



ERATV - European Register of Authorised Types of Vehicles

13-221-0001-5-001-001 BR 474.4

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Section 1: General Information

[PDF](#) [Excel](#) [XML](#)

▼ 0. Identification of the type

0.1 0.2 0.4 Type ID: 13-221-0001-5-001-001

0.3 Date of record: 27.10.2021

▼ 1. General Information

1.1 Type name: BR 474.4

1.2 Alternative type name: BR 474 DSH

▼ 1.3 Manufacturer

▼ 1.3.1 Manufacturer identification data

1.3.1.1 Name of organisation: S-Bahn Hamburg GmbH

1.3.1.2 Registered business number: HRB 63626

1.3.1.3 Organisation code:

▼ 1.3.2 Manufacturer contact data

1.3.2.1 Address of organisation, street and number: Hammerbrookstr. 44,

1.3.2.2 Town: Hamburg

1.3.2.3 Country code: D

1.3.2.4 Post code: 20097

1.3.2.5 E-mail address: IBGRegio@deutschebahn.com

Registration Method: New Type

Registered Vehicle Type:

1.4 Category:	Traction vehicles
1.5 Subcategory:	Self-propelled passenger trainset (incl. railbusses)
1.6 Platform:	BR 474

Section 2: Conformity with TSI

2.1 Conformity with TSI and Sections not complied with:

Section 3: Authorisations

Section 4: Technical Characteristics

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1435mm / DC 1200 V / Implementing
Regulation (EU) 2020/420 (Only
German) Set_3

CCS TSI (Regulation (EU) N° 2020/420 Only German)

LOC & PAS (Regulation (EU) No 1302/2014) amended by Reg.(EU)2016/919 amended by Reg.(EU)2018/868 amended by Reg.(EU) 2019/776 amended by Reg.(EU) 2020/387)

Sections not complied with :

- 4.2. Functional and technical specification of the sub-system
 - 4.2.1. General
 - 4.2.1.1. Breakdown
 - 4.2.1.2. Open points
 - 4.2.1.3. Safety aspects
 - 4.2.2. Structure and mechanical parts
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 - 4.2.2.2.1. General and definitions
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 - 4.2.2.2.3. End coupling
 - 4.2.2.2.4. Rescue coupling
 - 4.2.2.2.5. Staff access for coupling and uncoupling
 - 4.2.2.3. Gangways
 - 4.2.2.5. Passive safety
 - 4.2.2.6. Lifting and jacking
 - 4.2.2.8. Staff and freight Access doors
 - 4.2.2.9. Mechanical characteristics of glass (other than windscreens)
 - 4.2.3. Track interaction and gauging
 - 4.2.3.2. Axle load and wheel load
 - 4.2.3.3. Rolling Stock parameters which influence ground based systems
 - 4.2.3.3.1. Rolling Stock characteristics for the compatibility with train detection systems
 - 4.2.3.3.1.1. Rolling stock characteristics for compatibility with train detection system based on track circuits
 - 4.2.3.3.1.3. Rolling stock characteristics for compatibility with loop equipment
 - 4.2.3.3.2. Axle bearing condition monitoring
 - 4.2.3.3.2.1. Requirements applicable to on board detection equipment
 - 4.2.3.3.2.2. Rolling stock requirements for compatibility with trackside equipment
 - 4.2.3.4. Rolling stock dynamic behaviour
 - 4.2.3.4.1. Safety against derailment running on twisted track
 - 4.2.3.4.2. Running dynamic behaviour
 - 4.2.3.4.2.1. Limit values for running safety
 - 4.2.3.4.2.2. Track loading limit values
 - 4.2.3.4.3. Equivalent conicity
 - 4.2.3.4.3.1. Design values for new wheel profiles
 - 4.2.3.4.3.2. In-service values of wheelset equivalent conicity
 - 4.2.3.5. Running gear
 - 4.2.3.5.2. Wheelsets
 - 4.2.3.5.2.1. Mechanical and geometric characteristics of wheelsets
 - 4.2.3.5.2.2. Mechanical and geometrical characteristics of wheels
 - 4.2.3.5.2.3. Automatic Variable gauge wheelsets
 - 4.2.3.6. Minimum curve radius
 - 4.2.4.1. General

- 4.2.4.2. Main functional and safety requirements
 - 4.2.4.2.1. Functional requirements
 - 4.2.4.2.2. Safety requirements
- 4.2.4.3. Type of brake system
- 4.2.4.4. Brake command
 - 4.2.4.4.1. Emergency braking command
 - 4.2.4.4.2. Service braking command
 - 4.2.4.4.3. Direct braking command
 - 4.2.4.4.4. Dynamic braking command
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 - 4.2.4.5.1. General requirements
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 - 4.2.4.5.4. Calculations related to thermal capacity
 - 4.2.4.5.5. Parking brake
- 4.2.4.6. Wheel rail adhesion profile — Wheel slide protection system
 - 4.2.4.6.1. Limit of wheel rail adhesion profile
 - 4.2.4.6.2. Wheel slide protection system
- 4.2.4.7. Dynamic brake — Braking system linked to traction system
- 4.2.4.8. Braking system independent of adhesion conditions
 - 4.2.4.8.1. General
 - 4.2.4.8.2. Magnetic track brake
 - 4.2.4.8.3. Eddy current track brake
- 4.2.4.9. Brake state and fault indication
- 4.2.4.10. Brake requirements for rescue purposes
- 4.2.5. Passenger-related items
 - 4.2.5.1. Sanitary systems
 - 4.2.5.3. Passenger alarm
 - 4.2.5.3.1. General
 - 4.2.5.3.2. Requirements for information interfaces
 - 4.2.5.3.3. Requirements for activation of the brake by the passenger alarm
 - 4.2.5.3.5. Safety requirements
 - 4.2.5.3.6. Degraded mode
 - 4.2.5.3.7. Applicability to units intended for general operation
 - 4.2.5.4. Communication devices for passengers
 - 4.2.5.5.1. General
 - 4.2.5.5.2. Terminology used
 - 4.2.5.5.3. Door closing and locking
 - 4.2.5.5.4. Locking a door out of service
 - 4.2.5.5.5. Information available to the train crew
 - 4.2.5.5.6. Door opening
 - 4.2.5.5.7. Door-traction interlock
 - 4.2.5.5.8. Safety requirements for clauses 4.2.5.5.2 to 4.2.5.5.7
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 - 4.2.5.5.10. Applicability to units intended for general operation
 - 4.2.5.7. Inter-unit doors

- 4.2.5.8. Internal air quality
- 4.2.5.9. Body side windows
- 4.2.6. Environmental conditions and aerodynamic effects
 - 4.2.6.1. Environmental conditions — general
 - 4.2.6.1.1. Temperature
 - 4.2.6.1.2. Snow, ice and hail
 - 4.2.6.2. Aerodynamic effects
 - 4.2.6.2.1. Slipstream effects on passengers on platform and on workers trackside
 - 4.2.6.2.2. Head pressure pulse
 - 4.2.6.2.3. Maximum pressure variations in tunnels
 - 4.2.6.2.4. Cross wind
 - 4.2.6.2.5. Aerodynamic effect on ballasted tracks
- 4.2.7. External lights & visible and audible warning devices
 - 4.2.7.1. External lights
 - 4.2.7.1.1. Head lights
 - 4.2.7.1.2. Marker lights
 - 4.2.7.1.3. Tail lights
 - 4.2.7.1.4. Lamp controls
 - 4.2.7.2. Horn (audible warning device)
 - 4.2.7.2.1. General
 - 4.2.7.2.2. Warning horn sound pressure levels
 - 4.2.7.2.3. Protection
 - 4.2.7.2.4. Horn control
- 4.2.8. Traction and electrical equipment
 - 4.2.8.1. Traction performance
 - 4.2.8.1.1. General
 - 4.2.8.1.2. Requirements on performance
 - 4.2.8.2. Power supply
 - 4.2.8.2.1. General
 - 4.2.8.2.2. Operation within range of voltages and frequencies
 - 4.2.8.2.3. Regenerative brake with energy to the overhead contact line
 - 4.2.8.2.4. Maximum power and current from the overhead contact line
 - 4.2.8.2.5. Maximum current at standstill for DC systems
 - 4.2.8.2.6. Power factor
 - 4.2.8.2.7. System energy disturbances for ac systems
 - 4.2.8.2.8. On-board energy measurement system
 - 4.2.8.2.8.1. General
 - 4.2.8.2.8.2. Energy measurement function (EMF)
 - 4.2.8.2.8.3. Data handling system (DHS)
 - 4.2.8.2.8.4. Interface protocols and transferred data format between EMS and DCS
 - 4.2.8.2.9. Requirements linked to pantograph
 - 4.2.8.2.9.1. Working range in height of pantograph
 - 4.2.8.2.9.1.1. Height of interaction with contact wires (RST level)
 - 4.2.8.2.9.1.2. Working range in height of pantograph (IC level)
 - 4.2.8.2.9.2. Pantograph head geometry (IC level)
 - 4.2.8.2.9.2.1. Pantograph head geometry type 1 600 mm
 - 4.2.8.2.9.2.2. Pantograph head geometry type 1 950 mm
 - 4.2.8.2.9.2.3. Pantograph head geometry type 2 000 /2 260 mm

- 4.2.8.2.9.3. Pantograph head geometry type 1 800 mm
 - 4.2.8.2.9.3.a. Pantograph current capacity (IC level)
 - 4.2.8.2.9.4. Contact strip (IC level)
 - 4.2.8.2.9.4.1. Contact strip geometry
 - 4.2.8.2.9.4.2. Contact strip material
 - 4.2.8.2.9.5. Pantograph static contact force (IC level)
 - 4.2.8.2.9.6. Pantograph contact force and dynamic behaviour
 - 4.2.8.2.9.7. Arrangement of pantographs (RST level)
 - 4.2.8.2.9.8. Running through phase or system separation sections (RST level)
 - 4.2.8.2.9.9. Insulation of pantograph from the vehicle (RST level)
 - 4.2.8.2.9.10. Pantograph lowering (RST level)
 - 4.2.8.2.10. Electrical protection of the train
 - 4.2.8.3. Diesel and other thermal traction system
 - 4.2.9. Driver's Cab and driver-machine interface
 - 4.2.9.1. Driver's Cab
 - 4.2.9.1.1. General
 - 4.2.9.1.2. Access and egress
 - 4.2.9.1.2.1. Access and egress in operating conditions
 - 4.2.9.1.2.2. Driver's cab emergency exit
 - 4.2.9.1.3.1. Front visibility
 - 4.2.9.1.3.2. Rear and side view
 - 4.2.9.1.4. Interior layout
 - 4.2.9.1.5. Driver's seat
 - 4.2.9.1.7. Climate control and air quality
 - 4.2.9.1.8. Internal lighting
 - 4.2.9.2. Windscreen
 - 4.2.9.2.1. Mechanical characteristics
 - 4.2.9.2.2. Optical characteristics
 - 4.2.9.2.3. Equipment
 - 4.2.9.3. Driver machine interface
 - 4.2.9.3.1. Driver's activity control function
 - 4.2.9.3.5. Labelling
 - 4.2.9.3.6. Radio Remote control function by staff for shunting operation
- 4.2.9.4. On-board tools and portable equipment
- 4.2.9.5. Storage facility for staff personal effects
- 4.2.10. Fire safety and evacuation
 - 4.2.10.1. General and Categorisation
 - 4.2.10.2. Measures to prevent fire
 - 4.2.10.2.2. Specific measures for flammable liquids
 - 4.2.10.2.3. Hot axle box detection
 - 4.2.10.3. Measures to detect/control fire
 - 4.2.10.3.1. Portable Fire extinguishers
 - 4.2.10.3.2. Fire detection systems
 - 4.2.10.3.3. Fire automatic fighting system for freight diesel units
 - 4.2.10.3.4. Fire containment and control systems for passenger rolling stock
 - 4.2.10.3.5. Fire spreading protection measures for freight locomotives and freight self-propelling units

- 4.2.10.4. Requirements related to emergencies
 - 4.2.10.4.2. Smoke Control
 - 4.2.10.4.3. Passenger alarm and communication means
 - 4.2.10.4.4. Running capability
- 4.2.10.5. Requirements related to evacuation
 - 4.2.10.5.1. Passenger emergency exits
 - 4.2.10.5.2. Driver's cab emergency exits
- 4.2.11. Servicing
 - 4.2.11.1. General
 - 4.2.11.2. Train exterior cleaning
 - 4.2.11.2.1. Cleaning of driver's cab windscreen
 - 4.2.11.2.2. Exterior cleaning through a washing plant
 - 4.2.11.3. Connection to Toilet discharge system
 - 4.2.11.4. Water refilling equipment
 - 4.2.11.5. Interface for water refilling
 - 4.2.11.6. Special requirements for stabling of trains
 - 4.2.11.7. Refuelling equipment
 - 4.2.11.8. Train interior cleaning — power supply
- 4.2.12.1. General
- 4.2.12.2. General documentation
- 4.2.12.3. Documentation related to Maintenance
 - 4.2.12.3.1. The maintenance design justification file
 - 4.2.12.3.2. The Maintenance description file
- 4.2.12.4. Operating documentation
- 4.2.12.5. Lifting diagram and instructions
- 4.2.12.6. Rescue related descriptions

PRM (Regulation (EU) No 1300/2014 amended by Regulation (EU) 2019/772)

Sections not complied with :

- 4.2. Functional and technical specifications
 - 4.2.1. Infrastructure subsystem
 - 4.2.1.1. Parking facilities for persons with disabilities and persons with reduced mobility
 - 4.2.1.2. Obstacle-free route
 - 4.2.1.2.1. Horizontal circulation
 - 4.2.1.2.2. Vertical circulation
 - 4.2.1.2.3. Route identification
 - 4.2.1.3. Doors and entrances
 - 4.2.1.4. Floor surfaces
 - 4.2.1.5. Highlighting of transparent obstacles
 - 4.2.1.6. Toilets and baby nappy changing facilities
 - 4.2.1.7. Furniture and free-standing devices
 - 4.2.1.8. Ticketing, information desks and customer assistance points
 - 4.2.1.9. Lighting
 - 4.2.1.10. Visual information: signposting, pictograms, printed or dynamic information
 - 4.2.1.11. Spoken information
 - 4.2.1.12. Platform width and edge of platform
 - 4.2.1.13. End of platform
 - 4.2.1.14. Boarding aids stored on platforms
 - 4.2.1.15. Passenger track crossing to platforms

- 4.2.2. Rolling stock subsystem
 - 4.2.2.1. Seats
 - 4.2.2.1.1. General
 - 4.2.2.1.2. Priority seats
 - 4.2.2.1.2.1. General
 - 4.2.2.1.2.2. Uni-directional seats
 - 4.2.2.1.2.3. Facing seats arrangement
 - 4.2.2.2. Wheelchair spaces
 - 4.2.2.3. Doors
 - 4.2.2.3.3. Interior doors
 - 4.2.2.5. Toilets
 - 4.2.2.6. Clearways
 - 4.2.2.7. Customer information
 - 4.2.2.7.1. General
 - 4.2.2.7.3. Dynamic visual information
 - 4.2.2.7.4. Dynamic audible information
 - 4.2.2.8. Height changes
 - 4.2.2.9. Handrails
 - 4.2.2.10. Wheelchair accessible sleeping accommodation
 - 4.2.2.11. Step position for vehicle access and egress
 - 4.2.2.11.1. General requirements
 - 4.2.2.11.2. Access/egress steps
 - 4.2.2.12. Boarding aids
 - 4.2.2.12.1. Movable step and bridging plate
 - 4.2.2.12.2. On-board ramp
 - 4.2.2.12.3. On-board lift
- 4.3. Functional and technical specifications of the interfaces
 - 4.3.1. Interfaces with the infrastructure subsystem
 - 4.3.2. Interfaces with the rolling stock subsystem
 - 4.3.3. Interfaces with the telematics applications for passengers subsystem

1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg **LOC & PAS (Regulation (EU) No 1302/2014) amended by Reg.(EU)2016/919 amended by Reg.(EU)2018/868 amended by Reg.(EU) 2019/776 amended by Reg.(EU) 2020/387)**

Sections not complied with :

- 4.2. Functional and technical specification of the sub-system
 - 4.2.1. General
 - 4.2.1.1. Breakdown
 - 4.2.1.2. Open points
 - 4.2.1.3. Safety aspects
 - 4.2.2. Structure and mechanical parts
 - 4.2.2.1. General
 - 4.2.2.2. Mechanical interfaces
 - 4.2.2.2.1. General and definitions
 - 4.2.2.2.2. Inner coupling
 - 4.2.2.2.3. End coupling
 - 4.2.2.2.4. Rescue coupling
 - 4.2.2.2.5. Staff access for coupling and uncoupling
 - 4.2.2.3. Gangways

- 4.2.2.5. Passive safety
- 4.2.2.6. Lifting and jacking
- 4.2.2.8. Staff and freight Access doors
- 4.2.2.9. Mechanical characteristics of glass (other than windscreens)
- 4.2.3. Track interaction and gauging
 - 4.2.3.2. Axle load and wheel load
 - 4.2.3.3. Rolling Stock parameters which influence ground based systems
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 - 4.2.3.3.1.1. Rolling stock characteristics for compatibility with train detection system based on track circuits
 - 4.2.3.3.1.3. Rolling stock characteristics for compatibility with loop equipment
 - 4.2.3.3.2. Axle bearing condition monitoring
 - 4.2.3.3.2.1. Requirements applicable to on board detection equipment
 - 4.2.3.3.2.2. Rolling stock requirements for compatibility with trackside equipment
 - 4.2.3.4. Rolling stock dynamic behaviour
 - 4.2.3.4.1. Safety against derailment running on twisted track
 - 4.2.3.4.2. Running dynamic behaviour
 - 4.2.3.4.2.1. Limit values for running safety
 - 4.2.3.4.2.2. Track loading limit values
 - 4.2.3.4.3. Equivalent conicity
 - 4.2.3.4.3.1. Design values for new wheel profiles
 - 4.2.3.4.3.2. In-service values of wheelset equivalent conicity
 - 4.2.3.5. Running gear
 - 4.2.3.5.2. Wheelsets
 - 4.2.3.5.2.1. Mechanical and geometric characteristics of wheelsets
 - 4.2.3.5.2.2. Mechanical and geometrical characteristics of wheels
 - 4.2.3.5.2.3. Automatic Variable gauge wheelsets
 - 4.2.3.6. Minimum curve radius
 - 4.2.4.1. General
 - 4.2.4.2. Main functional and safety requirements
 - 4.2.4.2.1. Functional requirements
 - 4.2.4.2.2. Safety requirements
 - 4.2.4.3. Type of brake system
 - 4.2.4.4. Brake command
 - 4.2.4.4.1. Emergency braking command
 - 4.2.4.4.2. Service braking command
 - 4.2.4.4.3. Direct braking command
 - 4.2.4.4.4. Dynamic braking command
 - 4.2.4.4.5. Parking braking command
 - 4.2.4.5. Braking performance
 - 4.2.4.5.1. General requirements
 - 4.2.4.5.2. Emergency braking
 - 4.2.4.5.3. Service braking
 - 4.2.4.5.4. Calculations related to thermal capacity
 - 4.2.4.5.5. Parking brake
 - 4.2.4.6. Wheel rail adhesion profile — Wheel slide protection system
 - 4.2.4.6.1. Limit of wheel rail adhesion profile
 - 4.2.4.6.2. Wheel slide protection system

- 4.2.4.7. Dynamic brake — Braking system linked to traction system
- 4.2.4.8. Braking system independent of adhesion conditions
 - 4.2.4.8.1. General
 - 4.2.4.8.2. Magnetic track brake
 - 4.2.4.8.3. Eddy current track brake
- 4.2.4.9. Brake state and fault indication
- 4.2.4.10. Brake requirements for rescue purposes
- 4.2.5. Passenger-related items
 - 4.2.5.1. Sanitary systems
 - 4.2.5.3. Passenger alarm
 - 4.2.5.3.1. General
 - 4.2.5.3.2. Requirements for information interfaces
 - 4.2.5.3.3. Requirements for activation of the brake by the passenger alarm
 - 4.2.5.3.5. Safety requirements
 - 4.2.5.3.6. Degraded mode
 - 4.2.5.3.7. Applicability to units intended for general operation
 - 4.2.5.4. Communication devices for passengers
 - 4.2.5.5.1. General
 - 4.2.5.5.2. Terminology used
 - 4.2.5.5.3. Door closing and locking
 - 4.2.5.5.4. Locking a door out of service
 - 4.2.5.5.5. Information available to the train crew
 - 4.2.5.5.6. Door opening
 - 4.2.5.5.7. Door-traction interlock
 - 4.2.5.5.8. Safety requirements for clauses 4.2.5.5.2 to 4.2.5.5.7
 - 4.2.5.5.9. Door emergency opening
 - 4.2.5.5.10. Applicability to units intended for general operation
 - 4.2.5.7. Inter-unit doors
 - 4.2.5.8. Internal air quality
 - 4.2.5.9. Body side windows
- 4.2.6. Environmental conditions and aerodynamic effects
 - 4.2.6.1. Environmental conditions — general
 - 4.2.6.1.1. Temperature
 - 4.2.6.1.2. Snow, ice and hail
 - 4.2.6.2. Aerodynamic effects
 - 4.2.6.2.1. Slipstream effects on passengers on platform and on workers trackside
 - 4.2.6.2.2. Head pressure pulse
 - 4.2.6.2.3. Maximum pressure variations in tunnels
 - 4.2.6.2.4. Cross wind
 - 4.2.6.2.5. Aerodynamic effect on ballasted tracks
- 4.2.7. External lights & visible and audible warning devices
 - 4.2.7.1. External lights
 - 4.2.7.1.1. Head lights
 - 4.2.7.1.2. Marker lights
 - 4.2.7.1.3. Tail lights
 - 4.2.7.1.4. Lamp controls
 - 4.2.7.2. Horn (audible warning device)

- 4.2.7.2.1. General
- 4.2.7.2.2. Warning horn sound pressure levels
- 4.2.7.2.3. Protection
- 4.2.7.2.4. Horn control
- 4.2.8. Traction and electrical equipment
 - 4.2.8.1. Traction performance
 - 4.2.8.1.1. General
 - 4.2.8.1.2. Requirements on performance
 - 4.2.8.2. Power supply
 - 4.2.8.2.1. General
 - 4.2.8.2.2. Operation within range of voltages and frequencies
 - 4.2.8.2.3. Regenerative brake with energy to the overhead contact line
 - 4.2.8.2.4. Maximum power and current from the overhead contact line
 - 4.2.8.2.5. Maximum current at standstill for DC systems
 - 4.2.8.2.6. Power factor
 - 4.2.8.2.7. System energy disturbances for ac systems
 - 4.2.8.2.8. On-board energy measurement system
 - 4.2.8.2.8.1. General
 - 4.2.8.2.8.2. Energy measurement function (EMF)
 - 4.2.8.2.8.3. Data handling system (DHS)
 - 4.2.8.2.8.4. Interface protocols and transferred data format between EMS and DCS
 - 4.2.8.2.9. Requirements linked to pantograph
 - 4.2.8.2.9.1. Working range in height of pantograph
 - 4.2.8.2.9.1.1. Height of interaction with contact wires (RST level)
 - 4.2.8.2.9.1.2. Working range in height of pantograph (IC level)
 - 4.2.8.2.9.2. Pantograph head geometry (IC level)
 - 4.2.8.2.9.2.1. Pantograph head geometry type 1 600 mm
 - 4.2.8.2.9.2.2. Pantograph head geometry type 1 950 mm
 - 4.2.8.2.9.2.3. Pantograph head geometry type 2 000 /2 260 mm
 - 4.2.8.2.9.3. Pantograph head geometry type 1 800 mm
 - 4.2.8.2.9.3.a. Pantograph current capacity (IC level)
 - 4.2.8.2.9.4. Contact strip (IC level)
 - 4.2.8.2.9.4.1. Contact strip geometry
 - 4.2.8.2.9.4.2. Contact strip material
 - 4.2.8.2.9.5. Pantograph static contact force (IC level)
 - 4.2.8.2.9.6. Pantograph contact force and dynamic behaviour
 - 4.2.8.2.9.7. Arrangement of pantographs (RST level)
 - 4.2.8.2.9.8. Running through phase or system separation sections (RST level)
 - 4.2.8.2.9.9. Insulation of pantograph from the vehicle (RST level)
 - 4.2.8.2.9.10. Pantograph lowering (RST level)
 - 4.2.8.2.10. Electrical protection of the train
 - 4.2.8.3. Diesel and other thermal traction system
- 4.2.9. Driver's Cab and driver-machine interface
 - 4.2.9.1. Driver's Cab
 - 4.2.9.1.1. General
 - 4.2.9.1.2. Access and egress
 - 4.2.9.1.2.1. Access and egress in operating conditions
 - 4.2.9.1.2.2. Driver's cab emergency exit

- 4.2.9.1.3.1. Front visibility
- 4.2.9.1.3.2. Rear and side view
- 4.2.9.1.4. Interior layout
- 4.2.9.1.5. Driver's seat
- 4.2.9.1.7. Climate control and air quality
- 4.2.9.1.8. Internal lighting
- 4.2.9.2. Windscreen
 - 4.2.9.2.1. Mechanical characteristics
 - 4.2.9.2.2. Optical characteristics
 - 4.2.9.2.3. Equipment
- 4.2.9.3. Driver machine interface
 - 4.2.9.3.1. Driver's activity control function
 - 4.2.9.3.5. Labelling
 - 4.2.9.3.6. Radio Remote control function by staff for shunting operation
- 4.2.9.4. On-board tools and portable equipment
- 4.2.9.5. Storage facility for staff personal effects
- 4.2.10. Fire safety and evacuation
 - 4.2.10.1. General and Categorisation
 - 4.2.10.2. Measures to prevent fire
 - 4.2.10.2.2. Specific measures for flammable liquids
 - 4.2.10.2.3. Hot axle box detection
 - 4.2.10.3. Measures to detect/control fire
 - 4.2.10.3.1. Portable Fire extinguishers
 - 4.2.10.3.2. Fire detection systems
 - 4.2.10.3.3. Fire automatic fighting system for freight diesel units
 - 4.2.10.3.4. Fire containment and control systems for passenger rolling stock
 - 4.2.10.3.5. Fire spreading protection measures for freight locomotives and freight self-propelling units
 - 4.2.10.4. Requirements related to emergencies
 - 4.2.10.4.2. Smoke Control
 - 4.2.10.4.3. Passenger alarm and communication means
 - 4.2.10.4.4. Running capability
 - 4.2.10.5. Requirements related to evacuation
 - 4.2.10.5.1. Passenger emergency exits
 - 4.2.10.5.2. Driver's cab emergency exits
- 4.2.11. Servicing
 - 4.2.11.1. General
 - 4.2.11.2. Train exterior cleaning
 - 4.2.11.2.1. Cleaning of driver's cab windscreen
 - 4.2.11.2.2. Exterior cleaning through a washing plant
 - 4.2.11.3. Connection to Toilet discharge system
 - 4.2.11.4. Water refilling equipment
 - 4.2.11.5. Interface for water refilling
 - 4.2.11.6. Special requirements for stabling of trains
 - 4.2.11.7. Refuelling equipment
 - 4.2.11.8. Train interior cleaning — power supply
- 4.2.12.1. General

- 4.2.12.2. General documentation
- 4.2.12.3. Documentation related to Maintenance
 - 4.2.12.3.1. The maintenance design justification file
 - 4.2.12.3.2. The Maintenance description file
- 4.2.12.4. Operating documentation
- 4.2.12.5. Lifting diagram and instructions
- 4.2.12.6. Rescue related descriptions

PRM (Regulation (EU) No 1300/2014 amended by Regulation (EU) 2019/772)

Sections not complied with :

- 4.2. Functional and technical specifications
 - 4.2.1. Infrastructure subsystem
 - 4.2.1.1. Parking facilities for persons with disabilities and persons with reduced mobility
 - 4.2.1.2. Obstacle-free route
 - 4.2.1.2.1. Horizontal circulation
 - 4.2.1.2.2. Vertical circulation
 - 4.2.1.2.3. Route identification
 - 4.2.1.3. Doors and entrances
 - 4.2.1.4. Floor surfaces
 - 4.2.1.5. Highlighting of transparent obstacles
 - 4.2.1.6. Toilets and baby nappy changing facilities
 - 4.2.1.7. Furniture and free-standing devices
 - 4.2.1.8. Ticketing, information desks and customer assistance points
 - 4.2.1.9. Lighting
 - 4.2.1.10. Visual information: signposting, pictograms, printed or dynamic information
 - 4.2.1.11. Spoken information
 - 4.2.1.12. Platform width and edge of platform
 - 4.2.1.13. End of platform
 - 4.2.1.14. Boarding aids stored on platforms
 - 4.2.1.15. Passenger track crossing to platforms
 - 4.2.2. Rolling stock subsystem
 - 4.2.2.1. Seats
 - 4.2.2.1.1. General
 - 4.2.2.1.2. Priority seats
 - 4.2.2.1.2.1. General
 - 4.2.2.1.2.2. Uni-directional seats
 - 4.2.2.1.2.3. Facing seats arrangement
 - 4.2.2.2. Wheelchair spaces
 - 4.2.2.3. Doors
 - 4.2.2.3.3. Interior doors
 - 4.2.2.5. Toilets
 - 4.2.2.6. Clearways
 - 4.2.2.7. Customer information
 - 4.2.2.7.1. General
 - 4.2.2.7.3. Dynamic visual information
 - 4.2.2.7.4. Dynamic audible information
 - 4.2.2.8. Height changes
 - 4.2.2.9. Handrails
 - 4.2.2.10. Wheelchair accessible sleeping accommodation

- 4.2.2.11. Step position for vehicle access and egress
 - 4.2.2.11.1. General requirements
 - 4.2.2.11.2. Access/egress steps
 - 4.2.2.12. Boarding aids
 - 4.2.2.12.1. Movable step and bridging plate
 - 4.2.2.12.2. On-board ramp
 - 4.2.2.12.3. On-board lift
 - 4.3. Functional and technical specifications of the interfaces
 - 4.3.1. Interfaces with the infrastructure subsystem
 - 4.3.2. Interfaces with the rolling stock subsystem
 - 4.3.3. Interfaces with the telematics applications for passengers subsystem
- CCS TSI (Regulation (EU) N° 2020/420 Only German)**

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

1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3	<p>CCS TSI (Regulation (EU) N° 2020/420 Only German)</p> <p>LOC & PAS (Regulation (EU) No 1302/2014) amended by Reg.(EU)2016/919 amended by Reg.(EU)2018/868 amended by Reg.(EU) 2019/776 amended by Reg.(EU) 2020/387)</p> <p>PRM (Regulation (EU) No 1300/2014 amended by Regulation (EU) 2019/772)</p>
1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg	<p>LOC & PAS (Regulation (EU) No 1302/2014) amended by Reg.(EU)2016/919 amended by Reg.(EU)2018/868 amended by Reg.(EU) 2019/776 amended by Reg.(EU) 2020/387)</p> <p>PRM (Regulation (EU) No 1300/2014 amended by Regulation (EU) 2019/772)</p> <p>CCS TSI (Regulation (EU) N° 2020/420 Only German)</p>

2.2 Reference of 'EC type examination certificates'

EC certificate of verification : Reference of 'EC type examination certificates' (if module SB applied) and/or 'EC design examination certificates' (if module SH1 applied) 2871/1/SB/2021/RST/DEEN/00086/V02

EC certificate of verification : Reference of 'EC type examination certificates' (if module SB applied) and/or 'EC design examination certificates' (if module SH1 applied) 0893/2/SH1/2021/CCO/DE EN/3258

3.1.1 Member state of authorisation: Germany(DE)

3.1.2.1 Status:	Valid
3.1.2.2 Validity of Authorisation (until):	
3.1.2.3 Coded conditions for use and other restrictions:	1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3 1 Technical restriction related to construction 1.1 Minimum curve radius in meters: 120 1.3 Speed restrictions in Km/h: 100 1.4 Use in multiple operation (maximum number of trainsets authorised to be coupled together to operate as a single train): 2 2 Geographical restriction 2.1 Kinematic gauge (coding WAG TSI): G2 with height restriction 2.2 Wheelset gauge: 2.2.4 Gauge 1435 2.4 ERTMS on board: 2.4.1 ETCS 2.4 ERTMS on board: 2.4.2 GSM-R voice 2.4 ERTMS on board: 2.4.3 GSM-R for ETCS 2.5 B System on board 2.5.1 Class B signalling system: 2.5.156 PZB 90 2.5.2 Class B radio system: 2.5.219 Analogue Radio Germany - UIC 751 1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg 1 Technical restriction related to construction 1.1 Minimum curve radius in meters: 120 1.3 Speed restrictions in Km/h: 100 1.4 Use in multiple operation (maximum number of trainsets authorised to be coupled together to operate as a single train): 2 2 Geographical restriction 2.1 Kinematic gauge (coding WAG TSI): G2 with height restriction 2.2 Wheelset gauge: 2.2.4 Gauge 1435 2.4 ERTMS on board: 2.4.1 ETCS 2.4 ERTMS on board: 2.4.2 GSM-R voice 2.4 ERTMS on board: 2.4.3 GSM-R for ETCS 2.5 B System on board 2.5.1 Class B signalling system: 2.5.156 PZB 90 2.5.2 Class B radio system: 2.5.219 Analogue Radio Germany - UIC 751
3.1.2.4 Non-coded conditions for use and other restrictions:	1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3 1 Der hochautomatisierte Betrieb mit ATO ist nur in Kurz- und Vollzügen zulässig. In allen anderen 2 Der Betrieb des fahrzeugseitigen ZZS-Teilsystems darf nur mit SIM-Karten erfolgen, die eine 3 Begrenzungslinie: Ab 20 mm Radverschleiß im Enddrehgestell muss für den Schienenräumer der Radverschleiß mit 4 Schnellbremsung: Das nach [Bericht „Bombardier BR 474.2 S-Bahn Hamburg Bremstechnische Prüfung Ermittlung von ETCS-Bremskurven“, Nr. 57791-TVP21-182760-PR01, DB Systemtechnik GmbH, 11.10.2019] und [E-Mail „[2018-2-760] Digitale S-Bahn Hamburg: Nachberechnung zum Prüfbericht 57791-TVP21-182760-PR01, Andreas Stieff, DB Systemtechnik GmbH, 09.06.2021, 15:27 Uhr] ermittelte SB-Vermögen ist geringer als das bisherige nach [Bericht „Bremsbewertung des ET 474 (2. Bauserie), Nr. FTZ 661 Su/Fbbt-474-2, TTZ DBAG, 20.05.1999]. Mit [Systemdefinition Betrieb für

hochautomatische Fahrt, Nr. DSH-11796862, Version 4.0, DB AG, 25.01.2021] und [Richtlinie „Anhang V Bahnbetrieb Sonderbestimmungen für den Betrieb auf den eisen der Hamburger Gleichstrom-S-Bahn“, S-Bahn Hamburg GmbH, 02.03.2021] istangewiesen, dass der Tf auf verminderte Kraftschlüsse Rad/Schiene manuell zu reagieren hat. Die Lastabbremung und das ermittelte Bremsvermögen gehen von einer gleichmäßigen Beladung aus.

5 Notbremsung (Abschnitt 4.2.4.5.2): Das nach [Bericht „Bombardier BR 474.2 S-Bahn Hamburg Bremstechnische Prüfung Ermittlung von ETCS-Bremskurven“, Nr. 57791-TVP21-182760-PR01, DB Systemtechnik GmbH, 11.10.2019] und [E-Mail „[2018-2-760] Digitale S-Bahn Hamburg: Nachberechnung zum Prüfbericht 57791-TVP21-182760-PR01, Andreas Stieff, DB Systemtechnik GmbH, 09.06.2021, 15:27 Uhr] ermittelte SB-Vermögen ist geringer als das bisherige nach [Bericht „Bremsbewertung des ET 474 (2.Bauserie), Nr. FTZ 661 Su/Fbbt-474-2, TTZ DBAG, 20.05.1999].

6 Die Anweisung „Digitale S-Bahn Hamburg (DSH) Anweisung Bremse BR 474.4“ vom 30.09.2021 mit Dauerbremszettel und Bremsausfallkonzept ist betrieblich umzusetzen.

7 Bei einem Verlust von Bremsleistung (Ausfall von Fahrzeugbremsen, Störungen am Luftfederungssystem) darf die Fahrt unter ETCS-Führung im Lambda-Modell nicht fortgesetzt werden. Der Zug ist bei ETCS-Führung beim Eintritt einer Störung am Brems- oder

8 Die Verzögerungsleistung der Fahrzeuge wurde verringert. Dies führt zu einer Reduktion der Bremsleistung. Durch den Vorschlagenden ist dies betrieblich geeignet zu berücksichtigen.

1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg

1 Der hochautomatisierte Betrieb mit ATO ist nur in Kurz- und Vollzügen zulässig. In allen anderen

2 Der Betrieb des fahrzeugseitigen ZZS-Teilsystems darf nur mit SIM-Karten erfolgen, die eine

3 Begrenzungslinie: Ab 20 mm Radverschleiß im Enddrehgestell muss für den Schienenräumer der Radverschleiß mit

Schnellbremsung: Das nach [Bericht „Bombardier BR 474.2 S-Bahn Hamburg Bremstechnische Prüfung Ermittlung von ETCS-Bremskurven“, Nr. 57791-TVP21-182760-PR01, DB Systemtechnik GmbH, 11.10.2019] und [E-Mail „[2018-2-760] Digitale S-Bahn Hamburg: Nachberechnung zum Prüfbericht 57791-TVP21-182760-PR01, Andreas Stieff, DB Systemtechnik GmbH, 09.06.2021, 15:27 Uhr] ermittelte SB-Vermögen ist geringer als das bisherige nach [Bericht „Bremsbewertung des ET 474 (2. Bauserie), Nr. FTZ 661 Su/Fbbt-474-2, TTZ DBAG, 20.05.1999]. Mit [Systemdefinition Betrieb für hochautomatische Fahrt, Nr. DSH-11796862, Version 4.0, DB AG, 25.01.2021] und [Richtlinie „Anhang V Bahnbetrieb Sonderbestimmungen für den Betrieb auf den Gleisen der Hamburger Gleichstrom-S-Bahn“, S-Bahn Hamburg GmbH, 02.03.2021] ist angewiesen, dass der Tf auf verminderte Kraftschlüsse Rad/Schiene manuell zu reagieren hat. Die Lastabbremung und das ermittelte Bremsvermögen gehen von einer gleichmäßigen Beladung aus.

5 Notbremsung (Abschnitt 4.2.4.5.2): Das nach [Bericht „Bombardier BR 474.2 S-Bahn Hamburg Bremstechnische Prüfung Ermittlung von ETCS-Bremskurven“, Nr. 57791-TVP21-182760-PR01, DB Systemtechnik GmbH, 11.10.2019] und [E-Mail „[2018-2-760] Digitale S-Bahn Hamburg: Nachberechnung zum Prüfbericht 57791-TVP21-182760-PR01, Andreas Stieff, DB Systemtechnik GmbH, 09.06.2021, 15:27 Uhr] ermittelte SB-Vermögen ist geringer als das bisherige nach [Bericht „Bremsbewertung des ET 474 (2. Bauserie), Nr.

FTZ 661 Su/Fbbt-474-2, TTZ DBAG, 20.05.1999].

6 Die Anweisung „Digitale S-Bahn Hamburg (DSH) Anweisung Bremse BR 474.4“ vom 30.09.2021 mit Dauerbremszettel und Bremsausfallkonzept ist betrieblich umzusetzen.

(Luftfederungssystem) darf die Fahrt unter ETCS-Führung im Lambda-Modell nicht fortgesetzt werden. Der Zug ist bei ETCS-Führung beim Eintritt einer Störung am Brems- oder Luftfederungssystem sofort anzuhalten. Luftfederungssystem sofort anzuhalten.

8 Die Verzögerungsleistung der Fahrzeuge wurde verringert. Dies führt zu einer Reduktion der Bremsleistung. Durch den Vorschlagenden ist dies betrieblich geeignet zu berücksichtigen.

3.1.3.1.2.1.1 Name of organisation:	S-Bahn Hamburg GmbH
3.1.3.1.2.1.2 Registered business number:	HRB 63626
3.1.3.1.2.1.3 Organisation code:	
3.1.3.1.2.2.1 Address of organisation, street and number:	Sommerkamp 31
3.1.3.1.2.2.2 Town:	Hamburg
3.1.3.1.2.2.3 Country code:	D
3.1.3.1.2.2.4 Post code:	22335
3.1.3.1.2.2.5 E-mail address:	IBGRegio@deutschebahn.com

▼ 3.1.3.1.2.1 Authorisation holder identification data

▼ 3.1.3.1.2.2 Authorisation holder contact data

3.1.3.1.1 Date of the original authorisation:	08.10.2021
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▼ 3.1.3.1.2 Authorisation holder

3.1.3.1.3 Authorisation document reference:	DE8020210173
3.1.3.1.4 Certificate of verification : Reference of type examination or design examination type:	0893/2/SH1/2021/CCO/DE EN/3258; 2871/1/SB/2021/RST/DEEN/00086/V02
3.1.3.1.5 Parameters for which conformity to applicable national rules has been assessed:	<p>1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3 2009/965/EC</p> <p>4.1 Functional requirements for braking at train level</p> <p>4.5 Brake performance</p> <p>4.5.1 Emergency braking</p> <p>4.5.2 Service braking</p> <p>4.5.3 Calculations related to thermal capacity</p> <p>4.5.4 Parking brake</p> <p>7.2 Visual and audible vehicle identification and warning functions</p> <p>7.2.1 Vehicle marking</p> <p>8.4 Electromagnetic compatibility</p> <p>8.4.2 Electromagnetic compatibility with the signalling and telecommunications network</p> <p>12.2 On-board signalling</p> <p>12.2.1 National on-board signalling systems</p> <p>12.2.2 Compatibility of signalling system with the rest of the train</p> <p>1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg 2009/965/EC</p> <p>4.1 Functional requirements for braking at train level</p> <p>4.5 Brake performance</p> <p>4.5.1 Emergency braking</p> <p>4.5.2 Service braking</p> <p>4.5.3 Calculations related to thermal capacity</p> <p>4.5.4 Parking brake</p> <p>7.2 Visual and audible vehicle identification and warning functions</p> <p>7.2.1 Vehicle marking</p> <p>8.4 Electromagnetic compatibility</p> <p>8.4.2 Electromagnetic compatibility with the signalling and telecommunications network</p> <p>12.2 On-board signalling</p> <p>12.2.1 National on-board signalling systems</p> <p>12.2.2 Compatibility of signalling system with the rest of the train</p>
3.1.3.1.6 Comments:	
3.1.3.1.7 Reference to the written declaration by the proposer referred to in Article 3(11) of Regulation (EU) 402/2013:	<p>Erklärung des Vorschlagenden nach Artikel 16 der Durchführungsverordnung (EU) Nr. 402/2013, Digitale S-Bahn Hamburg (DSH), "Fahrzeugumrüstung Stufe 1" vom 04.10.2021"; Erklärung des Vorschlagenden nach Artikel 16 der Durchführungsverordnung (EU) Nr. 402/2013, Digitale S-Bahn Hamburg (DSH), "Fahrzeugumrüstung Stufe 2 + 3" vom 04.10.2021"</p>

▼ 3.1.3.1 Authorisation

3.0 Area Of Use: DE(Germany)

▼ 3.1 Authorisation in

▼ 3.1.2 Current status

▼ 3.1.3 Historical

▶ 3.1.3.1 Initial Registration

4.1.3 Wheel set gauge ^{RC} 1435 mm

4.1.12 Number of vehicles composing the fixed formation (for fixed formation only) 3

4.13.1 Signalling

4.13.1.1 ETCS equipment on-board and the set of specifications from CCS TSI Annex A ^{RC} Implementing Regulation (EU) 2020/420 (Only German) Set_3

4.13.1.5 Class B or other train protection control and warning systems installed (system and if applicable version) ^{RC} PZB 90 - S-Bahn Hamburg

4.13.1.7 ETCS on-board implementation ^{RC} BL3R2 according to set of specifications #3 according to Annex A, table A 2.3, Systemidentifier: 3R2.1.2.x.1.DE2.1.1.1.y.ATO1.z

4.13.1.8 ETCS System Compatibility ESC-NP-CCS7.4a

4.13.1.9 Managing information about the completeness of the train ^{RC} False

4.13.2 Radio

4.13.2.1 GSM-R Radio voice on board and its Baseline ^{RC} Regulation 2016/919 Set_1 (Mesa 23 SW 04.09.05, GSM-R Baseline 1)

4.13.2.3 Class B or other radio systems installed (system and if applicable version) ^{RC} Analogue Radio Germany - UIC 751

4.13.2.5 Radio Voice System Compatibility RSC-NP-CCS7.4a

4.13.2.6 Voice and operational communication implementation ^{RC} GSM-R

4.13.2.7 GSM-R Radio Data communication on board and its Baseline ^{RC} Implementing Regulation (EU) 2020/420 (Only German) Set_3

4.13.2.8 Radio Data System Compatibility RSC-NP-CCS7.4a

4.13.2.9 Data communication application for ETCS implementation ^{RC}	für ETCS-Ausrüstung GSM-R Baseline 1 according to set of specifications #3 according to Annex A, table A 2.3
4.13.2.10 Voice SIM Card GSM-R Home Network	GSM-R D (Germany)
4.13.2.11 Data SIM Card GSM-R Home Network	GSM-R D (Germany)
4.13.2.12 Voice SIM Card support of Group ID 555	False
4.10.1 Energy supply system (voltage and frequency) ^{RC}	DC 1200 V
4.10.4 Maximum current at standstill per pantograph (to be indicated for each DC systems the vehicle is equipped for)	DC 1200 V 1500 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) ^{RC}	DC 1200 V 0000.00 m to 0000.00 m
4.10.6 Pantograph head geometry (to be indicated for each energy supply system the vehicle is equipped for) ^{RC}	DC 1200 V Stromschiene 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) ^{RC}	DC 1200 V 0
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) ^{RC}	DC 1200 V sxxxxxx
4.10.11 Automatic dropping device (ADD) fitted (to be indicated for each energy supply system the vehicle is equipped for) ^{RC}	DC 1200 V False
4.10.14 Electric units equipped with power or current limitation function ^{RC}	1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3 True 1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg True
4.10.15 Mean contact force ^{RC}	1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3 70 N 1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg 70 N

4.1.2 Speed

4.1.2.1 Maximum design speed	1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3 100 km/h 1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg 100 km/h
4.1.5 Maximum number of trainsets or locomotives coupled together in multiple operation.	1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3 2 1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg 3
4.2.1 Reference profile ^{RC}	Begrenzung nach Anl. 8 (zu §22) der EBO - 2.312 Eg07/01/96 vom 03.12.96 für besondere Einsatzbereiche
4.3.1 Temperature range	Umgebungsbedingungen des Großraums Hamburg für den Einsatz als S-Bahn
4.3.3 Snow, ice and hail conditions	Umgebungsbedingungen des Großraums Hamburg für den Einsatz als S-Bahn
4.4.1 Fire safety category ^{RC}	A

4.5.2 Design mass

4.5.2.1 Design mass in working order	96965 kg
4.5.2.2 Design mass under normal payload	134289 kg
4.5.2.3 Design mass under exceptional payload ^{RC}	153715 kg

4.5.3 Static axle load

4.5.3.1 Static axle load in working order	10010 kg
4.5.3.2 Static axle load under normal payload	13049 kg
4.5.3.3 Static axle load under exceptional payload ^{RC}	14792 kg
4.5.3.4 Position of the axles along the unit (axle spacing) : a: Distance between axles b: Distance from end axle to the end of the nearest coupling plane c: distance between two inside axles	<p>1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3</p> <p>a: 0002,30 m b: 0002,53 m c: 0013,89 m</p> <p><i>Explanations:</i> for the end vehicles</p> <p>a: 0002,20 m b: 0002,53 m c: 0011,08 m</p> <p><i>Explanations:</i> for the middle vehicle</p> <p>1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg</p> <p>a: 0002,30 m b: 0002,53 m c: 0013,89 m</p> <p><i>Explanations:</i> for the end vehicles</p> <p>a: 0002,20 m b: 0002,53 m c: 0011,08 m</p> <p><i>Explanations:</i> for the middle vehicle</p>
4.5.5 Total vehicle mass (for each vehicle of the unit)	<p>1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3</p> <p>96965 kg</p> <p>1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg</p> <p>96965 kg</p>
4.5.6 Mass per wheel	<p>1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3</p> <p>5295 kg</p> <p>1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg</p> <p>5295 kg</p>
4.6.4 Combination of maximum speed and maximum cant deficiency for which the vehicle was assessed ^{RC}	<p>1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3</p> <p>0110,00 km/h - 0143,00 mm</p> <p>1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg</p> <p>0110,00 km/h - 0143,00 mm</p>
4.6.5 Rail inclination ^{RC}	<p>1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3</p> <p>1/40</p> <p>1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg</p> <p>1/40</p>
4.7.1 Maximum average deceleration	2,2 m/s ²

4.7.2.1 Brake performance on steep gradients with normal payload

4.7.2.1.2 Speed (if no reference case is indicated)	100 km/h
4.7.2.1.3 Gradient (if no reference case is indicated)	0 ‰ (mm/m)
4.7.2.1.4 Distance (if no reference case is indicated)	407 km
4.7.2.1.6 Maximum brake thermal energy capacity	1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3 59000 kJ 1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg 59000 kJ

4.7.3 Parking brake

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)	40 ‰ (mm/m)
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4.7.4.1 Eddy current brake

4.7.4.1.1 Eddy current track brake fitted RC	False
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4.7.4.2 Magnetic brake

4.7.4.2.1 Magnetic track brake fitted RC	True
4.7.4.2.2 Possibility of preventing the use of the magnetic track brake (only if fitted with magnetic brake) RC	True

4.7.4.3 Regenerative brake (only for vehicles with electrical traction)

4.7.4.3.1 Regenerative brake fitted RC	True
4.7.4.3.2 Possibility of preventing the use of the regenerative brake (only if fitted with regenerative brake) RC	False

4.7.5 Emergency brake : Stopping distance and deceleration profile for each load condition per design
maximum speed a: Load condition: working order b: Load condition: normal payload c: Load condition: exceptional payload

1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3a: 0383,00 m 0001,01 m/s²b: 0384,00 m 0001,00 m/s²c: 0414,00 m 0000,95 m/s²**1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg**a: 0383,00 m 0001,01 m/s²b: 0384,00 m 0001,00 m/s²c: 0414,00 m 0000,95 m/s²

4.7.6 For general operation : Brake weight percentage (lambda) or Braked mass

1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3

139,00 (%) or 00156,00 tonnes

1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg

139,00 (%) or 00156,00 tonnes

4.7.7 Service brake: At maximum service brake: Stopping distance, Maximum deceleration, for the load condition 'design mass under normal payload' at the design maximum speed.

1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_30774,00 m - 0000,50 m/s²**1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg**0774,00 m - 0000,50 m/s²

4.7.8 Wheel slide protection system

1435mm / DC 1200 V / Implementing Regulation (EU) 2020/420 (Only German) Set_3

True

1435mm / DC 1200 V / PZB 90 - S-Bahn Hamburg

True

4.8.1 Vehicle length 66 m

4.8.2 Minimum in-service wheel diameter^{RC} 610 mm4.8.4 Minimum horizontal curve radius capability^{RC} 120 m

4.8.5 Minimum vertical convex curve radius capability 500 m

4.8.6 Minimum vertical concave curve radius capability 500 m

4.9.1 Type of end coupling Automatic Type 10 / Scharfenberg

4.9.2 Axle bearing condition monitoring (hot axles box detection)^{RC} Detectable by line side4.12.3.1 Platform heights for which the vehicle is designed.^{RC} 760 mm
900 mm

4.14.1 Type of train detection systems Track circuits

for which the vehicle has been designed Axle counters
and assessed ^{RC}

Germany
