



CRR-G-033-C

Guideline for Application for Acceptance of New Light Rail Works

Guidance for CRR Inspectors and Railway Organisations

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Contents

1. Introduction.....	3
2. Independent Professional Review (IPR).....	3
3. Further Clarification.....	3
4. Annexes.....	3
Annex 1	5

1. Introduction

This Guideline shall be read in conjunction with the CRR ***Guideline for the Application for Acceptance for New Light Rail Works or New Light Rail Rolling Stock (CRR-G-032-B)***.

It provides:

The List of Parameters to be considered during AFA for Light Rail Works (refer to Annex I).

Should any aspect of a specific project not be integrating into the Parameters listed in the matrix, it is expected that the matrix (Annex I) is amended accordingly on project level.

2. Independent Professional Review (IPR)

The CRR requires the project to apply the methodologies given in CRR ***Guideline for the Application for Acceptance for New Light Rail Works or New Light Rail Rolling Stock (CRR-G-032-B)***.

The following parameter scopes require independent professional review:

- Fixed installations Train Command / Control / Signalling Equipment
- Tunnels and Underground structures
- Fire Safety Concept and Concept of Evacuation (within various parameters)
- Platform screen doors

The IPR shall be performed under the scope of accreditation to ISO 17020 Type A.

The work carried out by the independent professional shall be covered by a retrievable report. The report shall include all the results of examinations and the determination of conformity made from these results as well as all information needed to understand and interpret them. All this information shall be reported correctly, accurately, and clearly.

The full range of independent professional reviews may be carried out by a single organisation, or each individual review can be carried out by a different organisation. In each case, the requirement for independence of the reviewing organisation must be respected at all times.

3. Further Clarification

Further clarification on these Guidelines can be sought from the CRR.

4. Annexes

CRR-G-033-C Annex1

Annex 1

Parameter Number	Parameter
01.00	General Information on project scope
01.01	Summary of General Arrangement and Type and Purpose of Project (e.g. Line, kilometre points/ section, project boundary, location/ class/ type/length of: track, switches, crossings, max speed, train frequency, stops, platforms, structures, type of RST, RST-depots, freight hubs, permitted paths, stabling tracks, etc.)
01.02	Declaration of intended design life for each aspect of the project
01.03	Absence and/or control of hazardous materials during installation, operation, maintenance, de-commissioning. At min. declaration on absence of Asbestos, PCB, radioactive material (e.g. inside ionising smoke detectors), mercury.
01.04	Resistance to environmental factors (e.g. ranges for temperature, moisture, snow level, water level, etc.)
01.05	Fixed aspect track side: non CCT boards / foul point markers (retroreflective properties, design, size, etc.)
01.06	Mechanical enclosure, tamper / vandalism protection / Road vehicle containment (for powered systems, track, tunnels, control facilities, local interlockings, etc.)
01.07	Locking arrangement, access control, intrusion detection to safety related equipment, appropriate tamper protection for all parameters (including mechanical enclosure, locking arrangements, access management, intrusion detection, CCTV, etc.)
01.08	Overall Works fire safety concept and concept of evacuation (e.g. Emergency Plan, performance evaluation, fire barriers, emergency equipment (fire extinguishers, first aid equipment, etc.), integration of the individual concepts for the various parameters (Light Rail Rolling Stock concepts, tunnel/ underground structures concept, powered system concepts, station concepts, etc.))
02.00	Light rail Integration
02.01	Provisions for line of sight driving (sight lines (landscaping), separation from other traffic, etc.)
02.02	Transition between segregated and shared alignment
02.03	Shared running / intersections with other traffic (e.g. pedestrians, pedestrian zones, cyclists, road, light-rail, rail, protection equipment/arrangements, signage)
02.04	Level crossings (e.g. layout, signage, signalling)
02.05	Management of frontages and access / crossing requirements
02.06	Management of public utilities (including ducts, chambers, cabinets, etc.)
02.07	Emergency access / egress, evacuation concept for alignment
02.08	Access control to light rail alignment or equipment
02.09	Boundary works
02.10	Lighting of alignment

03.00	Light-Rail Clearance (all values to include nominal values and maintenance tolerances)
03.01	Determination on gauging concept (kinematic / dynamic), associated gauges and calculation rules
03.02	Electrical clearance concept (pantograph, shoe-gear, etc.)
03.03	Enlarged clearance between light-rail and structures, landscape, other traffic, etc.
03.04	Clearances on shared running (road, light-rail, heavy-rail)
03.05	Clearances for maintenance walkways, access roads parallel to the track
04.00	Track Alignment (all values to include nominal values and maintenance tolerances)
04.01	Determination of track alignment concept (including: maximum gradients, minimum radii of horizontal and vertical curves, geometric limits of reverse curves, maximum speeds in combination with permitted cant deficiencies, maximum cant, check rails, guard rails, grooved rail, flange running, unguided length of fixed obtuse crossings, etc.) --> must be evaluated in conjunction with parameters on Clearance and Guidance Function
04.02	Fixed and variable signage (distance markers, foul point markers, line speed, turnout routing, end of line, etc.)
05.00	Track
05.01	Axle load, Meter Load
05.02	Rail head profile, Rail inclination
05.03	Rail hardness
05.04	Rail fastening systems (static longitudinal loads, dynamic loads, application and repair-concepts)
05.05	Track sleepers (geometry, resistance to applied loads, permitted combinations with rail, rail inclination, rail fastening systems, permitted axle loads, permitted bending moments)
05.06	Slab track systems (geometry, resistance to applied loads, permitted combinations with rail, rail inclination, rail fastening systems, permitted axle loads, permitted bending moments)
05.07	Nominal track gauge and tolerances (including turnouts, grooved rails, checkrails, guard rails)
05.08	Nominal cross level and tolerances (cant, Rate of change of cant, permitted cant deficiency (plain track, switches, crossings, abrupt change of cant deficiency in switches, etc.)
05.09	Equivalent conicity - design limits (for speeds above 60km/h)
05.10	Drainage
05.11	Derailment containment or alternatives (Adequate derailment containment on all bridges and structures and elsewhere where the consequences of derailment would result in a significant hazard)
06.00	Switches, crossings, expansion devices, derailment devices (all values to include nominal values and tolerances)
06.01	Switches and crossings: Location, layout, geometry of switches and crossings (avoidance in tunnels / on bridges / in areas with public access)
06.02	Derailment devices (derailers): Location, layout, geometry (prohibition on bridges, embankments, avoidance in tunnels), free space as required

06.03	Switches and crossings and Derailment devices (derailers): Means of switching and locking after switching
06.04	Expansion devices: Location, layout, geometry
07.00	Structures
07.01	General parameter for any new or modified structures: Vertical loading for earthworks and earth pressure effects
07.02	General parameter for any new or modified structures: Fire safety and evacuation for any structures (fire protection of powered systems, emergency access and egress, emergency water supply, emergency communication between control and local staff, etc.)
07.03	General parameter for any new or modified structures: Noise and vibration suppression
07.04	New bridges/viaducts over the railway or other new structures over or adjacent to track: Resistance of sub structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, etc.)
07.05	New bridges/viaducts over the railway or other new structures over or adjacent to track: Resistance of super structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, etc.)
07.06	New bridges/viaducts over the railway or other new structures over or adjacent to track: Parapet containment
07.07	New bridges/viaducts over the railway or other new structures over or adjacent to track: Nominal parapet height + OCS protection
07.08	New bridges/viaducts over the railway or other new structures over or adjacent to track: Safety barriers on approach and exit
07.09	New bridges/viaducts over the railway or other new structures over or adjacent to track: Resistance of supports to rail vehicle impact
07.10	New bridges/viaducts over the railway or other new structures over or adjacent to track: Provisions for maintenance
07.11	New bridges/viaducts over the railway or other new structures over or adjacent to track: Drainage
07.12	Modification of existing bridges/viaducts or other structures over or adjacent to the track: Resistance of sub structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, derailment containment, etc.)
07.13	Modification of existing bridges/viaducts or other structures over or adjacent to the track:Resistance of super structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, derailment containment, etc.)
07.14	Modification of existing bridges/viaducts or other structures over or adjacent to the track: Parapet containment

07.15	Modification of existing bridges/viaducts or other structures over or adjacent to the track: Nominal parapet height + OCS protection
07.16	Modification of existing bridges/viaducts or other structures over or adjacent to the track: Safety barriers on approach and exit
07.17	Modification of existing bridges/viaducts or other structures over or adjacent to the track: Resistance of supports to rail vehicle impact (supports must be so dimensioned that they remain stable in the event of a vehicle colliding with them, otherwise should a support be destroyed, the rest of the structure must be able to support the loads imposed on it)
07.18	Modification of existing bridges/viaducts or other structures over or adjacent to the track: Provisions for maintenance
07.19	Modification of existing bridges/viaducts or other structures over or adjacent to the track: Drainage
07.20	New bridges/viaducts or other structures under the railway: Resistance of sub structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, derailment containment, etc.) (Endangered supports should be dimensioned so that they remain stable in the event of a vehicle colliding with them, otherwise should a support be destroyed, the rest of the structure should be able to support the loads imposed on it.)
07.21	New bridges/viaducts or other structures under the railway: Resistance of super structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, derailment containment, etc.) (Endangered supports should be dimensioned so that they remain stable in the event of a vehicle colliding with them, otherwise should a support be destroyed, the rest of the structure should be able to support the loads imposed on it.)
07.22	New bridges/viaducts or other structures under the railway: Resistance of structures, sub/super to fixtures (e.g. OCS support, signals, inspection walkway)
07.23	New bridges/viaducts or other structures under the railway: Derailment containment
07.24	New bridges/viaducts or other structures under the railway: Provision of walkway/handrails/access
07.25	New bridges/viaducts or other structures under the railway: Head room for public road bridges
07.26	New bridges/viaducts or other structures under the railway: Provisions for maintenance
07.27	New bridges/viaducts or other structures under the railway: Drainage
07.28	Modification of existing bridges/viaducts or other structures under the railway: Resistance of sub structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, derailment containment, etc.)

	(Endangered supports should be dimensioned so that they remain stable in the event of a vehicle colliding with them, otherwise should a support be destroyed, the rest of the structure should be able to support the loads imposed on it.)
07.29	Modification of existing bridges/viaducts or other structures under the railway: Resistance of super structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, derailment containment, etc.) (Endangered supports should be dimensioned so that they remain stable in the event of a vehicle colliding with them, otherwise should a support be destroyed, the rest of the structure should be able to support the loads imposed on it.)
07.30	Modification of existing bridges/viaducts or other structures under the railway: Resistance of structures, sub/super to fixtures (e.g. OCS support, signals, inspection walkway)
07.31	Modification of existing bridges/viaducts or other structures under the railway: Derailment containment
07.32	Modification of existing bridges/viaducts or other structures under the railway: Provision of walkway/handrails/access
07.33	Modification of existing bridges/viaducts or other structures under the railway: Head room for public road bridges
07.34	Modification of existing bridges/viaducts or other structures under the railway: Provisions for maintenance
07.35	Modification of existing bridges/viaducts or other structures under the railway: Drainage
07.36	Embankments/Cuttings: Resistance to vertical loading and earth pressure effects or other applied loads
07.37	Embankments/Cuttings: Drainage
07.38	Embankments/Cuttings: Protection of track from falling material, road vehicles etc.
07.39	Embankments/Cuttings: Provisions for maintenance
07.40	Retaining Walls: Resistance to vertical loading and earth pressure effects or other applied loads
07.41	Retaining Walls: Parapet/handrail details/vehicle containment/protection of track from falling material, road vehicles etc.
07.42	Retaining Walls: Provisions for maintenance

07.43	Retaining Walls: Drainage
08.00	Tunnels and Underground structures (including lines, stations, stabling, etc.)
08.01	Resistance of structures to relevant loads (vertical, buoyancy, traction/braking forces, resulting track twist, derailment containment, pressure variations, etc.) (Endangered supports should be dimensioned so that they remain stable in the event of a vehicle colliding with them, otherwise should a support be destroyed, the rest of the structure should be able to support the loads imposed on it.)
08.02	Resistance of structure to exceptional loads (tunnel fire, flooding, etc.)
08.03	Water proofing, Drainage
08.04	Walkways for operation, evacuation or maintenance (additional clearances, handholds...)
08.05	Ventilation, prevention of unacceptable piston effects
08.06	Fire safety and evacuation concept for tunnels and underground structures (fire performance test reports on combustible material (including e.g. electrical equipment), fire protection of fitted powered systems, cross-links between parallel tunnels, emergency access and egress, emergency power supply, emergency water supply, emergency communication between control and persons in tunnel/underground structure, ventilation management, smoke extraction, fire detection/ suppression systems, etc.)
08.07	Floodgates, fire separations, interfaces to signalling systems
08.08	Provisions for maintenance
09.00	Stations, Stops
09.01	General arrangement (location, dimensions, access/egress concept, planning criteria, passenger capacity, design-concepts, provisions for PRM, etc.)
09.02	Lighting (platforms, other areas)
09.03	Access and egress (doors, tactile guidance concept, normal and emergency)
09.04	Parking facilities for PRM
09.05	Toilet facilities
09.06	Transparent obstacles (windows, doors, etc.)
09.07	Furniture and free-standing devices
09.08	Ticketing, Ticket Control and Customer Assistance Points
09.09	Signage/Information: Visual information, Tactile Information, Audible information, Spoken Information, Passenger Information System (PIS)
09.10	Fire safety and evacuation concept for stations/stops (fire performance test reports on combustible material (including e.g. electrical equipment), fire protection of fitted powered systems, emergency access and egress, emergency power supply, emergency water supply, emergency communication between control and persons in stations/stops, ventilation management, smoke extraction, fire detection / alarm / suppression systems, etc.)
09.11	Escalators, lifts, travellers
09.12	Pedestrian Footways & Crossings

09.13	Fencing / Guidance of Passengers
09.14	Steps, ramps, landings and handrails
09.15	Drainage
09.16	Provisions for maintenance
10.00	Platforms
10.01	General guidance (including platform surface, edge identification, end identification and length of platform)
10.02	Platform height, width, clearances
10.03	Overhead clearances at platforms
10.04	Steps, ramps, landings and handrails
10.05	Drainage
10.06	Provisions for maintenance
11.00	Platform Screen Doors
11.01	General concept (door height, width, etc.)
11.02	Structural design (pressure effects, passenger crowding, abuse, etc.)
11.03	Emergency access / egress, evacuation concept (also in case of misaligned vehicles, etc.)
11.04	Protection of passengers from moving parts / obstacle detection
11.05	Provisions for maintenance
12.00	Powered Systems (systems which use, generate, store, distribute power)
12.01	Electrical equipment other than traction (protection against electric shock, isolation devices, MCB ratings, mechanical and electrical protection (e.g. surge/lightning protection, overload protection), storage devices, etc.)
12.02	Electrical Batteries/Capacitors other than traction (protection against electric shock, load shedding to support emergency power, battery box ventilation, protection, isolation devices, voltage ranges in reception or re-generation, lightning protection, etc.)
12.03	Electric traction power equipment (protection against electric shock, national grid feed, transformers, rectifiers, substations, feeders, isolation devices, equipment design, mechanical and electrical protection (e.g. overload protection), electrical interface, switching and control, regenerative braking interface, return path, voltage ranges in reception or re-generation, surge/lightning protection, etc.)
12.04	Electric Traction Power Batteries / Capacitors (protection against electric shock, isolation devices, ventilation, mechanical and electrical protection (e.g. surge protection, overload protection), isolation devices, emergency discharge, etc.)
12.05	Earthing / electrical bonding / return current
12.06	EMC & harmonics: Overall concept including any electric powered system, compatibility with operating environment, signalling system, other railways, incl. special locations / fault conditions
12.07	Pneumatic systems (isolation devices, air supply, protection, filtering, etc.)
12.08	Hydraulic systems (isolation devices, ventilation, protection, filtering, etc.)
12.09	Thermomechanical combustion engines, fuel system, power train (isolation devices, ventilation, protection, filtering, etc.)
12.10	Other powered systems (isolation devices, ventilation, protection, filtering,

	etc.)
12.11	Fire Safety of Powered Systems (material properties, test reports, fire detection, fire suppression, fire compartments, etc.)
13.00	Traction Power Supply Conductor, Current Return (Overhead Contact Line, Third Rail, Charge Points, etc.)
13.01	Nominal values and permitted limits of speed, current, voltage, frequency, power factor at the terminals of a substation and at any pantograph contact point supplied from that substation
13.02	Electrical protection coordination (incl. performance of automatic circuit breakers (immediate limits for over/under voltage, max. instantaneous voltage change over time, thermal limits, immediate limits for over current, max. instantaneous current change over time, lightning surge arrestors, protection of autotransformer systems, shielding under / over-bridges, etc.)
13.03	Concept for shared operation (e.g. on road, on heavy rail (tram-train))
13.04	Harmonic emissions towards the national grid
13.05	Max. permitted power draw per single pantograph in standstill or in movement
13.06	Stray current protection to railway equipment and any other equipment (e.g. utilities)
13.07	Segmentation of conductor, switching of segments, earthing of segments (in general applications, in tunnels, in stations, etc.)
13.08	Electrical protection, bonding of adjacent conducting structures (protection against dislocated live conductors, etc.)
13.09	Auxiliary supplied from Traction Conductor (e.g. turnout heating)
13.10	Mechanical mounting, mast systems of conductor (including specific solutions for mounting on bridges / embankments / in stations, nominal height (min. /max.), permitted tolerances (design min., absolute min., design max., absolute max.) (considering sag, creep, ice loading, uplift, etc.)) For OCL: Max. permitted lateral deviation from centre line of track (under cross wind, curves, track tolerances, pantograph movement, etc.)
13.11	Dynamic behaviour of conductor and quality of current collection
13.12	OCL: Pantograph spacing (min. spacing between adjacent raised pantograph.) Max. no of permitted pantographs per Light Rail Rolling Stock
13.13	Conductor material, cross-section, permitted vehicle contact strip/shoe material (AC/DC)
13.14	Feeder lines, return current lines, long distance feeders parallel to the railway, material, cross-section, mounting, mast systems, etc.
13.15	Electric protection concept of crossings with other railways, national grid, telecoms, etc.
13.16	Electric protection concept of road crossings (signage, goal frames, etc.)
13.17	Phase/system separations: Geometry and general design concept of system separation sections, local and remote control / status detection interface, switchgear of system separation sections (e.g. to allow re-start of train in isolated sections)
13.18	Provisions for maintenance
14.00	Fixed installations Control & Monitoring Equipment (only functions which relate to the internal management of fixed

	installations, not CCT)
14.01	General concept of systems and functions (electrics, electronics, software and/or hardware, SCADA, etc.); Including remote control of powered systems
14.02	Safety-related functions of control and monitoring equipment: Detailed design, safety evaluation (e.g. PSD management, management of powered systems, supervision of substations, management of fire alarm and fire suppression, etc.)
14.03	Voice communication systems for staff (cable/ radio) between line side phones, signalling controls, CTC, emergency communication
14.04	Voice communication systems for passengers to control (cable/ radio) between line side or station emergency communication points (including e.g. lifts), train emergency communication points, CTC
14.05	Safety-related functions of train control and monitoring systems for degraded operation
14.06	Interfaces of Safety-related functions of control and monitoring systems to CCT systems (e.g. PSD management, etc.)
14.07	Protection of power supply to safety-related train control functions; Load shedding, individual MCBs, etc.
14.08	Remote control of fixed installation control and monitoring equipment
14.09	PSD operation (normal, emergency, protection of users, locking in closed)
14.10	CCTV systems (Platforms, PSDs, alignment, stations, stops, help-points, access control points, etc.)
14.11	Central control facilities (location, layout, safety related functions, human factors, back-up control facilities, etc.)
14.12	Emergency Help Points
14.13	Data recording for Control and Monitoring Equipment
14.14	Provisions for maintenance
15.00	Fixed installations Train Command / Control / Signalling Equipment (CCT) (only CCT functions, not functions which relate to internal management of fixed installations)
15.01	General concept of CCT operations and functions: Normal and degraded operational modes and concepts (layout, line speeds, gradients, points, crossings, normal, reverse direction, permitted degraded modes, remote operations, operating mode transitions, etc.)
15.02	Safety-related functions of CCT systems; Detailed design, safety evaluation of CCT systems (electrics, electronics, software and/or hardware) (e.g. Automatic Train Protection (ATP), Automatic Train Operation (ATO), automated management of powered systems, remote control, detection of obstacles on track, selective door opening, platform side detection, positioning at platform, interaction with platform screen doors, etc.)
15.03	Safety-related functions of CCT systems for degraded operation (e.g. failure of ATO, operation with declared fire on-board, etc.)
15.04	Interfaces of Safety-related functions of CCT systems to Works (selective door opening, platform side detection, positioning at platform, interaction with platform scene doors, obstacle detection, etc.)
15.05	Protection of power supply to safety related CCT; Load shedding, individual

	MCBs, etc.
15.06	Data recording concept, Data Logger/event recorder
15.07	Line side signals, boards, etc.
15.08	CCT Control Room(s): general concept, equipment, etc.
15.09	CCT Control Room(s) Interface spec. (functional/physical/logical) of CCT equipment to: interlocking, data transmission, power supplies, local and remote control and display systems, other equipment
15.10	Local areas CCT data communication links
15.11	Long range CCT data communication links
15.12	Interlocking, road traffic controller: Table of permitted routes/paths, block margins/overlaps, wrongside working, speed limits, interlocking type and requirements and permitted normal/permitted degraded operational conditions (e.g. normal operations, shunting), Specific Interlocking Application Data, control table requirements, road traffic controller requirements.
15.13	Interlocking, road traffic controller: Interface specification (functional/physical/logical): operator interface, remote control, data transmission, power supplies, control and display systems, other interlocking systems, trackside signalling equipment, other equipment, etc.
15.14	Interlocking: Signalling controls type/locations: interlocking facilities, road traffic controllers, crossing controllers, etc.
15.15	Train ID management and routing system: permitted normal and degraded operational modes, interface spec. (functional/physical/logical): to data generation, interlocking, data transmission, power supplies, local and remote control & display systems, other equipment
15.16	Train detection systems: detection loops, axle counters, etc. (including impedance bonding, feed lines, etc.)
15.17	Train detection systems: permitted normal and degraded operational modes (e.g. degraded operation concept, emergency & engineering controls)
15.18	Train detection systems: Specific interface parameter to rolling stock (wheel to wheel continuity, axle load, minimum metal masses, sanding, magnetic track brakes, wheel impedance, metal free space around wheels, wheel geometry, vehicle geometry, position of first/ last /intermediate wheelsets in train, requirements on wheel diameters etc.)
15.19	ATP System: Specific parameter, type of signalling system, functions (e.g. signal protection, block protection, moving block, overspeed protection, air gap definition, etc.)
15.20	ATP System: Permitted normal and degraded operational conditions (e.g. degraded operation concept, emergency and engineering controls)
15.21	ATP System: Interface spec. (functional/physical/logical), e.g. to interlocking, braking rates, block length/ overlap, data transmission, power supplies, local control and display systems, other equipment
15.22	Variable aspect track side signals, locations, permitted normal and degraded operational conditions (e.g. remotely controlled, local setting, route indicator, degraded operation concept, emergency and engineering controls)
15.23	Variable aspect track side CCT signals: Interface spec. (functional/physical/logical): to interlocking, data transmission, power supplies, local control and display systems, other equipment

15.24	Fixed aspect track side CCT signals (retroreflective properties, design, size, etc.)
15.25	Point equipment (actuator, locking, detection, heater, etc.), permitted normal and degraded operational conditions (e.g. remotely controlled, local setting, emergency and engineering controls, point securing, position indication, degraded operation concept, emergency and engineering controls)
15.26	Signalised Road and Pedestrian Crossings: type of crossing, location, geometry, layout, sightlines, equipment (road signals, track signals, traffic signs and road markings, track side boards, equipment housing, etc.), speed limits, interlocking/RT controller interface and permitted (normal) operational conditions (e.g. normal operations, permitted degraded operational conditions (e.g. degraded operation concept, emergency and engineering controls), CCTV surveillance, automatic working)
15.27	Data recording for CCT
15.28	Provisions for maintenance
16.00	Interface to Light Rail Rolling Stock
16.01	Health, Safety and Environment: Noise and vibration suppression
16.02	Infrastructure Interface: Concept of compatibility with infrastructure and operations (general and specific operational restrictions, route restrictions)
16.03	Infrastructure Interface: Track / alignment interface criteria (including: track gauge and track tolerances, maximum gradients, minimum radii of horizontal and vertical curves, geometric limits of reverse curves, max. speeds in combination with permitted cant deficiencies, max cant, check rails, guard rails, grooved rail, flange running, etc.) (must be evaluated in conjunction with parameters on gauging concept and running dynamics)
16.04	Infrastructure Interface: Free movement of bogies, gangways, etc. based on prescribed alignment criteria
16.05	Infrastructure Interface: Determination on gauging concept (kinematic / dynamic), associated gauges and calculation rules
16.06	Infrastructure Interface: Platform interface, mobility-impaired passenger needs, powered steps/bridging plates
16.07	Coupling and drawgear Interface: Geometric position, gathering range on prescribed alignment criteria
16.08	Coupling and drawgear Interface: Mechanical coupling interface (incl. inter-vehicle coupling of trainsets)
16.09	Coupling and drawgear Interface: Electrical interface
16.10	Traction power supply: OCS geometric interface
16.11	Provisions for Vehicle rescue: Giving/receiving assistance, emergency coupling arrangements and limitations, compatibility with re-railing processes and equipment
17.00	Provisions for Maintenance
17.01	Concept on scope, methods, intervals, maintenance records, tools, training. For all safety critical equipment maintenance tolerances must be defined in co-ordination with the individual parameter maintenance provisions
17.02	Traceability of safety critical equipment: Component identifiers (unique ID, type, version, origin, etc.)

17.03	Software identifiers (unique ID, type, version, origin, etc.)
18.00	Provisions during heavy maintenance/construction work
18.01	Health and safety of staff at worksite including technical safeguards, protection of staff from aerodynamic effects, train movements
18.02	Protection of passengers / members of the public / running rail traffic / other parties during execution of work
18.03	Protection of environment
18.04	Temporary Works Design (Structural evaluation of scaffolding or any non-permanent structural works or earthworks during construction)
18.05	Specific operating rules update during planned work
18.06	Roadworks
18.07	Drainage
18.08	Demolition of structures near a railway
19.00	Provisions for operation
19.01	Operating rules / specific training requirements for normal operations, degraded operations, emergency operations, training and emergency exercises (including tunnels if applicable), underground structures, ATP, ATO, etc.
19.02	Health and safety of staff at worksite including technical safeguards, protection of staff from aerodynamic effects, train movements