

Section 1: General Information

0. Identification of the type

0.1 0.2 Type ID: 11-042-0004-1-001
0.3 Date of record: 2018-02-15

1. General Information

1.1 Type name: TRAXX F140 MS (D-A-PL-NL-CZ-SK-H)
1.2 Alternative type name: Bombardier E 186 (D-A-PL-NL-CZ-SK-H) KG10
1.3 Manufacturer's name: Bombardier Transportation GmbH
1.4 Category: Traction vehicles
1.5 Subcategory: Locomotive
1.6 Platform: TRAXX F140 MS

Section 2: Conformity with TSI

2.1 Conformity with TSI and Sections not complied with:

1435mm / AC 15kV-16.7Hz / ATB

PRM (Regulation (EU) No 1300/2014)

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

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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

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4.2.1.13. End of platform

4.2.1.14. Boarding aids stored on platforms

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4.2.2.1.1. General

4.2.2.1.2. Priority seats

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4.2.2.3. Doors

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4.2.2.3.2. Exterior doors

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4.2.2.4. Lighting

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4.2.2.6. Clearways

4.2.2.7. Customer Information

4.2.2.7.1. General

4.2.2.7.2. Signage, pictograms and tactile information

4.2.2.7.3. Dynamic visual 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

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4.3.2. Interfaces with the rolling stock subsystem

4.3.3. Interfaces with the Telematics Applications for Passengers subsystem

**LOC & PAS (Regulation (EU) No 1302/2014)
HS and CR CCS (Dec 2012/88/EU amended by**

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

PRM (Regulation (EU) No 1300/2014)

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4.2.1.2.3. Route identification

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1435mm / AC 15kV-16.7Hz / MIREL VZ1

1435mm / AC 15kV-16.7Hz / SHP

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1435mm / DC 1.5kV / ATB

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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

4.2.2.3. Doors

4.2.2.3.1. General

4.2.2.3.2. Exterior doors

4.2.2.3.3. Interior doors

4.2.2.4. Lighting

4.2.2.5. Toilets

4.2.2.6. Clearways

4.2.2.7. Customer Information

4.2.2.7.1. General

4.2.2.7.2. Signage, pictograms and tactile information

4.2.2.7.3. Dynamic visual 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

LOC & PAS (Regulation (EU) No 1302/2014)

HS and CR CCS (Dec 2012/88/EU amended by

1435mm / DC 3kV / MIREL VZ1

PRM (Regulation (EU) No 1300/2014)

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

4.2.2.3. Doors

4.2.2.3.1. General

4.2.2.3.2. Exterior doors

4.2.2.3.3. Interior doors

4.2.2.4. Lighting

4.2.2.5. Toilets

4.2.2.6. Clearways

4.2.2.7. Customer Information

4.2.2.7.1. General

4.2.2.7.2. Signage, pictograms and tactile information

4.2.2.7.3. Dynamic visual 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

LOC & PAS (Regulation (EU) No 1302/2014)

HS and CR CCS (Dec 2012/88/EU amended by

1435mm / DC 3kV / SHP

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

1435mm / AC 15kV-16.7Hz / Indusi/PZB	PRM (Regulation (EU) No 1300/2014) LOC & PAS (Regulation (EU) No 1302/2014) 7.3.2.12. Use of regenerative brakes (4.2.8.2.3). Specific case Czech Republic ('T') 7.4. Specific environmental conditions. Specific conditions Austria 7.4. Specific environmental conditions. Specific conditions Germany HS and CR CCS (Dec 2012/88/EU amended by Dec (EU) 2015/14) Noise (Regulation (EU) No 1304/2014) SRT (Regulation (EU) No 1303/2014)
1435mm / AC 15kV-16.7Hz / Level 2	PRM (Regulation (EU) No 1300/2014) LOC & PAS (Regulation (EU) No 1302/2014) 7.3.2.12. Use of regenerative brakes (4.2.8.2.3). Specific case Czech Republic ('T') 7.4. Specific environmental conditions. Specific conditions Austria 7.4. Specific environmental conditions. Specific conditions Germany HS and CR CCS (Dec 2012/88/EU amended by Dec (EU) 2015/14) Noise (Regulation (EU) No 1304/2014) SRT (Regulation (EU) No 1303/2014)
1435mm / AC 15kV-16.7Hz / LZB	PRM (Regulation (EU) No 1300/2014) LOC & PAS (Regulation (EU) No 1302/2014) 7.3.2.12. Use of regenerative brakes (4.2.8.2.3). Specific case Czech Republic ('T') 7.4. Specific environmental conditions. Specific conditions Austria 7.4. Specific environmental conditions. Specific conditions Germany HS and CR CCS (Dec 2012/88/EU amended by Dec (EU) 2015/14) Noise (Regulation (EU) No 1304/2014) SRT (Regulation (EU) No 1303/2014)
1435mm / AC 25kV-50Hz / ATB	PRM (Regulation (EU) No 1300/2014) LOC & PAS (Regulation (EU) No 1302/2014) 7.3.2.12. Use of regenerative brakes (4.2.8.2.3). Specific case Czech Republic ('T') 7.4. Specific environmental conditions. Specific conditions Austria 7.4. Specific environmental conditions. Specific conditions Germany HS and CR CCS (Dec 2012/88/EU amended by Dec (EU) 2015/14) Noise (Regulation (EU) No 1304/2014) SRT (Regulation (EU) No 1303/2014)

1435mm / AC 25kV-50Hz / Level 2

PRM (Regulation (EU) No 1300/2014)
LOC & PAS (Regulation (EU) No 1302/2014)
7.3.2.12. Use of regenerative brakes (4.2.8.2.3).
Specific case Czech Republic ('T')
7.4. Specific environmental conditions. Specific
conditions Austria
7.4. Specific environmental conditions. Specific
conditions Germany
**HS and CR CCS (Dec 2012/88/EU amended by
Dec (EU) 2015/14)**
Noise (Regulation (EU) No 1304/2014)
SRT (Regulation (EU) No 1303/2014)

1435mm / AC 25kV-50Hz / MIREL VZ1

PRM (Regulation (EU) No 1300/2014)
LOC & PAS (Regulation (EU) No 1302/2014)
7.3.2.12. Use of regenerative brakes (4.2.8.2.3).
Specific case Czech Republic ('T')
7.4. Specific environmental conditions. Specific
conditions Austria
7.4. Specific environmental conditions. Specific
conditions Germany
**HS and CR CCS (Dec 2012/88/EU amended by
Dec (EU) 2015/14)**
Noise (Regulation (EU) No 1304/2014)
SRT (Regulation (EU) No 1303/2014)

1435mm / DC 1.5kV / ATB

PRM (Regulation (EU) No 1300/2014)
LOC & PAS (Regulation (EU) No 1302/2014)
7.3.2.12. Use of regenerative brakes (4.2.8.2.3).
Specific case Czech Republic ('T')
7.4. Specific environmental conditions. Specific
conditions Austria
7.4. Specific environmental conditions. Specific
conditions Germany
**HS and CR CCS (Dec 2012/88/EU amended by
Dec (EU) 2015/14)**
Noise (Regulation (EU) No 1304/2014)
SRT (Regulation (EU) No 1303/2014)

1435mm / DC 1.5kV / Level 2

PRM (Regulation (EU) No 1300/2014)
LOC & PAS (Regulation (EU) No 1302/2014)
7.3.2.12. Use of regenerative brakes (4.2.8.2.3).
Specific case Czech Republic ('T')
7.4. Specific environmental conditions. Specific
conditions Austria
7.4. Specific environmental conditions. Specific
conditions Greece
**HS and CR CCS (Dec 2012/88/EU amended by
Dec (EU) 2015/14)**
Noise (Regulation (EU) No 1304/2014)
SRT (Regulation (EU) No 1303/2014)

1435mm / DC 3kV / ATB

PRM (Regulation (EU) No 1300/2014)
LOC & PAS (Regulation (EU) No 1302/2014)
7.3.2.12. Use of regenerative brakes (4.2.8.2.3).
Specific case Czech Republic ('T')
7.4. Specific environmental conditions. Specific
conditions Austria
7.4. Specific environmental conditions. Specific
conditions Germany
**HS and CR CCS (Dec 2012/88/EU amended by
Dec (EU) 2015/14)**
Noise (Regulation (EU) No 1304/2014)
SRT (Regulation (EU) No 1303/2014)

1435mm / DC 3kV / MIREL VZ1

PRM (Regulation (EU) No 1300/2014)
LOC & PAS (Regulation (EU) No 1302/2014)
7.3.2.12. Use of regenerative brakes (4.2.8.2.3).
Specific case Czech Republic ('T')
7.4. Specific environmental conditions. Specific
conditions Austria
7.4. Specific environmental conditions. Specific
conditions Germany
**HS and CR CCS (Dec 2012/88/EU amended by
Dec (EU) 2015/14)**
Noise (Regulation (EU) No 1304/2014)
SRT (Regulation (EU) No 1303/2014)

1435mm / DC 3kV / SHP

PRM (Regulation (EU) No 1300/2014)
LOC & PAS (Regulation (EU) No 1302/2014)
7.3.2.12. Use of regenerative brakes (4.2.8.2.3).
Specific case Czech Republic ('T')
7.4. Specific environmental conditions. Specific
conditions Austria
7.4. Specific environmental conditions. Specific
conditions Germany
**HS and CR CCS (Dec 2012/88/EU amended by
Dec (EU) 2015/14)**
Noise (Regulation (EU) No 1304/2014)
SRT (Regulation (EU) No 1303/2014)

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

TSI LOC/PAS:
2673/1/SB/2017/RST/EN/N20170255

Reference of 'EC type examination certificates' - if
module SB applied - and/or 'design verification
certificate' - if module SH1 applied

TSI ZZS:0893/1/SB/17/CCO/DE EN/2839.6

Section 3: Authorisations

Germany

3.1.2.1 Status:

Active

3.1.2.2 Validity of Authorisation (until):

3.1.2.3 Coded Restrictions:

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

1 Technical Restrictions
1.1 Minimum curve radius in meters: 100
2 Geographical Restrictions
2.1 Kinematic gauge (coding WAG TSI Annex C): G1
2.5 B-System on board: 13; 111; 113; 114; 119
3 Environmental Restrictions
3.1 Climatic zone EN50125/1999: 3.1.1 T1
1435mm / AC 15kV-16.7Hz / LZB

1 Technical Restrictions
1.1 Minimum curve radius in meters: 100
2 Geographical Restrictions
2.1 Kinematic gauge (coding WAG TSI Annex C): G1
2.5 B-System on board: 13; 111; 113; 114; 119
3 Environmental Restrictions
3.1 Climatic zone EN50125/1999: 3.1.1 T1

3.1.2.4 Non Coded Restrictions:

3.1.3.1.1 Date of the original authorisation:

2017-12-15

3.1.3.1.2 Authorisation holder:

Bombardier Transportation GmbH

3.1.3.1.3 Authorisation document reference:

DE 59 2017 1008

3.1.3.1.4 National certificate references:

3129-31tac/0
11-3110#001

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

1435mm / AC 15kV-16.7Hz / Indusi/PZB
1.0 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
2.0 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 carbody structure
- 2.1.6 Connections used between different parts of the vehicle
- 2.2 Mechanical interfaces for Endcoupling or Innercoupling
 - 2.2.3 Screw couplings
 - 2.2.4 Buffing, innercoupling and draw gear components
 - 2.2.5 Buffer marking
 - 2.2.6 Draw hook
 - 2.2.7 Gangways
- 2.3 Passive safety
- 3.0 Track interaction and gauging
 - 3.1 Vehicle gauge
 - 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
 - 3.2.4 Vertical acceleration
 - 3.3 Bogies / running gear
 - 3.3.1 Boogies
 - 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
- 4.0 Braking
 - 4.1 Functional Requirements 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 Friction brake
 - 4.7.1.2 Brake discs
 - 4.7.1.3 Brake pads
 - 4.7.2 Dynamic brake linked to traction
 - 4.7.5 Parking brake
- 4.8 Brake state and fault indication
- 4.9 Brake requirements for rescue purposes
- 6.0 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
 - 6.1.2.1 Crosswind effects
 - 6.2 Impact of the vehicle on the environment
 - 6.2.2 Limits for noise emissions
 - 6.2.2.1 Exterior noise impact
 - 6.2.2.2 Stationary noise impact
 - 6.2.2.3 Starting noise impact
 - 6.2.2.4 Pass-by noise impact
 - 6.2.3 Limits for Aerodynamic loads impact
 - 6.2.3.1 Head pressure pulses

- 6.2.3.2 Aerodynamic impact on passengers on platform
- 6.2.3.3 Aerodynamic impact on track workers
- 6.2.3.4 Ballast pick up and projection onto neighbouring property
- 7.0 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
 - 7.2.2.3 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
- 8.0 Onboard 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 over-voltages 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 onboard 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
- 8.7 Systems requiring special monitoring and protection measures
 - 8.7.2 Pressure vessel systems / pressure equipment
 - 8.7.6 Hydraulic/pneumatic control systems
- 9.0 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
 - 9.1.2 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 condition systems in driver cabs
 - 9.2.1.2 Noise in driver cabs
 - 9.2.1.3 Lighting in driver cabs
 - 9.3 Driver machine interface
 - 9.3.1 Driver machine interface
 - 9.3.1.1 Speed indication
 - 9.3.1.2 Driver's 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 cabs
 - 9.5 Equipment and other facilities onboard for staff
 - 9.5.1 Facilities onboard for staff
 - 9.5.1.1 Staff access for coupling /uncoupling
 - 9.5.1.3 Storage facilities for use by staff

- 9.5.3 On board tools and portable equipment
- 9.5.4 Audible communication system
- 9.6 Recording device
- 10.0 Fire safety and evacuation
 - 10.1 Fire safety
 - 10.1.1 Fire protection concept
 - 10.1.1.1 Classification of vehicle / Fire categories
 - 10.1.1.2 Fire protection measures
 - 10.1.1.2.1 General protection measures for vehicles
 - 10.1.1.2.2 Fire protection measures for specific kind of vehicles
 - 10.1.1.2.3 Protection of drivers cab
 - 10.1.1.2.4 Fire barriers
 - 10.1.1.2.5 Material properties
 - 10.1.1.2.6 Fire detectors
 - 10.1.1.2.7 Fire extinction equipment
 - 10.2 Emergency
 - 10.2.4 Emergency lighting
 - 12.0 On-board control command and signalling
 - 12.1 On board Radio system
 - 12.1.2 GSM-R compliant radio system
 - 12.1.2.1 Text messages
 - 12.1.2.2 Call forwarding
 - 12.1.2.3 Broadcast calls
 - 12.1.2.4 Cab-radio related functions
 - 12.1.2.5 Network selection by external trigger
 - 12.1.2.6 General purpose radio related functions
 - 12.1.2.7 Primary controller's MMI functionality
 - 12.1.2.9 Capacity of on board GSM-R
 - 12.1.2.10 GSM-R-ETCS interface
 - 12.1.2.11 Interconnection and roaming between GSM-R networks
 - 12.1.2.12 Border crossing
 - 12.1.2.13 GPRS and ASCI
 - 12.1.2.14 Interface between Rolling Stock driver's safety device, vigilance device, and GSM-R onboard assembly.
 - 12.1.2.15 Test specification for mobile equipment GSM-R
 - 12.1.2.16 Directed/automatic network selection
 - 12.1.2.17 Registration and deregistration

- 12.1.2.18 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
 - 12.2.4 ETCS cab signalling system
 - 12.2.4.1 Awakening
 - 12.2.4.2 Train categories
 - 12.2.4.3 Performance requirements for on-board GSM-R equipment related to quality of service
 - 12.2.4.4 Use of ETCS modes
 - 12.2.4.5 ETCS requirements when vehicle is driven from outside the cab
 - 12.2.4.7 Braking safety margins
 - 12.2.4.8 Reliability — Availability Requirements
 - 12.2.4.10 Ergonomic aspects of the DMI
 - 12.2.4.11 ETCS values of variables controlled outside UNISIG — Manual
 - 12.2.4.12 KM Conformance Requirements
 - 12.2.4.13 Requirements for pre-fitting ETCS on-board equipment
 - 12.2.4.14 ETCS Version Management
 - 12.2.4.15 Specification of ETCS variables
 - 12.2.4.17 Additional requirements on locomotives and multiple units
 - 12.2.4.19 Interface with service brake.
- 13.0 Specific Operational Requirements
 - 13.1 Specific items to place on-board
 - 13.2 Occupational health and safety
 - 13.3 Lifting diagram and instructions
- 1435mm / AC 15kV-16.7Hz / LZB
- 1.0 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
- 2.0 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 carbody structure
 - 2.1.6 Connections used between different parts of the vehicle
 - 2.2 Mechanical interfaces for Endcoupling or Innercoupling
 - 2.2.2 Characteristics of rescue coupling
 - 2.2.3 Screw couplings
 - 2.2.4 Buffing, innercoupling and draw gear components
 - 2.2.5 Buffer marking
 - 2.2.6 Draw hook
 - 2.2.7 Gangways
 - 2.3 Passive safety
- 3.0 Track interaction and gauging
 - 3.1 Vehicle gauge
 - 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
 - 3.2.4 Vertical acceleration
 - 3.3 Bogies / running gear
 - 3.3.1 Boogies
 - 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

- 4.0 Braking
 - 4.1 Functional Requirements 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 Friction brake
 - 4.7.1.2 Brake discs
 - 4.7.1.3 Brake pads
 - 4.7.2 Dynamic brake linked to traction
 - 4.7.5 Parking brake
 - 4.8 Brake state and fault indication
 - 4.9 Brake requirements for rescue purposes

3.1.3.1.6 Comments:

3.1.3.1 Initial Registration

3.1.2.3 Coded Restrictions:

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

1 Technical Restrictions

1.1 Minimum curve radius in meters: 100

2 Geographical Restrictions

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

2.5 B-System on board: 13; 111; 113; 114; 119

3 Environmental Restrictions

3.1 Climatic zone EN50125/1999: 3.1.1 T1

1435mm / AC 15kV-16.7Hz / LZB

1 Technical Restrictions

1.1 Minimum curve radius in meters: 100

2 Geographical Restrictions

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

2.5 B-System on board: 13; 111; 113; 114; 119

3 Environmental Restrictions

3.1 Climatic zone EN50125/1999: 3.1.1 T1

3.1.2.4 Non Coded Restrictions:

3.1.3.1.1 Date of the original authorisation:

2017-12-15

3.1.3.1.2 Authorisation holder:

Bombardier Transportation GmbH

3.1.3.1.3 Authorisation document reference:

DE 59 2017 1008

3.1.3.1.4 National certificate references:

3129-31tac/0
11-3110#001

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

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

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

2.0 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 carbody structure

2.1.6 Connections used between different parts of the vehicle

2.2 Mechanical interfaces for Endcoupling or Innercoupling

2.2.3 Screw couplings

- 2.2.4 Buffing, innercoupling and draw gear components
- 2.2.5 Buffer marking
- 2.2.6 Draw hook
- 2.2.7 Gangways
- 2.3 Passive safety
- 3.0 Track interaction and gauging
- 3.1 Vehicle gauge
- 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
 - 3.2.4 Vertical acceleration
- 3.3 Bogies / running gear
 - 3.3.1 Boogies
 - 3.3.2 Wheelset (Axle + wheels)
 - 3.3.3 Wheel
- 1.2 Maintenance instructions and requirements
- 1.1 General documentation
- 1.0 General documentation
- 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
- 4.0 Braking
 - 4.1 Functional Requirements 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 Friction brake
 - 4.7.1.2 Brake discs
 - 4.7.1.3 Brake pads
 - 4.7.2 Dynamic brake linked to traction
 - 4.7.5 Parking brake
- 4.8 Brake state and fault indication
- 4.9 Brake requirements for rescue purposes
- 6.0 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
 - 6.1.2.1 Crosswind effects
- 6.2 Impact of the vehicle on the environment
 - 6.2.2 Limits for noise emissions
 - 6.2.2.1 Exterior noise impact
 - 6.2.2.2 Stationary noise impact
 - 6.2.2.3 Starting noise impact
 - 6.2.2.4 Pass-by noise impact
 - 6.2.3 Limits for Aerodynamic loads impact
 - 6.2.3.1 Head pressure pulses
 - 6.2.3.2 Aerodynamic impact on passengers on platform
 - 6.2.3.3 Aerodynamic impact on track workers
 - 6.2.3.4 Ballast pick up and projection onto neighbouring property

7.0 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

7.2.2.3 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

8.0 Onboard 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 over-voltages 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 onboard 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

8.7 Systems requiring special monitoring and protection measures

8.7.2 Pressure vessel systems / pressure equipment

- 8.7.6 Hydraulic/pneumatic control systems
- 9.0 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
 - 9.1.2 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 condition systems in driver cabs
 - 9.2.1.2 Noise in driver cabs
 - 9.2.1.3 Lighting in driver cabs
- 9.3 Driver machine interface
 - 9.3.1 Driver machine interface
 - 9.3.1.1 Speed indication
 - 9.3.1.2 Driver's 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 cabs
- 9.5 Equipment and other facilities onboard for staff
 - 9.5.1 Facilities onboard for staff
 - 9.5.1.1 Staff access for coupling /uncoupling
 - 9.5.1.3 Storage facilities for use by staff
 - 9.5.3 On board tools and portable equipment
 - 9.5.4 Audible communication system
- 9.6 Recording device
- 10.0 Fire safety and evacuation
- 10.1 Fire safety

- 10.1.1 Fire protection concept
 - 10.1.1.1 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 drivers 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
 - 10.2.4 Emergency lighting
- 12.0 On-board control command and signalling
 - 12.1 On board Radio system
 - 12.1.2 GSM-R compliant radio system
 - 12.1.2.1 Text messages
 - 12.1.2.2 Call forwarding
 - 12.1.2.3 Broadcast calls
 - 12.1.2.4 Cab-radio related functions
 - 12.1.2.5 Network selection by external trigger
 - 12.1.2.6 General purpose radio related functions
 - 12.1.2.7 Primary controller's MMI functionality
 - 12.1.2.9 Capacity of on board GSM-R
 - 12.1.2.10 GSM-R-ETCS interface
 - 12.1.2.11 Interconnection and roaming between GSM-R networks
 - 12.1.2.12 Border crossing
 - 12.1.2.13 GPRS and ASCI
 - 12.1.2.14 Interface between Rolling Stock driver's safety device, vigilance device, and GSM-R onboard assembly.
 - 12.1.2.15 Test specification for mobile equipment GSM-R
 - 12.1.2.16 Directed/automatic network selection
 - 12.1.2.17 Registration and deregistration
 - 12.1.2.18 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
- 12.2.4 ETCS cab signalling system
 - 12.2.4.1 Awakening
 - 12.2.4.2 Train categories
 - 12.2.4.3 Performance requirements for on-board GSM-R equipment related to quality of service
 - 12.2.4.4 Use of ETCS modes
 - 12.2.4.5 ETCS requirements when vehicle is driven from outside the cab
 - 12.2.4.7 Braking safety margins
 - 12.2.4.8 Reliability — Availability Requirements
 - 12.2.4.10 Ergonomic aspects of the DMI
 - 12.2.4.11 ETCS values of variables controlled outside UNISIG — Manual
 - 12.2.4.12 KM Conformance Requirements
 - 12.2.4.13 Requirements for pre-fitting ETCS on-board equipment
 - 12.2.4.14 ETCS Version Management
 - 12.2.4.15 Specification of ETCS variables
 - 12.2.4.17 Additional requirements on locomotives and multiple units
 - 12.2.4.19 Interface with service brake.
- 13.0 Specific Operational Requirements
 - 13.1 Specific items to place on-board
 - 13.2 Occupational health and safety
 - 13.3 Lifting diagram and instructions
- 1435mm / AC 15kV-16.7Hz / LZB
- 1.0 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
- 2.0 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 carbody structure
 - 2.1.6 Connections used between different parts of the vehicle
- 2.2 Mechanical interfaces for Endcoupling or Innercoupling
 - 2.2.2 Characteristics of rescue coupling
 - 2.2.3 Screw couplings
 - 2.2.4 Buffing, innercoupling and draw gear components
 - 2.2.5 Buffer marking
 - 2.2.6 Draw hook
 - 2.2.7 Gangways
- 2.3 Passive safety
- 3.0 Track interaction and gauging
 - 3.1 Vehicle gauge
 - 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
 - 3.2.4 Vertical acceleration
 - 3.3 Bogies / running gear
 - 3.3.1 Boogies
 - 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
- 4.0 Braking
 - 4.1 Functional Requirements 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 Friction brake
 - 4.7.1.2 Brake discs
 - 4.7.1.3 Brake pads
 - 4.7.2 Dynamic brake linked to traction
 - 4.7.5 Parking brake
- 4.8 Brake state and fault indication
- 4.9 Brake requirements for rescue purposes

Poland

3.2.2.1 Status:	Active
3.2.2.2 Validity of Authorisation (until):	
3.2.2.3 Coded Restrictions:	
3.2.2.4 Non Coded Restrictions:	<p>1435mm / DC 3kV / Level 2</p> <p>Vehicle cannot be operated with ETCS on railway network in Poland.</p> <p>1435mm / DC 3kV / SHP</p> <p>Vehicle cannot be operated with ETCS on railway network in Poland.</p>
3.2.3.1.1 Date of the original authorisation:	2018-03-30
3.2.3.1.2 Authorisation holder:	Bombardier Transportation GmbH
3.2.3.1.3 Authorisation document reference:	PL 51 2018 0046
3.2.3.1.4 National certificate references:	

OR-11348

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

1435mm / DC 3kV / SHP

1.0 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

12.1.1 NON GSM-R radio system

12.2.1 National on board signalling systems

Additional authorisation given on basis of first authorisation in Germany.

3.2.3.1.6 Comments:

3.2.3.1 Initial Registration

3.2.2.3 Coded Restrictions:

3.2.2.4 Non Coded Restrictions:

1435mm / DC 3kV / Level 2

Vehicle cannot be operated with ETCS on railway network in Poland.

1435mm / DC 3kV / SHP

Vehicle cannot be operated with ETCS on railway network in Poland.

3.2.3.1.1 Date of the original authorisation:

2018-03-30

3.2.3.1.2 Authorisation holder:

Bombardier Transportation GmbH

3.2.3.1.3 Authorisation document reference:

PL 51 2018 0046

3.2.3.1.4 National certificate references:

OR-11348

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

1435mm / DC 3kV / SHP

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

12.1.1 NON GSM-R radio system
12.2.1 National on board signalling systems
1.2 Maintenance instructions and requirements
1.1 General documentation
1.0 General documentation
Additional authorisation given on basis of first authorisation in Germany.

3.2.3.1.6 Comments:

The Netherlands

3.3.2.1 Status:

Active

3.3.2.2 Validity of Authorisation (until):

3.3.2.3 Coded Restrictions:

1435mm / AC 25kV-50Hz / Level 2

1 Technical Restrictions
1.1 Minimum curve radius in meters: 100
1.3 Speed restrictions in Km/h (Marked on wagons and coaches but not marked on locos): 140
2 Geographical Restrictions
2.1 Kinematic gauge (coding WAG TSI Annex C): G1; (GI2 bottom of the vehicle)
2.4 ERTMS A on board: True
2.5 B-System on board: ATB
3 Environmental Restrictions
3.1 Climatic zone EN50125/1999: 3.1.1 T1

1435mm / DC 1.5kV / ATB

1 Technical Restrictions
1.1 Minimum curve radius in meters: 100
1.3 Speed restrictions in Km/h (Marked on wagons and coaches but not marked on locos): 140
2 Geographical Restrictions
2.1 Kinematic gauge (coding WAG TSI Annex C): G1
2.4 ERTMS A on board: True
2.5 B-System on board: ATB
3 Environmental Restrictions
3.1 Climatic zone EN50125/1999: 3.1.1 T1

3.3.2.4 Non Coded Restrictions:

1435mm / AC 25kV-50Hz / Level 2
Betuweroute A15 ERTMS Baseline 2, SRS 2.3.0d, Level 2: toegestaan
Betuweroute Havenspoorlijn ERTMS Baseline 2, SRS 2.3.0d, Level 1: toegestaan

Betuweroute Maasvlakte II en Kijfhoek ERTMS
Baseline 2, SRS 2.3.0d, Level 1: toegestaan

Amsterdam-Utrecht ERTMS Baseline 2, SRS 2.3.0d,
Level 2: toegestaan

Hanzelijn ERTMS Baseline 2, SRS 2.3.0d, Level 2:
toegestaan

Use in multiple operation (maximum number of
trainsets authorised to be coupled together to
operate as a single train): 2 locomotieven

Baanvakbeladingsklasse: D2

De locomotieven mogen niet over railremmen of
andere actieve rangeer- en reminrichtingen rijden

Minimum wieldiameter: 1.230 mm

Maximaal verkantingstekort: 150 mm

Maximale equivalente coniciteit van wiel en
spoorstaaf: < 0,8

Vmax op spoorweginfrastructuur voorzien van 25
kV AC: 120 km/h

1435mm / DC 1.5kV / ATB

sporen voorzien van ATB: onder ATB-EG en ATBvv
toegestaan

grensbaanvak Oldenzaal – Bad Bentheim:
toegestaan

grensbaanvak Venlo – Kaldenkirchen: toegestaan

Use in multiple operation (maximum number of
trainsets authorised to be coupled together to
operate as a single train): 2 locomotieven

Baanvakbeladingsklasse: D2

De locomotieven mogen niet over railremmen of
andere actieve rangeer- en reminrichtingen rijden

Minimum wieldiameter: 1.230 mm

Maximaal verkantingstekort: 150 mm

Maximale equivalente coniciteit van wiel en
spoorstaaf: < 0,8

Vmax bij multiple tractie indien de binnenste
stroomafnemers op staan: 120 km/h

3.3.3.1.1 Date of the original authorisation:

2018-05-09

3.3.3.1.2 Authorisation holder:

Bombardier Transportation GmbH

3.3.3.1.3 Authorisation document reference:

NL5120180025

3.3.3.1.4 National certificate references:

ILT-2018/264

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

1435mm / AC 25kV-50Hz / Level 2

0.0 None

Ricardo Certification B.V., DeBo Technisch dossier "TRAXX F140 MS VRO9.3, Varianten KF10, KG10 en KH10" met kenmerk TCC/JdG/50037/03-682187 (versie 3.0) d.d. 01-05-2018, Hoofdstuk 3 "Gebruiksvoorwaarden voor het subsysteem"

3.3.3.1.6 Comments:

3.3.3.1 Initial Registration

3.3.2.3 Coded Restrictions:

1435mm / AC 25kV-50Hz / Level 2

1 Technical Restrictions

1.1 Minimum curve radius in meters: 100

1.3 Speed restrictions in Km/h (Marked on wagons and coaches but not marked on locos): 140

2 Geographical Restrictions

2.1 Kinematic gauge (coding WAG TSI Annex C): G1; (GI2 bottom of the vehicle)

2.4 ERTMS A on board: True

2.5 B-System on board: ATB

3 Environmental Restrictions

3.1 Climatic zone EN50125/1999: 3.1.1 T1

1435mm / DC 1.5kV / ATB

1 Technical Restrictions

1.1 Minimum curve radius in meters: 100

1.3 Speed restrictions in Km/h (Marked on wagons and coaches but not marked on locos): 140

2 Geographical Restrictions

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

2.4 ERTMS A on board: True

2.5 B-System on board: ATB

3 Environmental Restrictions

3.1 Climatic zone EN50125/1999: 3.1.1 T1

3.3.2.4 Non Coded Restrictions:

1435mm / AC 25kV-50Hz / Level 2

Betuwerroute A15 ERTMS Baseline 2, SRS 2.3.0d, Level 2: toegestaan

Betuwerroute Havenspoorlijn ERTMS Baseline 2, SRS 2.3.0d, Level 1: toegestaan

Betuwerroute Maasvlakte II en Kijfhoek ERTMS Baseline 2, SRS 2.3.0d, Level 1: toegestaan

Amsterdam-Utrecht ERTMS Baseline 2, SRS 2.3.0d, Level 2: toegestaan

Hanzelijn ERTMS Baseline 2, SRS 2.3.0d, Level 2: toegestaan

Use in multiple operation (maximum number of trainsets authorised to be coupled together to operate as a single train): 2 locomotieven

Baanvakbeladingsklasse: D2

De locomotieven mogen niet over railremmen of andere actieve rangeer- en reminrichtingen rijden

Minimum wieldiameter: 1.230 mm

Maximaal verkantingstekort: 150 mm

Maximale equivalente coniciteit van wiel en spoorstaaf: < 0,8

Vmax op spoorweginfrastructuur voorzien van 25 kV AC: 120 km/h

1435mm / DC 1.5kV / ATB

sporen voorzien van ATB: onder ATB-EG en ATBvv toegestaan

grensbaanvak Oldenzaal – Bad Bentheim: toegestaan

grensbaanvak Venlo – Kaldenkirchen: toegestaan

Use in multiple operation (maximum number of trainsets authorised to be coupled together to operate as a single train): 2 locomotieven

Baanvakbeladingsklasse: D2

De locomotieven mogen niet over railremmen of andere actieve rangeer- en reminrichtingen rijden

Minimum wieldiameter: 1.230 mm

Maximaal verkantingstekort: 150 mm

Maximale equivalente coniciteit van wiel en spoorstaaf: < 0,8

Vmax bij multiple tractie indien de binnenste stroomafnemers op staan: 120 km/h

3.3.3.1.1 Date of the original authorisation:

2018-05-09

3.3.3.1.2 Authorisation holder:

Bombardier Transportation GmbH

3.3.3.1.3 Authorisation document reference:

NL5120180025

3.3.3.1.4 National certificate references:

ILT-2018/264
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3.3.3.1.5 Parameters for which conformity to applicable national rules has been assessed:

1435mm / AC 25kV-50Hz / Level 2

0.0 None

3.3.3.1.6 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	Level 2
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4.13.1.2 ETCS baseline.version (x.y). If the version is not fully compatible it shall be indicated in brackets	2.0 (2.3.0d)
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4.13.1.3 ETCS on-board equipment for reception of infill-function information via loop or GSM-R	loop
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4.13.1.4 ETCS national applications implemented (NID_XUSER of Packet 44)	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)	ATB Indusi/PZB LZB SHP MIREL VZ1
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4.13.1.6 Special conditions implemented on-board to switch over between different train protection control and warning systems.	None
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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				
4.13.2.3 Class B or other radio systems installed (system and if applicable version)		Kolibri FM 2-70				
4.13.2.4 Special conditions implemented on-board to switch over between different radio systems.		None				
4.10.1 Energy supply system		AC 25kV-50Hz AC 15kV-16.7Hz DC 3kV DC 1.5kV				
4.10.2 Maximum power (to be indicated for each energy supply system the vehicle is equipped for)	AC 15kV-16.7Hz	5600	kW			
	AC 25kV-50Hz	5600	kW			
	DC 1.5kV	4000	kW			
	DC 3kV	5600	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	900	A			
	AC 25kV-50Hz	800	A			
	DC 1.5kV	4000	A			
	DC 3kV	3000	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	0004.51	m	0006.49	m	
	AC 25kV-50Hz	0004.51	m	0006.49	m	
	DC 1.5kV	0004.80	m	0005.75	m	
	DC 3kV	0004.47	m	0006.67	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	1950	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	1
	DC 3kV	1
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 additive material
	DC 3kV	Carbon with additive material
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	140	km/h
	1435mm / AC 15kV-16.7Hz / Level 2	140	km/h
	1435mm / AC 15kV-16.7Hz / LZB	140	km/h
	1435mm / AC 25kV-50Hz / ATB	140	km/h
	1435mm / AC 25kV-50Hz / Indusi/PZB	140	km/h
	1435mm / AC 25kV-50Hz / Level 2	140	km/h
	1435mm / AC 25kV-50Hz / LZB	140	km/h
	1435mm / AC 25kV-50Hz / MIREL VZ1	160	km/h
	1435mm / DC 1.5kV / ATB	140	km/h
	1435mm / DC 1.5kV / MIREL VZ1	160	km/h
	1435mm / DC 3kV / ATB	140	km/h
	1435mm / DC 3kV / MIREL VZ1	160	km/h
	1435mm / DC 3kV / SHP	140	km/h

4.1.4 Conditions of use regarding train formation

Vehicle to be used in general operation

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 / Level 2	2	
	1435mm / AC 15kV-16.7Hz / LZB	2	
	1435mm / AC 25kV-50Hz / ATB	2	
	1435mm / AC 25kV-50Hz / Indusi/PZB	2	
	1435mm / AC 25kV-50Hz / Level 2	2	
	1435mm / AC 25kV-50Hz / LZB	2	
	1435mm / AC 25kV-50Hz / MIREL VZ1	2	
	1435mm / DC 1.5kV / MIREL VZ1	2	
	1435mm / DC 3kV / ATB	2	
1435mm / DC 3kV / MIREL VZ1	2		
1435mm / DC 3kV / SHP	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		L of EN12663-1:2010	
4.2.1 Vehicle kinematic gauge (interoperable gauge)		G1	
4.3.1 Temperature range		T1 (-25 to +40) according to EN 50125-1:1999 a	
		-30 to +40 (extended T1)	
4.3.2 Altitude range		A1	
4.3.3 Snow ice and hail conditions		nominal with snow deflector	
4.4.1 Fire safety category		B	
4.5.2 Design mass			
4.5.2.1 Design mass in working order	84194		kg

4.5.2.2 Design mass under normal payload		84194	kg
4.5.2.3 Design mass under exceptional payload		84194	kg
4.5.3 Static axle load			
4.5.3.1 Static axle load in working order		21263	kg
4.5.3.2 Static axle load under normal payload/ maximum payload for freight wagons		21263	kg
4.5.3.3 Static axle load under exceptional payload		21263	kg
4.5.4 Quasi-static guiding force (if exceeds the limit defined in TSI or not defined in the TSI)	1435mm	68.96	kN
4.6.1 Cant deficiency (maximum uncompensated lateral acceleration) for which the vehicle has been assessed	1435mm	150	mm
4.6.2 Vehicle equipped with a cant deficiency compensation system ("tilting vehicle")		False	
4.7.1 Maximum train deceleration		1.5	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 of (80 km/h, 21‰ (mm/m), 46 km)	
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)		40	‰ (mm/m)
4.7.4.1 Eddy current brake			

4.7.4.1.1 Eddy current brake fitted	False		
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	18.9	m	
4.8.2 Minimum in-service wheel diameter	1170	mm	
4.8.4 Minimum horizontal curve radius capability	100	m	
4.8.5 Minimum vertical convex curve radius capability	250	m	
4.8.6 Minimum vertical concave curve radius capability	300	m	
4.8.8 Suitability for transport on ferries	False		
4.9.1 Type of end coupling (indicating tensile and compressive forces)	Manual		
4.9.2 Axle bearing condition monitoring (hot axles box detection)	Detectable by line side		
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))	83	dB(A)	

4.11.2 Pass-by noise level was measured under reference conditions	True			
4.11.3 Stationary noise level (dB(A))	70	dB(A)		
4.11.4 Starting noise level (dB(A))	84	dB(A)		
4.14.1 Type of train detection systems for which the vehicle has been designed and assessed	track circuits axle counters			
4.14.2 Detailed vehicle characteristics related to compatibility with train detection systems				
4.14.2.1 Maximum distance between consecutive axles	7790	mm		
4.14.2.2 Minimum distance between consecutive axles	2600	mm		
4.14.2.3 Distance between the first and the last axle	12990	mm		
4.14.2.4 Maximum length of the vehicle nose	2955	mm		
4.14.2.5 Minimum wheel rim width	139	mm		
4.14.2.6 Minimum wheel diameter	1170	mm		
4.14.2.7 Minimum flange thickness	26	mm		
4.14.2.8 Minimum flange height	28	mm		
4.14.2.9 Maximum flange height	36	mm		
4.14.2.10 Minimum axle load	20829	t		
4.14.2.12 Wheel material is ferromagnetic	True			
4.14.2.13 Maximum sanding output	000500.000	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

0.01

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

1,3 Ohm for 75 Hz (1,5 kV)

2,5 Ohm for 50 Hz (3 kV)

AC 25kV-50Hz

1,3 Ohm for 75 Hz (1,5 kV)

2,5 Ohm for 50 Hz (3 kV)

DC 1.5kV

1,3 Ohm for 75 Hz (1,5 kV)

2,5 Ohm for 50 Hz (3 kV)

DC 3kV

1,3 Ohm for 75 Hz (1,5 kV)

2,5 Ohm for 50 Hz (3 kV)