

**COMMISSION IMPLEMENTING DECISION (EU) 2015/2299****of 17 November 2015****amending Decision 2009/965/EC as regards an updated list of parameters to be used for classifying national rules***(notified under document C(2015) 7869)***(Text with EEA relevance)**

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community <sup>(1)</sup>, and in particular Article 27(4) thereof,

Whereas:

- (1) On 30 November 2009 the Commission adopted Decision 2009/965/EC <sup>(2)</sup> with a list of parameters to be used for classifying national rules in the reference document referred to in Article 27 of Directive 2008/57/EC.
- (2) On the basis of a recommendation of the European Railway Agency (the Agency), the revision of the list of parameters is needed to make it coherent with the revised technical specification for interoperability (TSI) on rolling stock, freight wagons, locomotives and passenger rolling stock, noise, infrastructure, energy, control-command and signalling, operation and traffic management, telematic applications for freight and passenger services, safety on railway tunnels and accessibility to persons with reduced mobility.
- (3) In order to allow comparison and cross-referencing, in respect of a particular parameter, between the requirements contained within the revised TSIs and those contained in national rules, the list of parameters to be checked in conjunction with the placing in service of non-TSI conform vehicles, should, on the one hand, preserve compatibility with, and build upon existing agreements based on national rules and, on the other hand, reflect the revised TSIs. It is therefore necessary for the list of parameters to be updated. To ensure a harmonised understanding and application of the list, additional explanation should be added. It is appropriate to adopt the detailed list of parameters, prepared on the basis of the recommendation of the Agency (ERA-REC-118-2014/REC) of 11 November 2014, as the basis for the reference document referred to in Article 27(4) of Directive 2008/57/EC.
- (4) Decision 2009/965/EC should therefore be amended accordingly.
- (5) For the sake of clarity, the reference document referred to in Article 27(4) of Directive 2008/57/EC and described in Commission Decision 2011/155/EU <sup>(3)</sup> should be updated accordingly.
- (6) The measures provided for in this Decision are in accordance with the opinion of the Committee established in accordance with Article 29(1) of Directive 2008/57/EC,

HAS ADOPTED THIS DECISION:

*Article 1*

The Annex to Decision 2009/965/EC is replaced by the text in the Annex to this Decision.

<sup>(1)</sup> OJ L 191, 18.7.2008, p. 1.<sup>(2)</sup> Commission Decision 2009/965/EC of 30 November 2009 on the reference document referred to in Article 27(4) of Directive 2008/57/EC of the European Parliament and of the Council on the interoperability of the rail system within the Community (OJ L 341, 22.12.2009, p. 1).<sup>(3)</sup> Commission Decision 2011/155/EU of 9 March 2011 on the publication and management of the reference document referred to in Article 27(4) of Directive 2008/57/EC of the European Parliament and of the Council on the interoperability of the rail system within the Community (OJ L 63, 10.3.2011, p. 22).

*Article 2*

This Decision is addressed to the Member States and to the European Railway Agency.

It shall apply from 1 January 2016.

Done at Brussels, 17 November 2015.

*For the Commission*  
Violeta BULC  
*Member of the Commission*

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## ANNEX

## ANNEX

**List of parameters to be used for classifying national rules in the reference document referred to in Article 27 of Directive 2008/57/EC**

Reference	Parameter	Explanations
1	Documentation	
1.1	General documentation	General documentation, technical description of the vehicle, its design and intended use for the kind of traffic (long-distance train, suburban vehicles, commuter services, etc.) inclusive of intended and max design speed, including general plans, diagrams and necessary data for registers, e.g. length of vehicle, axle arrangement, axle spacing, mass per unit, etc.
1.2	Maintenance instructions and requirements	
1.2.1	Maintenance instructions	Maintenance manuals and leaflets, including requirements necessary to maintain design safety level of the vehicle. Any appropriate professional qualifications, i.e. skills that are requested for equipment maintenance.
1.2.2	The maintenance design justification file	The maintenance design justification file explains how maintenance activities are defined and designed in order to ensure that the rolling stock characteristics will be kept within permissible limits of use during its lifetime.
1.3	Instructions and documentation for operation	
1.3.1	Instructions for operation in normal and degraded modes of the vehicle	
1.4	National requirement for testing	This parameter should address rules (if any) for testing.
2	Structure and mechanical parts	
2.1	Vehicle structure	
2.1.1	Strength and integrity	Requirements for the mechanical strength of car body, under-frame, suspension systems, track sweeper and snow plough. Mechanical strength of separate items of this list such as bogie/running gear, axle box, suspension, axle shaft, wheel, axle bearings and pantograph will be defined separately.
2.1.2	Load capability	
2.1.2.1	Load conditions and weighed mass	Load conditions and weighed mass are mainly an operational issue (referring to the line class). The parameter refers to the understanding of the mass system, to ensure that the same understanding of the mass and load calculations are given. The load capability is an operational matter however maximum load condition shall be consistent with the design of the vehicle (strength of the structure).

Reference	Parameter	Explanations
2.1.2.2	Axle load and wheel load	Axle load and wheel load are mainly an operational issue (referring to the line class). The parameter refers to the understanding of the mass system, to ensure that the same understanding of the mass and load calculations are given (e.g. minimum and maximum axle load). Refer to parameter 3.3 for the structural strength of axles and wheels.
2.1.3	Joining technology	Requirements to the joints and to the joining technologies (welding, gluing, screwing, bolting, etc.).
2.1.4	Lifting and jacking	Special requirements to the vehicle design for lifting, jacking and re-railing, capacity of the vehicle body to resist lasting deformations, also geometry and location of the lifting points. Not included is the lifting and re-railing instruction; therefore see chapter 1.
2.1.5	Fixing of devices to car body structure	E.g. for weld-on parts, also for fixed devices inside the passenger areas.
2.1.6	Connections used between different parts of the vehicle	E.g. connection/suspension/damping system between, e.g. car body and bogie or between axle box and bogie frame.
2.2	Couplers/coupling systems	
2.2.1	Automatic coupling	Requirements and accepted types of automatic coupling systems. It takes into account electrical, mechanical and pneumatic.
2.2.2	Characteristics of rescue coupling	Requirements to coupling adapters which make different coupling systems compatible; in normal and degraded mode (e.g. rescue coupler).
2.2.3	Conventional screw coupling and other non-automatic coupling systems	Requirements for conventional screw coupling systems as well as other non-automatic coupling systems (e.g. semi-permanent inner couplings), their components and their interaction. Included: draw gear, draw hook, draw gear suspension. Excluded: buffers and buffing systems (therefore see parameter 2.2.4 "Buffing"), as well as air, brake, energy and control connections.
2.2.4	Buffing	Requirements for buffers and buffing systems related to vehicle coupling, including buffer marking.
2.2.5	Gangways	Requirements concerning gangways which allow people (staff or passenger) to interchange between coupled vehicles.
2.3	Passive safety	Requirements concerning passive safety of the vehicle in collision with obstacles (e.g. crashworthiness etc.). Including, e.g. obstacle deflector, limiting deceleration, survival space and structural integrity of occupied areas, reducing the risk of derailment and overriding, limiting consequences of hitting a track obstruction, interior fittings for passive safety. Reference to collision scenarios, survival space and structural integrity of the occupied areas, reducing the risk of overriding and derailment, limiting the consequences of hitting a track obstruction.

Reference	Parameter	Explanations
		Requirements concerning rail guard for protection of wheels from foreign objects and obstacles on the rails. Refers to: height of the lower end of the rail guard above the plain rail, minimum longitudinal force without permanent deformation. Deals not with snow plough.
3	Track interaction and gauging	
3.1	Vehicle gauge	Refers to all requirements connected to vehicle gauge/vehicle profile. To announce the accepted kinematic vehicle gauge(s) including pantograph gauge.
3.2	Vehicle dynamics	
3.2.1	Running safety and dynamics	Requirements to running behaviour and running safety of the vehicle. Included are: tolerance of vehicle to distortion of track, running on curved or twisted tracks, safe running on points and diamond crossings, etc.
3.2.2	Equivalent conicity	Requirements concerning equivalent conicity values which should be respected.
3.2.3	Wheel profile and limits	Requirements for wheel profiles in relation to the relevant track system(s); to announce accepted wheel profiles (e.g. S1002 is widely accepted).
3.2.4	Track loading compatibility parameters	E.g. dynamic wheel force, wheel forces exerted by a wheel set on the track (quasi static wheel force, maximum total dynamic lateral force, quasi static guiding force) including vertical acceleration.
3.2.5	Minimum horizontal curve radius, vertical concave curve radius, convex curve radius	The mechanical ability of a vehicle to pass through a horizontal curve of a defined radius. The value of minimum vertical convex curve (hump) and concave curve (bowl) radius of the track to be negotiated by the vehicle shall be announced; conditions (e.g. vehicle coupled/uncoupled).
3.3	Bogies/running gear	
3.3.1	Bogies	Requirements concerning bogie frame design and strength as well as bogie overall design.
3.3.2	Wheelset (complete)	Requirements on joining of the components (axle shaft, wheels, bearings, axle boxes, traction components...), tolerances, impedance between wheels. Not included: requirements on strength and strength calculation of axle shaft, wheels, bearings, traction components and on ability for non-destructive testing.
3.3.3	Wheel	Requirements on the wheel (e.g. strength, strength calculation, material, manufacturing method, inner mechanical tension state, surface roughness, surface protection/paint coat, marking, ability for non-destructive testing). In case of tyred wheels: requirements on wheel tyre, joining and fixing on wheel body, marking. For wheel profile and limits see 3.2.3.

Reference	Parameter	Explanations
3.3.4	Wheel/rail interaction influencing systems	Requirements to all vehicle mounted systems which have influence to the wheel/rail interaction such as wheel flange lubrication, upper sway/wearing track wheel interactions, requirements deriving from traction, braking, except for sanding system. Compatibility with CCS trackside equipment is covered for EMC by parameter 8.4.2 and for other compatibility requirements by parameters 12.2.4.
3.3.5	Sanding system	
3.3.6	Bearings on the wheelset	Requirements on wheelset bearings (e.g. strength, strength calculation, material, manufacturing method).
3.3.7	Axle shaft	Requirements on the axle shaft (e.g. strength, strength calculation, material, surface roughness, surface protection/paint coat, marking, ability for non-destructive testing).
3.3.8	Axle bearing condition monitoring	Parameter covers the axle box and hot axle box detection ("HABD") (on-board HABD and interfaces with trackside detectors).
3.4	Limit of maximum longitudinal positive and negative acceleration	Limit of acceleration due to maximum admissible longitudinal forces in the track.
4	Braking	
4.1	Functional requirements for braking at train level	Refers to the availability of basic brake functionalities (usually service braking, emergency braking, a parking brake function) and characteristics of the main brake system (usually automaticity, continuity, inexhaustibility).
4.2	Safety requirements for braking at train level	
4.2.1	Reliability of main brake system functionality	Requirement concerning the safe response of the brake system to provide the expected brake force after activation of an emergency brake command.
4.2.2	Reliability of traction/braking interlocking	Requirement that tractive effort is safely inhibited after activation of an emergency brake command.
4.2.3	Reliability of stopping distance	Requirement concerning the compliance with the calculated stopping distance after activation of an emergency brake command.
4.2.4	Reliability of parking brake	Requirement concerning the safe response of the parking brake system to keep the vehicle stationary under calculated circumstances after activation of a parking brake command.
4.3	Brake system — Recognised architecture and associated standards	Reference to existing solutions, e.g. UIC ("Union International des Chemins de fer") brake system.

Reference	Parameter	Explanations
4.4	Brake command	
4.4.1	Emergency braking command	Requirements concerning the emergency braking command, e.g. availability of independent emergency brake command devices, specification of appearance of emergency brake command devices, ability of self-locking of the emergency brake command devices, ability of activation of an emergency brake by the control-command and signalling on-board system, specification of the emergency brake after activation.
4.4.2	Service braking command	Requirements concerning the service braking command, e.g. specifications to the adjustability of the brake force by the service braking command, requirement of only one available service braking command and possibility to isolate the service braking function of the other service braking command(s), automatic cut-off of all tractive effort by the service braking command.
4.4.3	Direct braking command	Requirements concerning the direct braking command.
4.4.4	Dynamic braking command	Requirements concerning the dynamic braking command, e.g. possibility of independent and/or combined use of the dynamic brake from/with other brake systems, the possibility to inhibit the application of the regenerative brake.
4.4.5	Parking braking command	Requirements concerning the parking braking command, e.g. conditions in which the parking braking command has to be able to apply and/or release the parking brake.
4.5	Brake performance	
4.5.1	Emergency braking performance	Requirements concerning the emergency braking performance, e.g. response time, deceleration, stopping distance, modes to be considered (normal/degraded). Excluded: exploitation of wheel rail adhesion (see parameter 4.6.1).
4.5.2	Service braking performance	Requirements concerning the service braking performance, e.g. level and limit the maximum service braking performance.
4.5.3	Calculations related to thermal capacity	Requirements concerning the calculations related to thermal capacity, both on wheels and brake equipment, e.g. scenarios and load conditions to be applied, sequence of brake applications to be considered, maximum line gradient, associated length and operating speed.
4.5.4	Parking brake performance	Requirements concerning the parking braking performance, e.g. load condition, ruling track gradient.
4.5.5	Brake performance calculation	Requirements concerning the brake performance calculation, e.g. applicable wheel diameters, load conditions, friction coefficients, control modes.
4.6	Braking adhesion management	
4.6.1	Limit of wheel rail adhesion profile	Requirements concerning the limitation of the wheel-rail adhesion profile, e.g. target design friction coefficients to limit the exploitation of wheel rail adhesion for wheel slide protection, vehicle configurations to be considered, wheel diameter and load conditions to be considered.

Reference	Parameter	Explanations
4.6.2	Wheel slide protection system ("WSP")	Requirements concerning the wheel slide protection (WSP) system, e.g. for which vehicles/vehicle configurations a WSP system is mandatory, requirements on the WSP system performance, safety relevance.
4.7	Braking force production	
4.7.1	Friction brake components	
4.7.1.1	Brake blocks	
4.7.1.2	Brake discs	
4.7.1.3	Brake pads	
4.7.2	Dynamic brake linked to traction	Acceptance and requirements of emergency braking under use of dynamic brake which is linked to the traction system, e.g. requirements to the availability, constraints, etc.
4.7.3	Magnetic track brake	Requirements on magnetic track brakes, e.g. allowed operation cases, geometrical characteristics of the magnet elements, way of mounting (high/low hanging).
4.7.4	Eddy current track brake	Requirements on eddy current track brakes, e.g. allowed application cases, limitations to its operation.
4.7.5	Parking brake	Requirements concerning the brake force production of parking brakes, necessary energy supply to operate it (setting/releasing).
4.8	Brake state and fault indication	Requirements concerning the indication of the brake status to the driver/staff, e.g. brake energy availability, brake status of the several brake systems.
4.9	Brake requirements for rescue purposes	Requirements concerning the ability of brake systems regarding rescue of a train/vehicle, e.g. opportunity to release and isolate all brakes, controllability of the brake system of the rescued train/vehicle from other vehicles, compatibility with other types of brake in degraded mode. For rescue purposes of a train/vehicle usually the opportunity to release and isolate all brakes is necessary.
5	Passenger-related items	
5.1	Access	
5.1.1	Exterior doors	Includes requirements for door locking systems, steps and gaps for vehicle access for exterior passenger doors.
5.1.2	Boarding aids	Refers to technical specifications of equipment which may be on board to facilitate the access/excess for passengers to/from the vehicle.
5.2	Interior	
5.2.1	Interior doors	Requirements concerning the design of interior doors.
5.2.2	Intercirculation doors	Doors in connection between vehicles which can be at the end of the train.
5.2.3	Clearways	Clearance (width and height) of space inside in the vehicle for the passenger to have free access to all facilities (also related to passengers with reduced mobility).



Reference	Parameter	Explanations
5.2.4	Floor height changes	Requirements concerning floor height changes inside passenger vehicles. Excluded: step height and gap for vehicle access for exterior doors (see 5.1.1).
5.2.5	Interior lighting	Requirements concerning passenger related lighting (not technical equipment lighting and signal lights or emergency lighting that is covered by parameter 10.2.4).
5.3	Handrails	Requirements concerning handrails for passenger use inside/outside of the vehicle (design specifications, where to use).
5.4	Windows	Requirements concerning windows (windows to the outside of a vehicle), e.g. mechanical characteristics. Items excluded: — windscreen in the cab see parameter 9.1.3; — windows inside the vehicle; — fire safety, evacuation and emergency exits (see parameters 10.2.1).
5.5	Toilets	Requirements concerning the design and equipment of toilets (also in relation to use by people with reduced mobility). E.g. inside space, access, emergency call, hygienical requirements. Including need and design of staff toilets. Excluded: toilet emissions (see parameter 6.2.1.1).
5.6	Heating, ventilation and air conditioning systems	E.g. internal air quality, requirement in case of fire (switch off).
5.7	Passenger information	
5.7.1	Public address system	The parameter is considered as requirement for a one way communication. For communication from passenger to staff see parameter 10.2.3 "Passenger alarm".
5.7.2	Signs and information	Requirements concerning signs, pictograms and displayed text. Including safety instructions to passengers and emergency markings for passengers.
6	Environmental conditions and aerodynamic effects	
6.1	Impact of the environment on the vehicle	
6.1.1	Environmental conditions impacting on the vehicle	
6.1.1.1	Altitude	Refers to the altitude range to be considered for vehicles.
6.1.1.2	Temperature	Refers to the temperature range to be considered for vehicles.
6.1.1.3	Humidity	
6.1.1.4	Rain	

Reference	Parameter	Explanations
6.1.1.5	Snow, ice and hail	Requirements to prevent vehicles from degradation for snow, ice and hail conditions. What "snow, ice and hail" conditions have to be considered, scenarios like snowdrift, powder snow, snowfall of large quantities of light snow with low water equivalent content, temperature and humidity variation during one single run causing ice build-ups shall be taken into account. To define if capability to remove snow in front of the train is needed. To consider possible consequence of snow/ice on running stability, brake function and brake power supply, needs for windscreen's equipment, providing the driver with acceptable climate for working.
6.1.1.6	Solar radiation	
6.1.1.7	Resistance to pollution	Pollution effects to be considered, e.g. by chemically active substances, contaminating fluids, biologically active substances, dust, stones, ballast and other objects, grasses and leaves, pollen, flying insects, fibres, sand and sea spray.
6.1.2	Aerodynamic effects on the vehicle	
6.1.2.1	Crosswind effects	Refers to impact upon vehicle equipment and functions due to crosswinds. Characteristics of wind (e.g. wind speed) to be considered for the design of rolling stock to ensure safety, functionality and integrity.
6.1.2.2	Maximum pressure variation in tunnels	Impact due to rapid changes in pressure by entering, running in or leaving tunnels.
6.2	Impact of the vehicle on the environment	
6.2.1	External emissions	
6.2.1.1	Toilet emissions	Toilet discharge emissions to the external environment.
6.2.1.2	Exhaust gas emissions	Exhaust gas emissions to the external environment (see also parameter 8.6).
6.2.1.3	Chemical and particulate emission	Other emissions/spills from the vehicle like oil and grease leakage, flange lubricant, fuel etc.
6.2.2	Limits for noise emissions	
6.2.2.1	Stationary noise impact	Stationary noise impact caused by the vehicle upon the environment external to the railway system.
6.2.2.2	Starting noise impact	Starting noise impact caused by the vehicle upon the environment external to the railway system.
6.2.2.3	Pass-by noise impact	Pass-by noise impact caused by the vehicle upon the environment external to the railway system.
6.2.3	Limits for aerodynamic loads impact	Aerodynamic load impact, e.g. on people on platforms and on the open line.
6.2.3.1	Head pressure pulses	Effect of pressure pulses caused by the head of the train at the track side.
6.2.3.2	Aerodynamic impact on passengers/materials on the platform	Aerodynamic disturbance to passengers/materials on platform including assessment methods and operational loading conditions.

Reference	Parameter	Explanations
6.2.3.3	Aerodynamic impact on track workers	Aerodynamic disturbance to track workers.
6.2.3.4	Ballast pick-up and projection onto neighbouring property	May refer also to ice pick-up.
7	External warning, signalling, marking functions and software integrity requirements	
7.1	Integrity of software employed for safety related functions	Requirements concerning the integrity of software related to safety-related functions with impact on the train behaviour, e.g. integrity of software of train bus.
7.2	Visual and audible vehicle identification and warning functions	
7.2.1	Vehicle marking	Vehicle marking refers to operational and technical information for railway staff, may be inside and outside the vehicle.
7.2.2	External lights	
7.2.2.1	Headlights	“Headlights” refers to the functionality to provide sufficient visibility for the driver in front of the train. This may be ensured by using of the same physical devices as for marker lights or additional devices.
7.2.2.2	Marker lights	“Marker lights” are lights located at the front of train which have functionality to signal the front of a train. Several signal aspects for signalling the front of a train in different circumstances (e.g. train running on opposite track of the line, train in emergency situation, etc.) are possible.
7.2.2.3	End-of-train signal	Requirements concerning equipment which can display a visual end-of-train signal (e.g. red lights). Excluded: brackets for mounting end-of-train signals, see parameter 7.2.4.
7.2.2.4	Lamp controls	
7.2.3	Audible signal systems	Requirements concerning vehicle mounted audible signalling systems (e.g. warning horn). Refers to: <ul style="list-style-type: none"> <li>— warning horn tones;</li> <li>— warning horn sound pressure level (outside cab, for internal sound level see parameter 9.2.1.2);</li> <li>— protection of the device;</li> <li>— control of the device;</li> <li>— verification of sound pressure levels.</li> </ul>
7.2.4	Brackets	Requirements for means needed to mount/attach vehicle-external signalling devices (e.g. end-of-train signals, signal lamps, flags).

Reference	Parameter	Explanations
8	On-board power supply and control systems	
8.1	Traction performance requirements	Required traction performance as, e.g. acceleration, traction wheel/rail adhesion control, etc.
8.2	Functional and technical specification related to the interface between the vehicle and the energy subsystem	
8.2.1	Functional and technical specification related to the electric power supply	
8.2.1.1	Specific requirements for power supply	Specific requirements for power supply, e.g. power factor, sensitivity of on-board protection system.
8.2.1.2	Voltage and frequency of overhead contact line power supply	
8.2.1.3	Regenerative braking	
8.2.1.4	Maximum power and maximum train current that is permissible to draw from the overhead contact line	Including maximum current at standstill.
8.2.2	Pantograph functional and design parameters	
8.2.2.1	Pantograph overall design	
8.2.2.2	Pantograph head geometry	
8.2.2.3	Pantograph contact force (including static contact force, dynamic behaviour and aerodynamic effects)	Including quality of current collection.
8.2.2.4	Working range of pantographs	
8.2.2.5	Current capacity of pantograph including contact strip	
8.2.2.6	Arrangement of pantographs	
8.2.2.7	Insulation of pantograph from the vehicle	
8.2.2.8	Pantograph lowering	
8.2.2.9	Running through phase or system separation sections	

Reference	Parameter	Explanations
8.2.3	Contact strip functional and design parameters	
8.2.3.1	Contact strip geometry	
8.2.3.2	Contact strip material	
8.2.3.3	Contact strip assessment	
8.2.3.4	Detection of contact strip breakage	
8.3	Electrical power supply and traction system	
8.3.1	Energy consumption measurement	
8.3.2	Requirements for electrical installations on-board of a railway vehicle	
8.3.3	High voltage components	
8.3.4	Earthing	
8.4	Electromagnetic Compatibility ("EMC")	
8.4.1	EMC within the vehicle	Conducted emission and immunity levels to on-board apparatus, magnetic field for human exposure inside rolling stock (e.g. human exposure limits).
8.4.2	EMC between the vehicle and the railway system	
8.4.2.1	Maximum currents	
8.4.2.1.1	Rail return current	Interference current at the point of connection to the railway power supply network — pantograph/shoe gear level.
8.4.2.1.2	Heating cable interference current	Interference current due to the heating in Diesel traction.
8.4.2.1.3	Interference current under the vehicle	Interference currents circulating under the vehicle between the axles and mainly produced by on-board equipment.
8.4.2.1.4	Harmonic characteristics and related overvoltages on the overhead contact line	Vehicle requirements related to the maximum harmonics and the related overvoltages on the overhead contact line.
8.4.2.1.5	Effects of DC content in AC supply	Vehicle requirements related to the maximum DC component in AC power supply.
8.4.2.2	Maximum electro-magnetic fields/Induced voltages	

Reference	Parameter	Explanations
8.4.2.2.1	Electro-magnetic fields/Induced voltages in the track/under the vehicle	The electro-magnetic fields (or induced/interference voltages) at the location of railway equipment (axle counter detectors, ATP ("Automatic Train Protection"), antennas, hot axle box detectors, etc.).
8.4.2.2.2	Electro-magnetic fields/Induced voltages outside the track	The electro-magnetic fields (or induced/interference voltages) with shunting radios, vehicle radio frequency telecommunication systems (e.g. national radio or GSM-R ("Global System for Mobile communications — Railways"), etc.
8.4.2.3	Vehicle entrance impedance	Entrance impedance for the frequencies of the traction spectrum influencing the track circuits of the network, e.g. the entrance impedance at 50 Hz in the case of 50 Hz track circuits; entrance impedance to limit the inrush current, e.g. for DC track circuits.
8.4.2.4	Psophometric current	As defined in EN 50121-3-1 Annex A Interference on telecommunication lines — Psophometric currents.
8.4.2.5	Transverse voltage limits for compatibility voice/data circuits	
8.4.3	EMC between the vehicle and the environment	
8.4.3.1	Maximum electro-magnetic fields	Magnetic field for human exposure outside rolling stock (e.g. human exposure limits).
8.4.3.2	Induced interference current/voltage	
8.4.3.3	Psophometric current	As defined in EN 50121-3-1 Annex A Interference on telecommunication lines — Psophometric currents.
8.5	Protection against electrical hazards	Requirements for earthing are considered by parameter 8.3.4.
8.6	Diesel and other thermal traction system requirements	For "Exhaust gas emissions" see parameter 6.2.1.2.
8.7	Systems requiring special monitoring and protection measures	
8.7.1	Tanks and pipe systems for flammable liquids	Special requirements for tanks and pipe systems for flammable liquids (including fuel).
8.7.2	Pressure vessel systems/pressure equipment	
8.7.3	Steam boiler installations	
8.7.4	Technical systems in potentially explosive atmospheres	Special requirements for technical systems in potentially explosive atmospheres (e.g. liquid gas, natural gas and battery-powered systems, including protection of transformer tank).

Reference	Parameter	Explanations
8.7.5	Hydraulic/pneumatic supply and control systems	Functional and technical specifications, e.g. compressed air power supply, capacity, type, temperature range, air dryers (towers), dew point indicators, insulation, air intake characteristics, fault indicators, etc.
9	Staff facilities, interfaces and environment	
9.1	Driver's cab design	
9.1.1	Interior layout	General requirements concerning the cab interior layout such as anthropometric measurements of the driver, freedom of movement of personnel in the cab interior, seated and standing driving positions, number of seats (e.g. depending on one or two man operation).
9.1.2	Access to driver's cab	
9.1.2.1	Access, egress and doors	Requirements concerning accessibility to the driver's cab and engine room (also external walkways on hood units). Requirements concerning exterior and interior doors, hood access doors, door clearance, footsteps, handrails or opening handles, door locking, prevention from access by non-authorised persons.
9.1.2.2	Driver's cab emergency exits	Any means for driver's emergency exit or rescue services access to the cab (usually external doors, side windows or emergency hatches); definition of their clearances.
9.1.3	Windscreen in driver's cab	
9.1.3.1	Mechanical characteristics	Requirements concerning dimension, location, resist impacts from projectiles of the windscreen.
9.1.3.2	Optical characteristics	Requirements concerning optical characteristics of the windscreen, e.g. angle between primary and secondary images, permissible optical distortions of vision, material haze, luminous transmittance and chromaticity.
9.1.3.3	Equipment to the windscreen	E.g. de-icing, de-misting, external cleaning devices, sun protection, etc.
9.1.3.4	Front visibility/visibility field	Definition of visibility field for the driver to the line in front of him in relation to the driver's positions. Including wiper cleaning field.
9.1.4	Desk ergonomics	Requirements concerning ergonomics on the driver's desk, e.g. activation direction of levers and switches, ergonomics of emergency systems.
9.1.5	Driver's seat	Requirements concerning the driver's seat (e.g. anthropometric measurements, seat position in order to meet the reference position of eyes for external visibility, ability to escape in case of emergency, ergonomics and health aspects related to the seat's design, adjustability of the seat to enable standing driving position).
9.2	Health and safety	
9.2.1	Environmental conditions	

Reference	Parameter	Explanations
9.2.1.1	Heating, ventilation and air-conditioning systems in driver's cab	E.g. allowed CO <sub>2</sub> concentration in the cab, air flows caused by the ventilation system having an air velocity exceeding the limit value recognised to ensure a proper working environment, temperature ranges, temperatures which have to be reached under certain environmental circumstances.
9.2.1.2	Noise in driver's cab	Maximum noise level allowed in the cab, including horn sound level inside the cab.
9.2.1.3	Lighting in driver's cab	E.g. luminosity of lighting, independent lighting of the driver's desk reading zone, lighting control, adjustability of luminosity of lighting, allowed light colour.
9.2.2	Other health and safety requirements	Other requirements than those in the list of parameters for the parameter 9.2 "Health and safety".
9.3	Driver/machine interface	
9.3.1	Speed indication	Requirements concerning the speed indication system (accuracy/tolerances etc.). Excluded: recording of speed covered by parameter 9.6.
9.3.2	Driver display unit and screens	Functional requirements concerning the information and commands provided in the driver's cab. Excluded: ERTMS ("European Rail Traffic Management System") information and commands, including those provided on a display unit, are specified in chapter 12.
9.3.3	Controls and indicators	Functional requirements are specified with other requirements applicable to a specific function, in the clause describing that function.
9.3.4	Driver supervision	Requirements concerning the driver's vigilance, e.g. automatic vigilance safety system/deadman's device.
9.3.5	Rear and side view	Requirements concerning rear and side view: opening side windows/panel at each side of the cab, (clearance of the opening window/panel), exterior mirrors, camera system.
9.4	Marking and labelling in driver's cab	Requirements concerning signs, pictograms, labelling and statically displayed text for use of the driver inside the vehicle (cab, engine room, control cabinet). Which information has to be indicated in the driving cabs (usually V <sub>max</sub> , traction vehicle number, location of portable equipment, e.g. self-rescue device, signals, emergency exit). Use of harmonised pictograms.
9.5	Equipment and other facilities on-board for staff	
9.5.1	Facilities on-board for staff	
9.5.1.1	Staff access for coupling/uncoupling	E.g. Berne rectangle, handrails under the buffers.
9.5.1.2	External steps and handrails for shunting staff	
9.5.1.3	Storage facilities for use by staff	



Reference	Parameter	Explanations
9.5.2	Staff and freight access doors	This parameter addresses doors for freight use and for use of train crew other than cab doors. E.g. doors equipped with security device for opening only by staff including catering, also doors to engine room. Excluded: doors for passenger use, cab doors (also external walkways on hood units).
9.5.3	On-board tools and portable equipment	Required on-board tools and portable equipment, e.g. hand-lamp with red and white light, short circuiting equipment for track-circuits, a respirator. Excluded: items for operational reasons such as scotches, coupling adapters, rescue couplers (see chapter 2), fire extinguishing equipment (see chapter 10) and see chapter 13 "Specific operational requirements".
9.5.4	Audible communication system	E.g. for communication between: the train crew, or between the train crew (see parameter 10.2.3) and people inside/outside of the train (for passenger alarm see parameter 10.2.3). Excluded: train radio (see chapter 12).
9.6	Recording device	Recording device for the purpose of monitoring the interaction between train driver and the train as well as the parameters of the train. Requirements concerning the recording device, e.g. which information to be recorded, time increment, ability of event-time correlation, recording technology.
9.7	Remote control function from the ground	Requirements concerning the remote control function from the ground. Usually radio remote control function for shunting operation, also remote control by other means, excluded: push-pull train control and double head control.
10	Fire safety and evacuation	
10.1	Fire protection concept and protection measures	E.g. fire category, classification, protection measures for vehicles and parts of the vehicle (e.g. driver's cab), material properties, fire barriers, fire detectors (including ionisation detectors) and fire extinguishing equipment.
10.2	Emergency	
10.2.1	Passenger evacuation concept	Requirements regarding availability and design of passenger emergency exits and their indication, limitation on passengers per vehicle.
10.2.2	Rescue services' information, equipment and access	Description of rolling stock provided to the rescue services to permit them to handle emergencies. In particular information provided on how to obtain access to the interior of the rolling stock.
10.2.3	Passenger alarm	Requirements concerning passenger alarm, e.g. availability of alarm activation devices (location, number), functionality, how to reset, communication link from the passenger to the driver/staff, activation of emergency brake, emergency brake override.
10.2.4	Emergency lighting	Requirements for the emergency lighting system, e.g. for minimum operating time, lighting level/luminosity.
10.3	Emergency running capabilities	Measures for running capability of passenger rolling stock with a fire on board. Excluded: emergency brake override handled in parameter 10.2.3.

Reference	Parameter	Explanations
11	Servicing	
11.1	Train cleaning facilities	Train internal and external cleaning, e.g. external cleaning through a washing plant.
11.2	Train refuelling facilities	
11.2.1	Waste water disposal systems	Requirements concerning waste water disposal system, including interface to toilet discharge system. Usually definition of evacuation nozzle and the flushing connection for the toilet tank. Excluded: toilet emissions (see parameter 6.2.1.1).
11.2.2	Water supply system	Conformity to sanitary regulations regarding drinking water supply. Usually ensured by specifications of piping and sealing material and quality. Specification of filling adapters (interoperability constituents).
11.2.3	Further supply facilities	Requirements for any other supplies, e.g. external power supply for vehicles for stabling of trains.
11.2.4	Interface to refuelling equipment for non-electric rolling stock	Requirements concerning refuelling system for rolling stock using diesel fuel, LPG or other combustibles.
12	On-board control command and signalling	
12.1	On-board radio system	
12.1.1	Non-GSM-R radio system	Requirements for national radio systems if the installation on a vehicle is mandatory for authorisation.
12.1.2	GSM-R compliant radio system	
12.1.2.1	Use of hand portables as cab mobile radio	Requirements related to hand portables fulfilling cab radio functions. Indicate here if the 2 Watt hand portable can be used as an option or not and what are the related requirements, restrictions, etc., taking into account Section 7.3.3. "ERTMS — On-board implementation" of Commission Decision 2012/88/EU (1).
12.1.2.2	Other GSM-R requirements	Other requirements related to GSM-R disturbances, installation of filters, etc., which cannot be categorised under the former points.
12.2	On-board signalling	
12.2.1	National on-board signalling systems	Requirement to have national on-board train protection systems installed on-board (such as EBICAB) and corresponding functional requirements.
12.2.2	STM requirements	Requirements related to STM solutions (separate STM or integrated within ETCS on-board).
12.2.3	Transitions	Requirements related to transitions between national on-board signalling systems and ETCS; between ETCS and ETCS etc., at the borders of or within the Member State.

Reference	Parameter	Explanations
12.2.4	Compatibility of rolling stock with CCS Trackside	Other compatibility requirements than EMC for Rolling Stock with trackside CCS train detection systems, for EMC see 8.4.2.
12.2.4.1	Minimum axle distance	Requirement related to the functioning of axle counters, for $v > 350$ km/h, see § 3.1.2.3 of the document (ERA/ERTMS/033281): Interfaces between CCS trackside and other subsystems.
12.2.4.2	Minimum wheel diameter	Requirement related to the functioning of axle counters, for $v > 350$ km/h, see § 3.1.3.2 of the document (ERA/ERTMS/033281): Interfaces between CCS trackside and other subsystems.
12.2.4.3	Metal and inductive components-free space between wheels	Requirement related to the functioning of axle counters, see § 3.1.3.5 of the document (ERA/ERTMS/033281): Interfaces between CCS trackside and other subsystems.
12.2.4.4	Metal mass of a vehicle	Requirement related to the functioning of loop detection system.
12.2.4.5	Compatibility with fixed installations of CCS	Compatibility with fixed installations of CCS, see § 3.1.10 of the document (ERA/ERTMS/033281): Interfaces between CCS trackside and other subsystems.
12.2.5	ETCS (?) cab signalling system	
12.2.5.1	Level crossing functionality	Requirements for the set of specifications No 1 in Table A2 of the Annex A to the CCS TSI laid down in Decision 2012/88/EU related to the level crossing functionality for ETCS on-board.
12.2.5.2	Braking safety margins	Requirements for the set of specifications No 1 in Table A2 of the Annex A to the CCS TSI laid down in Decision 2012/88/EU related to the reliability of the braking curve for the on-board CCS.
12.2.5.3	Reliability — availability requirements	Minimum reliability/availability requirements shall be specified in order to limit the decrease of the system safety due to the frequent occurrence of degraded situations.
12.2.5.4	Safety requirements	Safety requirements for ETCS DMI functions for the set of specifications No 1 in Table A2 of the Annex A to the CCS TSI laid down in Decision 2012/88/EU.
12.2.5.5	Ergonomic aspects of DMI	Ergonomic DMI requirements for the set of specifications No 1 in Table A2 of the Annex A to the CCS TSI laid down in Decision 2012/88/EU.
12.2.5.6	Interface with service brake	Interface requirements with the service brake for the set of specifications No 1 in Table A2 of the Annex A to the CCS TSI laid down in Decision 2012/88/EU.
12.2.5.7	Other ETCS requirements (related to existing not interoperable networks)	ETCS requirements related to pre-B2 on-board equipment, compatibility with existing lines where pre-B2 equipment is installed. Or ETCS optional functionalities that may have an impact on the safe movement of the train.
12.2.5.8	Specification of condition of use where ETCS on-board does not implement all functions, interfaces and performances	Analysis of the impact when not implementing all functions, performances and interfaces specified in CCS TSI by the ETCS on-board subsystem. Useful for additional authorisations.

Reference	Parameter	Explanations
13	Specific operational requirements	
13.1	Specific items to place on-board	To announce specific items to place on-board which are required for operational reasons in normal and degraded mode (e.g. scotches, if the parking brake performance is not sufficient depending on track gradient, coupling adapters, rescue couplers, etc.). Requirements for distribution and availability of the items may be added here. See also parameter 9.5.3.
13.2	Ferry transport	Requirements concerning the use of ferries by the vehicle, including running gear and vehicle gauge constraints, requirements for securing and fixing.
14	Freight-related items	Freight-specific requirements.
14.1	Design, operation and maintenance constraints for the transport of dangerous goods	E.g. requirements derived from RID, national rules or other regulations for the transport of dangerous goods; including facilities specifically required for dangerous goods.
14.2	Specific facilities for the transport of freight	E.g. securing of freight, air-supply for other purpose than brake, provisions for the hydraulic/pneumatic equipment of freight wagons, requirements for freight loading and unloading, special requirements to the vehicle for vehicle turn dumping.
14.3	Doors and loading facilities	Requirements concerning freight loading doors and hatches, their closing and locking.

(<sup>1</sup>) Commission Decision 2012/88/EU of 25 January 2012 on the technical specification for interoperability relating to the control-command and signalling subsystems of the trans-European rail system (OJ L 51, 23.2.2012, p. 1), as amended by Commission Decision 2012/696/EU.

(<sup>2</sup>) See Annex A, Table A2, index No 1 of CCS TSI Decision 2012/88/EU.