

CRR-G-024-E Annex1 Author: Mary Molloy Reviewed by: Caomhne Boland Authorised by: Brian Higgisson Status: 17/08/2021		Note: The identification of requirements for different parameters is intended as an aid to applicants. It remains the responsibility of the applicant to perform the requirements capture for their project ((EU) 2016/797 Art. 18 (1)+(4))		"TSI ENE" refers to:(EU) No 1301/2014 and Corrigendum (amended by (EU) 2018/868 and (EU) 2019/776) "TSI INF" refers to :(EU) No 1299/2014 (amended by (EU) 2019/776) "TSI LOC PAS" refers to: (EU) No 1302/2014 (amended by (EU) 2018/868, (EU) 2019/776 and (EU) 2020/387) "TSI OPE" refers to: (EU) 2019/773 "TSI SRT" refers to :(EU) No 1303/2014 (amended by (EU) 2016/912 and (EU) 2019/776) "TSI PRM" refers to :(EU) No 1300/2014 (amended by (EU) 2019/772)		
version E update includes safety in railway tunnels, section 17		Projects in the scope of High Speed must request an updated list from CRR				
Ref.:	Parameter:	Detailed Parameter:	TSI & EU Requirements:	Mandatory Standards:	Voluntary Requirements:	National Rules:
1 General Information on project						
1.1	general	Summary of General Arrangement and Type and Purpose of Project (e.g. Line, chainage/ section, Project boundary, Location/ class/ type/length of: track, switches, crossings, stations, platforms, structures, RST-depots, freight hubs, permitted parths, stabling tracks)	TSI INF 4.2		EN 13803:2017	
1.2	general	Definition of Scope relating New Build/ Upgrade / Renewal (general description and description in the context of any applicable TSI)	TSI INF 2 TSI PRM 1.1+7.2 TSI SRT 1.1+4.2+7			
1.3	general	Declaration of intended design life for each aspect of the project				
1.4	general	Data sheet containing Infrastructure Register information according to applicable TSIs and to (EU) 2019/777	TSI INF 4.2 TSI OPE 4.8.1 TSI OPE AppD (EU) 2019/777			
1.5	general	absence and/or control of hazardous materials during installation, operation, maintenance, de-commissioning. At min. declaration on absence of Asbestos, PCB, radioactive material, etc.	1907/2006 REACH			
2 Track Layout (Line Layout)						
2.1	Track layout	TSI Category and Performance Parameters of the section	TSI INF 4.2.1+(SC) TSI INF 4.2.2 TSI INF App E	EN15528:2015	EN15663:2009	IRS-501-A 6.5
2.2	Track layout	National TSI Category and Performance Parameters of the section of line	TSI INF 4.2.1+(SC) TSI INF 4.2.2	EN15528:2015		IRS-501-A 6.5
2.3	Track layout	Evidence of available Structure Gauge	TSI INF 4.2.1 TSI INF 4.2.3.1 TSI INF 4.2.4.1 TSI INF 6.2.4.1 (5) TSI INF 7.7.14.1 TSI INF 7.7.14.3 TSI INF App O (open point)		EN15273-1:2013 + A1:2016 EN15273-3:2013 + A1:2016	Note: IRS on Gauging required here
2.4	Track layout	Distance between track centres	TSI INF 4.2.1 TSI INF 4.2.3.2 (6) TSI INF 4.2.4.2 TSI INF 6.2.4.2 TSI INF 7.7.14.2	EN15273-3:2013 9	EN15273-1:2013 + A1:2016 EN15273-3:2013	Note: IRS on Gauging required here
2.5	Track layout	Maximum gradients	TSI INF 4.2.3.3			
2.6	Track layout	Minimum radius of horizontal curve	TSI INF 4.2.3.4		EN 13803:2017	
2.7	Track layout	Geometric limits of Reverse Curve	TSI INF 4.2.3.4(2) TSI INF App I	EN13803:2017	EN 13803:2017	
2.8	Track layout	Minimum radius of vertical curve	TSI INF 4.2.3.5		EN 13803:2017	
3 Track parameters						
3.1	Track parameters	Nominal track gauge	TSI INF 4.2.4.1		EN 13848-1:2019	
3.2	Track parameters	Cant	TSI INF 4.2.4.2		EN 13803:2017 EN 14363:2016 + A1 2018 +NTR (for design limits)	
3.3	Track parameters	Rate of change of cant (as a function of time/ distance)	TSI INF 4.2.4.4			
3.4	Track parameters	Permitted Cant deficiency (plain track, switches, crossings, operation of trains with cant deficiency compensation systems, abrupt change of cant deficiency in switches)	TSI INF 4.2.4.3		EN 13803:2017 +NTR (for design limits)	
3.5	Track parameters	specific requirements for operation of trains with higher cant deficiency (It is recommended that a specific safety case is developed, which shall identify based on the technical solution chosen any related Parameters for Evaluation)	TSI INF 4.2.4.3 (2) TSI INF 6.2.4.5		UIC 518-1 EN15273-3:2013 + A1:2016 EN 14363:2016+A1:2018	
3.6	Track parameters	Equivalent conicity - design limits	TSI INF 4.2.4.5 TSI INF 6.2.4.6	EN 15302:2008+A1:2010	EN 13848-1:2019	
3.7	Track parameters	Rail head profile for plain line	TSI INF 4.2.4.6 TSI INF 6.2.4.7		EN13674-1:2011+ A1:2017 EN13674-4 :2006 + A1 2009	
3.8	Track parameters	moment of inertia of rail cross section				
3.9	Track parameters	rail steel and rail hardness	TSI INF 5.3.1.2 TSI INF 6.1.5.1	EN13674-1:2011 8.1 9.1.8 + 8.4 + 9.1.9	EN13674-1:2011 + A1:2017	
3.10	Track parameters	Rail inclination (plain line)	TSI INF 4.2.4.7.1			

3.11	Track parameters	rail fastening systems (static longitudinal loads, dynamic loads, definition of interfaces for application)	TSI INF 5.3.2 TSI INF 6.1.4.3		EN 13146-1:2012 EN 13146-4:2012 EN 13146-7:2012 EN 13146-8:2012 EN 13146-9:2009 +A1:2011 EN 13481-1:2012 EN 13481-2:2012/AC2014 EN 13481-3:2012	EN 13146-1:2012 EN 13146-4:2012 EN 13146-7:2012 EN 13146-8:2012 EN 13146-9:2009 +A1:2011 EN 13481-1:2012 EN 13481-2:2012/AC2014 EN 13481-3:2012
3.12	Track parameters	track sleepers (geometry, resistance to applied loads, permitted combinations with rail, rail inclination, rail fastening systems, permitted axle loads, permitted bending moments)	TSI INF 5.3.3 TSI INF 6.1.4.4		EN 13230-1:2016 EN 13230-2:2016 EN 13230-3:2016 EN 13145:2001+A1:2011	IRS-501-A
3.13	Track parameters	Track stiffness				
4.0	Switches, crossings, expansion devices, derailment devices					
4.1	Switches and crossings	Rail inclination (switches, crossings)	TSI INF 4.2.4.7.2			
4.2	Switches and crossings	Means of locking	TSI INF 4.2.8.6		EN 13232-4:2005 +A1:2011	
4.3	Switches and crossings	geometry -design values	TSI INF 4.2.5 TSI INF 4.2.8.6		EN 13232-2:2003+ A1:2011 EN 13232-4:2005 +A1:2011 EN 13232-5:2005 + A1:2011 EN 13232-7:2006 + A1:2011 EN 13232-9:2006 + A1:2011 EN 13803:2017 EN15273-3:2013 + A1:2016	
4.4	Switches and crossings	Use of swing nose crossing - not relevant for IE network	TSI INF 4.2.5.2			
4.5	Switches and crossings	Maximum unguided length of fixed obtuse crossings	TSI INF 4.2.5.3 TSI INF 6.2.5.2 TSI INF 6.2.4.8 TSI INF App J		EN 13232-2:2003 + A1:2011 EN 13232-4:2005 +A1:2011 EN 13232-5:2005 + A1:2011 EN 13232-6:2005+A1:2011 EN 13232-7:2006 + A1:2011 EN 13232-8:2007 + A1:2011 EN 13232-9:2006++ A1:2011 EN 13803:2017	
4.6	expansion devices	geometry -design values			EN13232-8:2007 + A1:2011	
4.7	derailment devices (derailers)	geometry -design values means of locking				
5.0	Track resistance to applied loads					
5.1	Track resistance to applied loads	Track resistance to vertical loads	TSI INF 4.2.6.1 TSI INF 6.2.5	EN 14363:2005 5.3.2.3 TSI LOC&PAS 4.2.3.2	EN 13803:2017 EN 14363:2016 + A1 2018	
5.2	Track resistance to applied loads	Longitudinal track resistance (including compatibility with braking systems)	TSI INF 4.2.6.2 TSI INF 6.2.5 + 6.2.4.15	TSI LOC&PAS 4.2.3.4.2.2.	EN 13803:2017 EN 14363:2016 + A1 2018	
5.3	Track resistance to applied loads	Lateral track resistance	TSI INF 4.2.6.3 TSI INF 6.2.5	EN 14363:2005 5.3.2.2 + 5.3.2.3 TSI LOC&PAS 4.2.3.4.2.2.	EN 13803:2017 EN 14363:2016 + A1 2018	
6.0	Structures resistance to applied loads					
6.1	general requirements for any new or modified structure					
6.1.1	general requirements for any new or modified structure	vertical loading for earthworks and earth pressure effects	TSI INF 4.2.7.2	EN1991-2:2003/AC:2010		
6.1.2	general requirements for any new or modified structure	Aerodynamic effects on structures caused by trains	TSI INF 4.2.7.3 TSI INF 6.2.4.9	EN1991-2:2003/AC:2010 (6.6)		
6.2	New bridges/viaducts over the railway or other new structures over or adjacent to track					
6.2.1	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.)	TSI INF 4.2.7.1 TSI INF 6.2.4.9	EN1991-2:2003/AC:2010 EN1990:2002 +A1:2005		
6.2.2	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.)	TSI INF 4.2.7.1 TSI INF 6.2.4.9	EN1991-2:2003/AC:2010 EN1990:2002 +A1:2005		
6.2.3	New bridges/viaducts over the railway or other new structures over or adjacent to track	Parapet containment / safety barriers			EN1317 NRA BD 52 DN-REQ-03034	
6.2.4	New bridges/viaducts over the railway or other new structures over or adjacent to track	Parapet height				
6.2.5	New bridges/viaducts over the railway or other new structures over or adjacent to track	Measures to protect the railway from vandalism				
6.2.6	New bridges/viaducts over the railway or other new structures over or adjacent to track	Containment of safety barriers on approaches			EN1317 NRA TD 19 DN-REQ-03034	
6.2.7	New bridges/viaducts over the railway or other new structures over or adjacent to track	Resistance of supports to rail vehicle impact				
6.2.8	New bridges/viaducts over the railway or other new structures over or adjacent to track	Requirements for maintenance	TSI INF 4.5 + 6.4			
6.3	Modification of existing bridges/viaducts over the railway					
6.3.1	Modification of existing bridges/viaducts over the railway	Resistance of sub structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, etc.)	TSI INF 4.2.7.4 TSI INF 6.2.4.10	TSI INF Annex E	EN 14363:2016 + A1 2018 EN15528:2015 EN1991-2:2003 EN1990:2002 +A1:2005	
6.3.2	Modification of existing bridges/viaducts over the railway	Resistance of super structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, etc.)	TSI INF 4.2.7.4 TSI INF 6.2.4.10	TSI INF Annex E	EN 14363:2016 + A1 2018 EN15528:2015 EN1991-2:2003 EN1990:2002 +A1:2005	
6.3.3	Modification of existing bridges/viaducts over the railway	Parapet containment			EN1317 NRA BD 52 DN-REQ-03034	

6.3.4	Modification of existing bridges/viaducts over the railway	Parapet height				
6.3.5	Modification of existing bridges/viaducts over the railway	Measures to protect the railway from vandalism				
6.3.6	Modification of existing bridges/viaducts over the railway	Containment or safety barriers on approaches			EN1317 NRA TD 19 DN-REQ-03034	
6.3.7	Modification of existing bridges/viaducts over the railway	Resistance of supports to rail vehicle impact				
6.3.8	Modification of existing bridges/viaducts over the railway	Requirements for maintenance	TSI INF 4.5 + 6.4			
6.4	New bridges/viaducts under the railway					
6.4.1	New bridges/viaducts under the railway	Resistance of sub structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, etc.)	TSI INF 4.2.7.1 TSI INF 6.2.4.9	EN1991-2:2003/AC:2010 EN1990:2002 +A1:2005		
6.4.2	New bridges/viaducts under the railway	Resistance of super structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, etc.)	TSI INF 4.2.7.1 TSI INF 6.2.4.9	EN1991-2:2003/AC:2010 EN1990:2002 +A1:2005		
6.4.3	New bridges/viaducts under the railway	Resistance of structures(sub/super to fixtures (e.g. OHLE support, signals, inspection walkway)				
6.4.4	New bridges/viaducts under the railway	Derailment containment				
6.4.5	New bridges/viaducts under the railway	Provision of walkway				
6.4.6	New bridges/viaducts under the railway	Provision of handrails				
6.4.7	New bridges/viaducts under the railway	Head room for public road bridges				
6.4.8	New bridges/viaducts under the railway	Protection of supports from road, water, rail vehicles, etc.				
6.4.9	New bridges/viaducts under the railway	Protection of supports and sub structure from the effects of water or subsidence				
6.4.10	New bridges/viaducts under the railway	Requirements for maintenance	TSI INF 4.5 + 6.4			
6.5	Modification of existing bridges/viaducts under the railway					
6.5.1	Modification of existing bridges/viaducts under the railway	Resistance of sub structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, etc.)	TSI INF 4.2.7.4 TSI INF 6.2.4.10	TSI INF Annex E	EN 14363:2016 + A1 2018 EN15528:2015 EN1991-2:2003 EN1990:2002 +A1:2005	
6.5.2	Modification of existing bridges/viaducts under the railway	Resistance of super structure to relevant loads (vertical, nosing, traction/braking forces, resulting track twist, etc.)	TSI INF 4.2.7.4 TSI INF 6.2.4.10	TSI INF Annex E	EN 14363:2016 + A1 2018 EN15528:2015 EN1991-2:2003 EN1990:2002 +A1:2005	
6.5.3	Modification of existing bridges/viaducts under the railway	Resistance of structures(sub/super to fixtures (e.g. OHLE support, signals, inspection walkway)				
6.5.4	Modification of existing bridges/viaducts under the railway	Derailment containment				
6.5.5	Modification of existing bridges/viaducts under the railway	Provision of walkway				
6.5.6	Modification of existing bridges/viaducts under the railway	Provision of handrails				
6.5.7	Modification of existing bridges/viaducts under the railway	Head room for public road bridges				
6.5.8	Modification of existing bridges/viaducts under the railway	Protection of supports from road, water, rail vehicles, etc.				
6.5.9	Modification of existing bridges/viaducts under the railway	Protection of supports and sub structure from the effects of water or subsidence				
6.5.10	Modification of existing bridges/viaducts under the railway	Requirements for maintenance				
6.6	Embankments					
6.6.1	Embankments	Resistance to vertical loading and earth pressure effects or other applied loads	TSI INF 4.2.7.2 TSI INF 6.2.4.9	EN1991-2:2003		
6.6.2	Embankments	Drainage				
6.7	Cuttings					
6.7.1	Cuttings	Resistance to vertical loading and earth pressure effects or other applied loads	TSI INF 4.2.7.2 TSI INF 6.2.4.9	EN1991-2:2003		
6.7.2	Cuttings	Protection of track from falling material, road vehicles etc				
6.7.3	Cuttings	Drainage				
6.8	Retaining Walls					
6.8.1	Retaining Walls	Resistance to vertical loading and earth pressure effects or other applied loads	TSI INF 4.2.7.2 TSI INF 6.2.4.9	EN1991-2:2003		
6.8.2	Retaining Walls	Parapet/handrail details/vehicle containment				
7.0	Stations and Platforms	Planning criteria, levels of service, provision for PRM				
7.1	Stations and Platforms	Passenger flow data			Part B Building Regulations	
7.2	Stations and Platforms	Communication Facilities	TSI PRM 4.2.1.8 TSI PRM 4.2.1.10 TSI PRM 4.2.1.11 TSI PRM 4.2.2.7 TSI PRM 4.4.1		ISO 21542:2011 Part M Building Regulations BS 8300	
7.3	Stations and Platforms	Concourse(unpaid side)			ISO 21542:2011 Part M Building Regulations BS 8300	
7.4	Stations and Platforms	Control room(safety/security)				
7.5	Stations and Platforms	Staff facilities			Health, Safety and Welfare at work Regulations	
7.6	Stations and Platforms	Commercial facilities			ISO 21542:2011 Part M Building Regulations BS 8300	
7.7	Stations and Platforms	Parking facilities for PRM	TSI PRM 4.2.1.1		ISO 21542:2011 Part M Building Regulations BS 8300	
7.8	Stations and Platforms	Obstacle free route	TSI PRM 4.2.1.2		ISO 21542:2011 Part M Building Regulations BS 8300	
7.9	Stations and Platforms	Doors and Entrances	TSI PRM 4.2.1.3		ISO 21542:2011 Part M Building Regulations BS 8300	
7.10	Stations and Platforms	Floor surfaces	TSI PRM 4.2.1.4		ISO 21542:2011 Part M Building Regulations BS 8300	
7.11	Stations and Platforms	Transparent obstacles	TSI PRM 4.2.1.5		ISO 21542:2011 Part M Building Regulations BS 8300	
7.12	Stations and Platforms	Toilets and baby changing facilities	TSI PRM 4.2.1.6		ISO 21542:2011 Part M Building Regulations BS 8300	
7.13	Stations and Platforms	Furniture and free standing devices	TSI PRM 4.2.1.7		ISO 21542:2011 Part M Building Regulations BS 8300	
7.14	Stations and Platforms	Ticketing, Ticket Control, Information Desks and Customer assistance points	TSI PRM 4.2.1.8 TSI PRM 4.4.1		ISO 21542:2011 Part M Building Regulations, Part B Building Regulations, BS 8300, BS 9999:2008	
7.15	Stations and Platforms	Lighting, Emergency Lighting	TSI PRM 4.2.1.9		EN12464-1 and -2 EN1838:2013 ISO 21542:2011 Part B Building Regulations Part M Building Regulations BS 8300	

7.16	Stations and Platforms	Visual information, Signage, Tactile Information, Audible information	TSI PRM 4.2.1.10 TSI PRM 4.4.1 TSI PRM 5.3.1.1		ISO 3864-1:2011, ISO 21542:2011 EN 81-70:2003 part70 ISO TR 7239:1984 Part M Building Regulations BS 8300		
7.18	Stations and Platforms	Spoken Information	TSI PRM 4.2.1.11 TSI PRM 4.4.1	IEC 60268-16	Part M Building Regulations BS 8300, ISO 21542:2011		
7.19	Stations and Platforms	Stairs	TSI PRM 4.2.1.2.2				
7.20	Stations and Platforms	Ramps, escalators, lifts, travelators	TSI PRM 4.2.1.2.2 EC lift directive EC machinery directive EC pressure equipment directive	EN 1756-2:2004+A1:2009	ISO 21542:2011 EN 81-70:2003 Part M Building Regulations BS 8300		
7.21	Stations and Platforms	Boarding Aids for PRM (ramps, platform lifts)	TSI PRM 4.2.1.14 TSI PRM 4.4.1 TSI PRM 4.4.3	EC 1371/2007			
7.22	Stations and Platforms	Level track crossings (not permitted in IRL)	TSI PRM 4.2.1.15				
7.23	Stations and Platforms	Drainage					
8.0	Platforms (specific additional requirements)						
8.1	Platforms	Track layout at platform	TSI INF 4.2.9.4				
8.2	Platforms	Gradient(longitudinal and lateral)	TSI INF 4.2.3.3				
8.3	Platforms	Usable length of platform	TSI INF 4.2.9.1				
8.4	Platforms	Width and edge of platform	TSI PRM 4.2.1.12		UIC 140		
8.5	Platforms	End of platforms	TSI PRM 4.2.1.13				
8.6	Platforms	Height of platforms	TSI INF 4.2.9.2				
8.7	Platforms	Offset of platforms from track	TSI INF 4.2.9.3 TSI INF 6.2.4.11				
8.8	Platforms	Drainage					
9.0	RST-Depots/ Freight Hubs/ Other railway buildings						
9.1	RST-Depots/ Freight Hubs/ Other railway buildings	Communications					
9.2	RST-Depots/ Freight Hubs/ Other railway buildings	Control room(safety/security)					
9.3	RST-Depots/ Freight Hubs/ Other railway buildings	Staff facilities (staff areas, sanitary equipment, HSE)					
10.0	Fixed installations for Servicing Trains						
10.1	Fixed installations for Servicing Trains	toilet discharge	TSI INF 4.2.12.2	TSI LOC&PAS			
10.2	Fixed installations for Servicing Trains	external train cleaning	TSI INF 4.2.12.3				
10.3	Fixed installations for Servicing Trains	internal train cleaning					
10.4	Fixed installations for Servicing Trains	water restocking	TSI INF 4.2.12.4	TSI LOC&PAS 98/83/EC			
10.5	Fixed installations for Servicing Trains	refuelling	TSI INF 4.2.12.5	TSI LOC&PAS			
10.6	Fixed installations for Servicing Trains	electrical shore supply	TSI INF 4.2.12.6	TSI LOC&PAS			
10.7	Fixed installations for Servicing Trains	inspection track (roof inspection, pit lane)					
11.0	Health, Safety and Environment						
11.1	provisions for operation	Occupational Health & Safety	(EU) 2016/797 (EU) 2016/798 TSI INF 4.4 TSI INF 4.7 TSI OPE				
11.2	Health, Safety and Environment	max. pressure variation in tunnels/ underground structures	TSI INF 4.2.10.1 TSI INF 4.7 TSI INF 6.2.4.12	EN 14067-5:2006 + A1 2010 4+ 6	EN 14067-3:2003 EN 14067-5:2006 + A1 2010		
11.3	Health, Safety and Environment	protection of workers from aerodynamic effects	TSI INF 4.7	TSI LOC&PAS TSI WAG	EN 14067-2:2003 EN 14067-4:2013 + A1:2018		
11.4	Health, Safety and Environment	aerodynamic effects on safety equipment in tunnels/ underground structures produced by passing trains	TSI SRT 4.2.1 TSI INF 4.7			IRS-501-A	
11.5	Health, Safety and Environment	noise and vibration suppression	TSI INF 4.7				
11.6	Health, Safety and Environment	protection against electric shock	TSI INF 4.7	TSI ENE			
11.7	Health, Safety and Environment	effects of crosswinds	TSI INF 4.2.10.2 TSI INF 4.7		EN 14067-6:2018		
11.8	Health, Safety and Environment	lineside walkways, positions of safety, access and egress, signage	TSI INF 4.7				
11.9	Health, Safety and Environment	Aerodynamic effect on ballasted track	TSI INF 4.2.10.3				
12.0	provisions for operation						
12.1	provisions for operation	distance markers	TSI INF 4.2.11.1				
12.2	provisions for operation	gradient markers					
12.3	provisions for operation	foul point markers					
12.4	provisions for operation	operating rules/ specific training requirements for normal operations + degraded operations + emergency operations relating to this INF (network/route) To cover at least documentation relating to the safety critical tasks of: -train preparation, -train despatch, -authorisation for train movement (e.g. signalman), -driving of train, -accompanying a train	TSI INF 4.3.4 TSI INF 4.4 TSI INF 4.6 TSI PRM 4.4 TSI PRM 4.5 TSI PRM 4.6 TSI OPE 2.1 TSI OPE 4.2.1.1 TSI OPE 4.2.3.6.2 TSI OPE 4.6.1	TSI OPE App F TSI OPE App G TSI OPE App B TSI OPE App C			
12.5	provisions for operation	training and examination requirements relating to this INF (analysis of training needs, training content, content of examinations)	TSI INF 4.6 TSI OPE 4.6.3.1 TSI OPE 4.6.3.2	TSI OPE App F 2.4+ F 3. TSI OPE App G 2.3+G 3.			
12.6	provisions for operation	Safety Assessment of comprehensiveness and suitability of operating rules/ specific training requirements for normal and degraded operations	TSI INF 4.6 TSI OPE 2.1	(EU) 2016/798			
12.7	provisions for operation	INF specific IM network access requirements (Technical/ Operational)	TSI OPE 4.1				
12.8	provisions for operation	INF specific IM information for Drivers Rule Book - normal, degraded, emergency situations - safety assessment to ensure completeness and accuracy of information	TSI OPE 4.2.1.2.1				
12.9	provisions for operation	INF specific IM information for Route Book - normal, degraded, emergency situations - safety assessment to ensure completeness and accuracy of information	TSI OPE 4.2.1.2.2				
12.10	provisions for operation	INF specific IM Route Book Real Time Information for drivers	TSI OPE 4.2.1.2.3				
12.11	provisions for operation	operating rules for boarding aids	TSI PRM 4.4.3 TSI OPE				
12.12	provisions for operation	operating rules for track brakes	TSI OPE				
12.13	provisions for operation	Changes to existing SMS, to interfaces to other SMS	(EU) 2016/797 (EU) 2016/798 TSI OPE				

12.14	provisions for operation	new/changed operational procedures	(EU) 2016/797 (EU) 2016/798 TSI OPE			
12.15	provisions for operation	Training/ operational handbook	TSI INF 4.6 (EU) 2016/797 (EU) 2016/798 TSI OPE			
12.16	provisions for operation	Tunnel specific competence of staff	TSI INF 4.6 TSI SRT 4.6.1 TSI OPE			
12.17	Maintenance Requirements and Maintenance Plan					
13.0	general requirements					
13.1	general requirements					
13.1.1	general requirements	All limits for INF must be co-ordinated with RST requirements.		TSI LOC&PAS TSI WAG	EN 13803:2017 EN13848-1:2019	
13.1.2	general requirements	For each immediate action limit, the intended measures to be taken (speed restriction, repair time) must be stated	TSI INF 4.5		EN 13803:2017 EN13232-9:2006 + A1:2011	
13.2	lateral alignment	immediate action limit				
13.2.1	lateral alignment	standard deviation - alert limit	TSI INF 4.2.8.1	EN 13848-5:2008+A1:2010 8.5	EN 13803:2017 EN13848-1:2019	
13.2.2	lateral alignment	isolated defects -mean to peak- alert limit	TSI INF 4.2.8.1	EN 13848-5:2008+A1:2010 8.5	EN 13803:2017 EN13848-1:2019	
13.2.3	lateral alignment	isolated defects -mean to peak- intervention limit	TSI INF 4.2.8.1	EN 13848-5:2008+A1:2010 8.5	EN 13803:2017 EN13848-1:2019	
13.2.4	longitudinal level	isolated defects -mean to peak- immediate action limit	TSI INF 4.2.8.1 TSI INF 4.5.1	EN 13848-5:2008+A1:2010 8.5	EN 13803:2017 EN13848-1:2019	IRS-501-A
13.3	longitudinal level	immediate action limit				
13.3.1	longitudinal level	standard deviation - alert limit	TSI INF 4.2.8.2	EN 13848-5:2008+A1:2010 8.3	EN 13803:2017 EN13848-1:2019	
13.3.2	longitudinal level	isolated defects -mean to peak- alert limit	TSI INF 4.2.8.2	EN 13848-5:2008+A1:2010 8.3	EN 13803:2017 EN13848-1:2019	
13.3.3	longitudinal level	isolated defects -mean to peak- intervention limit	TSI INF 4.2.8.2	EN 13848-5:2008+A1:2010 8.3	EN 13803:2017 EN13848-1:2019	
13.3.4	track twist	isolated defects -mean to peak- immediate action limit	TSI INF 4.2.8.2 TSI INF 4.5.1	EN 13848-5:2008+A1:2010 8.3	EN 13803:2017 EN13848-1:2019	IRS-501-A
13.4	track twist	immediate action limit for track twist				
13.4.1	track twist	isolated defects -zero to peak- alert limit	TSI INF 4.2.8.3 TSI INF 4.5	EN 13848-1:2003+A1:2008 4.6 EN 13848-5:2008+A1:2010 8.6	EN 13803:2017 EN13848-1:2019	
13.4.2	track twist	isolated defects -zero to peak- intervention limit	TSI INF 4.2.8.3 TSI INF 4.5	EN 13848-1:2003+A1:2008 4.6 EN 13848-5:2008+A1:2010 8.6	EN 13803:2017 EN13848-1:2019	
13.4.3	variation of track gauge	isolated defects -zero to peak- immediate action limit	TSI INF 4.2.8.3 TSI INF 4.5	EN 13848-1:2003+A1:2008 4.6 EN 13848-5:2008+A1:2010 8.6	EN 13803:2017 EN13848-1:2019	IRS-501-A
13.5	variation of track gauge	immediate action limit of track gauge as an isolated defect				
13.5.1	variation of track gauge	isolated defects -normal to peak- alert limit	TSI INF 4.2.8.4		EN 13803:2017 EN13848-1:2019	
13.5.2	variation of track gauge	isolated defects -normal to peak- intervention limit	TSI INF 4.2.8.4		EN 13803:2017 EN13848-1:2019	IRS-501-A
13.5.3	variation of track gauge	isolated defects -normal to peak- immediate action limit	TSI INF 4.2.8.4 TSI INF 4.5.1		EN 13803:2017 EN13848-1:2019	IRS-501-A
13.5.4	variation of track gauge	Mean track gauge over any 100m length -normal to peak- immediate action limit	TSI INF 4.2.8.4 TSI INF 4.5.1		EN 13803:2017 EN13848-1:2019	IRS-501-A
13.6	Cant	immediate action limit for cant				
13.6.1	Cant	isolated defects -design to peak- alert limit	TSI INF 4.2.8.5		EN 13803:2017 EN13848-1:2019	
13.6.2	Cant	isolated defects -design to peak- intervention limit	TSI INF 4.2.8.5	EN13848-1:2019	EN 13803:2017 EN13848-1:2019	
13.6.3	Cant	isolated defects -design to peak- immediate action limit	TSI INF 4.2.8.5	EN13848-1:2019	EN 13803:2017 EN13848-1:2019	IRS-501-A
13.7	control of equivalent conicity in service					
13.7.1	control of equivalent conicity in service	Requirements for controlling equivalent conicity in service - immediate action limit (incl. investigation of reported instability)	TSI INF 4.2.4.5 TSI INF 4.2.11.2	EN 15302:2008+A1:2010	EN 13715:2006+A1:2010	
13.8.0	in service geometry of switches and crossings					
13.8.1	in service geometry of switches and crossings	isolated defects -design to peak- alert limit	TSI INF 4.2.8.6 TSI INF 4.5		EN13848-1:2019	
13.8.2	in service geometry of switches and crossings	isolated defects -design to peak- intervention limit	TSI INF 4.2.5 TSI INF 4.2.8.6		EN 13232-2:2003 + A1:2011 EN 13232-4:2005 +A1:2011 EN 13232-5:2005 + A1:2011 EN 13232-7:2006 + A1:2011 EN 13232-9:2006 + A1:2011 EN 13803:2017	
13.8.3	in service geometry of switches and crossings	isolated defects -design to peak- immediate action limit	TSI INF 4.2.5		EN 13232-2:2003 + A1:2011 EN 13232-4:2005 + A1:2011 EN 13232-5:2005+ A1:2011 EN 13232-7:2006 + A1:2011 EN 13232-9:2006 + A1:2011 EN 13803:2017	IRS-501-A
13.9	platform edge					
13.9.1	platform edge	lateral position, intervention limit/ alert limit/ immediate action limit	TSI INF 4.5			
13.9.2	platform edge	horizontal position, intervention limit/ alert limit/ immediate action limit	TSI INF 4.5			
13.10	Maintenance for PRM aspects					
13.10.1	Maintenance for PRM aspects	alternative provisions for PRM during maintenance, replacement, repair	TSI PRM 4.5			
13.11	provisions for maintenance/ maintenance plan					
13.11.1	provisions for maintenance	Occupational Health & Safety, specific training	(EU) 2016/797 (EU) 2016/798 TSI OPE TSI INF 4.5.2 TSI INF 4.6 TSI INF 4.7			
13.11.2	Safety Critical Maintenance	Concept on scope, intervals, maintenance records, tools, training	(EU) 2016/797 (EU) 2016/798 TSI OPE TSI INF 4.5.2		EN 13848-1:2019 EN 13232-9:2006+A1:2011 EN 13803:2017	
13.11.3	Traceability of Safety Critical Components, Configuration Management	Component identifiers (unique ID, type, version, origin)	(EU) 2016/797 (EU) 2016/798 TSI OPE			
13.11.4	Traceability of SW Components	Software identifiers (unique ID, type, version, origin)	(EU) 2016/797 (EU) 2016/798 TSI OPE			
14.0	Protection of systems					
14.1	Protection of systems	environmental factors				
14.2	Protection of systems	mechanical enclosure, temper/vandalism protection				
14.3	Protection of systems	locking arrangement and access management to safety related equipment				
14.4	Protection of systems	CCTV, intrusion detection				
15.0	Electrical/ Electromagnetical Safety					

15.1	EMC (Emissions and Susceptibility)	Compatibility with operating environment, rolling stock, own and other signalling and telecommunication system equipment and other railways, specific requirements for special locations, evaluation to include credible fault conditions (incl. EMC plan)	EMC Directive (2014/30/EU)		EN 50121 series	IRS-403-A
15.2	Electrical/ Electromagnetical Safety	electrical safety (e.g. touch potential, protection of electric equipment/ cabling against damage, isolation coordination, cable sizing, circuit protection, RCD, etc.)				
15.3	Electrical/ Electromagnetical Safety	bonding, earthing concept (incl. lightning protection and earthing of equipment near OHL equipment)				
15.4	Electrical/ Electromagnetical Safety	Shielding from electromagnetic radiation				
16.0	Fire protection, detection, suppression, safe degradation					
16.1.0	Requirements for all structures					
16.1.1	General concept	Overall fire performance evaluation, concept of fire barriers and concept of evacuation (e.g. Emergency Plan)				
16.1.2	Safe degradation	Overall concept of safe degradation of safety critical equipment in case of fire				
16.1.3	Fire detection & suppression	Fixed fire detection & suppression equipment				
16.1.4	Fire detection & suppression	Portable fire-fighting equipment				
16.1.5	Specification, application conditions	specific requirements, type of telecommunication system and permitted (normal) operational conditions (e.g. Telephone, Radio, Fax, data-transmission)				
17.0	Requirements for safety in railway tunnels					
17.1	General - calculation of length of tunnel	When calculating the tunnel length in the context of evacuation and rescue the position of tunnel access points (from the portals) must be considered.				
17.2	Evacuation and Rescue	Identification of the relevant measures to mitigate the risks arising from a 'hot' tunnel specific railway incident ('hot' incidents: fire, explosion followed by fire, emission of toxic smoke or gases)	TSI SRT 2.2 (b) TSI SRT 2.2.1			
17.3	Evacuation and Rescue	Identification of the relevant measures to mitigate the risks arising from a 'cold' tunnel specific railway incident ('cold' incidents: collision, derailment)	TSI SRT 2.2 (b) TSI SRT 2.2.2			
17.4	Evacuation and Rescue	Identification of the relevant measures to mitigate the risks arising from a prolonged stop in the tunnel	TSI SRT 2.2 (b) TSI SRT 2.2.3			
17.5	Evacuation and Rescue	Description of evacuation and rescue operations following hot tunnel specific railway incident	TSI SRT 2.2 (a) TSI SRT 2.2.1			
17.6	Evacuation and Rescue	Description of evacuation and rescue operations following cold tunnel specific railway incident	TSI SRT 2.2 (a) TSI SRT 2.2.2			
17.7	Evacuation and Rescue	Description of evacuation and rescue operations following prolonged stop in the tunnel	TSI SRT 2.2 (a) TSI SRT 2.2.3			
17.8	Emergency Response Services	Definition of role	Fire Services Act 1981 & 2003 TSI SRT 2.3 (a)			
17.9	Emergency Response Services	A fire authority shall— (a) make provision for the prompt and efficient extinguishing of fires in buildings and other places of all kinds in its functional area and for the protection and rescue of persons and property from injury by fire, and (b) establish and maintain a fire brigade, provide premises and make such other provision as it considers necessary or desirable for such purpose, and (c) make adequate provision for the reception of and response to calls for the assistance of the fire brigade.	TSI SRT 2.3			
17.10	Emergency Response Services	Major emergencies will be managed within the National Major Emergency Framework using an all hazards approach utilising existing resources.	TSI SRT 2.3 (e)			
17.11	Emergency Response Services	Additional measures may be required by the emergency services	TSI SRT 2.3 (f)			
17.12	Functional and technical specifications	Prevent unauthorised access to emergency exits and technical rooms	TSI SRT 4.2.1.1			
17.13	Functional and technical specifications	Fire resistance of tunnel structures	TSI SRT 4.2.1.2			
17.14	Functional and technical specifications	Fire reaction of building material	TSI SRT 4.2.1.3 (EU) 2016/364			
17.15	Functional and technical specifications	Fire detection in technical rooms (tunnels longer than 1km)	TSI SRT 4.2.1.4			
17.16	Functional and technical specifications	Evacuation facilities - safe area (tunnels longer than 1km)	TSI SRT 4.2.1.5.1			
17.17	Functional and technical specifications	Evacuation facilities - access to the safe area (tunnels longer than 1km)	TSI SRT 4.2.1.5.2			
17.18	Functional and technical specifications	Evacuation facilities - communication means in safe areas (tunnels longer than 1km)	TSI SRT 4.2.1.5.3			
17.19	Functional and technical specifications	Evacuation facilities - emergency lighting (tunnels longer than 500m)	TSI SRT 4.2.1.5.4			
17.20	Functional and technical specifications	Evacuation facilities - escape signage (all tunnels)	TSI SRT 4.2.1.5.5			
17.21	Functional and technical specifications	Escape walkways (tunnels longer than 500m)	TSI SRT 4.2.1.6			
17.22	Functional and technical specifications	Evacuation and rescue points - calculation of length of tunnel	TSI SRT 4.2.1.7 (a)			
17.23	Functional and technical specifications	Evacuation and rescue points - outside the tunnel or inside the tunnel	TSI SRT 4.2.1.7 (b)			
17.24	Functional and technical specifications	Evacuation and rescue points - all requirements (water, train position, accessible to emergency services, de-energisation)	TSI SRT 4.2.1.7 (c)			
17.25	Functional and technical specifications	Evacuation and rescue points - requirements outside the portals of the tunnel	TSI SRT 4.2.1.7 (d)			
17.26	Functional and technical specifications	Evacuation and rescue points - requirements inside the tunnel	TSI SRT 4.2.1.7 (e)			
17.27	Functional and technical specifications	Emergency communication - radio communication between train and infrastructure manager control centre (tunnels longer than 1km)	TSI SRT 4.2.1.8 (a)			
17.28	Functional and technical specifications	Emergency communication - radio continuity between emergency response services and on-site command facilities (tunnels longer than 1km)	TSI SRT 4.2.1.8 (b)			
17.29	Functional and technical specifications	Electricity supply for emergency response services (tunnels longer than 1km)	TSI SRT 4.2.1.9			
17.30	Functional and technical specifications	Reliability of electrical systems (tunnels longer than 1km)	TSI SRT 4.2.1.10			
17.31	Functional and technical specifications	Communication and lighting at switching locations (tunnels longer than 1km)	TSI SRT 4.2.1.11			
17.32	Emergency Rules	Operational rules must address monitoring of train condition before entering the tunnel and incident management inside and outside the tunnel	TSI SRT 4.4.1			
17.33	Tunnel Emergency Plan	When considering the tunnel emergency plan 17.1 must be taken into account	TSI SRT 4.4.2			
17.34	Emergency Plan Exercises	When considering the tunnel emergency plan 17.1 must be taken into account	TSI SRT 4.4.3			
17.35	Emergency Plan - details	Switching off and Earthing Procedures: information to emergency services	TSI SRT 4.4.4			
17.36	Provision of information to passengers	Passengers shall be informed of on board emergency and safety procedures.	TSI SRT 4.4.5 (a) and (c)			
17.37	Health and Safety	Self-rescue device - freight trains, driver and other persons on board	TSI SRT 4.7.0 TSI SRT Appendix A			