia	GOST 3475–2000. Automatic coupler for the rolling stock of 1520 (1524) mm track gauge main railway lines. Setting dimensions. Regulations for technical operation of the railways of the Russian Federation approved by the order of the Ministry of Transport of Russia No. 286 of 21/12/2010, Appendix 5 paragraph 19. GOST 21447-7. Automatic coupler contour line. Dimensions. OST 32.193 – 2002. Slack-free couplers of locomotive-hauled passenger carriages and passenger carriages of multi-unit rolling stock for 1520 mm gauge railways. Coupler contour line and setting dimensions. GOST R 54749 – 2011. Coupler and automatic coupler of railway rolling stock. Technical requirements and rules of acceptance. Guidelines OSJD O-522/1. Technical conditions for automatic couplers of the members of the Organisation for Cooperation between Railways and the International Union of Railways.
Slovakia	GOST 21447-7. Automatic coupler contour line. Dimensions. Guidelines OSJD O-522/1. Technical conditions for automatic couplers of the members of the Organisation for Cooperation between Railways and the International Union of Railways. Technical operational regulations of the Railway of Slovak Republic Part 2 – Rolling stock and its repairs.
Ukraine	GOST 21447-7. Automatic coupler contour line. Dimensions. Leaflet OSJD O-522/1. Technical conditions for automatic couplers of the members of the Organisation for Cooperation between Railways (OSJD) and the International Union of Railways (UIC.) TsRB-0004. Technical operation regulations of the Ukrainian

	Railways, p. 11.5. NB ZhT TsV-TsL 022-2000. Safety standards on railway transport. Automatic couplers for rolling stock of railways. LAF automatic coupler (UNILINK). Technical requirements.
Estonia	TOR of Estonian Railways. Order No. 39 09.07.1999, p 146.

5.1.2.4 Аварийное сцепное устройство *(Rescue coupling)*

Russia, Belarus:

On passenger rolling stock, mainly SA-3 automatic couplers are used with contour line to GOST 21447. Rolling stock with other type of couplers shall be complete with adapters with contour line to GOST 21447.

For rolling stock not equipped with the coupling system compatible with the automatic coupler, a possibility of coupling with the automatic coupler via an adapter should be provided.

Detailed requirements for the operational parameters of the adapter are given in the documentation for the rolling stock, which is supplied with it.

These requirements have been approved by the following documents:

Belarus	TOR of Belarus Railway. GOST 21447-7. Automatic coupler contour line. Dimensions. GOST 3475–81. Automatic coupler for the rolling stock of 1520 (1524) mm track gauge main railway lines. Setting dimensions. Informative – GOST R 54749-2011. Coupler and automatic coupler of railway rolling stock. Technical requirements and rules of acceptance
Kazakhstan	TOR of railway transport
Latvia	TOR of Latvian Railway p. 396 Informative – GOST 21447-7. Automatic coupler contour line. Dimensions GOST 3475–81. Automatic coupler for the rolling stock of 1520 (1524) mm track gauge main railway lines. Setting dimensions OST 32.193-2002. Slack-free couplers of locomotive-hauled passenger carriages and passenger carriages of multi-unit rolling stock for 1520 mm gauge railways. Coupler contour line and setting dimensions OSJD O-522.1. Technical conditions for automatic couplers of the railways-members of the Organisation for Cooperation between Railways and the International Union of Railways

Lithuania	ADV/001 Regulations on the technical operation of railways 60/V. Guidelines for the repair and maintenance of automatic couplers of rolling stock GOST 21447-7. Automatic coupler contour line. Dimensions GOST 3475–81. Automatic coupler for the rolling stock of 1520 (1524) mm track gauge main railway lines. Setting dimensions
Poland	Leaflets: OSJD-520, 521, 516
Russia	GOST 21447-7. Automatic coupler contour line. Dimensions GOST 3475–81. Automatic coupler for the rolling stock of 1520 (1524) mm track gauge main railway lines. Setting dimensions GOST R 54749-2011. Coupler and automatic coupler of railway rolling stock. Technical requirements and rules of acceptance OSJD O-522/1. Technical conditions for automatic couplers of the railways-members of the Organisation for Cooperation between Railways and the International Union of Railways
Slovakia	Leaflets: OSJD-520, 521, 516 TOR of Railway of Slovak Republic. Part 2 – Rolling stock and its repairs.
Ukraine	GOST 21447-7. Automatic coupler contour line. Dimensions TsRB-0004. Technical operation regulations of the Ukrainian Railways GOST 31239–2000. Automatic couplers of carriages of 1520 mm track gauge railways. Operational safety requirements OSJD O-522/1. Technical conditions for automatic couplers of the railways-members of the Organisation for Cooperation between Railways and the International Union of Railways GOST 3475–81. Automatic coupler for the rolling stock of 1520 (1524) mm track gauge main railway lines. Setting dimensions
Estonia	TOR of Estonian Railway. Order No. 39 09.07.1999

5.1.2.5 Доступ персонала для сцепления и расцепления *(Staff access for coupling and uncoupling)*

Russia, Belarus:

The design of the coupler and its location on the rolling stock shall ensure safety of the work of the maintenance staff and easy access for inspection, repairs and maintenance.

Disengagement of the automatic couplers shall be ensured from either side of the carriage on straight and curved track sections by one person without going between the carriages. The disengagement shall take maximum 1 minute.

The design of the couplers shall ensure their engagement and disengagement without a person present between the rolling stock units with application of a longitudinal load to the vehicles causing them to move along the axis of the track.

Methods of compliance assessment: visual inspections and experimental testing.

These requirements have been approved by the following documents:

Belarus	TOR of Belarusian Railway GOST 31239–2000. Automatic couplers of carriages of 1520 mm track gauge railways. Operational safety requirements Informative – GOST R 54749-2011. Coupler and automatic coupler of railway rolling stock. Technical requirements and rules of acceptance
Kazakhstan	ST RK 1844-2008. Passenger carriages. Bogies with adjustable wheelsets for 1435 and 1520 mm track gauge railway. Technical requirements TOR of railway transport
Latvia	TOR of Latvian Railway
Lithuania	ADV/001 Regulations on the technical operation of railways GOST 31239–2000. Automatic couplers of carriages of 1520 mm track gauge railways. Operational safety requirements
Poland	Leaflet UIC 560
Russia	GOST R 54749-2011. Coupler and automatic coupler of railway rolling stock. Technical requirements and rules of acceptance OSJD O-522/1. Technical conditions for automatic couplers of the railways-members of the Organisation for Cooperation between Railways and the International Union of Railways Locomotive-hauled passenger carriages based on unified platforms. Technical requirements 2007.
Slovakia	GOST 12.2.056-81. SSBT (Occupational Safety Standards System). 1520 mm gauge electric locomotives and diesel locomotives. Safety requirements
Ukraine	GOST 31239–2004. Automatic couplers of carriages of 1520 mm track gauge railways. Operational safety requirements GOST 3475–81. Automatic coupler for the rolling stock of 1520 (1524) mm track gauge main railway lines. Setting dimensions NB ZhT TsV-TsL 022-2000. Automatic couplers for rolling stock of railways. Safety standards OSJD O-522/1. Technical conditions for automatic couplers of the railways-members of the Organisation for Cooperation between

	Railways and the International Union of Railways
Estonia	TOR of Estonian Railway. Order No. 39 09.07.1999

5.1.3 Межвагонный переход *(Gangways)*

Russia, Belarus:

Possibility of prevention of passenger access to the disengaged end platform shall be ensured.

In passenger carriages, safe passage of the maintenance staff and passengers from carriage to carriage shall be provided by means of end platforms. The design of the end platforms shall be of closed type, i. e. prevent the possibility of any accidental passenger or maintenance staff' coming into contact with any external elements of the railway rolling stock and any elements of railway transport infrastructure.

The design of the gangway shall include the connecting gangway and guardrails and can be implemented in either of the following two ways:

- gangway with U-guardrails can be fitted on the carriages with any type of couplers and automatic couplers;

- sealed gangway (closed contour) can be fitted on the carriages of train sets equipped with rigid type couplers and automatic couplers (which do not allow relative vertical shifts along the contour line).

The gangways shall have lighting in accordance with SP 2.5.1198.

The connecting gangway shall be designed for 1 kN load applied to 10x10 cm in any area and distributed load 3 kN/m^2. The stress level shall not exceed the yield level.

Compliance assessment: instrument measurements, linear measurements.

These requirements have been approved by the following documents:

Belarus	SP 2.5.1198 – 03. Sanitary regulations for the organisation of passenger traffic by railway transport Technical regulations on safety of railway rolling stock TR TS 001/2011. Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	ST RK GOST R 51690–2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions ST RK 1547 – 2006. Serving passengers on railway transport. Technical requirements for carriage of passenger on trains ST RK 1455 – 2005. Serving passengers on railway transport. Technical requirements for carriage of passenger on premium service

	trains Technical regulations on safety of railway rolling stock TR TS 001-2011.
Latvia	TSI PRM
Lithuania	Leaflet UIC 560. Doors, entrance platforms, windows, steps, handles and handrails of passenger and baggage carriages TSI PRM
Poland	Leaflet UIC 560 Doors, entrance platforms, windows, steps, handles and handrails of passenger and baggage carriages
Russia	Technical regulations on safety of railway rolling stock TR TS 001-2011. Sanitary regulations for the organisation of passenger traffic by railway transport SP 2.5.1198 – 03. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	Leaflet UIC 560. Doors, entrance platforms, windows, steps, handles and handrails of passenger and baggage carriages TSI PRM TOR of Railway of Slovak Republic. Part 2 – Rolling stock and its repairs.
Ukraine	DSTU UIC 5612007. Passenger carriages. Gangway passages. General technical requirements Sanitary regulations for the arrangement of equipment and operation of long-distance passenger carriages TsUVS MPS 1984 DSTU 4049-2001. Locomotive-hauled passenger carriages for main lines. Safety requirements
Estonia	TSI PRM Informative – SP 2.5.12.20.98

5.1.4 Прочность конструкции единицы ПС *(Strength of vehicle structure)*

Russia, Belarus:

Assessment of strength is performed in accordance with the requirements of the Standards for the Calculation and Design of 1520 mm Track Gauge Carriages for the Railways of the Ministry of Railways (Unpowered)

The following main loads shall be taken into account in the design:

1. Nominal values of longitudinal forces applied along the axes of the automatic couplers, tension 2.0 MN, compression 2.5 MN.

2. Vertical static loads. These include dry weight of the body, maximum weight of carried load or passengers (100 kg per passenger, including passenger's baggage).

3. Extreme loads.

4. Combinations of static loads.

5. Dynamic and quasi static loads.

Stress in the bearing elements of the body at quasi static tensile loads 1.5 MN and compression 2.5 MN and impacts of 2.5 MN shall not exceed permissible values given in Table A.1 of GOST 55182-2012.

The strength of the carriage body shall permit lifting the equipped carriage on two jacks diagonally across the carriage and lifting the carriage by the coupling, whereby the stress in the carriage structure shall not exceed the permissible values.

These requirements have been approved by the following documents:

Belarus	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered), GosVNIIV-VNIIZhT 1996 Informative – GOST R 53076-2008 (EH 12663:2000). Rail transport. Requirements for the strength of railway rolling stock bodies. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	ST RK 1846 – 2008. Passenger carriages and freight wagons. Methods of strength and running performance tests. GOST R 53076-2008 (EH 12663:2000). Rail transport. Requirements for the strength of railway rolling stock bodies. DSTU 4049-2001. Locomotive-hauled passenger carriages for main lines. Safety requirements
Latvia	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Lithuania	LST EN 12663. Railway equipment. Requirements for the body structures of railway transport.
Poland	TSI LOC&PAS PN-EN 12663-1:2010

Russia	GOST R 53076-2008 (EH 12663:2000). Rail transport. Requirements for the strength of railway rolling stock bodies. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered). VNIIV-VNIIZhT 1983.
Slovakia	EN 12663. Railway equipment. Requirements for the body structures of railway transport. TSI LOC&PAS
Ukraine	DSTU 4049-2001. Locomotive-hauled passenger carriages for main lines. Safety requirements Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. GOST 10527–2000. Two-axle bogies of passenger carriages on 1520 mm track gauge main railway lines. Technical conditions DSTU 4045-2001. Main line locomotive-hauled passenger carriage bogies. General technical conditions
Estonia	EVS-EN 12663:2000. Requirements for the strength of the railway rolling stock body structures. EVS-EN 15227:2008. Requirements for the impact resistance of the railway rolling stock body structures.

5.1.5 Пассивная безопасность *(Passive safety)*

Russia, Belarus:

Requirements for the passive safety system in accident collisions

Mean longitudinal acceleration value (deceleration speed) of the rolling stock units at the moment of collision with an obstacle according to the obstacle scenarios shall not exceed 5g (g = 9.81 m/sec).

Mean longitudinal acceleration value is determined on the bearing metal structures of a rolling stock unit body at the fixing points of the energy absorbers.

Mean longitudinal acceleration value is determined as a ratio of speed change in the time interval from the moment of exceeding the zero longitudinal effort sum acting on the opposite ends of the rolling stock unit (from the adjacent carriages or obstacle) to the moment when this sum equals zero, to the value of this time interval.

In collisions scenarios, plastic deformations of individual elements of the load bearing structures of the bodies not leading to loss of the overall bearing capacity of the carriages are allowed.

At the same time, preservation of the initial geometry of the rolling stock unit bodies within the tolerances provided in the manufacturer's engineering documents shall be ensured.

The strength of the fixing structures of the passenger seats/benches and luggage racks shall be in accordance with the maximum stress value of 0.9 sigma ("sigma" is the yield strength of the material).

The strength of the passenger seat/bench fixing elements shall be calculated for each of the following load scenarios (taking into account the weight of the seat/bench structure and passengers occupying them):

1) action of vertical force of gravity of the seats/benches and passengers occupying them with a vertical acceleration of 3g;

2) combined action of vertical force of gravity of the seat/benches and passengers occupying them with a vertical acceleration of 1g and force of inertia caused by longitudinal acceleration +/-4g for locomotive-hauled passenger carriages;

3) combined action of vertical force of gravity of the seats/benches and passengers occupying them with a vertical acceleration of 1g and force of inertia caused by lateral acceleration +/-1g.

In the strength calculations, the weight of one passenger is assumed to be 70 kg. The centre of gravity of a seated passenger is 660 mm above floor level. The weight of the passengers in the calculation scheme is taken to be rigidly connected to the bearing elements of the seat/bench structure and observing the specified location of the centre of gravity of a sitting passenger.

In the calculation of the strength of the luggage rack fastening elements, four calculation scenarios shall be considered:

1) action of the uniformly distributed (constant) vertical load equal to 1000 N/m;

2) action of a concentrated vertical load 850 N on the external longitudinal stiffener of the rack applied mid-way between adjacent elements fastening the rack to the wall;

3) combined action of the force of gravity of the rack structure and the luggage on it and the force of inertia caused by longitudinal accelerations +/-3g. For this, the luggage is assumed to be uniformly distributed on the rack based on 25 kg per each running metre of the rack;

4) combined action of the force of gravity of the rack structure and the luggage on it and the force of inertia caused by transversal accelerations +/-1g. For this, the luggage is assumed to be uniformly distributed on the rack based on 25 kg per each running metre of the rack.

The strength of the fastening structures of the body equipment (except the passenger seat/bench and luggage rack fastening) shall be in accordance with the maximum stress value of 0.9 sigma ("sigma" is the yield strength of the material) for each of the following instances of load:

a) action of vertical force of gravity of the equipment and load placed onto it with vertical acceleration equal to (1+/-c)g, where c = 2 at the end of the carriage and decreases linearly to 0.5 in the middle of the carriage;

2) combined action of vertical force of gravity of the equipment and load placed onto it with vertical acceleration of 1g and force of inertia caused by longitudinal acceleration +/-4g for locomotive-hauled passenger carriages;

3) combined action of vertical force of gravity of the equipment and load placed onto it with vertical acceleration of 1g and force of inertia caused by lateral acceleration +/-1g.

The strength of the fastening structures of the body equipment, passenger seats/benches and luggage racks shall be additionally tested to the stress limit value 0.9sigma under the combined action of the vertical force of gravity caused by vertical acceleration 1`g and force of inertia from longitudinal acceleration +/-5g. The mean longitudinal acceleration value in the rolling stock unit based on the collision calculation in accordance with the scenarios set out in Section 4 can be used instead of the longitudinal acceleration value of +/-5g. In such a case, the greater of the two mean acceleration values corresponding to two collision scenarios shall be chosen.

In occupied areas of the rolling stock (lounges, compartments), the interior equipment (seats, benches, sleeping berths, luggage racks, etc.) and interior design elements shall not have any sharp protruding parts (edges, corners, etc.) or such parts shall be covered with soft materials to minimise risk of injury.

The requirement for the energy absorbers, collision scenarios and clarifying requirements for the passive safety system are provided in the document (see Table) – Russia.

These requirements have been approved by the following documents:

Belarus	GOST/EN draft. Emergency crash systems of passenger railway rolling stock. Technical requirements and methods of control. (Based on EN 15227:201) Informative – Technical requirements for passive safety system of passenger rolling stock of 1520 mm track gauge railways No. 2740 of 20/12/2011
Kazakhstan	ST RK MEK 61373 2007. Railway rolling stock. Rolling stock equipment. Shock and vibration test. The following GOST/EN is scheduled to be drafted in 2012: Emergency crash systems of passenger railway rolling stock.Technical requirements and methods of control (based on EN 15227:2011)
Latvia	No standards
Lithuania	No standards

Poland	PN-EN 15227:2008
Russia	Technical requirements for passive safety system of passenger rolling stock of 1520 mm track gauge railways No. 2740 of 20/12/2011. GOST/EN draft. Emergency crash systems of passenger railway rolling stock. Technical requirements and methods of control (based on EN 15227:2011)
Slovakia	EN 12663 EN 15227 Law No. 513 of 2009
Ukraine	No standards
Estonia	No standards

5.1.6 Возможность поднятия домкратом (*Lifting and jacking)*

Russia, Belarus:

The body frame should allow lifting the body with all its equipment using four jacks or a crane and allow lifting the body on one side (in case of bogie rolling out or rolling in). The body shall be lifted at specially provided points. At the same time lifting of the body frame shall not cause residual deformation.

The structure of the body shall be designed for and tested at loads occurring during lifting of the equipped body by two jacks placed in the area of bolster beams of the frame diagonally and loads occurring during emergency lifting by the automatic coupler (end part of the carriage). It shall not cause any residual deformations or loss of stability of the structural elements.

It shall be possible to lift each unit of the railway rolling stock in case of wheelset derailment using cranes and jacks and possible to transport it with a blocked wheelset.

These requirements have been approved by the following documents:

Belarus	Technical regulations of the Customs Union "On safety of railway rolling stock" (TR TS 001/2011). NB ZhT TsT 01-98. Railway passenger carriages. Safety standards Informative – GOST R 51690–2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements (drafting stage) Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Kazakhstan	Technical regulations of the Customs Union "On safety of railway

	rolling stock" (TR TS 001/2011) was approved by decision of the Customs Union Committee No. 710, Clause 62, of 15/07/2011. Informative – GOST R 51690–2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions GOST R. Locomotive-hauled passenger carriages. General technical requirements (drafting stage)
Latvia	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Lithuania	Informative – GOST R 51690–2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions LST EN 12663. Railway equipment. Requirements for the body structures of railway transport.
Poland	Leaflet UIC 438-3
Russia	GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements Technical regulations of the Customs Union "On safety of railway rolling stock" (TR TS 001/2011) was approved by decision of the Customs Union Committee No. 710, Clause 62, of 15/07/2011.
Slovakia	Leaflet UIC 438
Ukraine	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. NB ZhT TsT 01-98. Railway passenger carriages.
Estonia	

5.1.7 Крепление устройств к конструкции кузова (*Fixing of devices to carbody structure)*

Russia, Belarus:

The equivalent tension in the bearing body elements and the equipment fastening elements (passenger seats, benches, sleeping berths and luggage racks, handrails, steps, foot boards, etc.) and the devices for the mechanisation and automation of handling under the simultaneous action of longitudinal, vertical and transversal acceleration impulses shall not

exceed the yield strength of the material. The rated values of the symmetrical triangular acceleration impulses are provided in the Table. The duration of the impulses is 0.2 sec.

Acceleration values in the calculations of the equipment fastening strength m/sec^2

Acceleration action direction			
Longitudinal	Transversal	Vertical	
		At the end of the body	In the middle of the body
± 40	±10	±30(± 20)*	±15
* For multiple-unit carriages.			

Fastening elements of the undercarriage equipment located under the body, including assembly units of the bogie connection with the body, shall withstand a longitudinal inertia load corresponding to the rated value of longitudinal acceleration 50 m/sec^2.

These requirements have been approved by the following documents:

Belarus	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered), GosVNIIV-VNIIZhT 1996 Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. Technical requirements for passive safety system of passenger rolling stock of 1520 mm track gauge railways. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	Technical requirements for passive safety system of passenger rolling stock of 1520 mm track gauge railways No. 2740 of 20/12/2011. Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered), GosVNIIV-VNIIZhT 1996 Informative – Draft GOST R. Locomotive-hauled passenger carriages. General technical requirements

Latvia	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Lithuania	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. LST EN 12663. Railway equipment. Requirements for the body structures of railway transport.
Poland	
Russia	Technical requirements for passive safety system of passenger rolling stock of 1520 mm track gauge railways No. 2740 of 20/12/2011. Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	EN 12663 EN 15227
Ukraine	DSTU 4049-2001. Locomotive-hauled passenger carriages for main lines. Safety requirements Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. NB ZhT TsT 01-98. Railway passenger carriages. GOST 30631-99. General requirements for machines, appliances and other industrial products in terms of resistance to external mechanical factors during operation. GOST 17516.1-90. Electric devices. General requirements for resistance to external mechanical factors
Estonia	EVS-EN 12663:2000. Requirements for the strength of railway rolling stock body structures.

5.1.8 Двери в служебные помещения (*Staff and freight access doors)*

Not applicable to 1520 passenger carriages.

5.1.9 Механические характеристики стекла *(Mechanical characteristics of glass other than windscreens)*

Russia, Belarus:

The strength of the glass and its resistance to mechanical and environmental factors shall comply with the requirements stipulated by GOST 5727 and withstand pressure of ±6 kPa from the shockwave of opposite-direction traffic. The window glass shall be made to GOST 5727.

To ensure shock resistance and increase infrared reflection, the external glass of the glass unit can be coated with polymer film of a thickness and colour approved by the customer.

The internal glass in toilets, broom cabinets and boiler rooms (if any) shall be ornamental, matte or covered with opaque film.

These requirements have been approved by the following documents:

Belarus	STB 1639-2006. Safety glass for land transport. General technical conditions GOST 111-2011. Sheet glass. Technical conditions Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements GOST 5727-88. Safety glass for land transport. General technical conditions
Kazakhstan	ST RK 1668 2007. Window and door glass for special railway rolling stock. Technical requirements GOST 5727-88. Safety glass for land transport. General technical conditions GOST R. Locomotive-hauled passenger carriages. General technical requirements (drafting stage) GOST 111–2001. Sheet glass. Technical conditions
Latvia	Informative – GOST 5727-88. Safety glass for land transport. General technical conditions
Lithuania	Instruction International Union of Railways 564-1. Safety glass windows Informative – GOST 5727-88. Safety glass for land transport. General technical conditions LST EN 12600:2003. Glass for construction. Pendulum test. The effect of testing method and sheet glass classification
Poland	International Union of Railways 564-1, International Union of Railways 625-2, PN-B-13059-1985
Russia	GOST 5727-88. Safety glass for land transport. General technical

	conditions GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements GOST 111–2001. Sheet glass. Technical conditions
Slovakia	UIC 564-1
Ukraine	GOST 5727-88. Safety glass for land transport. General technical conditions International Union of Railways 564-1. Safety glass windows
Estonia	Informative – GOST 5727-88. Safety glass for land transport. General technical conditions

5.1.10 Весовые характеристики (*Load conditions and weighted mass)*

Russia, Belarus:

For passenger carriages, the dead weight includes all water, fuel stocks and other carriage equipment elements. The weight of the passenger carriages consists of the gravity (weight) of the passengers with luggage determined based on the design carriage occupancy. The design long-distance carriage occupancy is determined based on the maximum number of seats. For long-distance trains, the average weight of one passenger with luggage is assumed to be 100 kg.

Maximum design static load of the wheelset on the rails kN (ton-force) shall not exceed:

- 176.6 (18) – for conventional network carriages;

- 167.0 (17) – for high speed carriages.

Upon approval of the infrastructure owner the maximum design static load for special and double-deck carriages may exceed 175.6 kN, but shall not exceed 250.0 kN.

The relative difference between the vertical static loads on the rails from the wheels of an empty equipped carriage (load distribution) shall comply with the values provided in the Table.

Load distribution (wheel weighing) of the carriage in per cent

Parameter	Parameter value*, not exceeding
Relative difference between wheel loads in one bogie	5 (8)
Relative difference between wheelset loads in one bogie	5
Relative difference between loads on either side of the carriage	4 (8)
Relative difference between loads on the bogies of the carriage	8 (16)
* Values in brackets are for mail,luggage, mail-luggage, special and multiple-unit carriages	

These requirements have been approved by the following documents:

Belarus	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	ST RK EN 15663 – 2011. City electric railway transport. Determination of check weight. GOST R. Locomotive-hauled passenger carriages. General technical requirements (drafting stage)
Latvia	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Lithuania	LST EN 12663. Railway equipment. Requirements for the body structures of railway transport. GOST R 51690–2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions Memo OSJD O+R 520. Passenger carriages operated between 1520 mm and 1435 mm track gauge railways. Technical guidelines and general technical requirements Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Poland	EN-12663-1:2010

	No passenger traffic on 1520 lines
Russia	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	EN-12663-1:2010 No passenger traffic on 1520 lines
Ukraine	DSTU 44932005. Passenger, diesel and electric carriages for main lines. Safety requirements Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. Leaflet UIC 505-1, leaflet OSJD O 500 TsRB-0004. Technical operation regulations of the Ukrainian Railways
Estonia	EVS-EN 12663:2000. Requirements for the strength of railway rolling stock body structures.

5.2 ГАБАРИТ ПС И ВОЗДЕЙСТВИЕ НА ПУТЬ *(TRACK INTERACTION AND GAUGING)*

5.2.1 Габарит ПС *(Kinematic gauge)*

Russia, Belarus:

The selection of the gauge for new rolling stock shall be made in accordance with the Guidelines for rolling stock gauge application GOST 9238 (TsV/4422).

The gauge of newly built rolling stock (general or special purpose) is set by the technical requirements and terms of reference approved by the infrastructure owner. The selection of the top gauge outline shall be made taking into account the type, purpose, area of use, technical and economic parameters of the rolling stock and the gauge parameter of the network. Rolling stock attribution options: only for travelling on 1520 (1524) mm track gauge railways; permitted travelling on both 1520 (1524) mm track gauge railways and 1435 mm track gauge railways.

GOST 9238 sets forth the initial rolling stock gauge outline and static calculation of their allowable construction outlines (gauge compliance).

The Guidelines for rolling stock gauge application GOST 9238 (TsV/4422) include a provision for a kinematic calculation method. The kinematic calculation method for the rolling stock gauge compliance is provided in the Guidelines OSJD/UIC O-500 and UIC 505-6 General rules for interoperable rolling stock gauges in cross-border traffic. The kinematic calculation method will be introduced for 1520 (1524) mm railways in the course of the GOST 9238 revision.

The established gauge for a particular type of rolling stock is included in the technical specifications for the rolling stock.

In Russia, a new GOST 9238 on gauge has been drafted setting forth initial railway rolling stock gauge outlines and clearance diagrams for general purpose and special railways (1520 and 1435 track gauge) and methods of calculation to determine the permissible construction dimensions for the gauge of railway rolling stock.

These requirements have been approved by the following documents:

Belarus	TOR of Belarusian Railway GOST 9238–2000. Construction and rolling stock clearance diagrams for 1520 (1524) mm track gauge railways. GOST Construction and Rolling Stock Clearance Diagrams. (in progress to replace GOST 9238-83) Guidelines for rolling stock gauge application GOST 9238 (TsV/4422). UIC 505-1. Railway transport stock - Rolling stock construction gauge Guidelines OSJD O 500 Appendix A. General rules for interoperable rolling stock gauges in cross-border traffic (direct)
Kazakhstan	TOR of railway transport GOST 9238–2000. Construction and rolling stock clearance diagrams for 1520 (1524) mm track gauge railways.

	Guidelines for rolling stock gauge application GOST 9238 (TsV/4422). Leaflet UIC 505-1 Leaflet OSJD O 500 Appendix A
Latvia	TOR of Latvian Railway LVS 282-2005. Construction and rolling stock clearance diagrams for railways. *(based on* GOST 9238–2000. Construction and rolling stock clearance diagrams for 1520 (1524) mm track gauge railways) (TOR require compliance with this standard)
Lithuania	ADV-001 Regulations on the technical operation of railways GOST 9238–2000. Construction and rolling stock clearance diagrams for 1520 (1524) mm track gauge railways. TsV/4422. Guidelines for rolling stock gauge application GOST 9238-83. MPS. 18/10/1986
Poland	GOST 9238-83 1T gauge Leaflet UIC 505-1 Leaflet OSJD O 500 Appendix A
Russia	GOST 9238–2000. Construction and rolling stock clearance diagrams for 1520 (1524) mm track gauge railways. GOST Construction and Rolling Stock Clearance Diagrams (in progress to replace GOST 9238-83) Leaflet UIC 505-1 Leaflet OSJD O 500 Appendix A TsV/4422. Guidelines for rolling stock gauge application (GOST 9238-83), 1986
Slovakia	STN 280312 (Slovak technical standards) TOR of Railway of Slovak Republic Leaflet UIC 505-1
Ukraine	GOST 9238–2000. Construction and rolling stock clearance diagrams for 1520 (1524) mm track gauge railways. International Union of Railways 505-1, OSJD O 500 TsRB-0004. Technical operation regulations of the Ukrainian Railways
Estonia	TOR of Ministry for Transport and Communications. Order No. 39 09.07.1999, p 134 Order of the Minister for Transport and Communications No. 103 "Guidelines for application of construction clearances".

5.2.2 Статическая осевая нагрузка *(Static axle load)*

Russia, Belarus:

Maximum design static load of the wheelset on the rails in kN shall not exceed:
- 176.6 – for general network carriages (up to 140 km/h);
- 167.0 – for high-speed carriages (up to 200 km/h).

Upon approval of the infrastructure owner the maximum design static load for special and double-deck carriages may exceed 175.6 kN, but shall not exceed 250.0 kN.

These requirements have been approved by the following documents:

Belarus	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements (drafting stage)
Kazakhstan	GOST R 51690–2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions Informative – GOST R. Locomotive-hauled passenger carriages. General technical requirements (drafting stage)
Latvia	Network statement, paragraph 3.2.2, updated annually.
Lithuania	AO LG standard ĮST 1005384-1:2011. 1520 mm track gauge railway lines where the speed of passenger trains may not exceed 160 km/h
Poland	Infrastructure manager's documents Leaflet UIC 700
Russia	GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	TOR Leaflet UIC 700
Ukraine	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. TM 14-01-02 Typical method of impact on track tests. DSTU UIC 518. Railway rolling stock. Running tests and acceptance tests of dynamic parameters. Requirements for safety, impact on tracks and running performance
Estonia	

5.2.3 Параметры ПС, влияющие на стационарные наземные системы *(Rolling Stock parameters which influence ground based systems)*

5.2.3.1 Электромеханические параметры ПС, влияющие на путевые устройства СЦБ *(Rolling Stock parameters which influence CCS subsystem)*

This parameter is regulated by the subsystem STsB and communication document.

These requirements have been approved by the following documents:

Belarus	GOST R 4835–2000. Wheelsets of carriages on 1520 mm track gauge main railway lines. Technical conditions GOST 29205-91. Electromagnetic compatibility of technical devices. Industrial radio interference from electric transport. Standards and methods of testing
Kazakhstan	ST RK MEK 62,236 2007. Railway rolling stock. Electromagnetic compatibility. Part 3-1. Train and complete vehicle GOST R 4835–2000. Wheelsets of carriages on 1520 mm track gauge main railway lines. Technical conditions
Latvia	TOR of Latvian Railway
Lithuania	GOST R 4835–2000. Wheelsets of carriages on 1520 mm track gauge main railway lines. Technical conditions LST EN 50121-3-1. Railway equipment. Electromagnetic compatibility. Part 3-1. Rolling stock. Train and complete rolling stock. LST EN 50121-3-2. Railway equipment. Electromagnetic compatibility. Part 3-2. Rolling stock. Apparatus
Poland	TSI LOC&PAS
Russia	GOST 29205-91. Electromagnetic compatibility of technical devices. Industrial radio interference from electric transport. Standards and methods of testing. (see document "Parameter analysis... Subsystem: STsB and communications
Slovakia	TSI LOC&PAS
Ukraine	GOST R 4835–2000. Wheelsets of carriages on 1520 mm track gauge main railway lines. Technical conditions GOST 29205-91. Electromagnetic compatibility of technical devices. Industrial radio interference from electric transport. Standards and methods of testing. TsRB-0004. Technical operation regulations of the Ukrainian Railways DSTU 4049-2001. Locomotive-hauled passenger carriages for main

	lines. Safety requirements
Estonia	TOR

5.2.3.2 Контроль буксового узла *(Axle bearing health monitoring)*

Currently, the requirements for this parameter are different in different countries or are not regulated. Various axle bearing monitoring systems are used.

Russia, Belarus:

The possibility of monitoring the axle bearing temperature by using onboard or trackside equipment shall be ensured. Trackside temperature monitoring devices detect excessive heating of axle bearings and generate an alarm signal (in accordance with the Guidelines for the layout, installation and operation of equipment for the automatic monitoring of the technical condition of travelling rolling stock, TsV-TsSh-453):

- emergency temperature level of axle bearings from 70 to 120 ±5 ºC;
- critical temperature level of axle bearings from 140 to 180 ±5 ºC.

Axle bearings overheating shall be detected by the KTSM type devices at travel speeds of 10–150 km/h and DISK devices at travel speeds of 5–250 km/h.

The axle bearing visibility area shall be provided in the technical documentation for control tools.

The carriages shall be equipped with the axle bearing heating monitoring system with trigger temperature 90±10 °C.

All axle bearings shall be equipped with heat sensors included in the axle bearing heating monitoring system of the carriage. The cables from the heat sensors to the signal unit shall be installed in conduits or flexible sleeves ensuring their protection from mechanical damage, impacts from ice, gravel and crushed ballast and have terminal boxes and plug connections.

During passenger carriage movement and at stops the inspectors shall identify any faulty axle bearings, whose temperature may not be different from the temperature of good axle bearings (the temperature is measured by contactless instruments), by external signs.

These requirements have been approved by the following documents:

Belarus	RD RB 09150.18.009-2002. Regulations on centralised train passage supervision in accordance with readings of the KTSM/DISK devices on Belarusian Railways. Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements Guidelines for the layout, installation and operation of equipment for automatic monitoring of the technical condition of travelling rolling stock, TsV-TsSh-453; Draft GOST R. Locomotive-hauled passenger carriage bogies. Technical conditions
Kazakhstan	ST RK 1773 2008. Axle bearings for wheelsets, passenger carriages and goods wagon bogies on 1520 mm track gauge main railway lines. Informative – Draft GOST R. Locomotive-hauled passenger carriage bogies. Technical conditions

	Informative – GOST R. Locomotive-hauled passenger carriages. General technical requirements (drafting stage)
Latvia	TOR Monitoring of technical condition of rolling stock in transit on public infrastructure tracks. LDz No. D-3/39-2011 of 25/01/2011 Guidelines for the layout, installation and operation of equipment for automatic monitoring of the technical condition of rolling stock in transit, LDz No. D-3/26-2011 of 20/01/2011
Lithuania	ADV/001 Regulations on the technical operation of railways A/85 Regulations for use of equipment for automatic monitoring of technical condition of rolling stock.
Poland	
Russia	Guidelines for the layout, installation and operation of equipment for automatic monitoring of the technical condition of travelling rolling stock, TsV-TsSh-453. GOST 10527–84. Two-axle bogies of passenger carriages on 1520 mm track gauge main railway lines. Technical conditions GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements Guidelines for maintenance of carriages in operation, approved by the Council for Rail Transport of the CIS States. Protocol No. 50 of 21/05/2009. GOST R. Locomotive-hauled passenger carriage bogies. Technical conditions
Slovakia	
Ukraine	Guidelines for the layout, installation and operation of equipment for automatic monitoring of the condition of travelling rolling stock, TsV-TsSh-0053 of 17/03/2003. GOST 10527. Two-axle bogies of passenger carriages on 1520 mm track gauge main railway lines. Technical conditions DSTU 4045-2001. Main line locomotive-hauled passenger carriage bogies. General technical conditions
Estonia	

5.2.4 Динамические параметры подвижного состава *(Rolling stock dynamic behaviour)*

These requirements have been approved by the following documents:

Belarus	NB ZhT TsT 01-98. Railway passenger carriages. Safety standards

	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Kazakhstan	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Latvia	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Lithuania	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. LST EN 14363:2005. Railway equipment. Tests for acceptance of performance parameters of railway transport. Running and stationary tests.
Poland	
Russia	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Slovakia	Leaflet UIC 518 EN 14363
Ukraine	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. NB ZhT TsT 01-98. Railway passenger carriages. DSTU UIC 518. Railway rolling stock. Running tests and acceptance tests of dynamic parameters. Requirements for safety, impact on tracks and running performance
Estonia	

5.2.4.1 Устойчивость к сходу с рельсов при движении по переходным кривым и по пути с отклонениями в пределах допуска содержания пути *(Safety against derailment running on twisted track)*

Russia, Belarus:

The coefficient of wheel resistance to derailment on straight and curved sections of railway track shall be at least 1.5. The coefficient of carriage resistance to overturning when travelling on curved sections of railway track shall be at least 1.4.

These requirements have been approved by the following documents:

Belarus	NB ZhT TsT 01-98. Railway passenger carriages. Safety standards Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. Informative – Draft GOST R. Locomotive-hauled passenger carriages. General technical requirements
Latvia	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Lithuania	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. LST EN 14363:2005. Railway equipment. Tests for acceptance of performance parameters of railway transport. Running and stationary tests.
Poland	PN-EN 14363:2007TSI LOC&PAS
Russia	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	Leaflet UIC 518 EN 14363 TSI LOC PAS
Ukraine	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. NB ZhT TsT 01-98. Railway passenger carriages.
Estonia	

5.2.4.2 **Параметры динамики движения *(Running dynamic behaviour)***

Russia, Belarus:

The parameters of interaction with the track infrastructure (derailment protection, traffic safety and load on the track) and fatigue strength of the underframe elements are largely dependent on the dynamic behaviour of the rolling stock.

These requirements have been approved by the following documents:

Belarus	NB ZhT TsT 01-98. Railway passenger carriages. Safety standards Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. GOST R 55050-2012. Railway rolling stock. Permissible impact on railway track and testing methods
Kazakhstan	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. Informative – GOST R. Railway rolling stock. Permissible impact on railway track and testing methods
Latvia	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Lithuania	LST EN 14363:2005. Railway equipment. Tests for acceptance of performance parameters of railway transport. Running and stationary tests. Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Poland	EN 14363:2006 TSI LOC&PAS
Russia	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. NB ZhT TsT 01-98. Railway passenger carriages. GOST R 55050-2012. Railway rolling stock. Permissible impact on railway tract and testing methods

Slovakia	Leaflet UIC 518 TSI LOC&PAS EN 14363
Ukraine	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. NB ZhT TsT 01-98. Railway passenger carriages. DSTU UIC 518. Railway rolling stock. Running tests and acceptance tests of dynamic parameters. Requirements for safety, impact on tracks and running performance
Estonia	

5.2.4.2.1 Предельные значения безопасного движения (*Limit values for running safety*)

Russia, Belarus:

The ratio of the frame force to the vertical static axle load of the wheelset (P_{ST}) when travelling on straight and curved railway track and on track switches:
for railway track with typical upper track structure – 0.4;
with sand and gravel ballast – 0.3

– vertical dynamics ratio Kg≤0,3

– stress at the outer and inner edges rail base σe≤240 MPa

– stress at the outer edges of rail points at regulated cross-sections, σkpcs≤240 MPa

- stress on subgrade σs≤275 mPa

Maximum horizontal load to mean vertical rail load on sleeper ratio: - for crushed stone and asbestos ballast, α≤1.4

- for gravel and sand ballast, α≤1.1

It shall be ensured that the bogie elements are not in contact, unless it is specified in the engineering documentation, and presence of spring elements to restrict the movement of the body or bolster relative to the bogie frame.

These requirements have been approved by the following documents:

Belarus	NB ZhT TsT 01-98. Railway passenger carriages. Safety standards Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.

	GOST R 55050-2012. Railway rolling stock. Permissible impact on track and testing methods
Kazakhstan	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. NB ZhT TsT 01-98. Railway passenger carriages. Informative – GOST R. Railway rolling stock. Permissible impact on track and testing methods GOST R. Locomotive-hauled passenger carriage bogies. Technical conditions
Latvia	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Lithuania	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Poland	PN-EN 14363:2007 TSI LOC&PAS
Russia	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. NB ZhT TsT 01-98. Railway passenger carriages. GOST R 55050-2012. Railway rolling stock. Permissible impact on track and testing methods
Slovakia	Leaflet UIC 518 EN 14363 TSI LOC&PAS
Ukraine	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. NB ZhT TsT 01-98. Railway passenger carriages. DSTU UIC 518. Railway rolling stock. Running tests and acceptance tests of dynamic parameters. Requirements for safety, impact on tracks and running performance
Estonia	

5.2.4.2.2 Предельные значения вертикальных и поперечных нагрузок на путь *(Track loading limit values)*

Russia, Belarus:

The parameters pertaining to the impact of rolling stock travelling at permissible speed on typical track are given in the table (NB ZhT TsL 01-98).

Parameter	**Standard value**
Stress at the outer and inner edges of the rail base, MPa, not exceeding	240
Stress at the outer and inner edges of the switch points at regulated cross-sections, MPa, not exceeding	275
Stress on subgrade, MPa, not exceeding	0.08
Maximum horizontal load to mean vertical rail load on sleeper ratio, not less than - for crushed stone and asbestos ballast - for gravel and sand ballast	 1.4 1.1

The compliance inspection is performed during tests at specially selected test sections of the line by experimental and calculation methods.

These requirements have been approved by the following documents:

Belarus	NB ZhT TsT 01-98. Railway passenger carriages. Safety standards Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. GOST R 55050-2012. Railway rolling stock. Permissible impact on railway track and testing methods
Kazakhstan	Standards for the calculation and design of new and upgraded carriages

	for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. NB ZhT TsT 01-98. Railway passenger carriages. Informative – GOST R. Railway rolling stock. Permissible impact on railway track and testing methods. (in progress)
Latvia	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Lithuania	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. LST EN 14363:2005. Railway equipment. Tests for acceptance of performance parameters of railway transport. Running and stationary tests.
Poland	PN-EN 14363:2007 TSI LOC&PAS
Russia	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. NB ZhT TsT 01-98. Railway passenger carriages. GOST R 55050-2012. Railway rolling stock. Permissible impact on railway track and testing methods.
Slovakia	Leaflet UIC 518 EN 14363 TSI LOC&PAS
Ukraine	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. NB ZhT TsT 01-98. Railway passenger carriages. DSTU UIC 518:2009. Railway rolling stock. Running tests and acceptance tests of dynamic parameters. Requirements for safety, impact on tracks and running performance. TM 14-01-02 Typical method of impact on track tests.
Estonia	

5.2.4.2.3 Эквивалентная конусность (профиль поверхности катания колесной пары во взаимодействии с поверхностью рельса) *(Equivalent conicity)*

In the 1520 system there is no concept of equivalent conicity, but there is the concept of the interaction between the surface of a wheelset and a rail.

5.2.4.2.3.1 Проектные значения для новых колёсных пар *(Design values for new wheel profiles)*

Russia, Belarus:

Parameters of wheels are set forth in GOST 10791-2011 Wrought wheels Technical conditions

Requirements for wheelsets are set forth in GOST R 4835–2000. Wheelsets of carriages on 1520 (1524) mm track gauge main railway lines. Technical conditions; now there is draft GOST 4835 Railway carriage wheelsets. Technical conditions (replacing 4835-2006)

These requirements have been approved by the following documents:

Belarus	GOST 10791-2011 Wrought wheels. Technical conditions GOST 4835. Railway carriage wheelsets. Technical conditions (replacing GOST 4835-2006)
Kazakhstan	GOST 10791-2011 Wrought wheels. Technical conditions Draft GOST 4835. Railway carriage wheelsets. Technical conditions (replacing 4835-2006)
Latvia	Guidelines for the formation, repair and maintenance of wheelsets of railway carriages (1520 mm gauge tracks) LDz No. DR 71/2005.
Lithuania	GOST 4835–80. Wheelsets for carriages on 1520 (1524) mm track gauge main railway lines. Technical conditions LST EN 13260. Railway equipment. Wheelsets and two-axle bogies. Wheelsets. Product requirements V/24. Guidelines for the formation, repairs and maintenance of wheelsets of railway carriages for 1520 mm gauge tracks
Poland	PN-EN13715:2008
Russia	GOST 10791-2011 Wrought wheels. Technical conditions GOST 4835-2006. Wheelsets for carriages on 1520 (1524) mm track gauge main railway lines. Technical conditions. GOST 4835. Railway carriage wheelsets. Technical conditions (replacing GOST 4835-2006)
Slovakia	STN 13715 + A1
Ukraine	GOST 4836–2000. Wheelsets of carriages on 1520 mm track gauge main railway lines. Technical conditions GOST 10791-2011 Wrought wheels. Technical conditions
Estonia	

5.2.4.2.3.2 Значения эквивалентной конусности для колесных пар в эксплуатации *(In-service values of wheelset equivalent conicity)*

The parameter is related to the wheel surface wear rates.

Russia, Belarus:

Allowable values are set forth in Regulations on the technical operation of railways.

The distance between the inner wheel edges of an unloaded wheelset shall be 1440 mm. For train carriages travelling at 120–140 km/h, the tolerances are +3 mm and -1 mm maximum; at speeds up to 120 km/h the allowable tolerances are +/- 3 mm max.

It is not allowed to release into operation and traffic any rolling stock with any cracks in any part of the wheelset axle or rim, disc or wheel hub, or with sharp, worn edges of the wheelset flange or having the following types of wheelset wear or damage affecting normal interaction between the track and rolling stock:

at travelling speed from 120 km/h to 140 km/h;

wear of running surface of passenger carriage wheels greater than 5 mm;

flange thickness greater than 33 mm or less than 28 mm when measured at 18 mm distance from the top of the flange;

at travelling speed up to 120 km/h;

wear of running surface in long distance passenger carriages greater than 7 mm, greater than 8 mm in local or commuter train carriages.

flange thickness greater than 33 mm or less than 28 mm when measured at 18 mm distance from the top of the flange.

vertical sharp flange wear greater than 18 mm high measured by a special template;

flat (dent) of more than 1 mm on the running surface of carriages with roller axle bearings.

If en route a flat (dent) of more than 1 mm, but less than 2 mm deep is discovered, it is permitted to move such carriage without separating from the train (at a maximum speed 100 km/h) to the nearest service point where the wheelsets can be replaced.

If the flat is 2 to 6 mm, the train may travel to the nearest railway station at 15 km/h, but if the flat exceeds 6-12 mm, at 10 km/h, where the wheelset must be replaced. In case of a flat exceeding 12 mm, travel up to 10 km/h is allowed provided the wheelset can be raised or prevented from rotating.

These requirements have been approved by the following documents:

Belarus	TOR of Belarus Railway
Kazakhstan	Technical regulations for operation of railway transport
Latvia	Guidelines for the formation, repair and maintenance of wheelsets of railway carriages (1520 mm gauge tracks) LDz No. DR 71/2005.
Lithuania	ADV/001 Regulations on the technical operation of railways V/24. Guidelines for the formation, repair and maintenance of wheelsets of railway carriages for 1520 mm gauge tracks
Poland	
Russia	Regulations for technical operation of the railways of the Russian Federation approved by the order of the Ministry of Transport of Russia No. 286 of 21/12/2010
Slovakia	
Ukraine	TsRB-004. Technical operation regulations of the Ukrainian Railways Guidelines for the organisation of accelerated passenger train traffic on Ukrainian railways and the requirements for the infrastructure and

	rolling stock. TsTECH 2012 Guidelines for inspection, repair and formation of carriage wheelsets TsV-TsL-0062
Estonia	

5.2.5 Ходовая часть *(Running gear)*

5.2.5.1 Конструкция рамы тележки *(Structural design of bogie frame)*

Russia, Belarus:

The bogie frame shall be a welded structure with the main load-bearing elements of box section.

These requirements have been approved by the following documents:

Belarus	GOST 10527–84. Two-axle bogies of passenger carriages on 1520 mm track gauge main railway lines. Technical conditions Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. GOST R. Locomotive-hauled passenger carriage bogies. Technical conditions
Kazakhstan	Draft GOST R. Locomotive-hauled passenger carriage bogies. Technical conditions Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Latvia	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Lithuania	Informative – GOST 10527–84. Two-axle bogies of passenger carriages on 1520 mm track gauge main railway lines. Technical conditions LST EN 13749:2011. Railway equipment. Wheelsets and two-axle bogies. Wheelsets. Product requirements
Poland	TSI LOC&PAS
Russia	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. GOST 10527–84. Two-axle bogies of passenger carriages on 1520 mm

	track gauge main railway lines. Technical conditions GOST R. Locomotive-hauled passenger carriage bogies. Technical conditions
Slovakia	TSI LOC&PAS
Ukraine	DSTU 4045-2001. Main line locomotive-hauled passenger carriage bogies. General technical conditions GOST 10527. Two-axle bogies of passenger carriages on 1520 mm track gauge main railway lines. Technical conditions Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) 1983
Estonia	

5.2.5.2 **Колесная пара** ***(Wheelsets)***

Russia, Belarus:

Requirements for wheelsets are set forth in GOST R 4835–2000. Wheelsets of carriages on 1520 (1524) mm track gauge main railway lines. Technical conditions; now there is draft GOST 4835 Railway carriage wheelsets. Technical conditions (replacing GOST 4835-2006)

Belarus	RD RB BCh 17.001-97. Guidelines for the formation, repair and maintenance of wheelsets of traction rolling stock for 1520 mm track gauge railways GOST 4835-2006. Wheelsets for carriages on 1520 (1524) mm track gauge main railway lines. Technical conditions Informative – Draft GOST 4835. Railway carriage wheelsets. Technical conditions (replacing GOST 4835-2006)
Kazakhstan	Draft GOST 4835. Railway carriage wheelsets. Technical conditions (replacing 4835-2006)
Latvia	TOR of Latvian Railway
Lithuania	V/74 ADV/001 Regulations on the technical operation of railways Guidelines for the assembly, repair and maintenance of wheelsets of railway carriages for 1520 mm track gauge LST EN 13260. Railway equipment. Wheelsets and two-axle bogies. Wheelsets. Product requirements GOST 4835–80. Wheelsets for carriages on 1520 (1524) mm track gauge main railway lines. Technical conditions

Poland	TSI LOC&PAS
Russia	GOST 4835-2006. Wheelsets for carriages on 1520 (1524) mm track gauge main railway lines. Technical conditions Draft GOST 4835. Railway carriage wheelsets. Technical conditions (replacing 4835-2006)
Slovakia	TSI LOC&PAS
Ukraine	TsRB-004. Technical operation regulations of the Ukrainian Railways Guidelines for inspection, certification, repair and formation of carriage wheelsets TsV-TsL-0062 RD RB BCh 17.001-97. Guidelines for assembly, repair and maintenance of wheelsets of traction rolling stock for 1520 mm track gauge railways of Ukraine
Estonia	

5.2.5.2.1 Механические и геометрические характеристики колесных пар *(Mechanical and geometrical characteristics of wheelsets)*

Russia, Belarus:

Types and main parameters of series wheelsets

Wheelset type	Rolling stock type	Design carriage speed, km/h	Maximum design static load of the wheelset on the rails kN(tonne-force)
RU1Sh-957-P *	Passenger	160	176.6 (18.0)
RU1Sh-957-G *	Goods	120	230.5 (23.5)
RV2Sh-957-G *			245.2 (25.0)

* Wheelset type designation:

RU1 – type 1 universal roller unit, RV2 – type 2 carriage roller

Sh – end fastening of inside bearings with disk spring washer

957 – nominal wheel diameter, mm. G – goods carriage type

P – passenger carriage type

NOTES

1 Maximum design static load of the wheelset on the rails kN – to GOST 22780.

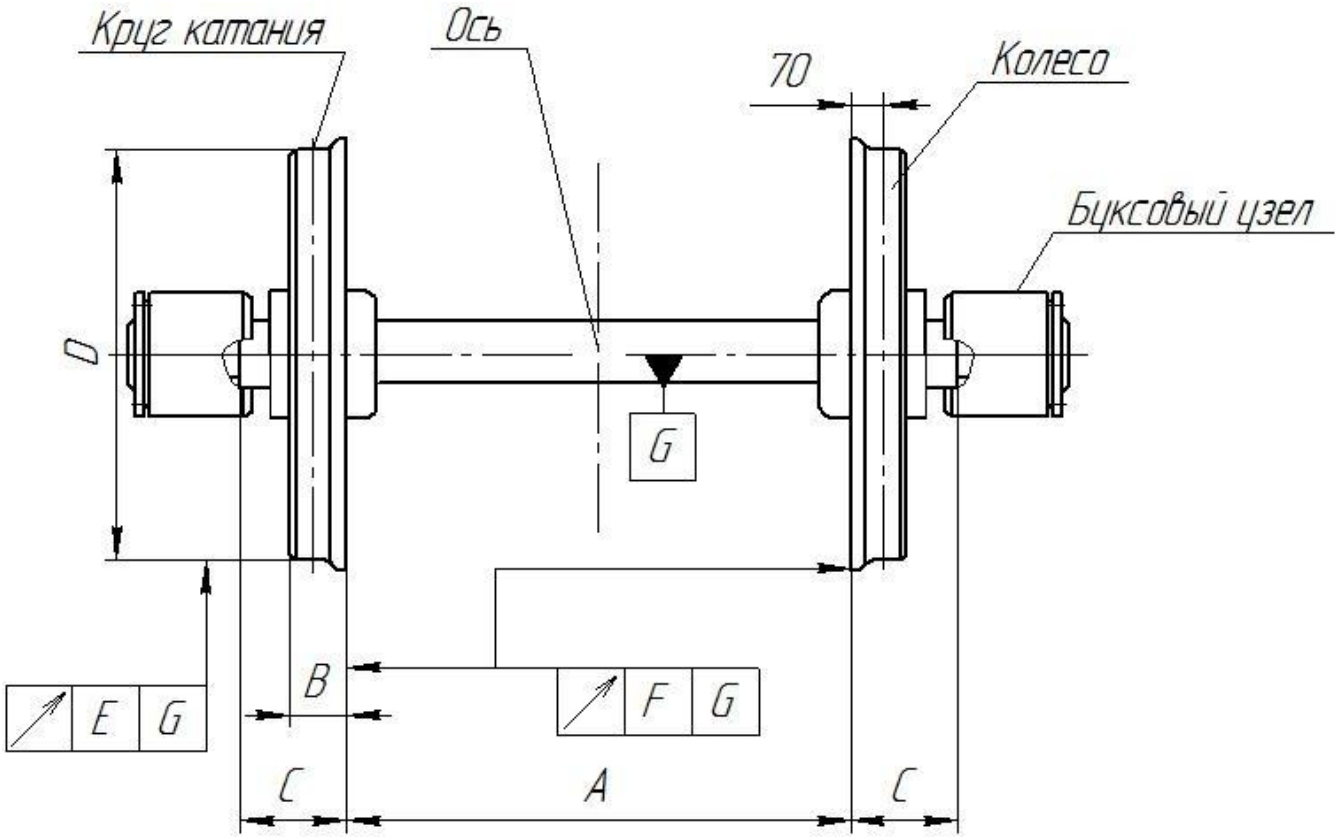
2 Maximum design static load of a wheelset on rails is set taking into account deviations in distribution of the actual gross weight of rolling stock on axles from the value in accordance with the requirements of GOST 22235.

Below is the reference information provided in GOST 4835 (approval stage, replacing GOST 4835-2006)

Wheelset design

Wheelset with rigidly fixed running wheels (Fig. 1 and 2) shall consist of:

- axle (solid or hollow):
  a) with pins for axle bearings
  b) with pre-axle sets
  b) with axle sets
  c) with middle cylindrical or conical part
- two wheels (running) solid (rolled or forged) or with additionally installed brake disks on the disk part of the wheel
- axle units
- brake disks, gear for the drive of the under-carriage generator drive and other parts located on the axle between two running wheels, if included in the design of the wheelset
- drive pulley installed on the axle neck

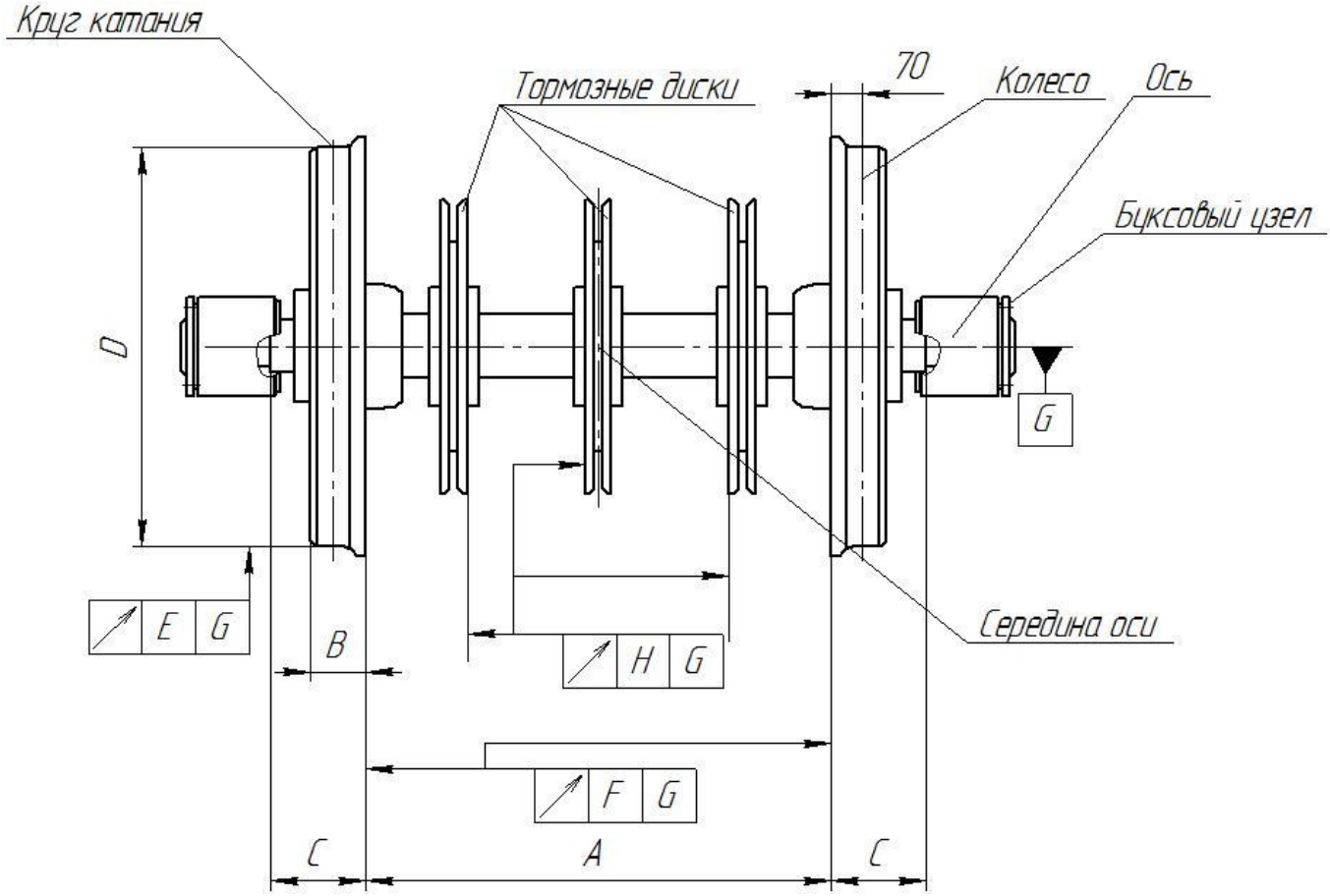


A – distance between the inner side surfaces of the wheel rims

B — wheel rim width; *C* — distance between the thrust face of the pre-axle and inner edge of the wheel rim; *D* — wheel diameter at the running surface; *E* — side wheel rim surface radial runout tolerance; *F* — end wheel rim surface radial runout tolerance; *G*— centreline of the wheelset

Круг катания	Running surface
Ось	Axle
Колесо	Wheel
Буксовый узел	Axle unit

Figure 1 – Wheelset with rigidly fixed running wheels without brake disks



A – distance between the inner side surfaces of the wheel rims
B — wheel rim width; *C* — distance between the thrust face of the pre-axle and inner edge of the wheel rim; *D* — wheel diameter on the running surface *E* — side wheel rim surface radial runout tolerance; *F* — end wheel rim surface radial runout tolerance; *G*— centreline of the wheelset; *H*– tolerance of inner brake disk end runout

NOTE – A different number of disks can be used in the wheelset design.

Figure 2 – Wheelset with rigidly fixed running wheels with brake disks

Letter designation and description of the wheelset with axially moving running wheels and a wheelset consisting of two wheel units joined by the bogie body are given in the reference documents

Круг катания	Running surface
Тормозные диски	Brake pads
Колесо	Wheel
Ось	Axle
Буксовый узел	Axle unit
Середина оси	Axis centre

These requirements have been approved by the following documents:

Belarus	GOST 4835–2000. Wheelsets of carriages on 1520 mm track gauge main railway lines. Technical conditions Informative – Draft GOST 4835. Railway carriage wheelsets. Technical conditions (replacing GOST 4835-2006)
Kazakhstan	GOST 4835–2000. Wheelsets of carriages on 1520 mm track gauge main railway lines. Technical conditions Draft GOST 4835. Railway carriage wheelsets. Technical conditions (replacing 4835-2006)
Latvia	TOR of Latvian Railway Guidelines for the formation, repair and maintenance of wheelsets of railway carriages (1520 mm gauge tracks) LDz No. DR 71/2005
Lithuania	ADV/001 Regulations on the technical operation of railways V/24. Guidelines for the formation, repair and maintenance of wheelsets of railway carriages for 1520 mm gauge tracks GOST 4835–80. Wheelsets for carriages on 1520 (1524) mm track gauge main railway lines. Technical conditions LST EN 13260. Railway equipment. Wheelsets and two-axle bogies. Wheelsets. Product requirements
Poland	TSI LOC&PAS
Russia	GOST 4835–2000. Wheelsets of carriages for 1520 mm track gauge main railway lines. Technical conditions GOST 4835. Railway carriage wheelsets. Technical conditions (replacing GOST 4835-2006)
Slovakia	TSI LOC&PAS
Ukraine	GOST 4835–2000. Wheelsets of carriages for 1520 mm track gauge main railway lines. Technical conditions Guidelines for inspection, certification, repair and formation of

	carriage wheelsets TsV-TsL-0062
Estonia	

5.2.5.2.2 Механические и геометрические характеристики колес *(Mechanical and geometrical characteristics of wheels)*

Design and dimensions

The designation of the main dimensions are given in Figure 1. The tolerance range of the main dimensions and deviations of the wheel shape are given in Table 2.

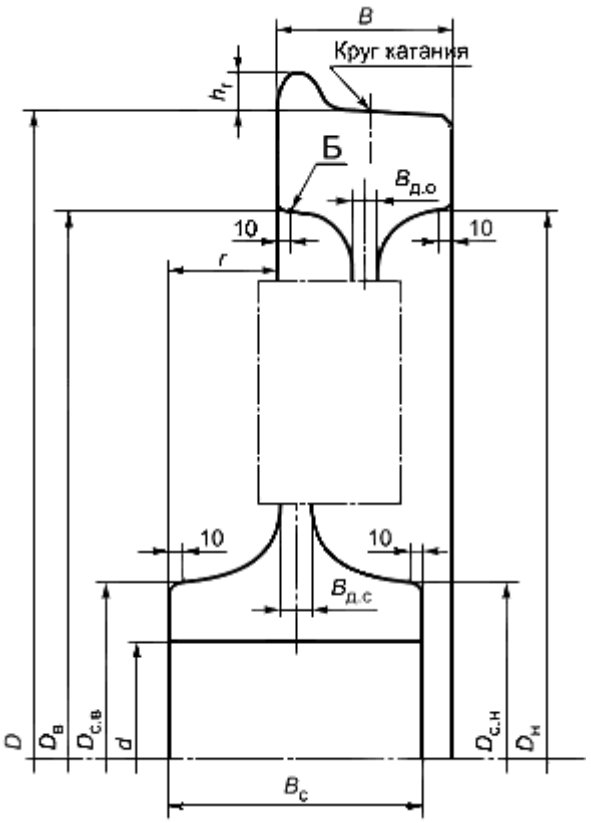


Figure 1. Main wheel dimensions

Круг катания	Running surface

Table 2. Tolerance range of the main dimensions and deviations of the wheelset for locomotive-hauled goods and passenger rolling stock, trailer carriages of electric and diesel trains.

Wheel	Definition	Designation	Tolerance range of dimensions and

element			deviations of wheel shape (mm) for manufacturing precision classes	
			1	2
Rim	Running surface diameter	D	8	14
	Inner rim surface diameter on the exterior wheel side	$D_{н}$	5	10
	Inner rim surface diameter on the interior wheel side	$D_{в}$	5	10
	Width	B	2	3
	Flange height	$h_{г}$	1	1
	Deformation	-	0.3	0.4
	Camber	-	0.3	0.5
	Undercut	-	0.3	0.5
	Difference of thickness around the wheel perimeter	-	1	2
	Difference of width around the wheel perimeter	-	1	2
	Deviation from roundness of the running surface	-	0.1	0.25
Pin	Outer pin surface diameter on the outside of the wheel	$D_{с.н}$	4	6

	Outer pin surface diameter on the inside of the wheel	$D_{с.в}$	4	6
	Opening diameter	d	4	4
	Length	$B_с$	2	10
	Distance from end surface of the pin to the lateral surface of the rim on the inside of the wheel	r	2	5
	Thickness variation around the wheel perimeter	-	2	4
	Deviation from surface parallelism - end surface of the pin in relation to the lateral surface of the rim on the inside of the wheel	-	1.5	2.5
	Opening eccentricity in relation to the running circle of the wheel	-	0.5	1
Disk	Thickness at the rim	$B_{д.о}$	2	4
	Thickness at the pin	$B_{д.с}$	2	6
	Difference in thickness around the wheel perimeter	-	1	2

Wheels of other designs and dimensions, manufacturing precision class 1 wheels and wheels for wheelsets of bogies of passenger, goods and shunting locomotives, the drive cars of electric and diesel trains, special rolling stock are manufactured pursuant to engineering documentation approved by the infrastructure owner.*

* In the Russian Federation the infrastructure owner is determined by federal law governing railway transport; in other CIS countries and Baltic States its role is played by the appropriate national railway transport administration bodies.

These requirements have been approved by the following documents:

Belarus	GOST 10791-2011 Wrought wheels. Technical requirements
Kazakhstan	GOST 10791-2011 Wrought wheels. Technical requirements
Latvia	TOR of Latvian Railway Guidelines for the formation, repair and maintenance of wheelsets of railway carriages (1520 mm gauge tracks) LDz No. DR 71/2005
Lithuania	ADV/001 Regulations on the technical operation of railways V/24. Guidelines for the formation, repair and maintenance of wheelsets of railway carriages for 1520 mm gauge tracks LST EN 13262. Railway equipment. Wheelsets and two-axle bogies. Wheels. Product requirements GOST 9036-88. Wrought wheels. Design and dimensions GOST 10791-2004. Wrought wheels. Technical requirements (informative)
Poland	Ct-4 (Mt-11. Guidelines for measurement and technical assessment of traction rolling stock wheelsets LHSt 11 (Mt-11). Guidelines for geometric measurement of traction rolling stock wheelsets
Russia	GOST 10791-2011 Wrought wheels. Technical requirements
Slovakia	TSI LOC&PAS
Ukraine	GOST 4491-86. Cast centres for rolling stock of 1520 mm track gauge railways. General technical conditions GOST 9036-88. Wrought wheels. Design and dimensions GOST 10791-2011 Wrought wheels. Technical requirements
Estonia	

5.2.5.3 Механические и геометрические характеристики оси *(Mechanical and geometrical characteristics of axle)*

Russia, Belarus:

The requirements are stipulated in GOST 31334-2007 Axles for the rolling stock of 1520 mm track gauge railways. Technical conditions and GOST 22780-93 Wheelsets for carriages on 1520 (1524) mm track gauge railway lines. Types, parameters and dimensions; now there is draft GOST Wheelset axles for railway rolling stock. General technical conditions (replacing GOST 31334-2007 and GOST 22780–93)

These requirements have been approved by the following documents:

Belarus	GOST 31334-2007 Axles for rolling stock of 1520 mm track gauge railways. Technical conditions

	GOST 22780-93 Wheelsets for carriages on 1520 (1524) mm track gauge railway lines. Types, parameters and dimensions GOST Wheelset axles for railway rolling stock General technical conditions (replacing GOST 31334-2007 and GOST 22780–93)
Kazakhstan	GOST 22780-93 Wheelsets for carriages on 1520 (1524) mm track gauge railway lines. Types, parameters and dimensions Informative – Draft GOST Wheelset axles for railway rolling stock General technical conditions (replacing GOST 31334-2007 and GOST 22780–93)
Latvia	TOR of Latvian Railway Guidelines for the formation, repair and maintenance of wheelsets of railway carriages (1520 mm gauge tracks) LDz No. DR 71/2005
Lithuania	V/24. Guidelines for the formation, repair and maintenance of wheelsets of railway carriages for 1520 mm gauge tracks LST EN 13261. Railway equipment. Wheelsets and two-axle bogies. Axles. Product requirements GOST 22780-77 Wheelsets for carriages on 1520 mm track gauge railway lines. Types, parameters and dimensions (informative).
Poland	PN-K-9146:1993 Traction trains, wheelset axles. Technical conditions and tests PN-EN-13103:2009, PN-EN-13104:2009, PN-EN-13261:2009, PN-EN-15313:2010 PN-K-02046:1993
Russia	GOST 31334-2007 Axles for rolling stock of 1520 mm track gauge railways. Technical conditions GOST 22780-93 Wheelsets for carriages on 1520 (1524) mm track gauge railway lines. Types, parameters and dimensions GOST Wheelset axles for railway rolling stock. General technical conditions (replacing GOST 31334-2007 and GOST 22780–93)
Slovakia	STN-EN-13103:2009, STN -EN-13104:2009, STN -EN-13261:2009, STN -EN-15313:2010
Ukraine	GOST 30237-96 (ISO 1005-3-82). Finished machined axles for rolling stock for 1520 mm track gauge railways. Technical conditions. GOST 22780-93 (ISO 1005-9-86) Wheelsets for carriages on 1520 (1524) mm track gauge railway lines. Types, parameters and dimensions.
Estonia	

5.2.6 Наименьший допустимый радиус проходимой кривой *(Minimum curve radius)*

Russia, Belarus:

Design of running parts, gangway passages and couplers shall ensure passing in the operational condition of:

a) single carriage – a circular curve with radius 80 m at speeds up to 5 km/h;

b) carriage unit and (or) coupled carriages:

1) S-curve with radius 170 m without straight section at speeds up to 5 km/h;

2) intersection of straight and curve with radius 120 m without ease radius at speeds up to 10 km/h;

These requirements have been approved by the following documents:

Belarus	TOR of Belarus Railway Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	TOR of railway transport Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. Informative – Draft GOST R. Locomotive-hauled passenger carriages. General technical requirements
Latvia	TOR of Latvian Railway
Lithuania	OSJD O+R 520. Passenger carriages operated between 1520 mm and 1435 mm track gauge railways. General requirements
Poland	TSI LOC&PAS
Russia	GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983 (Table 8.1)
Slovakia	TSI LOC&PAS
Ukraine	DBN B.2.3-19-2008. Transport structures. Engineering standards. Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983 (Table 8.1)
Estonia	

5.2.7 Устройство подачи песка *(Sanding)*

This parameter applies to traction rolling stock. Not applicable to passenger rolling stock.

5.2.8 Путеочиститель *(Life guards)*

This parameter applies to traction rolling stock. Not applicable to passenger rolling stock.

5.3 ТОРМОЖЕНИЕ *(BRAKING)*

5.3.1 Общие положения *(General)*

Russia, Belarus, Kazakhstan, Latvia, Lithuania, Ukraine:

The braking system should ensure the train deceleration, downhill train speed maintenance and stopping of the train not exceeding the permissible stopping distance, and immobility of a stationary train.

Automatic brakes of the rolling stock shall provide braking effort ensuring stopping of the train in case of emergency braking without exceeding the stopping distance approved by the railway infrastructure manager.

The braking equipment shall ensure skid-free braking within the entire applicable range of speed and the corresponding design pressure in the brake cylinders when the brakes are applied, observing the operating regulations.

Rolling stock shall be equipped with automatic pneumatic brakes ensuring braking of a train with the maximum permitted weight.

Mandatory parameters for determining braking efficiency are provided in the Operational guidelines for rolling stock brakes TsT-TsV-TsL-VNIIZhT/277 (Appendix 2, Table 1). These standards set the minimal braking effort of the brake blocks depending on the maximum permissible speed of travel of the trains and distance from the rail guard to the position of unexpected obstacles on the line.

These requirements have been approved by the following documents:

Belarus	TOR of Belarus Railway STP 09150.17.038-2006. Regulations for the operation of rolling stock brakes on Belarusian Railway
Kazakhstan	TOR of railway transport
Latvia	TOR of Latvian Railway
Lithuania	ADV/001 Regulations on the technical operation of railways R/86 „Geležinkelio riedmenų stabdžių naudojimo taisyklės“ (Rolling stock brakes control regulations)
Poland	Leaflet UIC 540, PN-K-88177:1998
Russia	Technical operation regulations of the Russian Railways, approved by Ministry of Transport order No. 286 of 21/12/2010 Operational guidelines for rolling stock brakes TsT-TsV-TsL-VNIIZhT/277 (Appendix 2, Table 1).

Slovakia	Leaflet UIC 540, TSI LOC&PAS
Ukraine	TsRB-004. Technical operation regulations of the Ukrainian Railways TsT-TsV-TsL-0015. Guidelines for the operation of rolling stock brakes on the Ukrainian railways. Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered)
Estonia	TOR, p. 144, 145

5.3.2 Основные требования функциональности и безопасности *(Main functional and safety requirements)*

5.3.2.1 Функциональные требования *(Functional requirements)*

Russia, Belarus:

Carriages shall be equipped with automatic pneumatic and electro-pneumatic direct action friction brakes.

A friction brake means pad or disc brakes.

To ensure the required emergency braking efficiency, the carriages can be additionally equipped with brakes not utilising the interaction force between the rail and the wheel.

At speeds from 100 km/h to the design speed on clean dry tracks, the carriage braking system shall ensure a braking distance not exceeding the distance set forth in Table B.1, GOST R 55182-2012 without skidding of the carriage wheelsets.

Automatic pneumatic and electro-pneumatic brakes of the rolling stock shall provide braking effort ensuring stopping of the train in case of emergency braking without exceeding the stopping distance set forth in the current standards.

The parking (hand) brake shall hold on a 30 ‰. slope.

Automatic pneumatic and electro-pneumatic brakes of the rolling stock and special rolling stock shall ensure smooth braking, and automatic brakes also shall ensure stopping of the train in case of disconnection or breaking of the braking line or opening of the emergency brake valve.

The carriages shall have at least three emergency stop valves located in the vestibules and in the middle of the carriage.

The rules for maintenance and control of the brakes on the trains are provided in the Operational guidelines for railway rolling stock brakes TsT-TsV-TsL-VNIIZhT/277.

The deceleration value during braking is limited by the conditions of the wheel adhesion to the track. The maximum permissible deceleration value during braking and the rate of change of deceleration when the braking mode is triggered are not regulated.

Compressed air pressure in the brake cylinder shall be at least 390 kPa, air line pressure variation not exceeding 10 kPa for 5 minutes in accordance with the Safety Standard NB ZhT TsL 01-98.

Additional information is provided the Regulations for the operation of rolling stock brakes on the railways of the CIS states, Latvia, Lithuania and Estonia approved by the Railway Transport Council of the Commonwealth (protocol No. 48 of 29-30 May 2008)

These requirements have been approved by the following documents:

Belarus	TOR of Belarus Railway STP 09150.17.038. Regulations for the operation of rolling stock brakes on Belarusian Railway NB ZhT TsL 01-98. Railway passenger carriages. Safety standards Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements Guidelines for the operation of rolling stock brakes on the Ukrainian railways. TsT-TsV-TsL-VNIIZhT/277
Kazakhstan	TOR of railway transport ST RK GOST R 516902006. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions
Latvia	TOR of Latvian Railway
Lithuania	ADV/001 Regulations on the technical operation of railways LST EN 13452:-1. Railway equipment. Braking. Braking systems of public transport. Part 1. Operational requirements. LST EN 13452:-2. Railway equipment. Braking. Braking systems of public transport. Part 2. Test methods. R/86 „Geležinkelio riedmenų stabdžių naudojimo taisyklės“ (Rolling stock brakes control regulations) LST EN 14198:2005. Railway equipment. Braking. Requirements for braking systems of trains GOST R 51690–2006. Passenger carriages for 1520 mm track gauge main railway lines. General technical conditions
Poland	Instructions UIC 540
Russia	Signalling instruction for railway transport in the Russian Federation, Appendix No. 7 (Table 4.1) TOR Guidelines for the operation of rolling stock brakes on the railways. TsT-TsV-TsL-VNIIZhT/277 NB ZhT TsT 01-98 (Chapter III) Regulations for the operation of rolling stock brakes on the railways of the CIS states, Latvia, Lithuania and Estonia approved by the Railway

	Transport Council of the Commonwealth (protocol No. 48 of 29-30 May 2008) GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	Leaflet UIC 540, TSI LOC&PAS
Ukraine	TsT-TsV-TsL-0015. Guidelines for the operation of rolling stock brakes on the Ukrainian railways. Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) NB ZhT TsT 01-98. Railway passenger carriages.
Estonia	TOR, p. 144

5.3.2.2 Требования безопасности *(Safety requirements)*

Russia

General rules for risk management on railway transport related to the functional safety of rolling stock and infrastructure objects are set forth in GOST R 54505-2011 Functional safety. Risk management on railway transport.

Slovakia

Not regulated.

These requirements have been approved by the following documents:

Belarus	TOR of Belarus Railway NB ZhT TsT 01-98. Railway passenger carriages. Safety standards Informative – GOST R 54505-2011. Functional safety. Risk management on railway transport. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	TOR of railway transport Informative – Draft GOST R. Locomotive-hauled passenger carriages. General technical requirements
Latvia	TOR
Lithuania	ADV/001 Regulations on the technical operation of railways
Poland	Instruction Cw 1 (Mw 56)

Russia	Regulations for the technical operation of the railways of the Russian Federation approved by the order of the Ministry of Transport of Russia No. 286 of 21/12/2010 GOST R 54505-2011. Functional safety. Risk management on railway transport. NB ZhT TsT 01-98. Railway passenger carriages. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements, p. 4.2.7
Slovakia	Not regulated
Ukraine	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) NB ZhT TsT 01-98. Railway passenger carriages.
Estonia	

5.3.3 Тип системы торможения *(Type of brake system)*

Russia, Belarus:

Feed and brake line diameter shall be 1¼ inch. The connection of the brake and feed lines between the carriages and with the locomotive shall be arranged using type R17B connecting hoses to GOST 2593-2009, connecting hoses with electrical contact 369 A to GOST 31374-2009. On train sets, other types of hoses may be used between the carriages provided they ensure the required strength of the brake line. The carriages of such sets can be equipped with connection hoses to GOST 2593-2009, and hoses with electrical contact to GOST 31374-2009.

To ensure the required emergency braking efficiency, the carriages can be additionally equipped with the brakes not utilising the interaction force between the rail and the wheel.

Russia

Specific requirements for the parameters of braking devices are set by design terms of reference.

These requirements have been approved by the following documents:

Belarus	GOST 2593-82. Connection hoses for railway rolling stock brakes. Technical conditions Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	ST RK 1823-2008. Brake (electro-pneumatic brake) for 1520 mm track

	gauge passenger carriages. Technical requirements GOST 2593-82. Connection hoses for railway rolling stock brakes. Technical conditions Informative – GOST R. Locomotive-hauled passenger carriages. General technical requirements (draft)
Latvia	Informative – GOST 2593-82. Connection hoses for railway rolling stock brakes. Technical conditions Guidelines for the operation of rolling stock brakes on the Ukrainian railways No. 19/2000
Lithuania	ADV/001 Regulations on the technical operation of railways 63/V Guidelines for repair of carriage braking equipment, TsV-TsL-945 equivalent GOST R 51690–2000. Passenger carriages for 1520 mm track gauge main railway lines. General technical conditions GOST 2593-82. Connection hoses for railway rolling stock brakes. Technical conditions
Poland	Leaflet UIC 543
Russia	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. GOST 2593-82. Connection hoses for railway rolling stock brakes. Technical conditions GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	Leaflet UIC 543
Ukraine	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) TsRB-0004. Technical operation regulations of the Ukrainian Railways
Estonia	EVR Rules of operation of rolling stock brakes

5.3.4 **Управление торможением *(Brake command)***

Not applicable to 1520 passenger carriages.

5.3.4.1 **Управление экстренным торможением *(Emergency braking command)***

Not applicable to 1520 passenger carriages.

5.3.4.2 Управление служебным торможением *(Service braking command)*

Not applicable to 1520 passenger carriages.

5.3.4.3 Управление прямодействующим тормозом *(Direct braking command)*

Not applicable to 1520 passenger carriages.

5.3.4.4 Управление динамическим тормозом *(Dynamic braking command)*

Not applicable to 1520 passenger carriages.

5.3.4.5 Управление стояночным тормозом *(Parking braking command)*

Russia, Belarus, Kazakhstan:

Railway rolling stock shall be equipped with parking brakes.

Railway rolling stock parking brakes shall provide the design braking effort and holding of a railway rolling stock unit within the maximum permissible values.

The handwheel of the parking brake shall be equipped with a device preventing spontaneous rotation of the handwheel.

Passenger carriages shall be equipped with parking (hand) brakes.

During braking the handle or handwheel of the hand brake shall turn clockwise with the application of effort not exceeding 300 N.

The parking (hand) brake shall ensure holding on a 30 ‰. slope.

Automatic parking brakes can be used.

Use of hand brakes with automatic parking brakes is not required.

These requirements have been approved by the following documents:

Belarus	TOR of Belarus Railway Technical regulations on the safety of railway rolling stock TR TS 001/2011. NB ZhT TsT 01-98. Railway passenger carriages. Certification requirements. Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Kazakhstan	Technical regulations on the safety of railway rolling stock TR TS 001-2011 p. 49 Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. TOR of railway transport
Latvia	TOR of Latvian Railway

Lithuania	ADV/001 Regulations on the technical operation of railways GOST R 51690–2000. Passenger carriages for 1520 mm track gauge main railway lines. General technical conditions
Poland	Leaflet UIC 540
Russia	Regulations for the technical operation of the railways of the Russian Federation approved by the order of the Ministry of Transport of Russia No. 286 of 21/12/2010 (Appendix 5 p. 7). Technical regulations on the safety of railway rolling stock TR TS 001-2011 p. 49 Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983. NB ZhT TsT 01-98. Railway passenger carriages. Certification requirements.
Slovakia	Leaflet UIC 540
Ukraine	TsT-TsV-TsL-0015. Guidelines for the operation of rolling stock brakes on the Ukrainian railways. Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) NB ZhT TsT 01-98. Railway passenger carriages.
Estonia	

5.3.5 Характеристики торможения *(Braking performance)*

5.3.5.1 Общие требования *(General requirements)*

Russia:

Mandatory minimum requirements for braking performance in the safety standards and tested in the required tests.

These requirements have been approved by the following documents:

Belarus	NB ZhT TsL 01-98. Railway passenger carriages. Safety standards Informative – Ministry for Transport Regulations for traction calculations for travel and shunting, 1985
Kazakhstan	TOR of railway transport
Latvia	Ministry for Transport Regulations for traction calculations for travel and shunting, 1985
Lithuania	R/86 Rolling stock brakes control regulations

	Ministry for Transport Regulations for traction calculations for travel and shunting, 1985 LST EN 14531-1:2005. Railway equipment. Braking. Methods of braking distance calculations. Part 1. General algorithms.
Poland	Leaflet UIC 540
Russia	NB ZhT TsT 01-98. Railway passenger carriages. Certification requirements.
Slovakia	Leaflet UIC 540
Ukraine	TsT-TsV-TsL-0015. Guidelines for the operation of rolling stock brakes on the Ukrainian railways. NB ZhT TsT 01-98. Railway passenger carriages. Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered)
Estonia	

5.3.5.2 Экстренное торможение *(Emergency braking)*

Emergency braking is the type of braking used for the immediate stopping of the train by emergency discharge of the brake line to ensure maximum braking force.

Russia, Belarus, Kazakhstan:

Standard limit values for stopping distance when friction brake is used

Speed at the start of braking, km/h	Stopping distance, m, from nominal speed, km/h
200	1500*/2100
160	1450
140	1100
120	1000
100	700

Standard limit values for stopping distance when friction brake is used on a section with standardised reduced adhesion

Design speed of carriage, km/h	Stopping distance, m, from nominal speed, km/h		
	120	100	80
200	750	500	330
160	800	550	350
140	800	550	350
120	1000	700	450

Braking effort shall be stable irrespective of wear of the friction elements.

Maximum allowed change in the maximum brake force with new pads and pads with maximum permissible wear shall not exceed:

5 % – when automatic brake is applied;

10 % – when parking brake is applied.

These requirements have been approved by the following documents:

Belarus	Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	GOST R. Locomotive-hauled passenger carriages. General technical requirements (draft)
Latvia	not regulated
Lithuania	ADV/001 Regulations on the technical operation of railways R/86 Rolling stock brakes control regulations Ministry for Transport Regulations for traction calculations for travel and shunting, 1985 LST EN 14531-1:2005. Railway equipment. Braking. Methods of braking distance calculations. Part 1. General algorithms.
Poland	Leaflet UIC 540
Russia	GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	Leaflet UIC 540
Ukraine	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) NB ZhT TsT 01-98. Railway passenger carriages.
Estonia	

5.3.5.3 Служебное торможение *(Service braking)*

Currently, the requirements for this parameter are the same in all countries and are set forth in Guidelines for the operation of rolling stock brakes on the Ukrainian railways. TsT-TsV-TsL-VNIIZhT/277 or by similar documents in effect in each country.

Russia:

Service braking on trains is regulated by the Guidelines for the operation of rolling stock brakes on the railways TsT-TsV-TsL-VNIIZhT/277

Belarus:

Service braking on trains is regulated by STP 09150.17.038 Regulations for the operation of rolling stock brakes on Belarus Railway

These requirements have been approved by the following documents:

Belarus	STP 09150.17.038-2006. Regulations for the operation of rolling stock brakes on Belarus Railway Informative – Guidelines for the operation of rolling stock brakes on the Ukrainian railways. TsT-TsV-TsL-VNIIZhT/277
Kazakhstan	Guidelines for the operation of rolling stock brakes on the railways. TsT-TsV-TsL-VNIIZhT/277
Latvia	In accordance with the traction calculations for train work Guidelines for the operation of rolling stock brakes on the Ukrainian railways No. 19/2000
Lithuania	ADV/001 Regulations on the technical operation of railways R/86 Rolling stock brakes control regulations Ministry for Transport Regulations for traction calculations for travel and shunting, 1985 LST EN 14531-1:2005. Railway equipment. Braking. Methods of braking distance calculations. Part 1. General algorithms.
Poland	Leaflet UIC 540
Russia	Guidelines for the operation of rolling stock brakes on the railways. TsT-TsV-TsL-VNIIZhT/277
Slovakia	Instructions UIC 540, TSI LOC
Ukraine	TsT-TsV-TsL-0015. Guidelines for the operation of rolling stock brakes on the Ukrainian railways.
Estonia	

5.3.5.4 Расчет мощности фрикционной пары *(Calculations related to thermal capacity)*

Russia, Belarus:

Braking effort shall be stable irrespective of wear of the friction elements.

When the gross weight to tare ratio exceeds 1.15, the carriage shall be equipped with a load-dependent automated friction force adjustment device.

Rated brake ratio shall be selected depending on the rated stopping distance value during emergency braking at the rated speed of travel.

At the carriage brake design stage, the following parameters shall be calculated:

- braking efficiency of the carriage;

- wheelset skidding conditions during braking;

- thermal load on friction sets.

A carriage brake system with 80, 100 and 120 km/h travel speed on a section with standardised reduced adhesion (0.05–-0.08) shall ensure a stopping distance not exceeding the one set forth in Table B.2 (Appendix B) with magnetic track brake (if any) off. Maximum allowed relative slip of the wheelsets is 90%.

Pad wear shall not exceed 0.28 cm^3/MJ at the initial braking speed not exceeding 140 km°h and 0.55^3/MJ at the initial braking speed from 140 to 200 km/h.

Russia:

Design brake pad force coefficient δ_d of passenger trains

Structural speed of carriage, m/sec	δd value for brake pads, at least	
	cast iron	composite
up to 33	0.60	0.22
33-40	0.78	0.27
40-45	0.80	0.28

Maximum brake force of the brake pads shall be checked to the maximum allowed wheel/track adhesion factor.

Passenger carriage wheel/track adhesion factor

Speed of carriage, m/sec	Wheel/track adhesion factor ψ_f value for the load of one wheelset on track, kN					
	60	100	140	180	220	260
11	0.139	0.132	0.123	0.115	0.107	0.102
17	0.128	0.121	0.114	0.108	0.101	0.095
39	0.106	0.099	0.093	0.087	0.081	0.077
45	0.102	0.096	0.090	0.084	0.078	0.074

These requirements have been approved by the following documents:

Belarus	Standards for the calculation and design of carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	Standards for the calculation and design of carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways Draft GOST R. Locomotive-hauled passenger carriages. General technical requirements
Latvia	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Lithuania	R/86 Rolling stock brakes control regulations Ministry for Transport Regulations for traction calculations for travel and shunting, 1985 LST EN 14531-1:2005. Railway equipment. Braking. Methods of braking distance calculations. Part 1. General algorithms.
Poland	TSI LOC&PAS
Russia	Standards for the calculation and design of carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered). VNIIV-VNIIZhT 1983. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	TSI LOC&PAS
Ukraine	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) NB ZhT TsT 01-98. Railway passenger carriages.
Estonia	

5.3.5.5 Стояночный тормоз *(Parking brake)*

Russia, Belarus:

Passenger carriages shall be equipped with parking (hand) brakes.

The parking brake (hand or automatic) shall ensure the holding of a rolling stock unit on at least 30 ‰. slope. Compliance with this requirement shall be supported by tests.

Use of hand brakes with automatic parking brakes is not required.

Currently GOST "Parking brakes (automatic and manual) of railway rolling stock. Technical requirements and methods of control" is being drafted.

These requirements have been approved by the following documents:

Belarus	TOR of Belarus Railway Informative – GOST Parking brakes (automatic and manual) of railway rolling stock. Technical requirements and methods of control
Kazakhstan	TOR of railway transport Draft GOST Parking brakes (automatic and manual) of railway rolling stock. Technical requirements and methods of control
Latvia	Informative – Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) VNIIV-VNIIZhT 1983.
Lithuania	ADV/001 Regulations on the technical operation of railways GOST R 51690–2000. Passenger carriages for 1520 mm track gauge main railway lines. General technical conditions
Poland	Leaflet UIC 540
Russia	Regulations for technical operation of the railways of the Russian Federation approved by the order of the Ministry of Transport of Russia No. 286 of 21/12/2010 GOST Parking brakes (automatic and manual) of railway rolling stock. Technical requirements and methods of control
Slovakia	Leaflet UIC 540
Ukraine	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) NB ZhT TsT 01-98. Railway passenger carriages.
Estonia	

5.3.6 Сцепление колес с рельсами – Система противоюзной защиты *(Wheel rail adhesion solicitation- Wheel slide protection system)*

5.3.6.1 Предельное значение коэффициента сцепления колес с рельсами *(Limit of wheel rail adhesion solicitation)*

Russia, Belarus, Kazakhstan:

Russia: Maximum brake force of the brake pads shall be checked to the maximum allowed wheel/track adhesion factor during braking ψ_f provided in the Table: The following condition shall also be observed:

Maximum value of pressure force applied on breaking pads shall be evaluated considering the maximum possible coefficients of tolerance for adhesion between wheel and rail and breaking values ψ_κ as shown in the table as well as observing the condition:

$\delta_{p'}\varphi_{кр} \leq \psi_{к,}$ где $\varphi_{кр}$ – расчётный коэффициент трения тормозных колодок

where $\varphi_{кр}$ – design coefficient of breaking pads adhesion.

Коэффициент сцепления колёс с рельсами пассажирских вагонов

Скорость вагона, м/с	Величина коэффициента $\psi_к$ сцепления колёс при нагрузке от одной колёсной пары на рельс, кН					
	60	100	140	180	220	260
11	0.139	0.132	0.123	0.115	0.107	0.102
17	0.128	0.121	0.114	0.108	0.101	0.095
39	0.106	0.099	0.093	0.087	0.081	0.077
45	0.102	0.096	0.090	0.084	0.078	0.074

These requirements have been approved by the following documents:

Belarus	Standards for the calculation and design of carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	Standards for the calculation and design of carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways Informative – Draft GOST R. Locomotive-hauled passenger carriages. General technical requirements
Latvia	Not regulated
Lithuania	Not regulated
Poland	TSI LOC & PAS
Russia	Standards for the calculation and design of carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered). VNIIV-VNIIZhT 1983., chapter 9 GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	TSI LOC & PAS
Ukraine	Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered) NB ZhT TsT 01-98. Railway passenger carriages.
Estonia	

5.3.6.2 Система противоюзной защиты *(Wheel slide protection system)*

Russia, Belarus:

When the gross weight to tare ratio exceeds 1.15, the carriage shall be equipped with a load-dependent automated friction force adjustment device.

Rated brake ratio shall be selected depending on the rated stopping distance value during emergency braking at the rated speed of travel.

Fault or breakdown of an anti-skid device shall not affect the performance of the braking system as a whole or parts thereof or create any conditions of braking performance reduction during braking.

Power supply of the anti-skid device shall be from an independent uninterruptible power source.

Possibility of instrumental monitoring of the anti-skid device shall be ensured.

These requirements have been approved by the following documents:

Belarus	Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements Draft GOST R. Locomotive-hauled passenger carriage bogies. Technical conditions
Kazakhstan	Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements Draft GOST R. Locomotive-hauled passenger carriage bogies. Technical conditions
Latvia	Not regulated
Lithuania	Not regulated
Poland	TSI LOC&PAS
Russia	GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements GOST R. Locomotive-hauled passenger carriage bogies. Technical conditions
Slovakia	TSI LOC&PAS
Ukraine	NB ZhT TsT 01-98. Railway passenger carriages. Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways (unpowered)
Estonia	

5.3.7 Системы динамического торможения (применение системы динамического торможения для улучшения характеристик экстренного торможения) *(Dynamic brake - Braking systems linked to traction system)*

Russia:

Not applicable to locomotive-hauled passenger carriages on 1520 mm track gauge.

5.3.8 Система торможения независимая от условий сцепления колеса с рельсом *(Braking system independent of adhesion conditions)*

5.3.8.1 Общие положения *(General)*

Russia, Belarus:

Equipping with an additional brake not depending on the wheel/track adhesion is allowed.

5.3.8.2 Магниторельсовый тормоз *(Magnetic track brake)*

Russia, Belarus:

Magnetic brake design shall not conflict with the main provisions of the following international documents (or other applicable regulatory documents in effect when the carriage is being designed and built):

- Technical requirements for brakes of locomotive-hauled passenger carriages for travel speeds up 200 km/h. Instructions UIC 540/4 O.
- Brakes – Manufacturing regulations for various brake parts
– Electromagnetic rail brake. Instructions UIC 541-06 O+P.
- Brakes – Braking power. Instructions UIC 544-1
- Recommendations for technical requirements for magnetic brakes of passenger carriages. Instructions No. 546 P
- Brakes – High performance brakes for passenger trains. Instructions UIC 546 O+P.

Activation of magnetic rail brakes shall be done from a separate tank.

5.3.8.3 Вихретоковый тормоз *(Eddy current track brake)*

Eddy current brakes without shoe contact with the tracks can be used.

5.3.9 Контроль состояния тормозов и индикация неисправностей *(Brake state and fault indication)*

Russia, Belarus:

Inside and outside, the carriages shall be equipped with signal devices reflecting:

- pressure in the pneumatic system of the brake cylinders;

- brake activation;

- brake release;

- parking brake engagement.

The signal devices located inside the body (in the service vestibule and attendant's compartment) shall serve as automated full brake release indicator (light or sound). At the same time, ergonomics requirements according to GOST 29.05.002 for digital indicators and GOST 21786 for sound indicators shall be satisfied.

Inside the body, a device for forced brake release shall be installed.

These requirements have been approved by the following documents:

Belarus	STP 09150.17.038-2006. Regulations for the operation of rolling stock brakes on Belarus Railway Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements Locomotive-hauled passenger carriages based on unified platforms. Technical requirements
Kazakhstan	Informative – Draft GOST R. Locomotive-hauled passenger carriages. General technical requirements
Latvia	Guidelines for the operation of rolling stock brakes on the Ukrainian railways No. DR-19/2000
Lithuania	GOST R 51690-2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions R/86 Rolling stock brakes control regulations 63/V Guidelines for the repair of carriage braking equipment
Poland	TSI LOC&PAS
Russia	GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	TSI LOC&PAS
Ukraine	Determined by the terms of reference for the design and construction of passenger carriages
Estonia	

5.3.10 Требования к тормозам в условиях буксировки *(Brake requirements for rescue purposes)*

This parameter is established based on the operational brakes requirements.

5.4 ОБСЛУЖИВАНИЕ ПАССАЖИРОВ *(PASSENGER RELATED ITEMS)*

5.4.1 Санитарные системы *(Sanitary systems)*

Russia, Belarus:

The inside and outside appearance of carriages, layout, interior equipment, level of lighting of carriage compartments shall comply with the sanitary regulations SP 2.5.1198-03; concentration of harmful substances in the air in the carriage shall comply with the hygiene requirements GN 2.1.6.1338-03.

Carriage design shall allow water filling using R17B type hoses to GOST 2593.

The carriages shall be equipped with sensors with shut-off valves for cutting off tank filling and water drain pipe in case of tank overfill.

Filling nozzles shall be on both sides of the carriage. Their connection heads shall have covers to prevent dirt penetration.

Carriages shall be equipped with a hot and cold water supply system with hydraulic isolation from the heating system.

The possibility of installing drinking water purification devices shall be provided.

The tank volume shall ensure a supply of at least 20 l of cold and hot water per place in sleeping carriages and at least 10 l per place in a carriage with seats. In carriages provide with shower cabins, the water supply shall be at least 30 l per place.

The tank and water distribution system shall ensure complete drainage, cleaning, flushing and disinfecting. The water supply system shall have tank water level gauges and an overfill protection device.

The carriage design shall ensure that the water inside the water supply system will not freeze for 8 hours after heating is switched off at an outside air temperature of -20 ◦C and for 12 hours at an outside air temperature of -10 ◦C.

The drain and filling tubes shall be heated.

The carriage shall have at least 2 toilet rooms with an area of at least 1.2 m^2.

Air exhaust from the toilet compartment shall be at least 50 m^3/h

Carriages shall be equipped with self-contained toilet systems in accordance with the sanitary requirements SP 2.5.1198-03.

The heating, ventilation and air conditioning system of the carriage and its sanitary equipment shall comply with the sanitary requirements SP 2.5.1198-03.

Heating equipment shall have protection covers. Temperature on the protection cover surface shall not exceed +55 °C.

Air head (overpressure) in the carriages shall be at least 15 Pa.

The heating, ventilation and air conditioning system of the carriage shall ensure environment parameters in accordance with with Appendix 5 of the sanitary requirements SP 2.5.1198-03.

The following types of artificial lighting shall be provided in passenger carriage compartments: primary and emergency.

In all carriages, emergency lighting for people evacuation with illuminance of at least 1 lx on the floor shall be provided.

Characteristics of artificial (general) illuminance of passenger carriages are given in Appendix 5 to sanitary regulations SP 2.5.1198-032.5.

Noise level shall not exceed 60 dBA in passenger compartments, 68 dBA in vestibules, 80 dBA in gangway passages and 65 dBA in areas above the bogie.

The equivalent level of external noise generated when the train is in motion shall not exceed 84 dBA at 100 m from the outer rail, at 25 m for new carriages on continuous welded rail track (in absence of acoustic shields).

Maximum permissible sound and sound pressure levels in passenger carriage compartments are given in Appendix 7 of the sanitary regulations SP 2.5.1198-03.

Vibration levels on the floor and seat surfaces in passenger and service compartments of sleeping carriages and on the floor and seat surfaces in passenger carriages with seats shall not exceed the parameters set forth in Appendix 8 of the sanitary regulations SP 2.5.1198-03.

Maximum permissible infrasound levels in passenger carriages shall comply with the parameters stipulated in Appendix 9 of the sanitary regulations SP 2.5.1198-03.

Noise levels in compartments adjacent to toilet compartments when the self-contained toilet system is operating shall not exceed standard values stipulated in sanitary regulations SP 2.5.1198-03.

These requirements have been approved by the following documents:

Belarus	SanPiN 2.2.4.13-7-2006. Sanitary standards and regulations. Hygiene requirements for control and assessment of vibration levels in railway rolling stock carriages. SanPiN 2.5.4.13-35-2006. Sanitary standards and regulations. Hygiene requirements for the organisation of passenger operations on railway

	transport Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	SP 2.5.1198-03 Sanitary and epidemiological standards and regulations No. 358 of 14/07/2005 "Sanitary and epidemiological requirements for maintenance and operation of passenger carriages", Ministry for Health of the Republic of Kazakhstan
Latvia	Cabinet of Ministers regulations No. 235 of 29/04/2003 "Requirements for quality and relative safety of drinking water, inspection and monitoring procedure"
Lithuania	Leaflet OSJD O+R-562-2008. Sanitary technical requirements for passenger carriage design Leaflet UIC 563. Sanitary equipment in passenger railway carriages. HN24 : 2003. Drinking water safety and quality requirements. Quality standard for AO LG service of Passenger Carriage Administration, approved by LG order No. 999 of 21/12/2011 TSI PRM
Poland	TSI LOC&PAS TSI PRM PN-EN-50125-1:2002/AC:2010
Russia	Sanitary regulations for the organisation of passenger traffic by railway transport (SP 2.5.1198–03). Threshold limit values (TLV) of pollutants in atmospheric air in inhabited places. Hygiene standards. (GN 2.1.6.1338-03) GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	TSI LOC&PAS
Ukraine	Sanitary regulations for the arrangement of equipment and operation of long-distance passenger carriages TsUVS-19, MPS 1984 Leaflet OSJD O+R562. Sanitary technical requirements for passenger carriage design
Estonia	

5.4.2 Системы оповещения и связи *(Public address system: audible communication system)*

Russia, Belarus:

Passenger carriages shall be equipped with a train intercom system and a public address system.

Carriages shall be equipped with information displays for displaying train route information, next stop, travel speed, weather, toilet occupancy status, etc.

Information displays (indicators) in 1st and 2nd class carriages are placed on partitions above the entrance doors and in premium class carriages above the doors of every compartment.

The information displayed on the indicators shall be unequivocally viewable from any place inside the carriage with natural and artificial lighting.

Interior in-carriage speakers and amplifiers shall be provided in the carriage for broadcasting messages to passengers. The train master/manager shall be able to broadcast messages to the entire train. Attendants shall be able to broadcast messages to their carriages.

On agreement with the customer, the carriages can be provided with GSM900/1800/UMTS repeaters with external antenna and transmitting feeder to ensure uninterrupted mobile communications for the passengers.

If requested by the customer, the carriages can be provided with video surveillance system ensuring video monitoring of the situation in the carriages in various modes (real time view, individual camera view, archive view, etc.).

At the same time, uninterrupted power supply of the communications and video surveillance equipment shall be ensured.

These requirements have been approved by the following documents:

Belarus	Technical regulations on safety of railway rolling stock TR TS 001/2011. STP 09150.19.019-2006. Operating requirements for train radio communications Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	Technical regulations on safety of railway rolling stock TR TS 001-2011
Latvia	TOR of Latvian Railway
Lithuania	LST 12299L ENV. Railway equipment. Passenger travelling comfort. Measurement and assessment. Quality standard for AO LG service of Passenger Carriage Administration, approved by LG order No. 999 of 21/12/2011 Leaflet UIC 565-3. Instructions for passenger carriage equipment for disabled passengers. TSI PRM

Poland	TSI LOC&PAS TSI PRM
Russia	GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements Technical regulations on safety of railway rolling stock TR TS 001-2011
Slovakia	TSI LOC&PAS TSI PRM
Ukraine	TsSh-0058. Rules for arrangement and calculation of train communication systems. Provision of additional information and video equipment for carriages shall be determined by terms of reference for designing and construction of a passenger carriage.
Estonia	

5.4.3 Возможность подачи сигнала тревоги пассажирами машинисту или поездной бригаде: функциональные требования *(Passenger alarm: functional requirements)*

Russia, Belarus:

An additional alarm signal sent by the passengers to the driver is the emergency brake valve.

Passenger carriages without attendants shall be provided with devices for passengers to communicate with the locomotive or train crew. Such devices shall be installed inside the passenger compartments.

These requirements have been approved by the following documents:

Belarus	Technical regulations on safety of railway rolling stock TR TS 001/2011.
Kazakhstan	Technical regulations on safety of railway rolling stock TR TS 001-2011
Latvia	TOR of Latvian Railway
Lithuania	TSI LOC&PAS, TSI PRM
Poland	TSI LOC&PAS
Russia	Technical regulations on safety of railway rolling stock TR TS 001-2011
Slovakia	TSI LOC&PAS
Ukraine	TsRB-0004. Technical operation regulations of the Ukrainian Railways Standards for the calculation and design of new and upgraded carriages for 1520 mm gauge tracks of the railways of the Ministry of Railways

	(unpowered) NB ZhT TsT 01-98. Railway passenger carriages.
Estonia	

5.4.4 Надписи и знаки безопасности для пассажиров *(Safety instructions to passengers - Signs)*

Russia, Belarus:

The following safety signage shall be provided on the carriage equipment to GOST R 12.4.026:

- "No naked flame. No smoking" – on covers of battery compartments (boxes).

- "Electric shock hazard" – on doors and covers of compartments and boxes containing electrical equipment, not-lockable control boards, on bodies of electrical devices with voltage over 42 V AC and over 110 V DC.

The locations and types of safety signs are stipulated in "Signs and inscriptions on passenger carriages of Russian railways" 0082-05 PKB TsL manual, "Signs and inscriptions on passenger carriages in cross-border traffic" 015-2010 PKB TsL and GOST R 12.4.026-2001.

These requirements have been approved by the following documents:

Belarus	TsRB/4676. Regulations on safety signage on railway transport facilities Informative – GOST R 12.4.026-2001. Railway rolling stock. Permissible impact on railway track and testing methods (in progress) Manual No 0082-05 PKB TsL. Signs and inscriptions on passenger carriages of Russian railways. GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	ST RK GOST R 51690–2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions Informative – Draft GOST R. Locomotive-hauled passenger carriages. General technical requirements
Latvia	PRM TSI

Lithuania	Key to layout of informative signage inside passenger rolling stock, approved by LG in 2004. Leaflet UIC 413
Poland	TSI LOC&PAS TSI PRM
Russia	GOST R 12.4.026-2001. Occupational safety standard system. Signal colours, safety signage, safety markup. Designation and rules of use. General technical requirements and parameters. Test methods. Manual No 0082-05 PKB TsL. Signs and inscriptions on passenger carriages of Russian railways. Manual "Signs and inscriptions on passenger carriages in cross-border traffic" 015 -2010 PBK TsL GOST R 55182-2012 Locomotive-hauled passenger carriages. General technical requirements
Slovakia	TSI LOC&PAS TSI PRM
Ukraine	GOST 12.4.026-76 SSBT Signal colours and safety signage. OST 32.4-76 SSBT Safety signage on railway transport facilities. TsL-0072. Guidelines for approval, location and method of application of signs and inscriptions on 1520 mm track gauge passenger carriages of Ukrainian railways.
Estonia	

5.4.5 *Системы связи для пассажиров (Communication devices for passengers)*

Covered by the requirements of paragraph 5.4.2

5.4.6 Внешние двери: вход и выход пассажиров из ПС *(Exterior doors: passenger access to and egress from Rolling Stock)*

Russia, Belarus:

Entrance doors of passenger carriages shall be equipped with opening (closing) systems (devices) and a control system ensuring safety of the staff and (or) passengers.

Entrance doors of the passenger carriages shall be provided with locking devices preventing them from being opened by passengers or unauthorised persons while the rolling stock is moving.

Emergency opening of the entrance doors of the passenger carriages shall be ensured via a standard scheme with locking in the open position. Emergency opening of the plug door shall be manual at the train travelling speed within allowed values.

Clear door openings in the passenger carriages shall ensure free movement of the passengers with luggage and have at least the following dimensions:

- external side doors 1900 x 780 mm for all classes of carriages, and 1790 x 760 mm for carriages intended for cross-border service

- external end doors 1800 x 700 mm for all classes of carriages, and 1800 x 630 mm for carriages intended for cross-border service

- passages 1900 x 520 mm for all classes of carriages and carriages intended for cross-border service

Exterior side doors shall be sliding plug type. For the carriages with travelling speed not exceeding 160 km/h and for special carriages, wing doors can be allowed.

Door locking in open position shall be provided.

For doors with automatic drive, automatic door closing and locking in closed position at carriage travel speed over 5.0 km/h shall be provided.

Automatic doors shall have illuminated control buttons with inscriptions or icons explaining their purpose.

All doors shall have locking devices, except swing doors. External side and end doors and doors in service compartments shall have locks with special key.

These requirements have been approved by the following documents:

Belarus	Technical regulations on safety of railway rolling stock TR TS 001/2011. Informative – SP 2.5.1198–03. Sanitary regulations for the organisation of passenger traffic by railway transport GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	Technical regulations on safety of railway rolling stock TR TS 001-2011 p. 88-89 ST RK GOST R 51690–2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions
Latvia	PRM TSI
Lithuania	LST EN 14752:2006. Railway equipment. Side door systems. Leaflet UIC 560. Doors, entrance platforms, windows, steps, handles and handrails of passenger and baggage carriages Leaflet UIC 565-3. Instructions for passenger carriage equipment for disabled passengers. TSI PRM
Poland	PN EN 14752:2006

	Leaflet UIC 560 Leaflet UIC 565-3 TSI LOC&PAS TSI PRM
Russia	Sanitary regulations for the organisation of passenger traffic by railway transport (SP 2.5.1198–03). Technical regulations on safety of railway rolling stock TR TS 001-2011 p. 88-89 GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	TSI LOC&PAS TSI PRM
Ukraine	DSTU 4049-2001. Locomotive-hauled passenger carriages for main lines. Safety requirements. Sanitary regulations for the arrangement of equipment and operation of long-distance passenger carriages TsUVS-19, MPS 1984 OSJD O+R562. Sanitary technical requirements for passenger carriage design
Estonia	

5.4.7 Конструкция дверных систем *(Door system construction)*

Russia, Belarus:

Carriages shall be provided with handrails and foot boards designed for both low and high platforms and with dimensions in accordance with the technical operational requirements.

The lower step height shall not exceed 550 mm above the rail top and shall not exceed 350 mm above the platform level.

Step depth shall be at least 300 mm, width at least 250 mm and the vertical distance between the steps shall not exceed 250 mm.

The supportive surfaces of the foot boards and steps shall be non-slip.

These requirements have been approved by the following documents:

Belarus	Informative – SP 2.5.1198–03. Sanitary regulations for the organisation of passenger traffic by railway transport GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	Technical regulations on safety of railway rolling stock TR TS 001-

	2011 p. 88-89 ST RK GOST R 51690–2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions
Latvia	PRM TSI
Lithuania	LST EN 14752:2006 Leaflet UIC 560. Doors, entrance platforms, windows, steps, handles and handrails of passenger and baggage carriages Leaflet UIC 565-3. Instructions for passenger carriage equipment for disabled passengers. TSI PRM
Poland	PN EN 14752:2006 Leaflet UIC 560 Leaflet UIC 565-3 TSI LOC&PAS TSI PRM
Russia	Sanitary regulations for the organisation of passenger traffic by railway transport (SP 2.5.1198–03). GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	STN EN 14752:2006 Leaflet UIC 560 Leaflet UIC 565-3 TSI LOC&PAS TSI PRM
Ukraine	DSTU 4049-2001. Locomotive-hauled passenger carriages for main lines. Safety requirements. Sanitary regulations for the arrangement of equipment and operation of long-distance passenger carriages TsUVS-19, MPS 1984 Leaflet OSJD O+R562. Sanitary technical requirements for passenger carriage design
Estonia	

5.4.8 Межвагонные двери *(Inter-unit doors)*

Russia, Belarus:

Inter-unit doors shall be provided for passage through the train.

End platforms of the passenger carriages shall be closed, preventing penetration of water and dirt, have convenient handrails, duty and emergency lighting for safe passage of the passengers and the dining carriage staff with trolleys. The floor shall be free from any openings or slots where a person's foot can be caught.

The clear door opening shall ensure free movement of the passengers with luggage and with the dimensions of external end doors of at least 1800 x 700 mm for all classes of carriages, and 1800 x 630 mm for carriages intended for cross-border service.

These requirements have been approved by the following documents:

Belarus	SanPiN 2.5.4.13-35-2006. Sanitary regulations and hygiene requirements for the organisation of carriage by railway transport. Informative – SP 2.5.1198–03. Sanitary regulations for the organisation of passenger traffic by railway transport
Kazakhstan	Technical regulations on safety of railway rolling stock TR TS 001-2011 ST RK GOST R 51690–2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions
Latvia	TSI PRM
Lithuania	TSI PRM Leaflet UIC 560. UIC 565-3.
Poland	Leaflet UIC 560 TSI LOC&PAS
Russia	Sanitary regulations for the organisation of passenger traffic by railway transport (SP 2.5.1198–03).
Slovakia	Leaflet UIC 560 TSI LOC&PAS
Ukraine	DSTU UIC 5612007. Passenger carriages. Gangway passages. General technical requirements Sanitary regulations for the arrangement of equipment and operation of long-distance passenger carriages TsUVS-19, MPS 1984 Leaflet OSJD O+R562. Sanitary technical requirements for passenger carriage design
Estonia	

5.4.9 Качество воздуха в помещениях подвижного состава *(Internal air quality)*

Russia, Belarus:

Air head (overpressure) in the passenger carriages shall be at least 15 Pa.

Relative humidity in the passageways of all types and classes of carriages shall be 15-75%.

The ventilation system shall be designed for continuous operation to ensure intake of external air of at least 20 cubic m/h per place in summer and at least 10 cubic m/h per place in winter. At the same time the carbon dioxide concentration in the compartments shall not exceed 0.1 vol. %.

Depending on the outside temperature, the air supply per place shall be at least as follows:
10 m^3/h at outside air temperature below -20°;

15 m^3/h at outside air temperature from -20° to -5°;

20 m^3/h at outside air temperature from -5° to +26°;

15 m^3/h at outside air temperature above +26°.

The air supplied to the carriages shall be cleaned using filters. Dust concentration in the supplied air after cleaning shall not exceed 0.5 mg/cubic m.

The air conditioning system shall ensure uniform distribution of supplied air and not allow direct supply of chilled air on a passenger.

The temperature of the chilled air supplied to the carriage shall be at least +16 °C at the outlet.

With maximum 70% of recuperated air used, decontamination devices shall be provided which ensure controlled efficiency of deactivating at least 95% of any biological agents. Total microbial count shall not exceed 2000 CFU/m^3.

Total haemolytic coccal flora shall not exceed 60 CFU/m^3 (3% of TMC).

No S.aureus, streptococci, coliforms or other pathogenic microorganisms shall be present in the air of the carriage. The concentration of harmful substances in the air of the carriage shall not exceed the maximum limit thresholds set for atmospheric air in inhabited places.

Microclimate parameters in passenger carriages

Parameter	Parameter value at outside air temperature, °C,	
	below +20	from +20 to + 40
1	2	3
Air temperature, °C		
- passenger and service compartments of all types and classes of carriages, dining area of dining carriage;	20-24	22-26

- seating area of the carriages;	20-24	22-28
- toilets, corridors (passageways) of all types and classes of carriages;	16-24	22-28
- dining carriage kitchen;	19-24	20-28
- shower module.	at least 24	at least 24
Vertical air temperature difference, °C, not exceeding		
- passenger and service compartments of premium carriages, dining area of dining carriage; shower module; dining room of the dining carriage;	2	2
- passenger and service compartments, corridors (passageways), toilets of all types and classes of carriages, dining carriage kitchen.	3	3
Horizontal air temperature difference, °C, not exceeding		
- first and last compartments, front and end of corridors in premium carriages, dining area of dining carriage;	2	-
- first and last compartments, front and end of corridors in passenger carriages of all types and classes, dining carriage kitchen.	3	-
Floor temperature, °C, at least		
- passenger and service compartment of all types and classes, dining area and kitchen of dining carriage;	15	-
Heated floor temperature, °C, not exceeding:		
- in passenger areas;	24	-

- in shower module.	30	-
Wall temperature, °C, at least		
- passenger and service compartments of all types and classes, dining area and kitchen of dining carriage;	15	-
Air velocity, m/s, not exceeding		
- passenger and service compartments of all types and classes, dining area and kitchen of dining carriage; shower module.	0.2*	0.25**
Relative humidity, %		
- passenger and service compartments of all types and classes, dining area and kitchen of dining carriage;	From 15 to 75	From 15 to 75
Resulting temperature, °RT		
- passenger and service compartments of all types and classes, dining area and kitchen of dining carriage:		
- for hot climate areas	18.3-22.3	20.5-24.5
- for moderate climate areas	16.3-20.3	18.8-22.8

* For sleeping carriage corridors and kitchens of dining carriages (in the middle) with air heating system, air velocity up to 0.3 m/sec is allowed.

** For sleeping carriage corridors with air heating system and kitchens of dining carriages (in the middle), air velocity up to 0.3 m/sec is allowed.

These requirements have been approved by the following documents:

Belarus	SanPiN 2.5.4.13-35-2006. Sanitary regulations and hygiene

	requirements for the organisation of carriage by railway transport. Informative – SP 2.5.1198–03. Sanitary regulations for the organisation of passenger traffic by railway transport
Kazakhstan	Technical regulations on safety of railway rolling stock TR TS 001-2011 ST RK GOST R 51690–2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions Sanitary and epidemiological standards and regulations No. 358 of 14/07/2005 "Sanitary and epidemiological requirements for maintenance and operation of passenger carriages", Ministry for Health of the Republic of Kazakhstan
Latvia	Leaflet OSJD O+R562. Sanitary technical requirements for passenger carriage design
Lithuania	Leaflet UIC 560. Leaflet UIC 565-3.
Poland	Leaflet UIC 560 TSI LOC&PAS
Russia	Sanitary regulations for the organisation of passenger traffic by railway transport (SP 2.5.1198–03).
Slovakia	Leaflet UIC 560 TSI LOC&PAS
Ukraine	Sanitary regulations for the arrangement of equipment and operation of long-distance passenger carriages TsUVS-19, MPS 1984 Leaflet OSJD O+R562. Sanitary technical requirements for passenger carriage design DSTU 4049-2001. Locomotive-hauled passenger carriages for main lines. Safety requirements
Estonia	

5.5 УСЛОВИЯ ОКРУЖАЮЩЕЙ СРЕДЫ И АЭРОДИНАМИЧЕСКИЕ ЭФФЕКТЫ *(ENVIRONMENTAL CONDITIONS AND AERODYNAMIC EFFECTS)*

5.5.1 Условия окружающей среды *(Environmental conditions)*

Currently, the requirements for this parameter are the same in all the countries; however, some specific parameter values may vary depending on the climate zones of the

country. These requirements are provided in GOST 15150-69 or other equivalent document in each country.

Belarus:

Rolling stock and its equipment shall be manufactured to U climate requirements according to GOST 15150.

Latvia:

GOST 15150-69

Poland:

PN-EN -50125-1:2002

PN-EN-60721-3-5:2010

TSI LOC PAS

Russia, Belarus:

General network carriages and their equipment shall be manufactured to U category location 1 according to GOST 15150. The carriages shall remain in operational condition after storage at the lowest permissible outside ambient temperature -60 ◦C. The carriage equipment not satisfying this requirement shall be easily removable and removed from the carriage for the storage period at temperature below -50 ◦C for storage in conditions appropriate for its design.

Depending on its installation site, the carriage equipment shall have the following location categories to GOST 15150:

- 3 – in carriage;
- 2 – in undercarriage chambers and vestibules;
- 1 – outside the carriage.

Electromechanical carriage equipment shall comply with the following mechanical design groups to GOST 17516.1:

- M25 - when placed on the body;

- M26 - when placed on the sprung parts of bogies;

- M27 - when placed on the non-sprung parts of bogies.

These requirements have been approved by the following documents:

Belarus	GOST 15150-69. Machinery, devices and other technical products. Modifications for different climatic areas. Categories, operation, storage and transportation conditions in terms of the impact of environmental climatic factors GOST 17516.1-90. Electric devices. General requirements for resistance to external mechanical factors GOST 15543.1-89. Electric devices. General requirements for resistance to external climatic factors Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages.

	General technical requirements
Kazakhstan	GOST 15150-69. Machinery, devices and other technical products. Modifications for different climatic areas. Categories, operation, storage and transportation conditions in terms of the impact of environmental climatic factors Informative – Draft GOST R. Locomotive-hauled passenger carriages. General technical requirements
Latvia	GOST 15150-69. Machinery, devices and other technical products. Modifications for different climatic areas. Categories, operation, storage and transportation conditions in terms of the impact of environmental climatic factors (informative)
Lithuania	GOST 15150-69. Machinery, devices and other technical products. Modifications for different climatic areas. Categories, operation, storage and transportation conditions in terms of the impact of environmental climatic factors GOST 17516-72. Electric devices. Operational conditions in terms of resistance to external mechanical factors GOST 17516.1-90. Electric devices. General requirements for resistance to external mechanical factors. Informative. LST EN 50125-1:2002. Application area – railway transport. Environmental impact on equipment. Part 1. Rolling stock equipment. LST EN 60721-3-5:2001. Classification of environmental conditions. Part 3. Classification of groups of environmental parameters and their severities. Subgroup 5. Ground vehicle installations (IEC 60721-3-5:1997)
Poland	PN-EN -50125-1:2002 PN-EN-60721-3-5:2010 TSI LOC & PAS
Russia	GOST 15150-69. Machinery, devices and other technical products. Modifications for different climatic areas. Categories, operation, storage and transportation conditions in terms of the impact of environmental climatic factors GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements GOST 17516.1-90. Electrical devices. General requirements for resistance to external mechanical factors GOST 15543.1-89. Electric devices. General requirements for resistance to external climatic factors
Slovakia	STN-EN-50125-1:2002 STN-EN-60721-3-5:2010

	TSI LOC and PAS
Ukraine	GOST 15150-69. Machinery, devices and other technical products. Modifications for different climatic areas. Categories, operation, storage and transportation conditions in terms of the impact of environmental climatic factors GOST 17516.1-90. Electrical devices. General requirements for resistance to external mechanical factors GOST 15543.1-89. Electric devices. General requirements for resistance to external climatic factors
Estonia	

5.5.2 Аэродинамические эффекты *(Aerodynamic effects)*

Russia, Belarus:

Aerodynamic effects are not regulated in the 1520 mm system.

5.6 ЗАЩИТА СИСТЕМЫ *(SYSTEM PROTECTION)*

5.6.1 Электробезопасность *(Protection against electrical hazards, new chapter number 4.2.8.4 in TSI revision 4.0)*

Russia, Belarus:

The electrical equipment of passenger carriages shall be provided with protection and an alarm which is activated in case of overloads, short circuit, earthing faults, electrical equipment overvoltage. The protection activation shall prevent damage to electrical equipment and shall not lead to any dangerous consequences: excessive heating leading to smoke generation or ignition and/or overvoltages leading to insulation failure of the electrical equipment.

Unprotected (non-insulated) parts of electrical equipment or railway rolling stock under voltage shall have protection from accidental access by staff and/or passengers. Metal enclosures of electrical equipment and all guards (including pipes), support structures for current-conducting parts, which in case of a failure can become live with voltage exceeding permissible values, shall be earthed to the body of the railway rolling stock.

Passenger carriages with an independent electricity supply unit shall be equipped with special storage places for protection devices and other special equipment necessary for technical maintenance and safe operation of the said rolling stock.

These requirements have been approved by the following documents:

Belarus	GOST 12.1.019-2009. Occupational safety standard system. Electrical safety. General requirements and classification of protection types Technical regulations on safety of railway rolling stock TR TS 001/2011. Informative –

	GOST R 54799-2011. Railway rolling stock. Requirements for protection from electric shock.
Kazakhstan	Technical regulations on safety of railway rolling stock TR TS 001-2011 TsV 104. Main line passenger carriages. Guidelines for technical maintenance of equipment ST RK 1831-2008. Electrical heating of passenger carriages used in cross-border service. Technical requirements GOST 12.1.019-2009. Occupational safety standard system. Electrical safety. General requirements and classification of protection types
Latvia	LVS EN50153
Lithuania	LST EN 501532003:2002. Application area – railway transport. Rolling stock. Electrical safety standards
Poland	PN-EN -50153:2004 TSI LOC and PAS
Russia	GOST 12.1.019-2009. Occupational safety standard system. Electrical safety. General requirements and classification of protection types GOST R 547992011. Railway rolling stock. Requirements for protection from electric shock. Technical regulations on safety of railway rolling stock TR TS 001-2011 p. 71-73
Slovakia	STN-EN-50153:2004 TSI LOC & PAS
Ukraine	GOST 12.1.019-79 (2009) SSBT. Electrical safety. General requirements and classification of protection types
Estonia	

5.6.2 **Диагностика; программное обеспечение *(Diagnostic; Software's, new chapter number 4.2.1 in TSI revision 4.0)***

5.6.2.1 **Диагностика *(Diagnostic)***

Russia, Belarus:

The procedure and requirements for the control and diagnostic systems for individual systems, units and parts of rolling stock shall be approved by the customer ordering the rolling stock and set forth in the operational manuals, repair guidelines and other technical and process documents for this type of rolling stock.

Currently effective are GOST 26656-85 Technical diagnostics. Testability. General requirements, GOST 27518-87 Product diagnostics. General requirements, GOST 20911-89 Technical diagnostics. Terms and definitions.

Monitoring, diagnostics and control system (MDCS) of the carriage shall be a software and equipment complex connected to the carriage equipment (CE).

In case of loss of power in the carriage, MDCS shall be supplied from the carriage battery.

Input and output signal parameters for communication between the instruments and automation devices shall comply with GOST 26.011.

Electrical encrypted input and output signals shall comply with GOST 26.014.

Diagnostics tools (sensors, equipment) shall comply with GOST R 52931.

In all modes of CE operation, its status information shall reflect its actual status. Any difference between the MDCS and reference instrument readings shall not exceed 5%.

If any carriage equipment undergoing diagnostics has its own monitoring system, the monitored parameters shall be read directly from that system.

Control of the carriage equipment in an emergency mode shall ensure generation of control signals based on real time information in respect of faults and pre-fault states of the equipment.

Control circuits setting the operating modes of the devices and subsystems and electrical equipment of the carriage shall be separated from the power circuits by actuating elements.

If CE control is performed not only by MDCS, this electrical circuit shall be provided with sensors ensuring correct output of the information in respect of this particular CE.

The MDCS control unit shall ensure:

- output of the necessary information in clear, comprehensible and easy perceivable form. Output parameters shall have unambiguous meaning;

- access levels (attendant, electrical technician, maintenance engineer);

- quick execution of commands received from the control unit. If a command cannot be quickly executed, an appropriate warning and/or progress bar in per cent shall be displayed.

MDCS memory shall ensure:

a) storage of information required for MDCS operation and protocols of emergencies until the next technical maintenance (TM);

b) possibility of deleting the protocols during maintenance;

c) safety of data in emergency situations:

1) with ambient temperature from -60 oC to +400 oC (exposure of the protective enclosure of the device to naked flame for 30 minutes);

2) with dynamic impact of 500 impacts with acceleration 100 m/c2 at frequency 0.5 Hz;

3) against individual impacts up to 1000 m/s2;

4) when submerged in water for over 120 minutes.

These requirements have been approved by the following documents:

Belarus	Technical regulations on safety of railway rolling stock TR TS 001/2011. GOST 26656-85 Technical diagnostics. Testability. General requirements GOST 27518-87 Product diagnostics. General requirements GOST 20911-89 Technical diagnostics. Terms and definitions Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	Technical regulations on safety of railway rolling stock TR TS 001-2011 GOST 26656-85 Technical diagnostics. Testability. General requirements GOST 27518-87 Product diagnostics. General requirements GOST 20911-89 Technical diagnostics. Terms and definitions
Latvia	Not regulated
Lithuania	Not regulated
Poland	TSI LOC and PAS
Russia	Technical regulations on safety of railway rolling stock TR TS 001-2011 GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements GOST 26656-85 Technical diagnostics. Testability. General requirements GOST 27518-87 Product diagnostics. General requirements GOST 20911-89 Technical diagnostics. Terms and definitions
Slovakia	TSI LOC & PAS
Ukraine	GOST 26656-85 Technical diagnostics. Testability. General requirements GOST 27518-87 Product diagnostics. General requirements GOST 20911-89 Technical diagnostics. Terms and definitions
Estonia	

5.6.2.2 Программное обеспечение *(Software's)*

Belarus, Russia, Ukraine, Kazakhstan:

General requirements for the software of onboard microprocessor systems of locomotive-hauled rolling stock are provided in the technical requirements and terms of

reference for the designing of the rolling stock. Full requirements for the onboard system software, units and devices are provided in the individual terms of reference.

Railway rolling stock software, both embedded and supplied on physical media, shall ensure:

a) operability after overloads caused by faults and/or failures of hardware and integrity in case of own faults;

b) protection from computer viruses, unauthorised access, consequences of faults and errors during storage, input, processing and output of the information, possibility of accidental information editing;

c) conformity with the properties and parameters set forth in accompanying documents.

These requirements have been approved by the following documents:

Belarus	Technical regulations of the Customs Union "On safety of railway rolling stock" TR TS 001/2011 p 25-26. STP 09150.11.088-2008. Information technologies. Development, operation and maintenance of automated systems. Stages and phases. Technical conditions for rolling stock
Kazakhstan	Technical regulations on safety of railway rolling stock TR TS 001-2011 p.25-26
Latvia	Not regulated
Lithuania	Not regulated
Poland	PN-EN-50128:2002/AC :2010 PN-EN-50155:2007/AC :2010 TSI LOC and PAS
Russia	Technical regulations on safety of railway rolling stock TR TS 001-2011 p.25-26 Technical conditions for rolling stock
Slovakia	STN EN 50128:2002, STN EN 50155:2002/A1:2003. TSI LOC & PAS
Ukraine	Technical conditions for rolling stock
Estonia	

5.6.3 Внешнее освещение, обозначение головы и хвоста поезда и звуковые сигналы *(External lights & visible and audible warning devices, new chapter number 4.2.7 in TSI revision 4.0)*

5.6.3.1 Внешнее освещение, обозначение головы и хвоста поезда *(External front and rear lights)*

5.6.3.1.1 Внешнее освещение *(Head lights)*

5.6.3.1.2 Обозначение головы поезда *(Marker lights)*

5.6.3.1.3 Обозначение хвоста поезда *(Tail lights)*

Russia, Belarus, Kazakhstan, Ukraine:

Passenger carriages shall be equipped with three signal lights on both end walls of carriages.

Tail signal light parameters are stipulated in Signalling guidelines TOR, GOST 12.2.056 p. 1.3.8–1.3.10, GOST 30487, Signal colour grade requirements in GOST 24179. Requirements for intensity and distribution of light under "Lighting requirements for light signalling devices of traction rolling stock, passenger carriages, track self-propelled machines and other mobile units of railway transport".

These requirements have been approved by the following documents:

Belarus	TOR of Belarusian Railway Signalling instructions on Belarusian railways Technical regulations of the Customs Union "On safety of railway rolling stock" TR TS 001/2011 p 93.
Kazakhstan	Technical regulations of the Customs Union "On safety of railway rolling stock" TR TS 001/2011 p 93.TOR of railway transport Signalling instructions on railways of the Republic of Kazakhstan No. 209 of 17/04/2011
Latvia	TOR of Latvian Railway
Lithuania	Regulations for railway transport traffic signalling
Poland	PN-EN -15153-1:2007 TSI LOC & PAS
Russia	Technical operation regulations of the Russian Railways, approved order of the Ministry for Transport of Russian Federation No. 286 of 21/12/2010, Appendix 7. Signalling instruction for railway transport in the Russian Federation Technical regulations on safety of railway rolling stock TR TS 001-2011 p. 93 GOST R 53784-2010. Optical elements for light signal devices of railway transport. Technical conditions Requirements for intensity and distribution of light under "Lighting requirements for light signalling devices of traction rolling stock, passenger carriages, track self-propelled machines and other mobile units of railway transport".
Slovakia	STN EN 15153-1 TSI LOC and PAS
Ukraine	TsShCh-0001. Signalling and communication instructions on Ukrainian railways GOST 24179. Optical filters, lens optical filters, lenses, diffusers, and

	deflecting glass inserts for signalling devices of railway transport. Technical conditions TsRB-0004. Technical operation regulations of the Ukrainian Railways
Estonia	Signalling instructions, Appendix to TOR

5.6.3.1.4 Управление световыми сигналами *(Lamp controls)*

Russia, Belarus, Ukraine, Kazakhstan:

Tail carriages shall be provided with light signalling devices and their control equipment allowing rolling stock marking schemes provided in the Signalling instructions to be implemented. Switching on is checked by the position of the switch and visually.

These requirements have been approved by the following documents:

Belarus	TOR of Belarusian Railway Signalling instructions on Belarusian railways
Kazakhstan	TOR of railway transport. Signalling instructions on railways of the Republic of Kazakhstan No. 209 of 17/04/2011
Latvia	TOR of Latvian Railway
Lithuania	Regulations for railway signalling (approved by the order of the Ministry of Transport of Lithuania No. 3-156 of 15/03/2011)
Poland	Order of Minister of Infrastructure of 18/02/2011 on signalling TSI LOC & PAS
Russia	Regulations for technical operation of the railways of the Russian Federation approved by the order of the Ministry of Transport of Russia No. 286 of 21/12/2010, Appendix 7 –Signalling instruction for railway transport in the Russian Federation
Slovakia	TSI LOC & PAS
Ukraine	TsShCh-0001 Signalling and communication instructions on Ukrainian railways GOST 24179. Optical filters, lens optical filters, lenses, diffusers, and deflecting glass inserts for signalling devices of railway transport. Technical conditions
Estonia	

5.6.3.2 Звуковые сигналы (тифон, свисток) *(Horn)*

Not applicable to passenger rolling stock

5.6.3.2.1 Общие положения *(General)*

5.6.3.2.2 Уровень звукового давления тифона *(Warning horn sound pressure levels)*

5.6.3.2.3 Защита от внешего воздействия *(Protection)*

5.6.4 Идентификация поезда и вагона – внешняя маркировка *(Train and vehicle identification – External marking, deleted in TSI revision 4.0)*

Currently, the requirements for external marking are the same in all the countries and are regulated by the TOR and other statutory documents.

Locomotive-hauled passenger carriages shall be registered and have a number assigned in accordance with the established procedure.

Russia, Belarus:

In accordance with TOR: each railway rolling stock unit shall have the following clear identification signs and inscriptions:

Russian Federation railway transport identification sign;

name of the railway rolling stock owner;

number, nameplate with date and place of manufacture;

identification numbers and acceptance seals on components in places stipulated in standards and regulations;

date and palace of the required types of repairs;

tare weight (except locomotives and special self-propelled rolling stock).

On each carriage (in accordance with GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements) a nameplate with the following information shall be attached:

- single mark of product circulation on the market of the member countries of the Customs Union;
- manufacturer's trademark;
- carriage sequence number according to the manufacturer's numbering system;
- carriage model;
- date of manufacture (month, year).

Tare weight of empty fully-equipped carriage shall be shown on the carriage.

Additional signs and inscription approved by the customer and owner of the infrastructure (owners) where the carriage is operated can be applied.

The carriages are assigned an 8-digit identification number in accordance with order of Ministry of Railways of the USSR No. 22Ts of 15 May 1984 "On the introduction of new numbering of the Ministry of Railways rolling stock". Signs and inscriptions are applied in accordance with the requirements of "Signs on passenger rolling stock of Russian railways" manual No. 0082-05 PKB-TsL.

These requirements have been approved by the following documents:

Belarus	TOR of Belarus Railway STP 09150.50.133 -2010. Trade mark and service mark of the Belorus Railway. Application procedure. Manual "Signs and inscriptions on passenger carriages operating in

	cross-border service" 0115-2010 PKB TsL Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	Technical regulations of the Customs Union "On safety of railway rolling stock" TR TS 001/2011 p 93.TOR of railway transport.
Latvia	TSI OPE TOR of Latvian Railway
Lithuania	ADV/001 Regulations on the technical operation of railways Manual of exterior signs, inscriptions and visual information on passenger rolling stock, approved by LG in 2004. TSI OPE
Poland	TSI OPE
Russia	Regulations for technical operation of the railways of the Russian Federation approved by the order of the Ministry of Transport of Russia No. 286 of 21/12/2010 GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements Manual No 0082-05 PKB TsL. Signs and inscriptions on passenger carriages of Russian railways. Methods of accounting by numbers of locomotive-hauled passenger carriages, approved by Roszheldor on 07/02/2008 On introduction of new numbering of rolling stock of Ministry of Railways, approved by Ministry of Railways of the USSR No. 22Ts of 15 May 1984
Slovakia	TSI OPE
Ukraine	TsRB-0004. Technical operation regulations of the Ukrainian Railways TsL-0072. Guidelines for approval, location and method of application of signs and inscriptions on 1520 mm track gauge passenger carriages of Ukrainian railways. On introduction of new numbering of rolling stock of Ministry of Railways, approved by Ministry of Railways of the USSR No. 22Ts of 15 May 1984
Estonia	

5.6.5 Электронная идентификация ПС *(Electronic identification of rolling stock, deleted in TSI revision 4.0)*

Russia:

Railway rolling stock shall be equipped with a device ensuring automatic identification of the side number.

Belarus:

Requirements for the Automated Identification System on Belorussian railway are not regulated.

Rolling stock identification shall be automatic by reading the identification number of the rolling stock unit when passing through the static reading points.

These requirements have been approved by the following documents:

Belarus	Not regulated
Kazakhstan	Not regulated
Latvia	Not regulated
Lithuania	Not regulated
Poland	Not regulated
Russia	Regulations for technical operation of the railways of the Russian Federation approved by the order of the Ministry of Transport of Russia No. 286 of 21/12/2010
Slovakia	Not regulated
Ukraine	Not regulated
Estonia	

5.7 ТЯГОВОЕ И ЭЛЕКТРИЧЕСКОЕ ОБОРУДОВАНИЕ *(TRACTION AND ELECTRICAL EQUIPMENT)*

5.7.1 Тяговые характеристики *(Traction performance)*

Not applicable to passenger rolling stock

5.7.2 Электроснабжение *(Power supply)*

5.7.2.1 Общие положения *(General)*

Russia, Latvia, Lithuania, Poland, Slovakia:

The following power supply systems are used in the carriages:

- centralised from the train high-voltage single-wire DC or AC main line with voltages according to the table; heating units receive power directly from the train main line via protection-switching equipment, and low voltage consumers via static inverter;
- centralised from the three-phase three-wire main line with insulated neutral, voltage 380 V with deviation ±10% and 50 Hz with deviation ±2 %; used for low voltage consumers directly or via matching transformer;

- independent with nominal DC voltage 24, 50 or 110 V from one or several undercarriage generators, each driven from the wheelset axle; used for low voltage consumer supply directly or via additional low voltage transformers;

- mixed from a combination of the above power supply options.

In carriages designed for travelling at speeds over 160 km/h, use of the undercarriage generators is not allowed.

Carriages shall be equipped with a high voltage compatible single-wire or double-wire train main line.

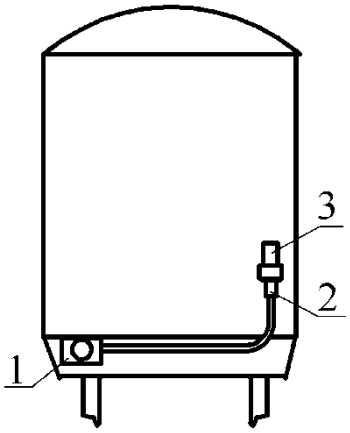
The high-voltage train line shall have insulation for an operating voltage of 3000 V DC. The main line cross-section shall be sized to ensure a continuous rating current flow of 400 A for carriages for the CIS and Baltic service and 800 A for carriages in cross-border service.

The two-wire high voltage main line shall ensure electromagnetic compatibility with the railway DC grid over both electrified and non-electrified railway sections provided the following requirements are satisfied: 4.2.11.23, 4.2.11.24. GOST 55182-2012.

"Zero" line connectors shall be situated on the ends of the carriages and locomotives (socket outlets and plugs) so as to ensure connection between carriages and with the locomotive with their random positioning.

The particular type of commonly-used high-voltage train main line shall be stated in the technical conditions (terms of reference) for the particular carriage type.

High-voltage train main line connectors shall be provided on both ends of the carriage as shown in the Figure. A plug that is not used for the connection of the main lines of adjacent carriages shall be fixed in a dummy socket. The geometric dimensions of the contact parts of socket outlet and plug are shown in the Figures.



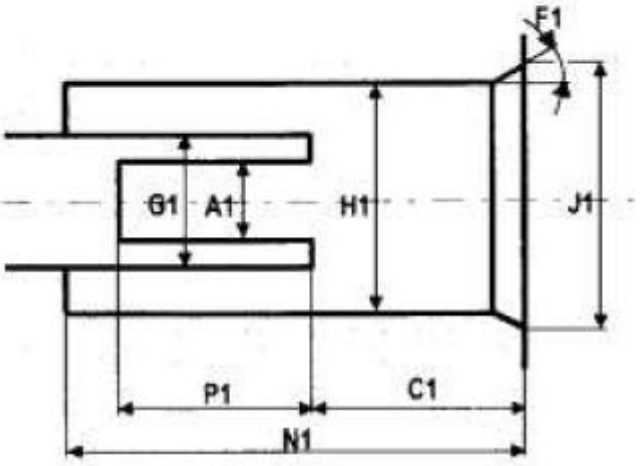
1 – socket outlet, 2 – plug, 3 – dummy socket

Arrangement of high-voltage train main line connectors

Geometric dimensions of the contact parts of the connectors

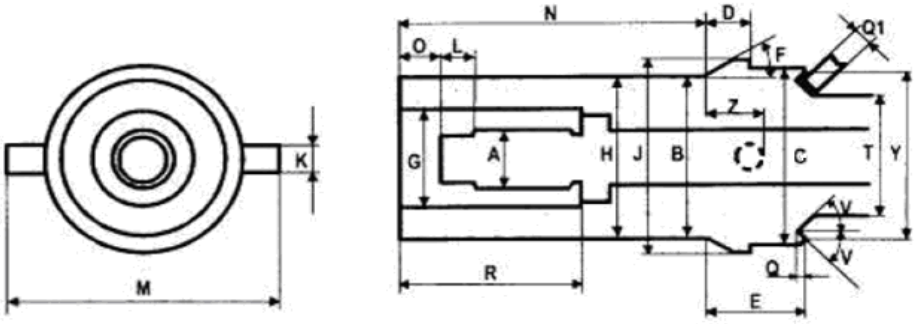
of high-voltage train main line

Maximum dimensions of the connection socket and connection plug shall comply with those provided in the figures throughout their entire service life.



Designation	Size	Tolerance
A1	∅25	±0.05
C1	66	+2 -1
F1	30°	±1°
G1	∅40	max
H1	∅71	min
J1	∅82	±0.7
N1	144	min
P1	60	min

Connection outlet



Designation	Size	Tolerance
A	∅25	+0.045 -0.040
B	∅72	±0.2
C	∅80	+2 -1
D	18	max
E	41	±0.1
F	30°	±1°
G	∅42.5	min
H	∅70.3	b
J	∅87	±0.2
K	∅12	+1

		-0.5
L	14	+1 -0.5
M	114	±2.5
N	130	±2
O	18	±1
Q	3.5	min
R	77	min
T	∅55	max
V	45°	±1°
Y	∅76	min
Z	24	±1

b – Maximum outer diameter including shell.

Connection plug

The types of external and emergency power supply connectors are not regulated, but are coordinated between the rolling stock manufacturer and customer placing order.

These requirements have been approved by the following documents:

Belarus	-
Kazakhstan	-
Latvia	Carriage design documents
Lithuania	-
Poland	-
Russia	GOST R 55182-2012. Locomotive-hauled passenger carriages. Fire safety requirements. Carriage design documents.
Slovakia	-
Ukraine	DSTU 2773-94 (GOST 9219. Interstate standard. Electric traction apparatuses. General technical conditions Instructions OSJD 550/2. Electrical heating of passenger carriages used in cross-border service.

	Instructions UIC 5502. Power supply of carriages from undercarriage main line.
Estonia	

5.7.2.2 Диапазон рабочих напряжений и частот *(Operation within range of voltages and frequencies)*

Russia, Latvia, Lithuania, Poland, Slovakia:

Parameters of high-voltage train main line

Область применения *Application scope*	Напряжение, В *Voltage V*			Частота, Гц *Frequency Hz*		
	Номинальное *nominal*	Наименьшее *min*	Наибольшее *max*	Номинальная *nominal*	Наименьшая *min*	Наибольшая *max*
Для вагонов сообщения по железным дорогам стран СНГ и Балтии *for coaches operated in CIS and Baltic States*	3000	2000	4000	Постоянный ток *DC*		
	3000	2200	3600	50	48	52
Для вагонов международного сообщения *For coaches operated in international traffic*	3000	2000	4000	Постоянный ток *DC*		
	3000	2200	3600	50	48	52
	1000	800	1150	$16^2/_3$	16	17.5
	1000	800	1150	50	48	52
	1500	1140	1650	50	48	52
	1500	1000	1800	Постоянный ток *DC*		

The high-voltage train line shall have insulation for an operating voltage of 3000 V DC. The main line cross-section shall be sized to ensure a continuous rating current flow of 400 A for carriages for the CIS and Baltic service and 800 A for carriages in cross-border service.

The carriage design shall provide a possibility of power supply when the carriage is in storage from an external three-phase 380 V AC 50 Hz grid with earthed neutral wire. The quality of electricity shall be in accordance with GOST 13109.

Voltage of the onboard carriage grid receiving power from converters or generators shall be selected from the following nominal voltage ranges:

- 24; 50; 110 V – DC;
- 220 V – single-phase AC 50 Hz;
- 220; 380 V – three-phase AC 50 Hz;

Deviations from the following values shall not be exceeded:

$\left.\begin{matrix}+5\\-30\end{matrix}\right\}$ % – for emergency lighting power supply voltage;

±5 % – normally allowed deviation for voltage of outlets used by passengers, with maximum allowed deviation ±10 %;

±2 % – normally allowed deviation for voltage frequency of outlets used by passengers;

$\begin{matrix}+6\\-3\end{matrix}$ % – for induction motor power supply voltage.

Onboard DC grid of the carriage shall be two-wire and isolated from the carriage body and shall be provided with leak detection devices.

Carriages shall be provided with a battery with operating temperature from -40 °C to +40 °C and limit operating temperature from from +45 °C to -50 °C to GOST 15150 ensuring at least 30% of the nominal supply capacity at a temperature of -40 °C. All components of the electrical equipment of the carriage shall maintain their characteristics (performance) after an exposure to the minimum ambient temperature of -60 °C, unless otherwise is stated in the customer's requirements for the carriage. Battery capacity shall be sufficient for uninterrupted power supply of the following consumers in case of outage of the main power supply source:

- equipment ensuring minimum passenger comfort (general lighting, 220 V outlets, ventilation, closed toilet system) for 1 hour;
- devices ensuring fire safety of the passengers (control circuits, axle box heating monitoring system, fire alarm system, tail lights, emergency lighting) for 6 hours;

The storage battery shall be provided with a charging device ensuring a charging algorithm based on outside temperature and the parameters of the battery used.

In case of outage of power supply of the electrical equipment of the carriage, power supply of the devices ensuring fire safety of the passengers (control circuits, axle box heating

monitoring system, fire alarm system, tail lights, emergency lighting) shall be provided from the operational power supply of the adjacent carriage.

These requirements have been approved by the following documents:

Belarus	
Kazakhstan	
Latvia	Informative – GOST 9219-88. Electrical draft gear. General technical requirements
Lithuania	Informative – GOST 9219-88. Electrical draft gear. General technical requirements
Poland	UIC instructions
Russia	GOST 2.610-97. Electricity. Electromagnetic compatibility of technical devices. Electrical power quality standards in general purpose power supply systems. GOST 15150-69. Machinery, devices and other technical products. Modifications for different climatic areas. Categories, operation, storage and transportation conditions in terms of the impact of environmental climatic factors GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	
Ukraine	
Estonia	

5.7.2.3 Рекуперативное торможение с возвратом энергии в тяговую сеть *(Regenerative brake with energy to the overhead contact line)*

5.7.2.4 Максимальные мощность и сила тока от контактной сети *(Maximum power and current from the overhead contact line)*

5.7.2.5 Максимальная сила тока на остановках для систем электроснабжения постоянного тока *(Maximum current at standstill for DC systems)*

5.7.2.6 Коэффициент мощности *(Power factor)*

5.7.2.7 Электромагнитная совместимость (СЦБ и связь, включая помехи, генерируемые ПС в тяговую сеть) *(EMC Directive +System energy disturbances)*

This parameter is defined in the document "Analysis of the basic parameters for maintaining the technical and operational compatibility of the 1520 mm and 1435 mm gauge rail systems at the Commonwealth of Independent States (CIS)/European Union (EU) border. Subsystem: CCS and communications.

Russia, Latvia, Lithuania, Slovakia:

The standards apply to both passenger and traction rolling stock.

Electrical equipment of the carriage shall comply with the requirements for resistance to electromagnetic interference in accordance with GOST R 51317.6.2 and radio interference in accordance with GOST R 51317.4.3.

The total radio interference level of the carriage generated, inter alia, by the overall electrical equipment, shall not exceed the permissible values set forth in GOST 29205 (Curve No. 1).

The permissible level of the interfering effect of the electrical equipment of the carriage on rail circuits and alarm devices (for carriages with centralised power supply system) is provided in the table.

Permissible level of interfering influence of the electrical equipment of the carriage

Signal current frequency, Hz	Transmission band, Hz	Permissible level of interference, mA
25	from 19 to 21	240
	from 21 to 29	60
	from 29 to 31	240
50	from 42 to 46	100
	from 46 to 54	24
	from 54 to 58	100
175	from 167 to 184	40
420	from 408 to 432	50
480	from 468 to 492	50
580	from 568 to 592	50
720	from 708 to 732	50
780	from 768 to 792	50
4545	from 4508 to 4583	30
5000	from 4963 to 5038	30
5555	from 5518 to 5593	30

Electric field strength of industrial frequency 50 Hz in passenger and service compartments at 0.2 m from the walls and windows and at 0.5–1.8 from the floor level shall not exceed 0.5 kV/m.

Magnetic field induction of industrial frequency 50 Hz in passenger and service compartments at 0.2 m from the walls and windows and at 0.5-1.5 from the floor level shall not exceed 5 μT (4 A/m).

Electric and magnetic fields of industrial frequency 50 Hz shall be measured with all household appliances fully off, including local lighting. The electric field shall be measured with general lighting fully off and magnetic field with general lighting fully on.

Belarus	
Kazakhstan	
Latvia	Informative – GOST 29205-91. Electromagnetic compatibility of technical devices. Industrial radio interference from electric transport. Standards and methods of testing
Lithuania	Informative – GOST 29205-91. Electromagnetic compatibility of technical devices. Industrial radio interference from electric transport. Standards and methods of testing
Poland	EMC Directive
Russia	GOST R 51317.6.2-2007. Electromagnetic compatibility of technical devices. Resistance to electromagnetic interference of technical equipment used in industrial areas. Requirements and methods of testing GOST R 51317.4.3-2006. Electromagnetic compatibility of technical devices. Resistance to radio frequency electromagnetic field. Requirements and methods of testing GOST 29205-91. Electromagnetic compatibility of technical devices. Industrial radio interference from electric transport. Standards and methods of testing
Slovakia	
Ukraine	
Estonia	

5.7.2.8 Измерение потребления энергии *(Energy consumption measuring function)*

5.7.2.9 Требования к токоприёмнику *(Requirements linked to pantograph)*

Not applicable to passenger rolling stock

5.7.2.10 Защита от аварийных процессов в электрооборудовании *(Electrical protection of the train)*

Russia, Latvia, Lithuania, Poland, Slovakia:

The carriage power supply system shall have a switching device enabling, in case of emergency, by one manual operation under load, the isolation of all connected consumers from the main power supply and switching off the power supply source itself.

The components of the electrical equipment used in the carriage (resistors, inductive reactors, switches, contactors, capacitors, generators, motors, transformers, converters) shall maintain their functionality and ensure all modes of operation:

- in the range of generator speed from minimum to maximum - in carriages with an independent power supply system;

- in the range from minimum to maximum voltage of the high-voltage main line of the train in accordance with the table - in carriages with centralised power supply system from the high-voltage main line of the train.

Components of electrical equipment shall maintain their functionality and ensure restoration of the operating mode after the transitional processes.

For carriages with an independent power supply system, the transitional processes are:

- start up of the converters and electrical apparatuses;

- switch on of consumers with power over 0.5 of the power source capacity.

For carriages with centralised power supply system from the high-voltage main line of the train, the transitional processes are:

- spike voltage fluctuations in the grid during pantograph disengagement and sparking;

- internal switching overvoltages;

- start up of the converters and electrical apparatuses;

- switch on of consumers with power over 0.5 of the power source capacity;

- passing neutral sections;

- change of current type.

The power and control circuits of the electrical equipment of the carriage shall have protection from abnormal processes caused by short circuits in the electrical equipment. The protection shall ensure the following:

- as a result of the protection system activation, the faulty circuit shall be isolated from the power source;

- power supply to the circuits not affected by the abnormal events (selective protection activation);

- as a result of the protection system activation, short circuit element failures are not allowed, unless such failure is a part of the protection according to the technical documentation;

- also in case of loss of phases in three-phase circuits of electric motors, the protection shall ensure joint phase disconnection.

The power supply system of the carriage shall comply with the electrical safety requirements set forth in GOST 12.1.019.

When voltage is supplied to the main line of the train (380 V and higher), the power on indicator light shall light up on the control panel.

Electrical equipment with voltage 3000 V shall be installed in places not accessible to passengers and uncertified staff.

Layout and design of the electrical equipment of the carriage and installation methods shall ensure easy access for maintenance and repairs.

The electrical equipment control panel shall be installed in such a way as to ensure its installation and removal without removing other carriage equipment. The control panel shall be provided with additional lighting.

Sections, cabinets and boxes with electrical equipment with easy removable (without tools) covers and/or guards shall be provided with locking devices preventing access to the electrical equipment live under voltages exceeding 42 V AC and 110 V DC.

Enclosures of the electrical equipment of the carriage with voltage 3000 V shall have locking devices ensuring power disconnection when the enclosure is opened, except the stationary high-voltage breaker (train main line terminal) in the box with the switching-protection for high-voltage devices.

Earthing of the metal enclosures of the electrical equipment, equipment guards and fixing structures for the conductive parts of the carriage shall be provided.

Electric impedance of the protective earthing of the carriage equipment with nominal voltage over 110 V DC and 42 V AC shall not exceed 0.1 Ohm.

Time of capacitor discharging in the electrical equipment when there is access to current-carrying parts connected to the capacitors shall not exceed 120 s for the undercarriage equipment and 30 s for equipment located in compartments and cabinets inside the carriage.

The dielectric strength of the electric circuit insulation after assembly of the carriage shall comply with the standard values provided in the table.

Electrical apparatuses used in the carriage shall comply with GOST 9219.

The electrical equipment of the carriage shall comply with the requirements for resistance to electromagnetic interference in accordance with GOST R 51317.6.2 and radio interference in accordance with GOST R 51317.4.3.

The total radio interference level of the carriage generated, inter alia, by the whole of the electrical equipment, shall not exceed the permissible values set forth in GOST 29205 (Curve No. 1).

Dielectric strength of the electric circuit insulation

Nominal electric circuit voltage, V		Test voltage, V (current value)
DC	AC	
up to 30 incl	up to 30 incl	750
from30 to 300 incl	from 30 to 100 incl	1250
» 300 » 660 »	» 100 » 660 »	1.7 *U*+1275
» 660 » 3000 »	» 660 » 3000 »	2.125 *U*+1700
N o t e : The table contains *U*, which is the nominal operating voltage of the electric circuits. Round the rated test voltage value to the nearest multiple of 250 V. Electric circuits shall withstand test voltage for at least 60 s.		

These requirements have been approved by the following documents:

Belarus	
Kazakhstan	
Latvia	Informative – GOST 9219. Electrical draft gear. General technical requirements Guidelines for ensuring fire safety in the international service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia 25. Meeting of Council for Railway Transport of 29/11/1999 Fire safety standards. International service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia. Fire safety requirements. 25th Meeting of Council for Railway Transport of 29/11/1999

Lithuania	
Poland	
Russia	GOST 12.1.019-79. Occupational safety standard system. Electrical safety. General requirements and classification of protection types GOST 9219-88. Electrical draft gear. General technical requirements GOST R 51317.6.2-2007. Electromagnetic compatibility of technical devices. Resistance to electromagnetic interference of technical equipment used in industrial areas. Requirements and methods of testing GOST R 51317.4.3-2006. Electromagnetic compatibility of technical devices. Resistance to radio frequency electromagnetic field. Requirements and methods of testing GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Slovakia	
Ukraine	
Estonia	

5.7.3 Дизельные и другие тепловые тяговые единицы *(Diesel and other thermal traction system)*

Not applicable to passenger rolling stock

5.8 *КАБИНА И УПРАВЛЕНИЕ (CAB AND OPERATION)*

Not applicable to passenger rolling stock

5.9 ПОЖАРНАЯ БЕЗОПАСНОСТЬ И ЭВАКУАЦИЯ *(FIRE SAFETY AND EVACUATION)*

5.9.1 Общие положения и категоризация *(General and Categorisation)*

(Paragraph 5.9.1 combines paragraphs 5.9.1.1-5.9.1.2)

Russia, Belarus

Passenger carriages shall be provided with fire alarm systems, fire extinguishing systems, special locations for fire extinguishers and firefighting equipment.

Fire alarm systems shall give out acoustic and/or visual information indicating the location of the outbreak, automatically detect failures (short circuit, breakage) in the detector lines connecting with the control and indicating device, and a possibility of regular functioning tests shall be provided.

These requirements have been approved by the following documents:

Belarus	GOST 12.1.004-91. SSBT (Occupational Safety Standards System). Fire safety. General requirements Informative –

	VNPB-03. Passenger carriages. Fire safety requirements. GOST R 55183-2012. Locomotive-hauled passenger carriages. Fire safety requirements. Guidelines for ensuring fire safety in passenger train carriages. Approved by OAO RZhD order No 2255r of 5 November 2009
Kazakhstan	GOST 12.1.004-91. SSBT (Occupational Safety Standards System). Fire safety. General requirements TR TS Technical regulations on safety of rolling stock. ST RK 1088-2002. Fire safety. Terms and definitions
Latvia	Cabinet of Ministers of the Republic of Latvia regulations No. 82 of 17/02/2004 "Fire safety regulations". LDz infrastructure manager's guidelines. Ensuring fire safety of locomotives, multi-unit rolling stock and passenger carriages, No. DR-64/2004 of 04 November 20. Guidelines for ensuring fire safety in the international service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia (25th Meeting of Council for Railway Transport of 29/11/1999) COMECON standard ST SEV 5637-86. Fire equipment. Fire classification Fire safety standards. International service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia. Fire safety requirements. (25th Meeting of Council for Railway Transport of 29/11/1999)
Lithuania	Guidelines for ensuring fire safety in the international service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia (25th Meeting of Council for Railway Transport of 29/11/1999). 201/S. Fire safety regulations on railway transport. Approved by the order of Director General of Lithuanian Railways No. Į-485 of 10/08/2005. LST EN ISO 13943:2011 Fire safety. Glossary.
Poland	TSI LOC and PAS
Russia	GOST 12.1.004-91. SSBT (Occupational Safety Standards System). Fire safety. General requirements VNPB-03. Passenger carriages. Fire safety requirements. GOST R 55183-2012. Locomotive-hauled passenger carriages. Fire safety requirements. Guidelines for ensuring fire safety in passenger train carriages. Approved by OAO RZhD order No 2255r of 5 November 2009
Slovakia	EN45545 series standards UIC 642

Ukraine	GOST 12.1.004-91. SSBT (Occupational Safety Standards System). Fire safety. General requirements TsUO-0018. Fire safety regulations on railway transport. NAPB 03.004-2002 (TsUO-0023). Standards for equipping railway transport facilities and rolling stock with fire safety equipment and inventory. TsUO-0039. Technical requirements for the fire safety of passenger carriages.
Estonia	Fire safety regulations on railway. Approved by order of Director General of Estonian Railways No. 223 of 23/07/1997.

5.9.1.1 Категоризация для пассажирских вагонов локомотивной тяги *(Categorisation of multipleunits passenger rolling stock). Объединнен в единый пункт 5.9.1*

5.9.2 Требования к материалам *(Material requirements)*

Russia, Belarus:

Materials and substances used for finishing interior surfaces of passenger carriages shall not exceed permissible levels of risk of fire occurrence and development and exposure of people to hazardous fire factors.

Substances and materials are classified according to their fire risk in Federal Law No. 123-FZ of 22 July 2008 "Technical regulations on fire safety requirements" (Articles 12, 13).

Non-metallic materials used in the internal structures of the carriages shall be approved by the railway fire authorities and have tests and documented fire risk parameters in respect of flammability class, smoke-development index, fire propagation index and toxicity of combustion products in accordance with GOST 12.1.044 (Subsections 2.1, 2.14, 2.15 and 2.16 respectively), flammability in accordance with GOST R 50810 (Sections 6, 7).

Requirements for materials used in the internal equipment of carriages based on their fire risk are given in Table 1 GOST 55183-2012.

Wooden parts should be pressure-impregnated and coated with flame retardants (GOST 12.2.056).

Textile materials melting under thermal impact shall be flame retardant and comply with the requirements of GOST R 50810-95.

These requirements have been approved by the following documents:

Belarus	Technical regulations on safety of railway rolling stock. TR TS 001/2011 GOST 12.1.004-9. Occupational safety standard system. Fire risk. General requirements Informative – GOST R 50810-95. Fire safety of textile materials. Decorative fabrics. Flammability testing methods and classification. VNPB-03. Passenger carriages. Fire safety requirements. GOST R 55183-2012. Locomotive-hauled passenger carriages. Fire

	safety requirements.
Kazakhstan	TR TS Technical regulations on safety of rolling stock, p. 64 ST RK GOST R 51690–2000. Passenger carriages on 1520 mm track gauge main railway lines. General technical conditions GOST 12.1.004-91. SSBT (Occupational Safety Standards System). Fire safety. General requirements
Latvia	Fire safety standards. International service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia. Fire safety requirements. 25. Meeting of Council for Railway Transport of 29/11/1999
Lithuania	39/V-KL Fire safety standards. International service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia. Fire safety requirements. (25th Meeting of Council for Railway Transport of 29/11/1999). LST EN 50306:2003. Railway equipment. Rolling stock cables with special flame retardant coating. Thin coating.
Poland	PN-EN-50306-1,2,3,4:2003
Russia	GOST 12.1.004-91. SSBT (Occupational Safety Standards System). Fire safety. General requirements GOST 12.1.044-89. Fire and explosion risk of substances and materials. List of parameters and methods of their determination. GOST R 50810-95. Fire riskof textile materials. Decorative fabrics. Flammability testing methods and classification. VNPB-03. Passenger carriages. Fire safety requirements. TR TS Technical regulations on safety of rolling stock, p. 64. Technical regulations on fire safety requirements No. 122-FZ of 22 July 2008. GOST R 55183-2012. Locomotive-hauled passenger carriages. Fire safety requirements.
Slovakia	EN45545-2 series standards UIC 642
Ukraine	GOST 12.1.004-91. SSBT (Occupational Safety Standards System). Fire safety. General requirements DSTU 4049-2001. Locomotive-hauled passenger carriages for main lines. Safety requirements. NAPB 03.004-2002 (TsUO-0023). Standards for equipping railway transport facilities and rolling stock with fire safety equipment and inventory. GOST 12.1.044-89. Fire and explosion risk of substances and materials. List of parameters and methods of their determination. TsUO-0039. Technical requirements for the fire safety of passenger carriages.

Estonia	Fire safety standards. International service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia. Fire safety requirements. (25th Meeting of Council for Railway Transport of 29/11/1999)

5.9.3 Специальные меры для воспламеняющихся жидкостей и газов *(Specific measures for flammable liquids and gases)*

Russia, Belarus:

These requirements have been approved by the following documents:

Belarus	GOST 12.1.004-9. Occupational safety standard system. Fire risk. General requirements Informative – Fire safety regulations on railway transport (PPBO-109-92). Approved by Ministry of Railways of Russian Federation, No. TsUO/112 of 11/11/1992 VNPB-03. Passenger carriages. Fire safety requirements. GOST R 55183-2012. Locomotive-hauled passenger carriages. Fire safety requirements.
Kazakhstan	GOST 12.1.004-91. SSBT (Occupational Safety Standards System). Fire safety. General requirements ST RK 1088-2002. Fire safety. Terms and definitions
Latvia	Guidelines for ensuring fire safety in the international service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia. (25th Meeting of Council for Railway Transport of 29/11/1999)
Lithuania	Guidelines for ensuring fire safety in the international service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia (25th Meeting of Council for Railway Transport of 29/11/1999) Standard LST EN 2:1996/A1:2004 Gaisrų klasifikavimas (Classification of fires) 201/S. Fire safety regulations on railway transport.
Poland	PN-K-02511:2000 ISO 5658-2:2006 Leaflet UIC 642
Russia	Fire safety regulations on railway transport (PPBO-109-92). Approved by Ministry of Railways of Russian Federation, No. TsUO/112 of

	11/11/1992 VNPB-03. Passenger carriages. Fire safety requirements. GOST R 55183-2012. Locomotive-hauled passenger carriages. Fire safety requirements.
Slovakia	EN-45545-7
Ukraine	GOST 12.1.004-91. SSBT (Occupational Safety Standards System). Fire safety. General requirements NAPB 03.004-2002 (TsUO-0023). Standards for equipping railway transport facilities and rolling stock with fire safety equipment and inventory. DSTU 4049-2001. Locomotive-hauled passenger carriages for main lines. Safety requirements. TsUO-0039. Technical requirements for the fire safety of passenger carriages.
Estonia	Guidelines for ensuring fire safety in the international service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia (25th Meeting of Council for Railway Transport of 29/11/1999).

5.9.4 Эвакуация пассажиров *(Passenger evacuation)*

Russia, Belarus:

Carriages shall have at least two emergency exits (windows), and double-deck carriages at least two on each deck.

By each emergency exit window, a sign shall be placed with text or graphic information about the additional purpose of the window and the sequence of actions in case of fire or other emergency.

Evacuation devices (ladders, rope ladders, etc.) shall be designed for 2.0 kN load. The time of deploying the evacuation devices to the working position shall not exceed 30 s. Automatic doors shall be provided with devices allowing manual opening with force not exceeding 100 N in case of failure of the automatic drive. The time for emergency opening shall not exceed 30 s.

Requirements for ensuring safe conditions for passenger evacuation:

The safe evacuation of people from passenger carriages in case of fire is considered to have been ensured if the time from the moment of detection of fire to the end of the people evacuation to a safe area (rated evacuation time) does not exceed the necessary time for people evacuation in case of fire.

Rated evacuation time shall be determined by the design organisation for each carriage model in accordance with the requirements of GOST 12.1.004 (paragraph 1.2).

The necessary evacuation time (from the start of the fire to blockage of escape routes as a result of spreading of hazardous fire products having limit thresholds for humans) shall be determined for each carriage model during its field fire tests. It is allowed to determine that time using full scale carriage fragments.

Carriages shall have at least two emergency exits (windows), and double-deck carriages at least two on each deck.

By each emergency exit window, a sign shall be placed with text or graphic information about the additional purpose of the window and the sequence of actions in case of fire or other emergency.

Double -deck carriages shall be provided with devices ensuring safe escape though the emergency exit windows on the second deck.

The main passage of the carriage shall be provided with fixing points for carpet runners (if any) to prevent the creation of obstacles during the evacuation of passengers.

Internal carriage doors on the escape routes shall allow locking them in the open position.

These requirements have been approved by the following documents:

Belarus	GOST 12.1.004-9. Occupational safety standard system. Fire safety. General requirements Informative – GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements GOST R 55183-2012. Locomotive-hauled passenger carriages. Fire safety requirements.
Kazakhstan	GOST 12.1.004-91. SSBT (Occupational Safety Standards System). Fire safety. General requirements
Latvia	Fire safety standards. International service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia. Fire safety requirements. 25. Meeting of Council for Railway Transport of 29/11/1999 LDz infrastructure manager's guidelines Assurance of fire safety of locomotives, multi-unit rolling stock and passenger carriages, No. DR-64/2004 of 04 November 20.
Lithuania	39/V-KL Fire safety standards. International service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia. Fire safety requirements. (25th Meeting of Council for Railway Transport of 29/11/1999)

Poland	TSI LOC&PAS EN-45545-4
Russia	GOST 12.1.004-91. SSBT (Occupational Safety Standards System). Fire safety. General requirements GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements GOST R 55183-2012. Locomotive-hauled passenger carriages. Fire safety requirements.
Slovakia	TSI LOC&PAS EN-45545-4
Ukraine	GOST 12.1.004-91. SSBT (Occupational Safety Standards System). Fire safety. General requirements NAPB 03.004-2002 (TsUO-0023). Standards for equipping railway transport facilities and rolling stock with fire safety equipment and inventory. DSTU 4049-2001. Locomotive-hauled passenger carriages for main lines. Safety requirements.
Estonia	Fire safety standards. International service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia. Fire safety requirements. (25th Meeting of Council for Railway Transport of 29/11/1999)

5.9.5 Огнезадерживающие барьеры *(Fire barriers)*

Russia, Belarus:

The carriage design shall include fire partitions intended to prevent fire propagation (fire partitions, transom windows, interdeck floor of double-deck carriage).

In the carriages, fire partitions shall be installed between the service compartment (with the control panel for the electrical equipment of the carriage) and the passenger compartment.

In compartment carriages, fire partitions shall be installed between the passenger compartments dividing the passenger space into at least three sections.

The intra-ceiling space in non-compartment type carriages and over the big (main) passage of the compartment carriages shall be divided into at least three areas by installing fire retardant frames.

The fire partition between the service compartment (with the control panel for the electrical equipment of the carriage) and the passenger compartment shall be in contact with the metal cladding of the body along the roof – side walls angle. The materials of the fire partition of the side wall siding shall be fire resistant or fire retardant. Technological gaps between the fire partition and the metal lining of the roof shall be packed with fire resistant or

fire retardant material with the same fire resistance properties as the fire partition itself.

Intercompartment fire partitions shall be in contact with the roof insulation metal cladding or roof insulation, side wall and floor cladding. The technological gaps along the join of the partition with the roof insulation cladding or side wall cladding and the technological gaps where pipe, air duct and cable conduit pass through the fire partitions, shall be covered with fire resistant or fire retardant material with the same fire resistance properties as the fire partition itself.

Fire partitions and frames shall have fire resistance properties expressed as time (in minutes) of occurrence of the following indicators according to GOST 30247.0 (Section 9):

- loss of integrity (E);
- loss of heat insulation capacity (I);
- loss of load bearing capacity (R) (interdeck floors).

Fire resistance threshold for the fire partitions between the service compartment and the passenger area shall correspond to E 30/I 15 according to GOST 30247.0 (Section 10), and EI 15 for the intercompartment fire partitions and frames.

If there are diesel fuel tanks under the carriage, the lower part of the body shall have fire resistance threshold of REI 45 or be provided with a screen in the form of a type 1 fire partition with fire resistance of EI 45.

Butt joins of the connection elements of fire retardant partitions, the actual design of the fire resistant corridor door with a translucent element and door frame, the partition between the service compartment and passenger space shall all have the same fire resistance properties as the fire partition itself.

The translucent element of the fire resistant door in the fire partition shall have fire resistance threshold of at least E 30.

These requirements have been approved by the following documents:

Belarus	Technical regulations on safety of railway rolling stock, TR TS 0021/2011. Informative – VNPB-03. Passenger carriages. Fire safety requirements. GOST R 55183-2012. Locomotive-hauled passenger carriages. Fire safety requirements.
Kazakhstan	TR TS Technical regulations on safety of rolling stock.
Latvia	Fire safety standards. International service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia. Fire safety requirements (25th Meeting of Council for Railway Transport of 29/11/1999).
Lithuania	39/V-KL Translation of Fire safety standards. International service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia. Fire safety requirements. (25th Meeting of Council for Railway Transport of 29/11/1999)
Poland	TSI LOC&PAS

	EN-45545-3 prEN 45545-1:2010 PN-K-02507:1997 Leaflet UIC 564-2 Leaflet UIC 642
Russia	VNPB-03. Passenger carriages. Fire safety requirements. GOST R 55183-2012. Locomotive-hauled passenger carriages. Fire safety requirements. Technical regulations on safety of rolling stock TR TS 001/2011, p. 64.
Slovakia	EN-45545-3
Ukraine	DSTU 4049-2001. Locomotive-hauled passenger carriages for main lines. Safety requirements. TsUO-0039. Technical requirements for the fire safety of passenger carriages.
Estonia	Fire safety standards. International service passenger train carriages between the CIS countries, Republic of Latvia, Republic of Lithuania and Republic of Estonia. Fire safety requirements. (25th Meeting of Council for Railway Transport of 29/11/1999)

5.10 ОБСЛУЖИВАНИЕ *(SERVICING)*

5.10.1 Общие положения *(General)*

Russia, Belarus:

The main purpose of technical maintenance during operation is to ensure traffic safety as a result of continuously keeping the locomotive-hauled passenger carriages in good operating condition. This is achieved by monitoring the operation of units and systems, performance of routine maintenance, timely prevention, detection and elimination of faults and compliance with the fire safety requirements and sanitary standards.

The requirements for the technical condition of railway rolling stock and performance of maintenance and repairs are set forth in the standards and regulations. The procedure for technical maintenance and repair during which the proper technical condition of the railway rolling stock is confirmed shall be established respectively by the infrastructure owner and by the non-general use railway track owner.

The procedure for the technical maintenance and repair of railway rolling stock and the components thereof shall be established by technical documentation.

The organisation of the technical maintenance and routine repair system for railway rolling stock running in the infrastructure and components thereof and supervision of

compliance of the distance travelled between repairs shall be established by the infrastructure owner.

These requirements have been approved by the following documents:

Belarus	TOR of Belarusian Railway Informative – Guidelines for technical maintenance of carriages in operation, TsV-TsL-408. Approved by the Council for Rail Transport of the CIS States. Minutes No. 50 of 21–22 May 2009
Kazakhstan	PTE No 261 of 10/05/2011 ST RK 1455 – 2005. Passengers service on railway transport. Technical requirements for carriage of passenger on premium service trains
Latvia	Latvian TOR
Lithuania	Law on traffic safety of railway transport, No. IX-1905 of 16/12/2003 ADV/001 Regulations on the technical operation of railways 139/KL Guidelines for technical maintenance of passenger carriages.
Poland	Technical documentation on operation and technical maintenance DSU
Russia	Regulations for technical operation of the railways of the Russian Federation approved by the order of the Ministry of Transport of Russia No. 286 of 21/12/2010. Guidelines for technical maintenance of carriages in operation. Approved by OAO RZhD order No 179 of 31/08/2009. Guidelines for technical maintenance of carriages in operation, TsV-TsL-408. Approved by the Council for Rail Transport of the CIS States. Minutes No. 50 of 21–22 May 2009 Order of the Ministry of Railways No. 9-SE of 04/04/1997 "On introduction of new system of technical maintenance and repair of passenger carriages" with amendments by the order of Russian Ministry for Transport of 13/01/2011. №15
Slovakia	TOR Technical documentation on operation and technical maintenance of rolling stock
Ukraine	TsRB-0004. Technical operation regulations of the Ukrainian Railways GOST 18322-78, Art. 1-2. Machinery maintenance and repair system. Terms and definitions Regulations for use of passenger carriages in cross-border service (PPPV) approved at 51st meeting on railway transport of CIS states 27 - 28/10/2009.
Estonia	TOR approved by Minister's order No. 39 of 09.07.1999, p. 148–152

5.10.2 Доступ к лобовому стеклу для очистки *(Cleaning of driver's cab windscreen)*

Not applicable to passenger rolling stock

5.10.3 Внешняя очистка пассажирского вагона *(Exterior cleaning through a washing plant)*

Russia, Belarus:

All work involving washing and cleaning the passenger carriages shall be performed in special enclosed areas or special facilities of plants, depots or passenger technical stations provided with mechanised washing equipment, or in absence of such, with the necessary manual washing tools (telescopic brushes, mops, detergent solution containers, hoses, jet hoses, high pressure units, etc.) Washing of railway rolling stock bodies under the contact line is prohibited.

Exterior washing and cleaning outdoors shall be performed at 0 °C or higher. At 0 °C and below only manual wiping of the carriage windows with detergent solution or heated detergent solution or non-freezing liquid is allowed. Exterior cleaning and washing work at outside temperatures below 0 °C shall be performed indoors ensuring temperature conditions above 0 °C.

During the warm season, outdoor washing is allowed in special sheltered areas at ambient temperatures above 25 °C with mandatory pre-rinsing of the body with cold water

Interior washing and cleaning of the passenger carriages and multiple-unit rolling stock shall be performed at ambient temperatures inside carriages of at least 10 °C. When the temperature is below 10 °C, dry cleaning is performed.

The cleaning and washing procedure shall be established by the passenger carriage owners depending on the type of rolling stock, operation area, the nature of the dirtiness; for passenger carriages - after each trip in accordance with SP 2.5.1198-03.

The speed of passenger carriage travel through the carriage washing facility shall not exceed 2 km/h.

In absence of a carriage washing facility, passenger carriages shall be washed manually using brushes or mops on telescopic handles, long jet-hoses, buckets for detergent solutions and high pressure units.

These requirements have been approved by the following documents:

Belarus	Informative – GOST R 54612-2011. Locomotive-hauled passenger carriages and multiple-unit rolling stock. Cleaning and washing requirements
Kazakhstan	Sanitary and epidemiological standards and regulations "Sanitary and epidemiological requirements for maintenance and operation of

	passenger carriages", Ministry for Health of the Russian Federation No. 358 of 14/07/2005.
Latvia	Single technological process for treatment of long-distance and local service passenger trains for Riga-Passenger Station, LDz 2002
Lithuania	Quality standard for AO LG service of Passenger Carriage Administration, approved by LG order No. 999 of 21/12/2011
Poland	TSI LOC&PAS
Russia	GOST R 54612-2011. Locomotive-hauled passenger carriages and multiple-unit rolling stock. Cleaning and washing requirements
Slovakia	TSI LOC&PAS
Ukraine	GOST 2761-84. Centralised domestic/potable water supply sources. Hygiene and technical requirements and rules of selection Guidelines for washing and cleaning of passenger carriages. Instruction OSD O+R562. Sanitary technical requirements for passenger carriage design.
Estonia	Locomotive maintenance regulations

5.10.4 Система опорожнения туалета *(Toilet discharge system)*

Currently, the requirements for this parameter are the same in all countries.

Russia, Belarus:

If the locomotive-hauled passenger carriages are provided with self-contained toilets, they shall have external connections for pumping out and emptying. Instruction OSJD O+R 562 "SANITARY TECHNICAL REQUIREMENTS FOR PASSENGER CARRIAGE DESIGN" shall be used as reference material.

The collector tank shall allow evacuation of faecal waste from it using vacuum sewer evacuator equipment and/or a stationary service unit and interior flushing with water or disinfectants. The tank shall be provided with standardised CAMLOCK type faecal waste evacuation units with outer diameter 91.5 mm, stop valve diameter 81.3 mm.

These requirements have been approved by the following documents:

Belarus	p. 5.1.22 SP 2.5.1198–03. Sanitary regulations for the organisation of passenger traffic by railway transport Instruction OJSD O+R562. Sanitary technical requirements for passenger carriage design.
Kazakhstan	Sanitary and epidemiological standards and regulations "Sanitary and epidemiological requirements for maintenance and operation of passenger carriages", Ministry for Health of the Russian Federation No. 358 of 14/07/2005.

	Leaflet OJSD O+R562. Sanitary Technical Requirements For Passenger Carriage Design.
Latvia	Leaflet OJSD O+R562. Sanitary Technical Requirements For Passenger Carriage Design.
Lithuania	Leaflet OJSD O+R562. Sanitary Technical Requirements For Passenger Carriage Design.
Poland	TSI LOC&PAS
Russia	Leaflet OJSD O+R562. Sanitary Technical Requirements For Passenger Carriage Design. Sanitary regulations for the organisation of passenger traffic by railway transport, P 2.5.1198–03, p. 5.1.22. General requirements for self-contained toilet systems for installation in locomotive-hauled passenger carriages on general and special networks, 0114-2010 PKB TsL, approved by OAO RZhD order No. 1210r of 21/07/2010.
Slovakia	TSI LOC&PAS
Ukraine	Leaflet OJSD O+R562. Sanitary Technical Requirements For Passenger Carriage Design.
Estonia	Leaflet OJSD O+R562. Sanitary Technical Requirements For Passenger Carriage Design.

5.10.5 Система водоснабжения *(Water refilling equipment)*

Russia, Belarus:

The carriage design shall allow water filling using R17B type hoses to GOST 2593.

The carriages shall be equipped with sensors with shut-off valves for cutting off tank filling and a water drain pipe in case of tank overfill.

Filling nozzles shall be on both sides of the carriage. Their connection heads shall have covers to prevent dirt penetration and be provided with heaters.

The water supply system shall not have any adverse effect on the quality of the delivered (source) water. Water quality in the tanks and distribution taps of the carriage shall comply with the requirements of sanitary regulations SanPiN 2.1.4.1074-01.

These requirements have been approved by the following documents:

Belarus	GOST 2761-84. Centralised household water supply sources. Hygiene and technical requirements and rules of selection Leaflet OJSD O+R562. Sanitary technical requirements for passenger carriage design. Informative –

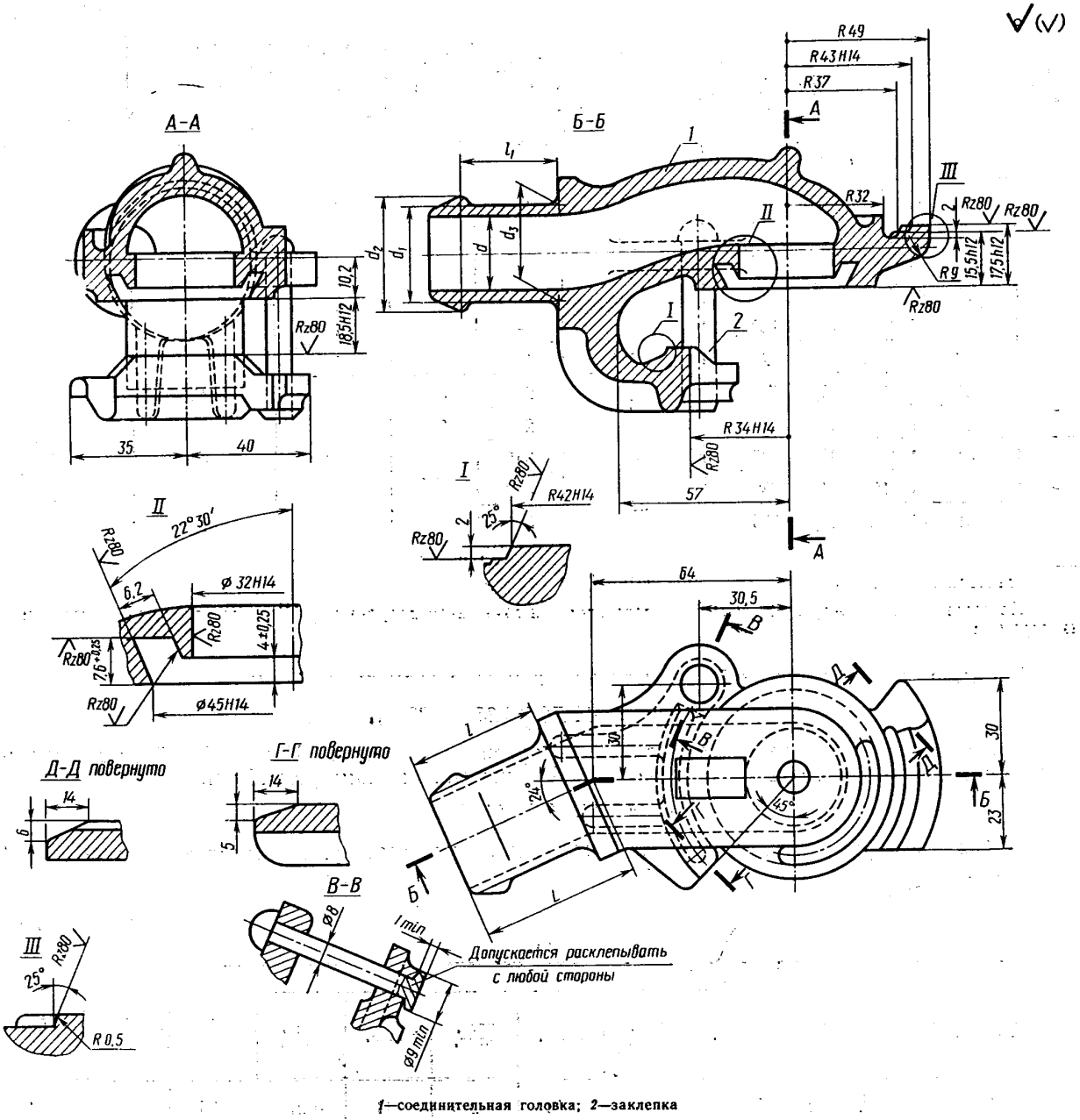
	GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements
Kazakhstan	Sanitary and epidemiological standards and regulations "Sanitary and epidemiological requirements for maintenance and operation of passenger carriages", Ministry for Health of the Russian Federation No. 358 of 14/07/2005. Leaflet OJSD O+R562. Sanitary technical requirements for passenger carriage design.
Latvia	Cabinet of Ministers regulations No. 235 of 29/04/2003 "Requirements for quality and relative safety of drinking water, inspection and monitoring procedure"
Lithuania	HN24: 2003. Drinking water safety and quality requirements.
Poland	TSI LOC&PAS
Russia	GOST R 55182-2012. Locomotive-hauled passenger carriages. General technical requirements SanPiN 2.1.4.1074-01. Drinking water. Hygiene requirements for quality of water in centralised systems of drinking water supply. Quality control, approved by order of Chief Sanitary Inspector of the Russian Federation No. 24 of 24/06/2001.
Slovakia	TSI LOC&PAS
Ukraine	GOST 2761-84. Centralised household water supply sources. Hygiene and technical requirements and rules of selection Leaflet OSD O+R562. Sanitary technical requirements for passenger carriage design. Sanitary regulations for the arrangement of equipment and operation of long-distance passenger carriages TsUVS-19, MPS 1984
Estonia	TsT ChS-50. Guidelines for water preparation for cooling engines of locomotives and diesel trains. TOR, p. 48-49

5.10.6 Разъем для заправки водой *(Interface for water refilling)*

Currently, the requirements for this parameter are the same in all countries.

Belarus, Kazakhstan, Latvia, Lithuania, Russia, Ukraine and Estonia:

The R17B connection head is used for water filling in accordance with GOST 2593-82 Connection hoses for railway rolling stock brakes. Technical conditions (this GOST is currently being revised).



Черт. 4

Д-Д повернуто	Д-Д rotated
Г-Г повернуто	Г-Г rotated
Допускается расклдепивать с любой стороны	Riveting on any side is allowed
1 – соединительная головка 2 – заклепка	1 – connecting head 2 – rivet
Черт, 4	Drawing 4

Poland and Slovakia

According to Leaflet UIC 563.

These requirements have been approved by the following documents:

Belarus	GOST 2593-82. Connection hoses for railway rolling stock brakes. Technical conditions
Kazakhstan	GOST 2593-82. Connection hoses for railway rolling stock brakes. Technical conditions
Latvia	GOST 2593-82. Connection hoses for railway rolling stock brakes. Technical conditions (informative)
Lithuania	GOST 2593-82. Connection hoses for railway rolling stock brakes. Technical conditions
Poland	Leaflet UIC 563, PN-K-88177:1997
Russia	GOST 2593-82. Connection hoses for railway rolling stock brakes. Technical conditions
Slovakia	Leaflet UIC 563
Ukraine	GOST 2593-82. Connection hoses for railway rolling stock brakes. Technical conditions
Estonia	

5.10.7 Специальные требования для отстоя поездов *(Special requirements for stabling of trains)*

Russia, Belarus:

All passenger units arriving to the reserve depots shall be inspected by repair inspectors on both sides during movement to identify defects that can be easily detected while the carriages are moving. After stopping, technical condition and internal equipment are inspected.

All passenger carriages arriving in the reserve depot shall be cleaned and washed inside and outside. In winter season, running gear and braking equipment of the carriages shall be cleared of ice and compressed snow. Sanitary treatment is performed on the interior of all carriages.

While the carriages remain in the reserve depot, their good operating condition and security shall be ensured.

All removable internal equipment, soft and hard inventory and radio equipment shall be handed over for storage.

To ensure their good condition, batteries shall be regularly recharged.

These requirements have been approved by the following documents:

Belarus	Carriage accompanying documents; ST RK 1831-2008. Unified requirements for system of technical maintenance of passenger carriages used in cross-border service, approved by the Council for Rail Transport of the CIS States (minutes No. 54); Procedure for actions of the train crew staff in extraordinary situations,

	approved by order No. 70NZ of 06/02/2003.
Kazakhstan	
Latvia	The equipment requirements are set forth by project terms of reference
Lithuania	The equipment requirements are set forth by project terms of reference
Poland	The equipment requirements are set forth by project terms of reference
Russia	Standard provisions regarding technical maintenance of passenger carriage reserve, No. 247 PKB TsV, p. 3.5. Accompanying document for carriage equipment
Slovakia	The equipment requirements are set forth by project terms of reference
Ukraine	The requirements for technical maintenance depots are set forth by project terms of reference.
Estonia	The equipment requirements are set forth by project terms of reference

5.10.8 Оборудование заправки топливом *(Refuelling equipment)*

Russia:

This type of equipment is not regulated.

5.11 ДОКУМЕНТАЦИЯ ПО ЭКСПЛУАТАЦИИ, ТЕХНИЧЕСКОМУ ОБСЛУЖИВАНИЮ И РЕМОНТУ *(DOCUMENTATION FOR OPERATION AND MAINTENANCE)*

5.11.1 Общие положения *(General)*

Russia, Belarus, Kazakhstan, Ukraine:

General passenger carriage operation, maintenance and repair requirements are set forth in TOR.

Terms and definitions are set forth in GOST R 53341-2009. Operation, maintenance and repair of railway rolling stock. Terms and definitions.

Content of the documents for operation, maintenance and routine repair of rolling stock shall comply with GOST 2.601-2006. Unified Engineering Documentation System. Operation manuals;

Content of the documents for repairs shall comply with GOST 2.602-95. Unified Engineering Documentation System. Repair manuals.

These requirements have been approved by the following documents:

Belarus	TOR of Belarusian Railway GOST 2.610-2006 «Unified Engineering Documentation System. Operation manuals GOST 2.602-95 Unified Engineering Documentation System. Repair

	manuals Informative – GOST R 53341-2009 Operation, maintenance and repair of railway rolling stock. Terms and definitions
Kazakhstan	TOR of railway transport. GOST 2.601-2006 Unified Engineering Documentation System. Operation manuals GOST 2.602-95 Unified Engineering Documentation System. Repair manuals Informative – GOST R 53341-2009 Operation, maintenance and repair of railway rolling stock. Terms and definitions
Latvia	Cabinet of Ministers of Latvia, No. 724 of 03/08/2010. Technical operational regulations of railways
Lithuania	ADV-001 Regulations on the technical operation of railways Order of Minister for commissioning of new subsystems and rolling stock No. 3-507 of 22/06/2006
Poland	Order of the Minister of Transport on operation and technical requirements for rolling stock of 07/11/2007 (amendments of 12/10/2005).
Russia	Regulations for technical operation of the railways of the Russian Federation approved by the order of the Ministry of Transport of Russia No. 286 of 21/12/2010. GOST R 53341-2009 Operation, maintenance and repair of railway rolling stock. Terms and definitions GOST 2.601-2006 «Unified Engineering Documentation System. Operation manuals GOST 2.602-95 «Unified Engineering Documentation System. Repair manuals
Slovakia	Technical documentation on operation and technical maintenance of rolling stock
Ukraine	Technical operation regulations of the Ukrainian Railways No. TsRB-0004 GOST 18322-78, Art. 1-2. Machinery maintenance and repair system. Terms and definitions GOST 2.601-2006. Unified Engineering Documentation System. Operation manuals GOST 2.602-95. Unified Engineering Documentation System. Repair manuals
Estonia	Law on railway transport, 2004, Article on acceptance of rolling stock

	to service TOR, p. 137

5.11.2 Общая документация *(General documentation)*

Russia, Belarus:

The main documentation set required for the operation and repairs of rolling stock shall be established in the terms of reference for the rolling stock design.

The main document on which the operation is based is the operation manual (OM), and maintenance and routine repairs shall follow the repair manual to be included with the carriage document set.

OM requirements are set forth in GOST 2.601-2006

Repair manual requirements are set forth in GOST 2.602.-95

These requirements have been approved by the following documents:

Belarus	GOST 2.610-2006. Unified Engineering Documentation System. Operation manuals GOST 2.602-95. Unified Engineering Documentation System. Repair manuals Rules of use of passenger carriages in international railway service (PPPV) approved by 51st Council for Railway Transport of 2009.
Kazakhstan	GOST 2.601-2006. Unified Engineering Documentation System. Operation manuals GOST 2.602-95. Unified Engineering Documentation System. Repair manuals Rules of use of passenger carriages in international railway service (PPPV) approved by 51st Council for Railway Transport of 2009
Latvia	Cabinet of Ministers of Latvia, No. 724 of 03/08/2010. Technical operational regulations of railways Cabinet of Ministers regulations "Procedure for accepting into service, conformity assessment, manufacture, upgrades and restorative repairs of rolling stock" No. 1211 of 28/12/2010.
Lithuania	ADV/001 Regulations on the technical operation of railways Order of AO LG Director General "On establishing frequency of technical inspection and repairs of passenger rolling stock" No. I-805 of 07/10/2011.
Poland	Order of the Minister of Transport on operation and technical requirements for rolling stock of 07/11/2007 (amendments of 12/10/2005).

Russia	GOST 2.601-2006. Unified Engineering Documentation System. Operation manuals GOST 2.602-95. Unified Engineering Documentation System. Repair manuals Rules of use of passenger carriages in international railway service (PPPV) approved by 51st Council for Railway Transport of 2009
Slovakia	TOR
Ukraine	GOST 2.610-2006. Unified Engineering Documentation System. Operation manuals GOST 2.602-95. Unified Engineering Documentation System. Repair manuals Rules of use of passenger carriages in international railway service (PPPV) approved by 51st Council for Railway Transport of 2009
Estonia	TOR, p. 137 Order of EVR Cargo Board members No. 1-3 p.2/7-S of 10/02/2009.

5.11.3 Документация по техническому обслуживанию и ремонту *(Maintenance file)*

5.11.3.1 Обоснование системы технического обслуживания и ремонта *(The maintenance design justification file)*

Russia:

According to the TOR, railway rolling stock shall have timely scheduled preventive repairs, maintenance and be kept in operation in good operational condition ensuring safety of travel and operation of railway transport and compliance with the requirements of occupational safety and fire safety.

Owners of railway rolling stock and railway transport staff directly servicing it are responsible for proper technical condition, maintenance, repairs and compliance with the established terms of service of railway rolling stock.

Technical maintenance and repair of the carriages shall be performed at the technical service stations, depots and plants with diagnostic tools.

The frequency of technical maintenance and all types of repairs of passenger carriages is regulated by order of Ministry of Railways of the Russian Federation No. 9-Ts of 4 April 1997 "On introduction of the new system of technical maintenance and repair of passenger carriages" as amended by order of the Ministry for Transport of 13 January 2001. №15

These requirements have been approved by the following documents:

Belarus	TOR of Belarusian Railway Rules of use of passenger carriages in international railway service

	(PPPV) approved by 51st Council for Railway Transport of 2009
Kazakhstan	TOR of railway transport. Rules of use of passenger carriages in international railway service (PPPV) approved by 51st Council for Railway Transport of 2009
Latvia	Cabinet of Ministers of Latvia, No. 724 of 03/08/2010. Technical operational regulations of railways Cabinet of Ministers regulations "Procedure for accepting into service, conformity assessment, manufacture, upgrades and restorative repairs of rolling stock" No. 1211 of 28/12/2010.
Lithuania	ADV/001 Regulations on the technical operation of railways Order of AO LG Director "On establishing frequency of technical inspection and repairs of passenger rolling stock" No. I-805 of 07/10/2011.
Poland	Order of the Minister of Transport on operation and technical requirements for rolling stock of 07/11/2007 (amendments of 12/10/2005).
Russia	Regulations for technical operation of the railways of the Russian Federation approved by the order of the Ministry of Transport of Russia No. 286 of 21/12/2010. Rules of use of passenger carriages in international railway service (PPPV) approved by 51st Council for Railway Transport of 2009. Order of the Ministry of Railways No. 9-Ts of 04 April 1997 "On introduction of new system of technical maintenance and repair of passenger carriages" as amended by the order of Russian Ministry for Transport of 13 January 2011. №15
Slovakia	Technical documentation on operation and technical maintenance of rolling stock
Ukraine	Technical operation regulations of the Ukrainian Railways No. TsRB-0004 Order No. 199-Ts On introduction of system of technical maintenance and repair of passenger carriages Rules of use of passenger carriages in international railway service (PPPV) approved by 51st Council for Railway Transport of 2009.
Estonia	TOR, p. 131

5.11.3.2 Руководства по техническому обслуживанию и ремонту (*Maintenance documentation)*

Russia, Belarus:

The requirements for technical maintenance and routine repairs are included in the Operation Manuals.

Types and content of repair documents are set forth in GOST 2.602 –95.

These requirements have been approved by the following documents:

Belarus	GOST 2.610-2006. Unified Engineering Documentation System. Operation manuals GOST 2.602-95. Unified Engineering Documentation System. Repair manuals
Kazakhstan	GOST 2.610-2006. Unified Engineering Documentation System. Requirements for operation manuals GOST 2.602-95. Unified Engineering Documentation System. Repair manuals
Latvia	GOST 2.610-2006. Unified Engineering Documentation System. Requirements for operation manuals (informative) Cabinet of Ministers regulations "Procedure for accepting into service, conformity assessment, manufacture, upgrades and restorative repairs of rolling stock" No. 1211 of 28/12/2010.
Lithuania	GOST 2.610-2006. Unified Engineering Documentation System. Requirements for operation manuals (informative) GOST 2.602-68 (as amended on 18/09/1985 and 06/03/1989) Repair documents GOST 2.602-95. Repair documents (Informative) Order of Minister of Railway of the Republic of Lithuania No. 3-122 of 22/04/2008
Poland	Order of the Minister of Transport on operation and technical requirements for rolling stock of 07/11/2007 (amendments of 12/10/2005).
Russia	GOST 2.610-2006. Unified Engineering Documentation System. Requirements for operation manuals GOST 2.602-95. Unified Engineering Documentation System. Repair manuals
Slovakia	Technical documentation on operation and technical maintenance of rolling stock
Ukraine	GOST 2.610-2006. Unified Engineering Documentation System. Requirements for operation manuals GOST 2.602-95. Unified Engineering Documentation System. Repair manuals
Estonia	GOST 2.610-2006. Unified Engineering Documentation System. Requirements for operation manuals (informative) GOST 2.602-95. Repair documents (Informative) TOR, p. 148-152 List of process documents for technical maintenance and repairs of rolling stock, EVR Cargo Ltd of 10/02/2009 (defines list of 70

	documents).

5.11.4 Эксплуатационные документы *(Operating documentation)*

Russia, Belarus:

The operating documentation is intended for rolling stock operation, familiarisation with its design, review of conditions of operation, restating the information confirming the main parameters and values guaranteed by the manufacturer, repeating the information in respect of condition and parameters of the equipment in operation.

The content of the books, sections and subsections of the listed documents is regulated by GOST 2.610-2006 "Unified Engineering Documentation System. Requirements for operation manuals"

These requirements have been approved by the following documents:

Belarus	GOST 2.610-2006. Unified Engineering Documentation System. Operation manuals GOST 2.602-95. Unified Engineering Documentation System. Repair manuals
Kazakhstan	GOST 2.610-2006. Unified Engineering Documentation System. Requirements for operation manuals GOST 2.610-2006. Unified Engineering Documentation System. Operation manuals
Latvia	Cabinet of Ministers of Latvia, No. 724 of 03/08/2010. Technical operational regulations of railways Instruction No. DVI-3/340 LDz "Guidelines for technical maintenance of locomotives in operation"
Lithuania	ADV/001 Regulations on the technical operation of railways
Poland	Order of the Minister of Transport on operation and technical requirements for rolling stock of 07/11/2007 (amendments of 12/10/2005).
Russia	GOST 2.610-2006. Unified Engineering Documentation System. Requirements for operation manuals GOST 2.610-2006. Unified Engineering Documentation System. Operation manuals
Slovakia	Technical documentation on operation and technical maintenance of rolling stock
Ukraine	GOST 2.610-2006. Unified Engineering Documentation System. Requirements for operation manuals GOST 2.610-2006. Unified Engineering Documentation System.

	Operation manuals
Estonia	TOR

5.11.5 Инструкции по порядку действий в аварийных ситуациях (*Rescue diagram and instructions)*

Russia:

Regulations and guidelines governing actions in emergency and extraordinary situations apply to passenger carriages.

These requirements have been approved by the following documents:

Belarus	TOR of Belarusian Railway Informative – Regulations for the actions of train crews in case of extraordinary situations on passenger trains en route, approved by OAO RZhD 23/08/2007 Guidelines for ensuring fire safety in passenger train carriages. Approved by OAO RZhD, No 2255r, 02/11/2009
Kazakhstan	TOR of railway transport.
Latvia	Cabinet of Ministers of Latvia, No. 724 of 03/08/2010. Technical operational regulations of railways
Lithuania	ADV/001 Regulations on the technical operation of railways. ADV/003 Railway traffic regulations
Poland	Instruction Ir-1. Guidelines for train traffic on PKP TSI LOC&PAS
Russia	Technical operation regulations of the Russian Railways, approved by order of the Ministry of Transport of Russia No. 286 of 21/12/2010 Regulations for the actions of train crews in case of extraordinary situations on passenger trains en route, approved by OAO RZhD, No 281r of 23/08/2007 Guidelines for ensuring fire safety in passenger train carriages. Approved by OAO RZhD, No 2255r, 02/11/2009 Special instructions
Slovakia	Infrastructure administrators' instructions TSI LOC&PAS
Ukraine	Technical operation regulations of the Ukrainian Railways No. TsRB-0004 Recommended guidelines for actions of the staff of Ukrzaliznytsia divisions to ensure the safety of traffic in extraordinary situations in accordance with the requirements of the Ukrainian Railways Operation Regulations, Guidelines for traffic of trains and shunting on railways of Ukraine, Signalling instructions on railways of Ukraine, approved

	by Ukrzaliznytsia order No. 992-Ts of 20/12/2004.
Estonia	TOR Special instructions

6 COMPARISON WITH THE 1435 MM GAUGE SYSTEM TARGET VALUES

6.1 КОНСТРУКЦИЯ И МЕХАНИЧЕСКОЕ ОБОРУДОВАНИЕ *(STRUCTURE AND MECHANICAL PARTS)*

6.1.1 Общие положения *(General)*

6.1.2 Механические сцепные устройства *(Mechanical interfaces)*

6.1.2.1 Общие положения и определения *(General and definitions)*

6.1.2.2 Внутрисекционное сцепное устройство *(Inner coupling)*

Not applicable to passenger carriages

6.1.2.3 Концевое сцепное устройство *(End coupling)*

TSI requirements:

«Where an end coupling is provided at any end of a unit, the following requirements apply to all types of end coupling (automatic, semi-automatic or manual): end couplings shall incorporate a resilient coupling system, capable of withstanding the forces due to the intended operational and rescue conditions;»

TSI Requirements are applicable to the 1520 mm gauge system except for the requirements specified for manual coupling. Manual coupling devices in the system 1520 mm do not apply. As a standard end-coupling device on passenger carriages the automatic coupler CA-3 is used.

6.1.2.4 Аварийное сцепное устройство *(Rescue coupling)*

TSI requirements:"Provisions shall be made to enable the recovery of the line in case of breakdown by hauling or propelling the unit to be rescued by means of a power unit equipped with the same type of end coupling system or by means of a recovery unit with a manual coupling system.

This is achieved either by means of a permanently installed compatible coupling system or through a rescue coupler (also called rescue adaptor)."

TSI Requirements are applicable to 1520 mm system with the exception of references to the manual coupling type UIC. Instead of manual coupling UIC automatic coupler CA-3 is used.

6.1.2.5 Доступ персонала для сцепления и расцепления *(Staff access for coupling and uncoupling)*

The first paragraph of TSI is applicable to 1520 mm system.

For 1520 mm system, coupling devices that require the participation of staff for decoupling units of rolling stock should be equipped with disconnecting drive, allowing to manage the operations of coupling devices without staff to be present in the intersectional zone at the time of application of the longitudinal compressive force.

For UIC manual coupling devices, a zone where staff can intervene is necessary and should be clearly defined (Berne rectangle).

6.1.3 Межвагонный и межсекционный переход *(Gangways)*

The structure of the TSI requirements is applicable to the 1520 mm system, but with other values. There are additional requirements for gangways (to be checked against TSI PRM by ERA).

6.1.4 Прочность конструкции единицы ПС *(Strength of vehicle structure)*

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide, but the values, methods of calculation and verification are different.

6.1.5 Пассивная безопасность *(Passive safety)*

Functional requirements for passive safety and the principles of their definition, based on scenarios which are similar but different than those defined by TSI, are applicable to 1520 mm system.

6.1.6 Возможность поднятия домкратом (*Lifting and jacking)*

TSI requirements are applicable to the 1520 mm system with the exception of values and calculation methods and the symbols for marking of lifting points.

6.1.7 Крепление устройств к конструкции кузова (Fixing of devices to carbody structure)

The purpose of the requirements for this parameter in the TSI and in the 1520 mm gauge coincide, but the values, methods of calculation and verification are different.

6.1.8 Двери в служебные помещения *(Staff and freight access doors)*

Not applicable to passenger carriages

6.1.9 Механические характеристики стекла *(Mechanical characteristics of glass other than windscreens)*

TSI requirements are applicable to the 1520 mm system.

In the 1520 mm system there are also additional requirements for this parameter.

6.1.10 Условия загрузки и весовые характеристики (*Load conditions and weighted mass)*

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide, but the parameters' values differ.

6.2 ВОЗДЕЙСТВИЕ НА ПУТЬ И ГАБАРИТ ПС *(TRACK INTERACTION AND GAUGING)*

6.2.1 Габарит ПС *(Kinematic gauge)*

TSI requirements for this parameter are not applicable and must be replaced by those of applicable standards (or similar documents in different states).

6.2.2 Статическая осевая нагрузка *(Static axle load)*

TSI does not specify the exact value of axle load, but only require to indicate information about actual axles loads, distance between axles of an rolling stock unit and its length.

The axle load limits are established by TSI Infrastructure depending on the line's category.

Unlike TSI the 1520 mm system requires absolute load track restrictions from the rolling stock. Differences for values of wheels and axles loads allowed for 1520 mm system are stricter than defined in TSI.

6.2.3 Параметры ПС, влияющие на стационарные наземные системы *(Rolling Stock parameters which influence ground based systems)*

6.2.3.1 Электромеханические параметры ПС, влияющие на путевые устройства СЦБ *(Rolling Stock parameters which influence CCS subsystem)*

To be considered within the Analysis of subsystem CCS.

6.2.3.2 Контроль буксового узла *(Axle bearing health monitoring)*

The purpose of the requirements for this parameter in the TSI and 1520 mm system coincide.

TSI requirements are not applicable to track-side monitoring systems of 1520 mm system due to the difference in gauge.

Requirements for on-board monitoring systems should be defined as for 1435 mm system and as for the 1520 mm one.

6.2.4 Динамические параметры подвижного состава *(Rolling stock dynamic behaviour)*

6.2.4.1 Устойчивость к сходу с рельсов при движении по переходным кривым и по пути с отклонениями в пределах допуска содержания пути *(Safety against derailment running on twisted track)*

TSI requirements may be applied, but the values of the coefficients require further clarification.

1520 mm system applies a different approach and methodology than those defined in TSI.

6.2.4.2 Параметры динамики движения *(Running dynamic behaviour)*

TSI requirements may be applied, but the values of the coefficients require further clarification.

1520 mm system applies a different approach and methodology than those defined in TSI.

6.2.4.3 Предельные значения безопасного движения *(Limit values for running safety)*

TSI requirements may be applied, but the values of the coefficients require further clarification.

1520 mm system applies a different approach and methodology than those defined in TSI.

6.2.4.3.1 Предельные значения вертикальных и поперечных нагрузок на путь *(Track loading limit values)*

TSI requirements may be applied, but the values of the coefficients require further clarification.

1520 mm system applies a different approach and methodology than those defined in TSI.

6.2.4.3.2 Эквивалентная конусность *(Equivalent conicity)*

This parameter is not applicable in the 1520 mm system.

6.2.4.3.2.1 Проектные значения для профиля новых колёс *(Design values for new wheel profiles)*

TSI requirements are not applicable to 1520 mm system due to the difference of approaches and because of the lack of the equivalent conicity parameter.

In 1520 mm system Description of the wheel profile is according to the requirements of applicable standards.

6.2.4.3.2.2 Значения эквивалентной конусности для существующих колесных пар *(In-service values of wheelset equivalent conicity)*

TSI requirements are not applicable to 1520 mm system due to the difference of approaches and because of the lack of the equivalent conicity parameter.

Description of the wheel profile according to the requirements of applicable standards.

Wear tolerances are limited by the requirements of applicable standards .

6.2.5 Ходовая часть *(Running gear)*

6.2.5.1 Конструкция рамы тележки *(Structural design of bogie frame)*

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide, but the values, methods of calculation and verification are different.

6.2.5.2 Колесная пара *(Wheelsets)*

6.2.5.3 Механические и геометрические характеристики колесных пар *(Mechanical and geometrical characteristics of wheelsets)*

Mechanical characteristics: The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide, but the values, methods of calculation and verification are different.

Geometric characteristics: TSI requirements are not applicable because of the difference of gauge.

6.2.5.4 Механические и геометрические характеристики колес *(Mechanical and geometrical characteristics of wheels)*

Mechanical characteristics: The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide, but the values, methods of calculation and verification are different.

Geometric characteristics: TSI requirements are not applicable. Profiles of the wheels in the 1520 mm system are determined by the requirements of applicable standartds.

6.2.5.5 **Механические характеристики оси** ***(Mechanical characteristics of axle)***

Mechanical characteristics: The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide, but the values, methods of calculation and verification are different.

6.2.6 **Наименьший допустимый радиус проходимой кривой** ***(Minimum curve radius)***

This parameter is used in the 1520 mm gauge; minimum values to be considered differ comparing to TSI.

6.2.7 **Устройство подачи песка** ***(Sanding)***

Not applicable to passenger carriages

6.2.8 **Гребнесмазыватели и лубрикаторы** ***(Flange lubrication)***

Not applicable to passenger carriages

6.2.9 **Путеочиститель** ***(Life guards)***

Not applicable to passenger carriages

6.3 ТОРМОЖЕНИЕ ***(BRAKING)***

6.3.1 **Общие положения** ***(General)***

TSI requirements are applicable to 1520 mm system and are comparable, but their exact values must be adapted to the 1520 mm system.

6.3.2 Основные требования функциональности и безопасности ***(Main functional and safety requirements)***

6.3.2.1 **Функциональные требования** ***(Functional requirements)***

TSI requirements are applicable to 1520 mm system and are comparable, but their exact values must be adapted to the 1520 mm system.

6.3.2.2 **Требования безопасности** ***(Safety requirements)***

The safety requirements in the 1520 mm system are currently not implying the need for risk analysis.

6.3.3 **Тип системы торможения** ***(Type of brake system)***

TSI requirements are not applicable to 1520 mm system.

6.3.4 Управление торможением ***(Brake command)***

6.3.4.1 **Экстренное торможение** ***(Emergency braking)***

TSI requirements are applicable to 1520 mm system and are comparable, but their exact values must be adapted to the 1520 mm system.

6.3.4.2 **Служебное торможение** ***(Service braking)***

Not applicable to passenger carriages

6.3.4.3 **Управление прямодействующим тормозом** ***(Direct braking command)***

Not applicable to passenger carriages

6.3.4.4* Управление динамическим тормозом *(Dynamic braking command)

Not applicable to passenger carriages

6.3.4.5* Управление стояночным тормозом *(Parking braking command)

TSI requirements are practically applicable to the 1520 mm system.

6.3.5 Характеристики торможения *(Braking performance)*

6.3.5.1* Общие требования *(General requirements)

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide, but the values, methods of calculation and verification are different.

6.3.5.2* Экстренное торможение *(Emergency braking)

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide, but the values, methods of calculation and verification are different.

6.3.5.3* Служебное торможение *(Service braking)

TSI requirements are applicable and comparable to 1520 mm system, but their exact values must be adapted to the 1520 mm system.

6.3.5.4* Расчеты термоциклической стойкости *(Calculations related to thermal capacity)

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide, but the values, methods of calculation and verification are different.

6.3.5.5* Стояночный тормоз *(Parking brake)

TSI requirements are applicable to 1520 mm system and are comparable, but their exact values must be adapted to the 1520 mm system.

6.3.6 Сцепление колес с рельсами – Система противоюзной защиты *(Wheel rail adhesion solicitation- Wheel slide protection system)*

6.3.6.1* Предельное значение коэффициента сцепления колес с рельсами *(Limit of wheel rail adhesion solicitation)

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide, but the values, methods of calculation and verification are different.

6.3.6.2* Система противоюзной защиты *(Wheel slide protection system)

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide, but the values, methods of calculation and verification are different.

6.3.7* Системы динамического торможения (электродинамические, гидродинамические) *(Interface with traction - Braking systems linked to traction (electric, hydro-dynamic))

Not applicable to passenger carriages

6.3.8 Система торможения независимая от условий сцепления колеса с рельсом *(Braking system independent of adhesion conditions)*

6.3.8.1* Общие положения *(General)

6.3.8.2* Магниторельсовый тормоз *(Magnetic track brake)

This parameter is not regulated in the 1520 mm system.

6.3.8.3 **Вихретоковый тормоз *(Eddy current track brake)***

This parameter is not regulated in the 1520 mm system.

6.3.9 **Контроль состояния тормозов и индикация неисправностей *(Brake state and fault indication)***

TSI requirements are comparable with the requirements of 1520 mm system.

6.3.10 **Требования к тормозам в условиях буксировки *(Brake requirements for rescue purposes)***

TSI requirements are comparable with the requirements of 1520 mm system.

This parameter will require additional study when putting the 1520 mm system in the TSI.

6.4 ОБСЛУЖИВАНИЕ ПАССАЖИРОВ *(PASSENGER RELATED ITEMS)*

There is need to adapt PRM rules (persons with reduced mobility) for the 1520 mm system.

6.4.1 **Санитарные системы *(Sanitary systems)***

TSI requirements are applicable to 1520 mm system, however there are additional requirements for 1520 mm system.

6.4.2 **Системы оповещения и связи *(Public address system: audible communication system)***

TSI requirements are applicable to 1520 mm system, however there are additional requirements for 1520 mm system.

6.4.3 **Возможность подачи сигнала тревоги пассажирами машинисту: функциональные требования *(Passenger alarm: functional requirements)***

TSI requirements are not applicable to the 1520 mm system.

TSI requirements are newly developed and will require additional study.

In the 1520 mm system, the passenger alarm leads to emergency braking (activation of train line stop valve) and means absolute stop the train.

6.4.4 **Надписи и знаки безопасности для пассажиров *(Safety instructions to passengers - Signs)***

TSI requirements are applicable to 1520 mm system, however there are additional requirements for 1520 mm system.

6.4.5 Системы связи для пассажиров *(Communication devices for passengers)*

Covered by paragraph 6.4.2

6.4.6 **Внешние двери: вход и выход из ПС *(Exterior doors: access to and egress from Rolling Stock)***

TSI requirements are applicable to 1520 mm system and are comparable, but their exact values must be adapted to the 1520 mm system.

TSI requirements are newly developed and can apply only to the newly designed rolling stock.

There is also a need for further study taking into account the requirements of TSI PRM (e.g. geometrical dimensions)

6.4.7 Конструкция дверных систем *(Door system construction)*

TSI requirements are applicable to 1520 mm system and are comparable, but their exact values must be adapted to the 1520 mm system.

There is also a need for further study taking into account the requirements of TSI PRM.

6.4.8 Межвагонные двери *(Inter-unit doors)*

TSI requirements are applicable to 1520 mm system and are comparable, but their exact values must be adapted to the 1520 mm system.

There is also a need for further study taking into account the requirements of TSI PRM.

6.4.9 Качество воздуха внутри ПС *(Internal air quality)*

TSI requirements are applicable to 1520 mm system, however there are additional requirements for 1520 mm system.

6.5 УСЛОВИЯ ОКРУЖАЮЩЕЙ СРЕДЫ И АЭРОДИНАМИЧЕСКИЕ ЭФФЕКТЫ *(ENVIRONMENTAL CONDITIONS AND AERODYNAMIC EFFECTS)*

6.5.1 Условия окружающей среды *(Environmental conditions)*

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide, but the values, methods of calculation and verification are different.

6.5.2 Аэродинамические эффекты *(Aerodynamic effects)*

This parameter is not applicable in the 1520 mm system.

This parameter will require additional study when putting the 1520 mm system in the TSI.

6.6 ЗАЩИТА СИСТЕМЫ *(SYSTEM PROTECTION)*

6.6.1 Электробезопасность *(Protection against electrical hazards)*

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincides. This parameter for 1520 mm system is described by applicable standards.

6.6.2 Диагностика; программное обеспечение *(Diagnostic; Software's)*

6.6.2.1 Диагностика *(Diagnostic)*

6.6.2.2 Программное обеспечение *(Software's)*

For 6.6.2:

This parameter is applied in the 1520 mm system.

According to TSI description of these parameters is distributed in other sections. Requirements are defined by normative documents for each type of rolling stock, as well as by additional design requirements that are agreed with the customer.

6.6.3 Внешнее освещение, обозначение головы и хвоста поезда и звуковые сигналы *(External lights & visible and audible warning devices)*

6.6.3.1 Внешнее освещение, обозначение головы и хвоста поезда *(External front and rear lights)*

6.6.3.1.1 Внешнее освещение *(Head lights)*

Not applicable to passenger carriages

6.6.3.1.2 Обозначение головы поезда *(Marker lights)*

Not applicable to passenger carriages

6.6.3.1.3 Обозначение хвоста поезда *(Tail lights)*

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide, but the values are different.

This parameter in the 1520 mm system is described by national rules and regulations for signalisation systems in each country.

6.6.3.1.4 Управление световыми сигналами *(Lamp controls)*

TSI requirements are comparable to the 1520 mm system.

6.6.3.2 Звуковые сигналы (тифон, свисток) *(Horn)*

6.6.3.2.1 Общие положения *(General)*

Not applicable to passenger carriages

6.6.3.2.2 Уровень звукового давления тифона *(Warning horn sound pressure levels)*

Not applicable to passenger carriages

6.6.3.2.3 Защита от внешего воздействия *(Protection)*

Not applicable to passenger carriages

6.6.4 Идентификация поезда и вагона – внешняя маркировка *(Train and vehicle identification – External marking)*

This parameter applies in the 1520 mm system and is regulated by Rules for Technical Operation and other national documents in each country. Common requirements are set out in PPV, PPPV, rules of CIS. In EU it is regulated by TSI OPE.

6.6.5 Электронная идентификация ПС *(Electronic identification of rolling stock)*

This parameter is used in the 1520 mm system. Regulated in Russia. Not regulated by TSI.

6.7 ТЯГОВОЕ И ЭЛЕКТРИЧЕСКОЕ ОБОРУДОВАНИЕ *(TRACTION AND ELECTRICAL EQUIPMENT)*

6.7.1 Тяговые характеристики *(Traction performance)*

Not applicable to passenger carriages

6.7.2 Электроснабжение *(Power supply)*

6.7.2.1 Общие положения *(General)*

Power supply for passenger carriages is not regulated in TSI. It is regulated for 1520 mm system.

6.7.2.2 Диапазон рабочих напряжений и частот *(Operation within range of voltages and frequencies)*

Power supply for passenger carriages is not regulated in TSI. It is regulated for 1520 mm system.

6.7.2.3 Рекуперативное торможение с возвратом энергии в тяговую сеть *(Regenerative brake with energy to the overhead contact line)*

Not applicable to passenger carriages

6.7.2.4 Максимальные мощность и сила тока от контактной сети *(Maximum power and current from the overhead contact line)*

Not applicable to passenger carriages

6.7.2.5 Максимальная сила тока на остановках для систем электроснабжения постоянного тока *(Maximum current at standstill for DC systems)*

Not applicable to passenger carriages

6.7.2.6 Коэффициент мощности *(Power factor)*

Not applicable to passenger carriages

6.7.2.7 Электромагнитная совместимость (СЦБ и связь, включая помехи, генерируемые ПС в тяговую сеть) *(EMC Directive +System energy disturbances)*

This parameter is applied and regulated in the 1520 mm system by the requirements of safety, applicable standards and other normative documents. In EU regulated by EMC Directive.

6.7.2.8 Измерение потребления энергии *(On-board energy consumption measuring function)*

Not applicable to passenger carriages

6.7.2.9 Требования к токоприёмнику *(Requirements linked to pantograph)*

Not applicable to passenger carriages

6.7.2.10 Защита от аварийных процессов в электрооборудовании *(Electrical protection of the train)*

TSI requirements are comparable with the requirements of 1520 mm system but their exact values must be adapted for a 1520 mm system.

6.7.3 Дизельные и другие тепловые тяговые единицы *(Diesel and other thermal traction system)*

Not applicable to passenger carriages

6.7.4 Входной импеданс между токоприёмником и колесом (для совместимости с рельсовыми цепями) *(Impedance between pantograph and wheels)*

Not applicable to passenger carriages

6.8 КАБИНА И УПРАВЛЕНИЕ *(CAB AND OPERATION)*

Not applicable to passenger carriages

6.9 ПОЖАРНАЯ БЕЗОПАСНОСТЬ И ЭВАКУАЦИЯ *(FIRE SAFETY AND EVACUATION)*

6.9.1 Общие положения и категоризация *(General and Categorisation)*

(Covers paragraphs 6.9.1.1-6.9.1.2)

This parameter is applied in the 1520 mm system and described by the requirements of applicable standartds or national documents in each country.

6.9.2 Требования к материалам *(Material requirements)*

This parameter is applied in the 1520 mm system and described by the requirements of applicable standards or national documents in each country. In EU regulated by TS 45545-2. (EN 45545-2 to be published in 2013).

6.9.3 Специальные меры для воспламеняющихся жидкостей *(Specific measures for flammable liquids)*

This parameter is applied in the 1520 mm system and described by the requirements of GOST or national documents in each country. In EU regulated by TS 45545-2.

6.9.4 Эвакуация пассажиров *(Passenger evacuation)*

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide. This parameter for 1520 mm system is described in requirement of applicable standards, safety standards, or national documents in each country.

6.9.5 Огнезадерживающие барьеры *(Fire barriers)*

This parameter is applied in the 1520 mm system and described by the requirements of applicable standards, safety standards or national documents in each country. In EU regulated by EN1363-1:1999 .

6.10 ОБСЛУЖИВАНИЕ *(SERVICING)*

6.10.1 Общие положения *(General)*

TSI requirements are applicable to the 1520 mm system.

6.10.2 Доступ к лобовому стеклу для очистки *(Cleaning of driver's cab windscreen)*

Not applicable to passenger carriages

6.10.3 Внешняя очистка поезда *(Exterior cleaning through a washing plant)*

TSI requirements are applicable to the 1520 mm system.

6.10.4 Система опорожнения туалета *(Toilet discharge system)*

Requirements for the 1520 mm system are comparable to requirements of TSI.

6.10.5 Система водоснабжения *(Water refilling equipment)*

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide. This parameter for 1520 mm system is described by the requirements of applicable normative documents , or national documents in each country.

6.10.6 Разъем для заправки водой *(Interface for water refilling)*

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincide. This parameter for 1520 mm system is described by the applicable standards requirements.

6.10.7 Специальные требования для отстоя поездов *(Special requirements for stabling of trains)*

This parameter is applied in the 1520 mm system and described by the requirements of the project technical specification or instructions for preparation for operation and maintenance of passenger carriages.

6.10.8 Оборудование заправки топливом *(Refuelling equipment)*

This parameter is applied in the 1520 mm system and described by the requirements of design technical specification.

6.11 ДОКУМЕНТАЦИЯ ПО ЭКСПЛУАТАЦИИ И ТЕХНИЧЕСКОМУ ОБСЛУЖИВАНИЮ *(DOCUMENTATION FOR OPERATION AND MAINTENANCE)*

6.11.1 Общие положения *(General)*

This parameter is applied in the 1520 mm system and described by the requirements of standards or national documents in each country, or CIS rules.

6.11.2 Общая документация *(General documentation)*

The purpose of the requirements for this parameter in the TSI and in the 1520 mm system coincides.

6.11.3 Документация по техническому обслуживанию и ремонту *(Maintenance file)*

6.11.3.1 Обоснование системы технического обслуживания и ремонта *(The maintenance design justification file)*

This parameter is applied in the 1520 mm system and described by the requirements of standards or national documents in each country, or CIS rules.

6.11.3.2 Руководства по техническому обслуживанию и ремонту (*Maintenance documentation)*

This parameter is applied in the 1520 mm system and described by the requirements of standards, or national documents in each country, or CIS rules.

6.11.4 Эксплуатационные документы *(Operating documentation)*

This parameter is applied in the 1520 mm system and described by the requirements of standards, or national documents in each country, or CIS rules.

6.11.5 Инструкции по порядку действий в аварийных ситуациях (*Rescue diagram and instructions)*

This parameter is applied in the 1520 mm system and described by the requirements of national documents in each country.

7 APPENDICES

7.1 LIST OF THE CONTACT GROUP MEMBERS

The following delegations have participated in the work on the document:

- Republic of Belarus
- Republic of Latvia
- Republic of Lithuania
- Republic of Poland
- Russian Federation
- Slovak Republic
- Ukraine
- Republic of Estonia
- Organisation for Co-Operation Between Railways (OSJD)
- European Railway Agency (ERA)