

Section 1: General Information

0. Identification of the type

0.1 0.2 Type ID: 13-040-0001-9-002

0.3 Date of record: 2017-02-27

1. General Information

1.1 Type name: Velaro D (UM)

1.2 Alternative type name: BR407

1.3 Manufacturer's name: Siemens AG

Registration Method: New Type of a registered Platform

Registered Vehicle Type:

1.4 Category: Traction vehicles

1.5 Subcategory: Self-propelled passenger trainset (incl. railbusses)

1.6 Platform: Velaro_D

Section 2: Conformity with TSI

2.1 Conformity with TSI and Sections not complied with:

1435mm / AC 15kV-16.7Hz / Crocodile
HS CCS (Dec 2006/860/EC)
HS+CR SRT (Dec 2008/163/EC)
HS+CR PRM (Dec 2008/164/EC)
HS RST (Dec 2008/232/EC)

1435mm / AC 15kV-16.7Hz / Indusi/PZB
HS CCS (Dec 2006/860/EC)
HS+CR SRT (Dec 2008/163/EC)
HS+CR PRM (Dec 2008/164/EC)
HS RST (Dec 2008/232/EC)

1435mm / AC 15kV-16.7Hz / KVB
HS CCS (Dec 2006/860/EC)
HS+CR SRT (Dec 2008/163/EC)
HS+CR PRM (Dec 2008/164/EC)
HS RST (Dec 2008/232/EC)

1435mm / AC 15kV-16.7Hz / LZB
HS CCS (Dec 2006/860/EC)
HS+CR SRT (Dec 2008/163/EC)
HS+CR PRM (Dec 2008/164/EC)
HS RST (Dec 2008/232/EC)

1435mm / AC 15kV-16.7Hz / TVM
HS CCS (Dec 2006/860/EC)
HS+CR SRT (Dec 2008/163/EC)
HS+CR PRM (Dec 2008/164/EC)
HS RST (Dec 2008/232/EC)

1435mm / AC 25kV-50Hz / Crocodile
HS CCS (Dec 2006/860/EC)
HS+CR SRT (Dec 2008/163/EC)
HS+CR PRM (Dec 2008/164/EC)
HS RST (Dec 2008/232/EC)

1435mm / AC 25kV-50Hz / Indusi/PZB
HS CCS (Dec 2006/860/EC)
HS+CR SRT (Dec 2008/163/EC)
HS+CR PRM (Dec 2008/164/EC)
HS RST (Dec 2008/232/EC)

1435mm / AC 25kV-50Hz / KVB	HS CCS (Dec 2006/860/EC) HS+CR SRT (Dec 2008/163/EC) HS+CR PRM (Dec 2008/164/EC) HS RST (Dec 2008/232/EC)
1435mm / AC 25kV-50Hz / LZB	HS CCS (Dec 2006/860/EC) HS+CR SRT (Dec 2008/163/EC) HS+CR PRM (Dec 2008/164/EC) HS RST (Dec 2008/232/EC)
1435mm / AC 25kV-50Hz / TVM	HS CCS (Dec 2006/860/EC) HS+CR SRT (Dec 2008/163/EC) HS+CR PRM (Dec 2008/164/EC) HS RST (Dec 2008/232/EC)
1435mm / DC 1.5kV / Crocodile	HS CCS (Dec 2006/860/EC) HS+CR SRT (Dec 2008/163/EC) HS+CR PRM (Dec 2008/164/EC) HS RST (Dec 2008/232/EC)
1435mm / DC 1.5kV / Indusi/PZB	HS CCS (Dec 2006/860/EC) HS+CR SRT (Dec 2008/163/EC) HS+CR PRM (Dec 2008/164/EC) HS RST (Dec 2008/232/EC)
1435mm / DC 1.5kV / KVB	HS CCS (Dec 2006/860/EC) HS+CR SRT (Dec 2008/163/EC) HS+CR PRM (Dec 2008/164/EC) HS RST (Dec 2008/232/EC)
1435mm / DC 1.5kV / LZB	HS CCS (Dec 2006/860/EC) HS+CR SRT (Dec 2008/163/EC) HS+CR PRM (Dec 2008/164/EC) HS RST (Dec 2008/232/EC)
1435mm / DC 1.5kV / TVM	HS CCS (Dec 2006/860/EC) HS+CR SRT (Dec 2008/163/EC) HS+CR PRM (Dec 2008/164/EC) HS RST (Dec 2008/232/EC)
1435mm / DC 3kV / Crocodile	HS CCS (Dec 2006/860/EC) HS+CR SRT (Dec 2008/163/EC) HS+CR PRM (Dec 2008/164/EC) HS RST (Dec 2008/232/EC)
1435mm / DC 3kV / Indusi/PZB	HS CCS (Dec 2006/860/EC) HS+CR SRT (Dec 2008/163/EC) HS+CR PRM (Dec 2008/164/EC) HS RST (Dec 2008/232/EC)
1435mm / DC 3kV / KVB	HS CCS (Dec 2006/860/EC) HS+CR SRT (Dec 2008/163/EC) HS+CR PRM (Dec 2008/164/EC) HS RST (Dec 2008/232/EC)
1435mm / DC 3kV / LZB	HS CCS (Dec 2006/860/EC) HS+CR SRT (Dec 2008/163/EC) HS+CR PRM (Dec 2008/164/EC) HS RST (Dec 2008/232/EC)
1435mm / DC 3kV / TVM	HS CCS (Dec 2006/860/EC) HS+CR SRT (Dec 2008/163/EC) HS+CR PRM (Dec 2008/164/EC) HS RST (Dec 2008/232/EC)

2.3 Applicable specific cases (specific cases conformity with which has been assessed)

2.2 Reference of 'EC type examination certificates'

Reference of 'EC type examination certificates' - if module SB applied - and/or 'design verification certificate' - if module SH1 applied	0893/1/SB/16/CCO/DE EN/1612
Reference of 'EC type examination certificates' - if module SB applied - and/or 'design verification certificate' - if module SH1 applied	0893/6/SD/16/RST/DE EN/1611
Reference of 'EC type examination certificates' - if module SB applied - and/or 'design verification certificate' - if module SH1 applied	0893/1/SB/16/RST/DE EN/1610.1

Section 3: Authorisations

France

3.1.2.1 Status:	Active
3.1.2.2 Validity of Authorisation (until):	
3.1.2.3 Coded Restrictions:	
3.1.2.4 Non Coded Restrictions:	
3.1.3.1.1 Date of the original authorisation:	2016-12-15
3.1.3.1.2 Authorisation holder:	Siemens AG
3.1.3.1.3 Authorisation document reference:	A/BJ/2016-12-038 ; dossier 2015100008
3.1.3.1.4 National certificate references:	FR5920161005
3.1.3.1.5 Parameters for which conformity to applicable national rules has been assessed:	
	1435mm / AC 15kV-16.7Hz / Crocodile
	0.0 None
	1435mm / AC 15kV-16.7Hz / Indusi/PZB
	0.0 None
	1435mm / AC 15kV-16.7Hz / KVB
	0.0 None
	1435mm / AC 15kV-16.7Hz / LZB
	0.0 None
	1435mm / AC 15kV-16.7Hz / TVM
	0.0 None
	1435mm / AC 25kV-50Hz / Crocodile
	0.0 None
	1435mm / AC 25kV-50Hz / Indusi/PZB
	0.0 None
	1435mm / AC 25kV-50Hz / KVB

0.0 None
1435mm / AC 25kV-50Hz / LZB
0.0 None
1435mm / AC 25kV-50Hz / TVM
0.0 None
1435mm / DC 1.5kV / Crocodile
0.0 None
1435mm / DC 1.5kV / Indusi/PZB
0.0 None
1435mm / DC 1.5kV / KVB
0.0 None
1435mm / DC 1.5kV / LZB
0.0 None
1435mm / DC 1.5kV / TVM
0.0 None
1435mm / DC 3kV / Crocodile
0.0 None
1435mm / DC 3kV / Indusi/PZB
0.0 None
1435mm / DC 3kV / KVB
0.0 None
1435mm / DC 3kV / LZB
0.0 None
1435mm / DC 3kV / TVM
0.0 None

3.1.3.1.6 Comments:

3.1.3.1 Initial Registration

3.1.2.3 Coded Restrictions:

3.1.2.4 Non Coded Restrictions:

3.1.3.1.1 Date of the original authorisation: 2016-12-15
3.1.3.1.2 Authorisation holder: Siemens AG
3.1.3.1.3 Authorisation document reference: A/BJ/2016-12-038 ; dossier 2015100008
3.1.3.1.4 National certificate references:
FR5920161005

3.1.3.1.5 Parameters for which conformity to applicable national rules has been assessed:

1435mm / AC 15kV-16.7Hz / Crocodile
0.0 None

1435mm / AC 15kV-16.7Hz / Indusi/PZB

0.0 None

1435mm / AC 15kV-16.7Hz / KVB

0.0 None

1435mm / AC 15kV-16.7Hz / LZB

0.0 None

1435mm / AC 15kV-16.7Hz / TVM

0.0 None

1435mm / AC 25kV-50Hz / Crocodile

0.0 None

1435mm / AC 25kV-50Hz / Indusi/PZB

0.0 None

1435mm / AC 25kV-50Hz / KVB

0.0 None

1435mm / AC 25kV-50Hz / LZB

0.0 None

1435mm / AC 25kV-50Hz / TVM

0.0 None

1435mm / DC 1.5kV / Crocodile

0.0 None

1435mm / DC 1.5kV / Indusi/PZB

0.0 None

1435mm / DC 1.5kV / KVB

0.0 None

1435mm / DC 1.5kV / LZB

0.0 None

1435mm / DC 1.5kV / TVM

0.0 None

1435mm / DC 3kV / Crocodile

0.0 None

1435mm / DC 3kV / Indusi/PZB

0.0 None

1435mm / DC 3kV / KVB

0.0 None

1435mm / DC 3kV / LZB

0.0 None

1435mm / DC 3kV / TVM

0.0 None

Germany

3.2.2.1 Status:	Active
3.2.2.2 Validity of Authorisation (until):	
3.2.2.3 Coded Restrictions:	1435mm / AC 15kV-16.7Hz / Indusi/PZB 1 Technical Restrictions 1.1 Minimum curve radius in meters: 150 1.3 Speed restrictions in Km/h (Marked on wagons and coaches but not marked on locos): 320 2 Geographical Restrictions 2.1 Kinematic gauge (coding WAG TSI Annex C): G1 2.5 B-System on board: 53; 56; 12; 54; 55; 46; 47; 07 3 Environmental Restrictions 3.1 Climatic zone: 3.1.3 T3
3.2.2.4 Non Coded Restrictions:	1435mm / AC 15kV-16.7Hz / LZB 1 Technical Restrictions 1.1 Minimum curve radius in meters: 150 1.3 Speed restrictions in Km/h (Marked on wagons and coaches but not marked on locos): 320 2 Geographical Restrictions 2.1 Kinematic gauge (coding WAG TSI Annex C): G1 2.5 B-System on board: 53; 56; 12; 54; 55; 46; 47; 07 3 Environmental Restrictions 3.1 Climatic zone: 3.1.3 T3
3.2.3.1.1 Date of the original authorisation:	2020-07-30
3.2.3.1.2 Authorisation holder:	Siemens Mobility GmbH
3.2.3.1.3 Authorisation document reference:	DE5920201088
3.2.3.1.4 National certificate references:	DE5120141040
3.2.3.1.5 Parameters for which conformity to applicable national rules has been assessed:	1435mm / AC 15kV-16.7Hz / Indusi/PZB 2009/965/EC 1 General documentation 1.1 General documentation 1.2 Maintenance instructions and requirements

- 1.2.1 Maintenance instructions
- 1.2.2 The maintenance design justification file
- 1.3 Instructions and documentation for operation
 - 1.3.1 Instructions for operation in normal and degraded modes of the vehicle
- 1.4 Track side tests of the complete vehicle
- 2 Structure and mechanical parts
 - 2.1 Vehicle structure
 - 2.1.1 Strength and integrity
 - 2.1.2 Load capability
 - 2.1.2.1 Load conditions and weighted mass
 - 2.1.2.2 Axle load and wheel load
 - 2.1.3 Joining technology
 - 2.1.4 Lifting and jacking
 - 2.1.5 Fixing of devices to car body structure
 - 2.1.6 Connections used between different parts of the vehicle
 - 2.2 Mechanical interfaces for end coupling or inner coupling
 - 2.2.1 Automatic coupling
 - 2.2.2 Characteristics of rescue coupling
 - 2.2.3 Screw couplings
 - 2.2.4 Buffing, inner coupling and draw gear components
 - 2.2.5 Buffer marking
 - 2.2.6 Draw hook
 - 2.2.7 Gangways
 - 2.3 Passive safety
- 3 Track interaction and gauging
 - 3.1 Vehicle gauge
 - 3.1.1 Vehicle gauge
 - 3.1.2 Specific case
 - 3.2 Vehicle dynamics
 - 3.2.1 Running safety and dynamics
 - 3.2.2 Equivalent conicity, wheel profile and limits
 - 3.2.3 Track loading compatibility parameters
 - 3.2.4 Vertical acceleration
 - 3.3 Bogies / running gear
 - 3.3.1 Bogies
 - 3.3.2 Wheelset (Axle + wheels)

3.3.3 Wheel

3.3.4 Wheel/rail interface (including wheel flange lubrication and sanding)

3.3.5 Bearings on the wheelset

3.3.6 Minimum curve radius to be negotiated

3.3.7 Rail guard

3.4 Limit of maximum longitudinal positive and negative acceleration

4 Braking

4.1 Functional requirements for braking at train level

4.2 Safety requirements for braking at train level

4.2.1 Traction/braking interlocking

4.3 Brake system - Recognised architecture and associated standards

4.4 Brake command

4.4.1 Emergency braking command

4.4.2 Service braking command

4.4.3 Direct braking command

4.4.4 Dynamic braking command

4.4.5 Parking braking command

4.5 Brake performance

4.5.1 Emergency braking

4.5.2 Service braking

4.5.3 Calculations related to thermal capacity

4.5.4 Parking brake

4.6 Braking adhesion management

4.6.1 Limit of wheel rail adhesion profile

4.6.2 Wheel slide protection system

4.7 Braking force production

4.7.1 Braking force production

4.7.2 Friction brake

4.7.2.1 Brake blocks

4.7.2.2 Brake discs

4.7.2.3 Brake pads

4.7.3 Dynamic brake linked to traction

4.7.4 Magnetic track brake

4.7.5 Eddy current track brake

4.7.6 Parking brake

4.8 Brake state and fault indication

- 4.9 Brake requirements for rescue purposes
- 5 Passenger-related items
 - 5.1 Access
 - 5.1.1 Exterior doors
 - 5.1.2 Interior doors
 - 5.1.3 Clearways
 - 5.1.4 Steps and lighting
 - 5.1.5 Floor height changes
 - 5.1.6 Handrails
 - 5.1.7 Boarding aids
 - 5.2 Windows
 - 5.3 Toilets
 - 5.4 Passenger information
 - 5.4.1 Public address system
 - 5.4.2 Signs and information
 - 5.5 Seats and specific PRM arrangements
 - 5.6 Specific passenger-related facilities
 - 5.6.1 Lift systems
 - 5.6.2 Heating, ventilation and air conditioning systems
 - 5.6.3 Other
- 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
 - 6.1.1.2 Temperature
 - 6.1.1.3 Humidity
 - 6.1.1.4 Rain
 - 6.1.1.5 Snow, ice and hail
 - 6.1.1.6 Solar radiation
 - 6.1.1.7 Chemical and particulate matter
 - 6.1.2 Aerodynamic effects on the vehicle
 - 6.1.2.1 Crosswind effects
 - 6.1.2.2 Maximum pressure variation in tunnels
 - 6.2 Impact of the vehicle on the environment
 - 6.2.1 Impact of the vehicle on the environment (general)
 - 6.2.2 Chemical and particulate emissions

- 6.2.2.1 Toilet emissions
- 6.2.2.2 Exhaust gas emissions
- 6.2.3 Limits for noise emissions
 - 6.2.3.1 Exterior noise impact
 - 6.2.3.2 Stationary noise impact
 - 6.2.3.3 Starting noise impact
 - 6.2.3.4 Pass-by noise impact
- 6.2.4 Limits for aerodynamic loads impact
 - 6.2.4.1 Head pressure pulses
 - 6.2.4.2 Aerodynamic impact on passengers/materials on the platform
 - 6.2.4.3 Aerodynamic impact on track workers
 - 6.2.4.4 Ballast pick up and projection onto neighbouring property
- 7 External warning, marking functions and software integrity requirements
 - 7.1 Integrity of software employed for safety related functions
 - 7.2 Visual and audible vehicle identification and warning functions
 - 7.2.1 Vehicle marking
 - 7.2.2 External lights
 - 7.2.2.1 Headlights
 - 7.2.2.2 Marker lights
 - 7.2.2.3 Tail lights
 - 7.2.2.4 Lamp controls
 - 7.2.3 Warning horn
 - 7.2.3.1 Warning horn tones
 - 7.2.3.2 Warning horn sound pressure levels
 - 7.2.3.3 Warning horns, protection
 - 7.2.3.4 Warning horns, control
 - 7.2.3.5 Warning horns verification of sound pressure levels
 - 7.2.4 Brackets
- 8 On-board power supply and control systems
 - 8.1 Traction performance requirements
 - 8.1.1 Residual acceleration at max speed
 - 8.1.2 Residual traction capability in degraded mode
 - 8.1.3 Traction wheel/rail adhesion requirements

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 Power supply

8.2.1.2 Impedance between pantograph and wheels

8.2.1.3 Voltage and frequency of overhead contact line power supply

8.2.1.4 Energy recuperation

8.2.1.5 Maximum power and maximum current that is permissible to draw from the overhead contact line

8.2.1.6 Power factor

8.2.1.7 System energy disturbances

8.2.1.7.1 Harmonic characteristics and related overvoltages on the overhead contact line

8.2.1.7.2 Effects of DC content in AC supply

8.2.1.8 Electrical protection

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 static contact force

8.2.2.4 Pantograph contact force (including dynamic behaviour and aerodynamic effects)

8.2.2.5 Working range of pantographs

8.2.2.6 Current capacity

8.2.2.7 Arrangement of pantographs

8.2.2.8 Insulation of pantograph from the vehicle

8.2.2.9 Pantograph lowering

8.2.2.10 Running through phase separation sections

8.2.2.11 Running through system separation sections

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

8.2.3.5 Current capacity

8.3 Electrical power supply and traction system

- 8.3.1 Energy consumption measurement
- 8.3.2 Main electrical circuit configuration
- 8.3.3 High voltage components
- 8.3.4 Earthing
- 8.4 Electromagnetic compatibility
 - 8.4.1 Electromagnetic compatibility within the on-board electrical power supply and control system
 - 8.4.2 Electromagnetic compatibility with the signalling and telecommunications network
 - 8.4.3 Electromagnetic compatibility with other vehicles and with the trackside part of the railway system
 - 8.4.4 Electromagnetic compatibility with the environment
- 8.5 Protection against electrical hazards
- 9 Staff facilities, interfaces and environment
 - 9.1 Driver's cab design
 - 9.1.1 Cab design
 - 9.1.1.1 Interior layout
 - 9.1.1.2 Desk ergonomics
 - 9.1.1.3 Driver's seat
 - 9.1.1.4 Means for the driver to exchange documents
 - 9.1.1.5 Other facilities to control operation of the train
 - 9.1.2 Access to driver's cab
 - 9.1.2.1 Access, egress and doors
 - 9.1.2.2 Driver's cab emergency exits
 - 9.1.3 Windscreen in driver's cab
 - 9.1.3.1 Mechanical characteristics
 - 9.1.3.2 Optical characteristics
 - 9.1.3.3 Equipment
 - 9.1.3.4 Front visibility
 - 9.2 Working conditions
 - 9.2.1 Environmental conditions
 - 9.2.1.1 Heating, ventilation and air conditioning systems in driver's cab
 - 9.2.1.2 Noise in driver's cab
 - 9.2.1.3 Lighting in driver's cab
 - 9.2.2 Others
 - 9.3 Driver/machine interface

- 9.3.1 Driver/machine interface
 - 9.3.1.1 Speed indication
 - 9.3.1.2 Driver display unit and screens
 - 9.3.1.3 Controls and indicators
- 9.3.2 Driver supervision
- 9.3.3 Rear and side view
- 9.4 Marking and labelling in driver's cab
- 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
 - 9.5.1.2 External steps and handrails for shunting staff
 - 9.5.1.3 Storage facilities for use by staff
 - 9.5.1.4 Other facilities
 - 9.5.2 Staff and freight access doors
 - 9.5.3 On-board tools and portable equipment
 - 9.5.4 Audible communication system
- 9.6 Recording device
- 9.7 Remote control function
- 10 Fire safety and evacuation
 - 10.1 Fire safety
 - 10.1.1 Fire protection concept
 - 10.1.1.1 Fire protection concept
 - 10.1.1.2 Classification of vehicle/fire categories
 - 10.1.2 Fire protection measures
 - 10.1.2.1 General protection measures for vehicles
 - 10.1.2.2 Fire protection measures for specific kind of vehicles
 - 10.1.2.3 Protection of driver's cab
 - 10.1.2.4 Fire barriers
 - 10.1.2.5 Material properties
 - 10.1.2.6 Fire detectors
 - 10.1.2.7 Fire extinction equipment
 - 10.2 Emergency
 - 10.2.1 Passenger emergency exits
 - 10.2.2 Rescue services' information, equipment and access
 - 10.2.3 Passenger alarm
 - 10.2.4 Emergency lighting

11 Servicing

11.1 Train cleaning facilities

11.1.1 Train external cleaning facilities

11.1.2 Train internal cleaning

11.2 Train refuelling facilities

11.2.1 Waste water disposal systems

11.2.2 Water supply system

11.2.3 Further supply facilities

11.2.4 Interface to refuelling equipment for non electric rolling stock

12 On-board control command and signalling

12.1 On-board radio system

12.1.1 Non-GSM-R radio system

12.1.2 Use of hand portables as cab mobile radio

12.1.3 GSM-R compliant radio system

12.1.3.1 Text messages

12.1.3.2 Call forwarding

12.1.3.3 Broadcast calls

12.1.3.4 Cab-radio related functions

12.1.3.5 Network selection by external trigger

12.1.3.6 General purpose radio-related functions

12.1.3.7 Primary controller's MMI functionality

12.1.3.8 Capacity of on-board GSM-R

12.1.3.9 GSM-R-ETCS interface

12.1.3.10 Interconnection and roaming between GSM-R networks

12.1.3.11 Border crossing

12.1.3.12 GPRS and ASCI

12.1.3.13 Interface between rolling stock driver's safety device, vigilance device, and GSM-R on-board assembly

12.1.3.14 Test specification for mobile equipment GSM-R

12.1.3.15 Directed/automatic network selection

12.1.3.16 Registration and deregistration

12.1.3.17 GSM-R Version Management

12.2 On-board signalling

12.2.1 National on-board signalling systems

12.2.2 Compatibility of signalling system with the rest of the train

12.2.3 Compatibility of rolling stock with track infrastructure

12.2.3.1 Relation between axle distance and wheel diameter

12.2.3.2 Metal free space around wheels

12.2.3.3 Metal mass of a vehicle

13 Specific operational requirements

13.1 Specific items to place on-board

13.2 Occupational health and safety

13.3 Lifting diagram and instructions for rescue

1435mm / AC 15kV-16.7Hz / LZB

2009/965/EC

1 General documentation

1.1 General documentation

1.2 Maintenance instructions and requirements

1.2.1 Maintenance instructions

1.2.2 The maintenance design justification file

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1.3.1 Instructions for operation in normal and degraded modes of the vehicle

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2 Structure and mechanical parts

2.1 Vehicle structure

2.1.1 Strength and integrity

2.1.2 Load capability

2.1.2.1 Load conditions and weighted mass

2.1.2.2 Axle load and wheel load

2.1.3 Joining technology

2.1.4 Lifting and jacking

2.1.5 Fixing of devices to car body structure

2.1.6 Connections used between different parts of the vehicle

2.2 Mechanical interfaces for end coupling or inner coupling

2.2.1 Automatic coupling

2.2.2 Characteristics of rescue coupling

2.2.3 Screw couplings

2.2.4 Buffering, inner coupling and draw gear components

2.2.5 Buffer marking

2.2.6 Draw hook

- 2.2.7 Gangways
- 2.3 Passive safety
- 3 Track interaction and gauging
 - 3.1 Vehicle gauge
 - 3.1.1 Vehicle gauge
 - 3.1.2 Specific case
 - 3.2 Vehicle dynamics
 - 3.2.1 Running safety and dynamics
 - 3.2.2 Equivalent conicity, wheel profile and limits
 - 3.2.3 Track loading compatibility parameters
 - 3.2.4 Vertical acceleration
 - 3.3 Bogies / running gear
 - 3.3.1 Bogies
 - 3.3.2 Wheelset (Axle + wheels)
 - 3.3.3 Wheel
 - 3.3.4 Wheel/rail interface (including wheel flange lubrication and sanding)
 - 3.3.5 Bearings on the wheelset
 - 3.3.6 Minimum curve radius to be negotiated
 - 3.3.7 Rail guard
 - 3.4 Limit of maximum longitudinal positive and negative acceleration
- 4 Braking
 - 4.1 Functional requirements for braking at train level
 - 4.2 Safety requirements for braking at train level
 - 4.2.1 Traction/braking interlocking
 - 4.3 Brake system - Recognised architecture and associated standards
 - 4.4 Brake command
 - 4.4.1 Emergency braking command
 - 4.4.2 Service braking command
 - 4.4.3 Direct braking command
 - 4.4.4 Dynamic braking command
 - 4.4.5 Parking braking command
 - 4.5 Brake performance
 - 4.5.1 Emergency braking
 - 4.5.2 Service braking
 - 4.5.3 Calculations related to thermal capacity
 - 4.5.4 Parking brake

- 4.6 Braking adhesion management
 - 4.6.1 Limit of wheel rail adhesion profile
 - 4.6.2 Wheel slide protection system
- 4.7 Braking force production
 - 4.7.1 Braking force production
 - 4.7.2 Friction brake
 - 4.7.2.1 Brake blocks
 - 4.7.2.2 Brake discs
 - 4.7.2.3 Brake pads
 - 4.7.3 Dynamic brake linked to traction
 - 4.7.4 Magnetic track brake
 - 4.7.5 Eddy current track brake
 - 4.7.6 Parking brake
- 4.8 Brake state and fault indication
- 4.9 Brake requirements for rescue purposes
- 5 Passenger-related items
 - 5.1 Access
 - 5.1.1 Exterior doors
 - 5.1.2 Interior doors
 - 5.1.3 Clearways
 - 5.1.4 Steps and lighting
 - 5.1.5 Floor height changes
 - 5.1.6 Handrails
 - 5.1.7 Boarding aids
 - 5.2 Windows
 - 5.3 Toilets
 - 5.4 Passenger information
 - 5.4.1 Public address system
 - 5.4.2 Signs and information
 - 5.5 Seats and specific PRM arrangements
 - 5.6 Specific passenger-related facilities
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- 7.2.3.1 Warning horn tones
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- 8.1.3 Traction wheel/rail adhesion requirements
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- 8.2.1 Functional and technical specification related to the electric power supply
- 8.2.1.1 Power supply
- 8.2.1.2 Impedance between pantograph and wheels
- 8.2.1.3 Voltage and frequency of overhead contact line power supply
- 8.2.1.4 Energy recuperation
- 8.2.1.5 Maximum power and maximum current that is permissible to draw from the overhead contact line
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- 8.2.1.7.2 Effects of DC content in AC supply
- 8.2.1.8 Electrical protection
- 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 static contact force
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- 8.2.2.8 Insulation of pantograph from the vehicle

- 8.2.2.9 Pantograph lowering
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 - 8.4.2 Electromagnetic compatibility with the signalling and telecommunications network
 - 8.4.3 Electromagnetic compatibility with other vehicles and with the trackside part of the railway system
 - 8.4.4 Electromagnetic compatibility with the environment
- 8.5 Protection against electrical hazards
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 - 9.1.1.3 Driver's seat
 - 9.1.1.4 Means for the driver to exchange documents
 - 9.1.1.5 Other facilities to control operation of the train
 - 9.1.2 Access to driver's cab
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 - 9.1.2.2 Driver's cab emergency exits
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- 9.1.3.1 Mechanical characteristics
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 - 9.3.2 Driver supervision
 - 9.3.3 Rear and side view
- 9.4 Marking and labelling in driver's cab
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 - 9.5.1 Facilities on-board for staff
 - 9.5.1.1 Staff access for coupling/uncoupling
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- 10 Fire safety and evacuation
 - 10.1 Fire safety
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 - 10.1.1.2 Classification of vehicle/fire categories
 - 10.1.2 Fire protection measures
 - 10.1.2.1 General protection measures for vehicles

10.1.2.2 Fire protection measures for specific kind of vehicles

10.1.2.3 Protection of driver's cab

10.1.2.4 Fire barriers

10.1.2.5 Material properties

10.1.2.6 Fire detectors

10.1.2.7 Fire extinction equipment

10.2 Emergency

10.2.1 Passenger emergency exits

10.2.2 Rescue services' information, equipment and access

10.2.3 Passenger alarm

10.2.4 Emergency lighting

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11.1 Train cleaning facilities

11.1.1 Train external cleaning facilities

11.1.2 Train internal cleaning

11.2 Train refuelling facilities

11.2.1 Waste water disposal systems

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11.2.3 Further supply facilities

11.2.4 Interface to refuelling equipment for non electric rolling stock

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12.1.1 Non-GSM-R radio system

12.1.2 Use of hand portables as cab mobile radio

12.1.3 GSM-R compliant radio system

12.1.3.1 Text messages

12.1.3.2 Call forwarding

12.1.3.3 Broadcast calls

12.1.3.4 Cab-radio related functions

12.1.3.5 Network selection by external trigger

12.1.3.6 General purpose radio-related functions

12.1.3.7 Primary controller's MMI functionality

12.1.3.8 Capacity of on-board GSM-R

12.1.3.9 GSM-R-ETCS interface

12.1.3.10 Interconnection and roaming between GSM-R networks

12.1.3.11 Border crossing

12.1.3.12 GPRS and ASCI
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13.2 Occupational health and safety
13.3 Lifting diagram and instructions for rescue
Siemens Mobility GmbH applies for exciting the 3. Railway Package based on Article 1.2a EU 2020/781

3.2.3.1.6 Comments:

3.2.3.1 Initial Registration

3.2.2.3 Coded Restrictions:

1435mm / AC 15kV-16.7Hz / Indusi/PZB

1 Technical Restrictions

1.1 Minimum curve radius in meters: 150

1.3 Speed restrictions in Km/h (Marked on wagons and coaches but not marked on locos): 320

2 Geographical Restrictions

2.1 Kinematic gauge (coding WAG TSI Annex C): G1

2.5 B-System on board: 53; 56; 12; 54; 55; 46; 47; 07

3 Environmental Restrictions

3.1 Climatic zone: 3.1.3 T3

1435mm / AC 15kV-16.7Hz / LZB

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1.1 Minimum curve radius in meters: 150

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2.1 Kinematic gauge (coding WAG TSI Annex C): G1

2.5 B-System on board: 53; 56; 12; 54; 55; 46; 47; 07

3 Environmental Restrictions

3.1 Climatic zone: 3.1.3 T3

3.2.2.4 Non Coded Restrictions:

3.2.3.1.1 Date of the original authorisation:

2020-07-30

3.2.3.1.2 Authorisation holder:

Siemens Mobility GmbH

3.2.3.1.3 Authorisation document reference:

DE5920201088

3.2.3.1.4 National certificate references:

DE5120141040

3.2.3.1.5 Parameters for which conformity to applicable national rules has been assessed:

1435mm / AC 15kV-16.7Hz / Indusi/PZB

1 General documentation

1.1 General documentation

1.2 Maintenance instructions and requirements

1.2.1 Maintenance instructions

1.2.2 The maintenance design justification file

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2.1.2.2 Axle load and wheel load

2.1.3 Joining technology

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3.1.1 Vehicle gauge

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3.2 Vehicle dynamics

3.2.1 Running safety and dynamics

3.2.2 Equivalent conicity, wheel profile and limits

3.2.3 Track loading compatibility parameters

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3.3 Bogies / running gear

3.3.1 Bogies

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3.3.3 Wheel

3.3.4 Wheel/rail interface (including wheel flange lubrication and sanding)

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3.3.6 Minimum curve radius to be negotiated

3.3.7 Rail guard

3.4 Limit of maximum longitudinal positive and negative acceleration

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4.1 Functional requirements for braking at train level

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4.2.1 Traction/braking interlocking

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4.4.1 Emergency braking command

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- 4.4.3 Direct braking command
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- 4.5 Brake performance
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- 4.6 Braking adhesion management
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 - 4.6.2 Wheel slide protection system
- 4.7 Braking force production
 - 4.7.1 Braking force production
 - 4.7.2 Friction brake
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- 4.8 Brake state and fault indication
- 4.9 Brake requirements for rescue purposes
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 - 5.1.3 Clearways
 - 5.1.4 Steps and lighting
 - 5.1.5 Floor height changes
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 - 5.2 Windows
 - 5.3 Toilets
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 - 5.6 Specific passenger-related facilities

5.6.1 Lift systems

5.6.2 Heating, ventilation and air conditioning systems

5.6.3 Other

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

6.1.1.2 Temperature

6.1.1.3 Humidity

6.1.1.4 Rain

6.1.1.5 Snow, ice and hail

6.1.1.6 Solar radiation

6.1.1.7 Chemical and particulate matter

6.1.2 Aerodynamic effects on the vehicle

6.1.2.1 Crosswind effects

6.1.2.2 Maximum pressure variation in tunnels

6.2 Impact of the vehicle on the environment

6.2.1 Impact of the vehicle on the environment (general)

6.2.2 Chemical and particulate emissions

6.2.2.1 Toilet emissions

6.2.2.2 Exhaust gas emissions

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6.2.3.1 Exterior noise impact

6.2.3.2 Stationary noise impact

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6.2.4 Limits for aerodynamic loads impact

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6.2.4.2 Aerodynamic impact on passengers/materials on the platform

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6.2.4.4 Ballast pick up and projection onto neighbouring property

7 External warning, marking functions and software integrity requirements

7.1 Integrity of software employed for safety related functions

7.2 Visual and audible vehicle identification and warning functions

7.2.1 Vehicle marking

7.2.2 External lights

7.2.2.1 Headlights

7.2.2.2 Marker lights

7.2.2.3 Tail lights

7.2.2.4 Lamp controls

7.2.3 Warning horn

7.2.3.1 Warning horn tones

7.2.3.2 Warning horn sound pressure levels

7.2.3.3 Warning horns, protection

7.2.3.4 Warning horns, control

7.2.3.5 Warning horns verification of sound pressure levels

7.2.4 Brackets

8 On-board power supply and control systems

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8.1.2 Residual traction capability in degraded mode

8.1.3 Traction wheel/rail adhesion requirements

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 Power supply

8.2.1.2 Impedance between pantograph and wheels

8.2.1.3 Voltage and frequency of overhead contact line power supply

8.2.1.4 Energy recuperation

8.2.1.5 Maximum power and maximum current that is permissible to draw from the overhead contact line

8.2.1.6 Power factor

8.2.1.7 System energy disturbances

8.2.1.7.1 Harmonic characteristics and related overvoltages on the overhead contact line

8.2.1.7.2 Effects of DC content in AC supply

8.2.1.8 Electrical protection

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 static contact force
- 8.2.2.4 Pantograph contact force (including dynamic behaviour and aerodynamic effects)
- 8.2.2.5 Working range of pantographs
- 8.2.2.6 Current capacity
- 8.2.2.7 Arrangement of pantographs
- 8.2.2.8 Insulation of pantograph from the vehicle
- 8.2.2.9 Pantograph lowering
- 8.2.2.10 Running through phase separation sections
- 8.2.2.11 Running through system separation sections
- 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
 - 8.2.3.5 Current capacity
- 8.3 Electrical power supply and traction system
 - 8.3.1 Energy consumption measurement
 - 8.3.2 Main electrical circuit configuration
 - 8.3.3 High voltage components
 - 8.3.4 Earthing
- 8.4 Electromagnetic compatibility
 - 8.4.1 Electromagnetic compatibility within the on-board electrical power supply and control system
 - 8.4.2 Electromagnetic compatibility with the signalling and telecommunications network
 - 8.4.3 Electromagnetic compatibility with other vehicles and with the trackside part of the railway system
 - 8.4.4 Electromagnetic compatibility with the environment
- 8.5 Protection against electrical hazards
- 9 Staff facilities, interfaces and environment
 - 9.1 Driver's cab design
 - 9.1.1 Cab design
 - 9.1.1.1 Interior layout
 - 9.1.1.2 Desk ergonomics

- 9.1.1.3 Driver's seat
- 9.1.1.4 Means for the driver to exchange documents
- 9.1.1.5 Other facilities to control operation of the train
- 9.1.2 Access to driver's cab
 - 9.1.2.1 Access, egress and doors
 - 9.1.2.2 Driver's cab emergency exits
- 9.1.3 Windscreen in driver's cab
 - 9.1.3.1 Mechanical characteristics
 - 9.1.3.2 Optical characteristics
 - 9.1.3.3 Equipment
 - 9.1.3.4 Front visibility
- 9.2 Working conditions
 - 9.2.1 Environmental conditions
 - 9.2.1.1 Heating, ventilation and air conditioning systems in driver's cab
 - 9.2.1.2 Noise in driver's cab
 - 9.2.1.3 Lighting in driver's cab
 - 9.2.2 Others
- 9.3 Driver/machine interface
 - 9.3.1 Driver/machine interface
 - 9.3.1.1 Speed indication
 - 9.3.1.2 Driver display unit and screens
 - 9.3.1.3 Controls and indicators
 - 9.3.2 Driver supervision
 - 9.3.3 Rear and side view
- 9.4 Marking and labelling in driver's cab
- 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
 - 9.5.1.2 External steps and handrails for shunting staff
 - 9.5.1.3 Storage facilities for use by staff
 - 9.5.1.4 Other facilities
 - 9.5.2 Staff and freight access doors
 - 9.5.3 On-board tools and portable equipment
 - 9.5.4 Audible communication system
- 9.6 Recording device
- 9.7 Remote control function

10 Fire safety and evacuation

10.1 Fire safety

10.1.1 Fire protection concept

10.1.1.1 Fire protection concept

10.1.1.2 Classification of vehicle/fire categories

10.1.2 Fire protection measures

10.1.2.1 General protection measures for vehicles

10.1.2.2 Fire protection measures for specific kind of vehicles

10.1.2.3 Protection of driver's cab

10.1.2.4 Fire barriers

10.1.2.5 Material properties

10.1.2.6 Fire detectors

10.1.2.7 Fire extinction equipment

10.2 Emergency

10.2.1 Passenger emergency exits

10.2.2 Rescue services' information, equipment and access

10.2.3 Passenger alarm

10.2.4 Emergency lighting

11 Servicing

11.1 Train cleaning facilities

11.1.1 Train external cleaning facilities

11.1.2 Train internal cleaning

11.2 Train refuelling facilities

11.2.1 Waste water disposal systems

11.2.2 Water supply system

11.2.3 Further supply facilities

11.2.4 Interface to refuelling equipment for non electric rolling stock

12 On-board control command and signalling

12.1 On-board radio system

12.1.1 Non-GSM-R radio system

12.1.2 Use of hand portables as cab mobile radio

12.1.3 GSM-R compliant radio system

12.1.3.1 Text messages

12.1.3.2 Call forwarding

12.1.3.3 Broadcast calls

12.1.3.4 Cab-radio related functions

12.1.3.5 Network selection by external trigger

- 12.1.3.6 General purpose radio-related functions
- 12.1.3.7 Primary controller's MMI functionality
- 12.1.3.8 Capacity of on-board GSM-R
- 12.1.3.9 GSM-R-ETCS interface
- 12.1.3.10 Interconnection and roaming between GSM-R networks
- 12.1.3.11 Border crossing
- 12.1.3.12 GPRS and ASCI
- 12.1.3.13 Interface between rolling stock driver's safety device, vigilance device, and GSM-R on-board assembly
- 12.1.3.14 Test specification for mobile equipment GSM-R
- 12.1.3.15 Directed/automatic network selection
- 12.1.3.16 Registration and deregistration
- 12.1.3.17 GSM-R Version Management
- 12.2 On-board signalling
 - 12.2.1 National on-board signalling systems
 - 12.2.2 Compatibility of signalling system with the rest of the train
 - 12.2.3 Compatibility of rolling stock with track infrastructure
 - 12.2.3.1 Relation between axle distance and wheel diameter
 - 12.2.3.2 Metal free space around wheels
 - 12.2.3.3 Metal mass of a vehicle
- 13 Specific operational requirements
 - 13.1 Specific items to place on-board
 - 13.2 Occupational health and safety
 - 13.3 Lifting diagram and instructions for rescue
1435mm / AC 15kV-16.7Hz / LZB
- 1 General documentation
 - 1.1 General documentation
 - 1.2 Maintenance instructions and requirements
 - 1.2.1 Maintenance instructions
 - 1.2.2 The maintenance design justification file
 - 1.3 Instructions and documentation for operation
 - 1.3.1 Instructions for operation in normal and degraded modes of the vehicle
 - 1.4 Track side tests of the complete vehicle
- 2 Structure and mechanical parts

- 2.1 Vehicle structure
 - 2.1.1 Strength and integrity
 - 2.1.2 Load capability
 - 2.1.2.1 Load conditions and weighted mass
 - 2.1.2.2 Axle load and wheel load
 - 2.1.3 Joining technology
 - 2.1.4 Lifting and jacking
 - 2.1.5 Fixing of devices to car body structure
 - 2.1.6 Connections used between different parts of the vehicle
- 2.2 Mechanical interfaces for end coupling or inner coupling
 - 2.2.1 Automatic coupling
 - 2.2.2 Characteristics of rescue coupling
 - 2.2.3 Screw couplings
 - 2.2.4 Buffing, inner coupling and draw gear components
 - 2.2.5 Buffer marking
 - 2.2.6 Draw hook
 - 2.2.7 Gangways
- 2.3 Passive safety
- 3 Track interaction and gauging
 - 3.1 Vehicle gauge
 - 3.1.1 Vehicle gauge
 - 3.1.2 Specific case
 - 3.2 Vehicle dynamics
 - 3.2.1 Running safety and dynamics
 - 3.2.2 Equivalent conicity, wheel profile and limits
 - 3.2.3 Track loading compatibility parameters
 - 3.2.4 Vertical acceleration
 - 3.3 Bogies / running gear
 - 3.3.1 Bogies
 - 3.3.2 Wheelset (Axle + wheels)
 - 3.3.3 Wheel
 - 3.3.4 Wheel/rail interface (including wheel flange lubrication and sanding)
 - 3.3.5 Bearings on the wheelset
 - 3.3.6 Minimum curve radius to be negotiated
 - 3.3.7 Rail guard
 - 3.4 Limit of maximum longitudinal positive and negative acceleration

4 Braking

4.1 Functional requirements for braking at train level

4.2 Safety requirements for braking at train level

4.2.1 Traction/braking interlocking

4.3 Brake system - Recognised architecture and associated standards

4.4 Brake command

4.4.1 Emergency braking command

4.4.2 Service braking command

4.4.3 Direct braking command

4.4.4 Dynamic braking command

4.4.5 Parking braking command

4.5 Brake performance

4.5.1 Emergency braking

4.5.2 Service braking

4.5.3 Calculations related to thermal capacity

4.5.4 Parking brake

4.6 Braking adhesion management

4.6.1 Limit of wheel rail adhesion profile

4.6.2 Wheel slide protection system

4.7 Braking force production

4.7.1 Braking force production

4.7.2 Friction brake

4.7.2.1 Brake blocks

4.7.2.2 Brake discs

4.7.2.3 Brake pads

4.7.3 Dynamic brake linked to traction

4.7.4 Magnetic track brake

4.7.5 Eddy current track brake

4.7.6 Parking brake

4.8 Brake state and fault indication

4.9 Brake requirements for rescue purposes

5 Passenger-related items

5.1 Access

5.1.1 Exterior doors

5.1.2 Interior doors

5.1.3 Clearways

5.1.4 Steps and lighting

5.1.5 Floor height changes

- 5.1.6 Handrails
- 5.1.7 Boarding aids
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- 5.5 Seats and specific PRM arrangements
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 - 5.6.3 Other
- 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
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 - 6.2.3.3 Starting noise impact
 - 6.2.3.4 Pass-by noise impact
 - 6.2.4 Limits for aerodynamic loads impact

- 6.2.4.1 Head pressure pulses
- 6.2.4.2 Aerodynamic impact on passengers/materials on the platform
- 6.2.4.3 Aerodynamic impact on track workers
- 6.2.4.4 Ballast pick up and projection onto neighbouring property
- 7 External warning, marking functions and software integrity requirements
- 7.1 Integrity of software employed for safety related functions
- 7.2 Visual and audible vehicle identification and warning functions
 - 7.2.1 Vehicle marking
 - 7.2.2 External lights
 - 7.2.2.1 Headlights
 - 7.2.2.2 Marker lights
 - 7.2.2.3 Tail lights
 - 7.2.2.4 Lamp controls
 - 7.2.3 Warning horn
 - 7.2.3.1 Warning horn tones
 - 7.2.3.2 Warning horn sound pressure levels
 - 7.2.3.3 Warning horns, protection
 - 7.2.3.4 Warning horns, control
 - 7.2.3.5 Warning horns verification of sound pressure levels
 - 7.2.4 Brackets
- 8 On-board power supply and control systems
- 8.1 Traction performance requirements
 - 8.1.1 Residual acceleration at max speed
 - 8.1.2 Residual traction capability in degraded mode
 - 8.1.3 Traction wheel/rail adhesion requirements
- 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 Power supply
 - 8.2.1.2 Impedance between pantograph and wheels
 - 8.2.1.3 Voltage and frequency of overhead contact line power supply
 - 8.2.1.4 Energy recuperation

8.2.1.5 Maximum power and maximum current that is permissible to draw from the overhead contact line

8.2.1.6 Power factor

8.2.1.7 System energy disturbances

8.2.1.7.1 Harmonic characteristics and related overvoltages on the overhead contact line

8.2.1.7.2 Effects of DC content in AC supply

8.2.1.8 Electrical protection

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 static contact force

8.2.2.4 Pantograph contact force (including dynamic behaviour and aerodynamic effects)

8.2.2.5 Working range of pantographs

8.2.2.6 Current capacity

8.2.2.7 Arrangement of pantographs

8.2.2.8 Insulation of pantograph from the vehicle

8.2.2.9 Pantograph lowering

8.2.2.10 Running through phase separation sections

8.2.2.11 Running through system separation sections

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

8.2.3.5 Current capacity

8.3 Electrical power supply and traction system

8.3.1 Energy consumption measurement

8.3.2 Main electrical circuit configuration

8.3.3 High voltage components

8.3.4 Earthing

8.4 Electromagnetic compatibility

8.4.1 Electromagnetic compatibility within the on-board electrical power supply and control system

8.4.2 Electromagnetic compatibility with the signalling and telecommunications network

8.4.3 Electromagnetic compatibility with other vehicles and with the trackside part of the railway system

8.4.4 Electromagnetic compatibility with the environment

8.5 Protection against electrical hazards

9 Staff facilities, interfaces and environment

9.1 Driver's cab design

9.1.1 Cab design

9.1.1.1 Interior layout

9.1.1.2 Desk ergonomics

9.1.1.3 Driver's seat

9.1.1.4 Means for the driver to exchange documents

9.1.1.5 Other facilities to control operation of the train

9.1.2 Access to driver's cab

9.1.2.1 Access, egress and doors

9.1.2.2 Driver's cab emergency exits

9.1.3 Windscreen in driver's cab

9.1.3.1 Mechanical characteristics

9.1.3.2 Optical characteristics

9.1.3.3 Equipment

9.1.3.4 Front visibility

9.2 Working conditions

9.2.1 Environmental conditions

9.2.1.1 Heating, ventilation and air conditioning systems in driver's cab

9.2.1.2 Noise in driver's cab

9.2.1.3 Lighting in driver's cab

9.2.2 Others

9.3 Driver/machine interface

9.3.1 Driver/machine interface

9.3.1.1 Speed indication

9.3.1.2 Driver display unit and screens

9.3.1.3 Controls and indicators

9.3.2 Driver supervision

9.3.3 Rear and side view

9.4 Marking and labelling in driver's cab

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
 - 9.5.1.2 External steps and handrails for shunting staff
 - 9.5.1.3 Storage facilities for use by staff
 - 9.5.1.4 Other facilities
- 9.5.2 Staff and freight access doors
- 9.5.3 On-board tools and portable equipment
- 9.5.4 Audible communication system
- 9.6 Recording device
- 9.7 Remote control function
- 10 Fire safety and evacuation
 - 10.1 Fire safety
 - 10.1.1 Fire protection concept
 - 10.1.1.1 Fire protection concept
 - 10.1.1.2 Classification of vehicle/fire categories
 - 10.1.2 Fire protection measures
 - 10.1.2.1 General protection measures for vehicles
 - 10.1.2.2 Fire protection measures for specific kind of vehicles
 - 10.1.2.3 Protection of driver's cab
 - 10.1.2.4 Fire barriers
 - 10.1.2.5 Material properties
 - 10.1.2.6 Fire detectors
 - 10.1.2.7 Fire extinction equipment
 - 10.2 Emergency
 - 10.2.1 Passenger emergency exits
 - 10.2.2 Rescue services' information, equipment and access
 - 10.2.3 Passenger alarm
 - 10.2.4 Emergency lighting
- 11 Servicing
 - 11.1 Train cleaning facilities
 - 11.1.1 Train external cleaning facilities
 - 11.1.2 Train internal cleaning
 - 11.2 Train refuelling facilities
 - 11.2.1 Waste water disposal systems
 - 11.2.2 Water supply system
 - 11.2.3 Further supply facilities

- 11.2.4 Interface to refuelling equipment for non electric rolling stock
- 12 On-board control command and signalling
 - 12.1 On-board radio system
 - 12.1.1 Non-GSM-R radio system
 - 12.1.2 Use of hand portables as cab mobile radio
 - 12.1.3 GSM-R compliant radio system
 - 12.1.3.1 Text messages
 - 12.1.3.2 Call forwarding
 - 12.1.3.3 Broadcast calls
 - 12.1.3.4 Cab-radio related functions
 - 12.1.3.5 Network selection by external trigger
 - 12.1.3.6 General purpose radio-related functions
 - 12.1.3.7 Primary controller's MMI functionality
 - 12.1.3.8 Capacity of on-board GSM-R
 - 12.1.3.9 GSM-R-ETCS interface
 - 12.1.3.10 Interconnection and roaming between GSM-R networks
 - 12.1.3.11 Border crossing
 - 12.1.3.12 GPRS and ASCI
 - 12.1.3.13 Interface between rolling stock driver's safety device, vigilance device, and GSM-R on-board assembly
 - 12.1.3.14 Test specification for mobile equipment GSM-R
 - 12.1.3.15 Directed/automatic network selection
 - 12.1.3.16 Registration and deregistration
 - 12.1.3.17 GSM-R Version Management
 - 12.2 On-board signalling
 - 12.2.1 National on-board signalling systems
 - 12.2.2 Compatibility of signalling system with the rest of the train
 - 12.2.3 Compatibility of rolling stock with track infrastructure
 - 12.2.3.1 Relation between axle distance and wheel diameter
 - 12.2.3.2 Metal free space around wheels
 - 12.2.3.3 Metal mass of a vehicle
 - 13 Specific operational requirements
 - 13.1 Specific items to place on-board
 - 13.2 Occupational health and safety

13.3 Lifting diagram and instructions for rescue

Siemens Mobility GmbH applies for executing the 3. Railway Package based on Article 1.2a EU 2020/781

3.2.3.1.6 Comments:

Section 4: Technical Characteristics

Wheel set gauge

4.1.3 Wheel set gauge	1435	mm
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4.13.1 Signalling

4.13.1.1 ETCS equipment on-board and its level	None
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4.13.1.5 Class B or other train protection control and warning systems installed (system and if applicable version)	Crocodile Indusi/PZB KVB LZB TVM
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4.13.1.6 Special conditions implemented on-board to switch over between different train protection control and warning systems.	Indusi/PZB -> KVB Indusi/PZB -> LZB KVB -> TVM
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4.13.2 Radio

4.13.2.1 GSM-R equipment on board and its version (FRS and SRS)	7/15
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4.13.2.2 Number of GSM-R mobile sets in driving cab for data transmission	0
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4.13.2.3 Class B or other radio systems installed (system and if applicable version)	None
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4.13.2.4 Special conditions implemented on-board to switch over between different radio systems.	None
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4.10.1 Energy supply system	AC 25kV-50Hz AC 15kV-16.7Hz DC 3kV DC 1.5kV
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4.10.2 Maximum power (to be indicated for each energy supply system the vehicle is equipped for)	AC 15kV-16.7Hz	10650	kW		
	AC 25kV-50Hz	10125	kW		
	DC 1.5kV	6000	kW		
	DC 3kV	6000	kW		
4.10.3 Maximum rated current from the catenary (to be indicated for each electrical energy supply system the vehicle is equipped for)	AC 15kV-16.7Hz	710	A		
	AC 25kV-50Hz	450	A		
	DC 1.5kV	4000	A		
	DC 3kV	2000	A		
4.10.4 Maximum current at standstill per pantograph (to be indicated for each DC systems the vehicle is equipped for)	DC 1.5kV	300	A		
	DC 3kV	200	A		
4.10.5 Height of interaction of pantograph with contact wires (over top of rail) (to be indicated for each energy supply system the vehicle is equipped for)	AC 15kV-16.7Hz	0004.49	m	0006.53	m
	AC 25kV-50Hz	0004.50	m	0006.65	m
	DC 1.5kV	0004.45	m	0006.53	m
	DC 3kV	0004.45	m	0006.53	m
4.10.6 Pantograph head (to be indicated for each energy supply system the vehicle is equipped for)	AC 15kV-16.7Hz	1950 sc DE and AT	mm		
	AC 25kV-50Hz	1450 (sc FR)	mm		
	DC 1.5kV	1950	mm		
	DC 3kV	1950	mm		
4.10.7 Number of pantographs in contact with the overhead contact line (OCL) (to be indicated for each energy supply system the vehicle is equipped for)	AC 15kV-16.7Hz	1			
	AC 25kV-50Hz	1			
	DC 1.5kV	2			
	DC 3kV	1			
4.10.8 Shortest distance between two pantographs in contact with the OCL (to be indicated for each energy supply system the vehicle is equipped for; to be indicated for single and if applicable multiple operation) (only if number of raised pantographs is more than 1)	DC 1.5kV	94.8	m		

4.10.9 Type of OCL used for the test of current collection performance (to be indicated for each energy supply system the vehicle is equipped for) (only if number of raised pantographs is more than 1)	DC 1.5kV	A
4.10.10 Material of pantograph contact strip the vehicle may be equipped with (to be indicated for each energy supply system the vehicle is equipped for)	AC 15kV-16.7Hz	Plain carbon
	AC 25kV-50Hz	Plain carbon
	DC 1.5kV	Carbon with cladded cooper
	DC 3kV	Carbon with cladded cooper
4.10.11 Automatic dropping device (ADD) fitted (to be indicated for each energy supply system the vehicle is equipped for)	AC 15kV-16.7Hz	True
	AC 25kV-50Hz	True
	DC 1.5kV	True
	DC 3kV	True
4.10.12 TSI conform energy meter for billing purposes installed on board	AC 15kV-16.7Hz	True
	AC 25kV-50Hz	True
	DC 1.5kV	True
	DC 3kV	True

4.1.2 Speed

4.1.2.1 Maximum design speed	1435mm / AC 15kV-16.7Hz / Indusi/PZB	160	km/h
	1435mm / AC 15kV-16.7Hz / LZB	320	km/h
	1435mm / AC 25kV-50Hz / Crocodile	200	km/h
	1435mm / AC 25kV-50Hz / KVB	200	km/h
	1435mm / AC 25kV-50Hz / TVM	320	km/h
	1435mm / DC 1.5kV / Crocodile	200	km/h
	1435mm / DC 1.5kV / KVB	200	km/h
	1435mm / DC 3kV / Crocodile	200	km/h

4.1.4 Conditions of use regarding train formation	Fixed formation
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4.1.5 Maximum number of trainsets or locomotives coupled together in multiple operation.	1435mm / AC 15kV-16.7Hz / Indusi/PZB	2	
	1435mm / AC 15kV-16.7Hz / LZB	2	
	1435mm / AC 25kV-50Hz / Crocodile	2	
	1435mm / AC 25kV-50Hz / KVB	2	
	1435mm / AC 25kV-50Hz / TVM	2	
	1435mm / DC 1.5kV / Crocodile	2	
	1435mm / DC 1.5kV / KVB	2	
	1435mm / DC 3kV / Crocodile	2	
4.1.8 Type meets the requirements necessary for validity of the vehicle authorisation granted by one Member State in other MSs		Not applicable	
4.1.10 Structural category		P-II of EN12663-1:2010	
4.2.1 Vehicle kinematic gauge (interoperable gauge)		UIC 505-1 G1	
4.3.1 Temperature range		T3 (-25 to +45)	
4.3.2 Altitude range		A1	
4.3.3 Snow ice and hail conditions		nominal	
4.4.1 Fire safety category		B	
4.5.2 Design mass			
4.5.2.1 Design mass in working order		463257	kg
4.5.2.2 Design mass under normal payload		500057	kg
4.5.2.3 Design mass under exceptional payload		521735	kg
4.5.3 Static axle load			
4.5.3.1 Static axle load in working order		15330	kg

4.5.3.2 Static axle load under normal payload/ maximum payload for freight wagons		16510	kg
4.5.3.3 Static axle load under exceptional payload		17060	kg
4.5.4 Quasi-static guiding force (if exceeds the limit defined in TSI or not defined in the TSI)	1435mm	56.7	kN
4.6.1 Cant deficiency (maximum uncompensated lateral acceleration) for which the vehicle has been assessed	1435mm	165	mm
4.6.2 Vehicle equipped with a cant deficiency compensation system ("tilting vehicle")		False	
4.7.1 Maximum train deceleration		1.69	m/s ²
4.7.2.1 Brake performance on steep gradients with normal payload			
4.7.2.1.1 Reference case of TSI		Reference case (90% of design speed, Category 1 of HS INF TSI Dec 2008/217/EC)	
4.7.3 Parking brake			
4.7.3.2 Parking brake type (if the vehicle is fitted with it)		Manual operated from the vehicle	
4.7.3.3 Maximum gradient on which the unit is kept immobilized by the parking brake alone (if the vehicle is fitted with it)		35	‰ (mm/m)
4.7.4.1 Eddy current brake			
4.7.4.1.1 Eddy current brake fitted		True	
4.7.4.1.2 Possibility of preventing the use of the eddy current brake (only if fitted with eddy current brake)		True	

4.7.4.2 Magnetic brake

4.7.4.2.1 Magnetic brake fitted False

4.7.4.3 Regenerative brake (only for vehicles with electrical traction)

4.7.4.3.1 Regenerative brake fitted True

4.7.4.3.2 Possibility of preventing the use of the regenerative brake (only if fitted with regenerative brake) True

4.8.1 Vehicle length 200.72 m

4.8.2 Minimum in-service wheel diameter 830 mm

4.8.4 Minimum horizontal curve radius capability 150 m

4.8.5 Minimum vertical convex curve radius capability 500 m

4.8.6 Minimum vertical concave curve radius capability 500 m

4.8.8 Suitability for transport on ferries False

4.9.1 Type of end coupling (indicating tensile and compressive forces) **Automatic Type 10 / Scharfenberg**

4.9.2 Axle bearing condition monitoring (hot axles box detection) Onboard equipped (OP)

4.9.3 Flange lubrication

4.9.3.1 Flange lubrication fitted True

4.9.3.2 Possibility of preventing the use of the lubrication device (only if fitted with flange lubrication) True

4.11.1 Pass-by noise level (dB(A)) 92 dB(A)

4.11.2 Pass-by noise level was measured under reference conditions True

4.11.3 Stationary noise level (dB(A))	68	dB(A)
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4.11.4 Starting noise level (dB(A))	85	dB(A)
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4.12.1 General passenger related characteristics

4.12.1.1 Number of fixed seats	From 00460 To 00460
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4.12.1.2 Number of toilets	10
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4.12.1.3 Number of sleeping places	From 00000 To 00000
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4.12.2 PRM related characteristics

4.12.2.1 Number of priority seats	From 00053 To 00053
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4.12.2.2 Number of wheelchair spaces	From 00002 To 00002
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4.12.2.3 Number of PRM accessible toilets	1
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4.12.2.4 Number of wheelchair accessible sleeping places	From 00000 To 00000
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4.12.3 Passenger access and egress

4.12.3.1 Platform heights for which the vehicle is designed.	550	mm
	760	mm

4.12.3.2 Description of any integrated boarding aids (if provided)	on-board lifts
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4.12.3.3 Description of any portable boarding aids if considered in the design of the vehicle for meeting the PRM TSI requirements	none
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4.14.1 Type of train detection systems for which the vehicle has been designed and assessed	track circuits
	axle counters
	loops

4.14.2 Detailed vehicle characteristics related to compatibility with train detection systems

4.14.2.1 Maximum distance between consecutive axles	14875	mm
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4.14.2.2 Minimum distance between consecutive axles	2500	mm
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4.14.2.3 Distance between the first and the last axle		193300	mm		
4.14.2.4 Maximum length of the vehicle nose		3710	mm		
4.14.2.5 Minimum wheel rim width		135	mm		
4.14.2.6 Minimum wheel diameter		830	mm		
4.14.2.7 Minimum flange thickness		27.5	mm		
4.14.2.8 Minimum flange height		27.5	mm		
4.14.2.9 Maximum flange height		36	mm		
4.14.2.10 Minimum axle load		13.07	t		
4.14.2.12 Wheel material is ferromagnetic		True			
4.14.2.13 Maximum sanding output		000650.000	g	000030.000	s
4.14.2.14 Possibility of preventing the use of sanding		True			
4.14.2.16 Maximum impedance between opposite wheels of a wheelset		27.71	Ohm		
4.14.2.17 Minimum vehicle impedance (between wheels and pantograph) (only for vehicles equipped for 1500V or 3000V DC)	AC 15kV-16.7Hz	1.644	Ohm for 75Hz		
	AC 25kV-50Hz	1.644	Ohm for 75Hz		
	DC 1.5kV	1.644	Ohm for 75Hz		
	DC 3kV	1.644	Ohm for 75Hz		