

EuroSpec



Specification for toilets of railway vehicles



Specification for toilets of railway vehicles

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© SNCF-MOBILITES, Rail Delivery Group (RDG), Deutsche Bahn (DB),
Nederlandse Spoorwegen (NS), Österreichische Bundesbahnen (ÖBB),
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Issue Record

Issue	Date	Comments	Source
1	April 2012	void	EuroSpec “ Specification for Toilets of Railway Vehicles”
1.1	September 2012	Updated after consultation with UNIFE and additional improvements by specialists	
2.0	August 2014	New requirements added. Verification for several requirements added.	
3.0	January 2020	New requirements added, verifications added, feedback of UNIFE included. References to new standards added.	

Revision History

Version	Date	Change
3.0	January 2020	New requirements have been added, some requirements are improved and for all requirements is described how compliance with the requirement will be verified.

1 FOREWORD

EuroSpec is a group of European train operating companies providing harmonised product specifications for use in train procurement and refurbishment.

The main target is to improve the reliability and quality of trains by using common and standardised functional and non-functional specification and verification methods.

The benefits of using EuroSpec:

- Increase of reliability by sharing good practice and experience;
- Simplification of the tender process in time and cost as a result of fewer variations in requirements between tenders;
- Standardised products and cost reduction due to harmonisation of train operators' requirements.

The EuroSpec specifications comprise merged functional and product basic requirements. All EuroSpec specifications focus on technical aspects exclusively based on the existing national requirements.

A EuroSpec specification is a voluntary specification designed to be used within the European region. The primary field of application is the European rolling stock domain and all associated interfaces.

Regarding the hierarchy this common specification can be positioned as follows, in order of prevalence:

- EN standards
- UIC/ UNIFE Technical Recommendations (TecRecs)
- UIC Codes (leaflets)
- EuroSpec Specifications
- Company Specifications

2 INTRODUCTION

This document is a voluntary specification, produced by SNCF-MOBILITES, Rail Delivery Group (RDG), Deutsche Bahn (DB), Nederlandse Spoorwegen (NS), Österreichische Bundesbahnen (ÖBB) and Schweizerische Bundesbahnen (SBB).

Individual companies may choose to mandate it through internal instructions/procedures or contract conditions.

Purpose of this document

This document provides a voluntary specification for toilets on railway vehicles for use by companies in the rail sector if they so choose.

The purpose of this document is to provide a common specification for toilets on railway vehicles in rolling stock between train operators. This document is to replace individual company specific functional requirements and constitutes a common reference being used for tendering and verification.

Application of this document

- This specification is voluntary. Individual companies may however elect to mandate all or part of its use through company procedures or contract conditions. Where this is the case, the company concerned must specify the nature and extent of application.

- Specific compliance requirements and dates of application have therefore not been identified since these will be the subject of the internal procedures or contract conditions of those companies that choose to adopt this standard.

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3 SCOPE

This specification is applicable to rolling stock that is equipped with toilets. This specification is intended for European style toilets (sitting type). The applicable requirements of this specification can also be used for other type of toilets, for example squatting toilets and urinals.

This specification is an add-on to the Technical Specifications of Interoperability (TSI). In addition to this specification additional operator specific specifications might be defined. The specification contains requirements at system level of toilets of railway vehicles and its interfaces and unifies the requested performances of the different operators.

This specification is not intended to block innovation or to prevent improvement. For this purpose, each requirement is followed by a rationale.

If applicable, the requirements are referenced to the EN 15380 structure. It is foreseen that more requirement sets and European standards will make use of this common reference structure.

4 NORMATIVE REFERENCES

The following referenced documents are indispensable for the application of this document. ENs are developed by CEN¹ or CENELEC², UIC leaflets are developed by UIC³ and are made available from their members.

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 16362-2013	Railway applications - Ground based services - Water restocking equipment
EN 16922-2017	Railway applications - Ground based services - Vehicle waste water discharge equipment
UIC Code 563-1990	Fittings provided in coaches in the interests of hygiene and cleanliness

¹ Comité Européen de Normalisation / European Committee for Standardization - www.cen.eu

² Comité Européen de Normalisation Électrotechnique / European Committee for Electrotechnical Standardization - www.cenelec.eu

³ Union internationale des chemins de fer / International Union of Railways - www.uic.org

5 TERMS, DEFINITIONS AND ABBREVIATIONS

Adjustable software parameters	Software parameters that can be adjusted by the customers technicians.
Back syphoning	The reversal of the normal flow of a fluid due to undesired pressure differences.
Black water	Waste water from the toilet.
Defined start-up time	A customer-defined maximum time needed for the transition between the train mode "shut down" (no power) and the train mode "operate" (ready for service).
EN	Euronorm
Freeze drain	A freeze drain is the draining of a part of the toilet system initiated automatically by a specific temperature or manually to prevent damage to the system caused by the freezing of water.
Fresh water	Water from the fresh water tank.
Grey water ⁴	Waste water from hand wash and galley sinks, usually contaminated with soap, germicides, residues of food, drink and dish water.
LV	Low Voltage
mm	Millimetre
HMI	Human Machine Interface.
N	Newton
On-board maintenance	Maintenance activities that can take place independent of the location of the train (typically not performed in a workshop).

⁴ Definition according to EN16992:2017

PH neutral	A PH value between 6 and 8.
Quick release connector	A connector for electric, water or compressed air suitable for easy and frequent disconnection without the need for tools.
RAMS LCC	Reliability, Availability, Maintainability, Safety and Life Cycle Costs.
RIC	International Coach Regulations.
Standard laptop	A laptop which is widely available on the market and can be purchased from several suppliers. This laptop shall run a common operating system (e.g. Windows) and shall consist of a number of USB ports, an Ethernet port and the processor and memory capacity shall be sufficient to perform the required tasks.
Standard tooling	Tooling set available for on-board maintenance.
TCMS	Train Control and Monitoring System.
Toilet	The complete toilet module including the toilet system.
Toilet system	Technical system needed for operating the toilet. (LV supply, compressed air supply and train signals are excluded).
Train set	A train set is a fixed formation that can operate as a train; it is by definition not intended to be reconfigured, except within a workshop environment. It is composed of only motored or of motored and non-motored vehicles.
TSI	Technical Specification for Interoperability.
UIC	International Union of Railways (Union Internationale des Chemins de Fer).
UNIFE	Association of the European Rail Industry (Union des Industries Ferroviaires Européennes).
Waste water	All waste water, grey water and black water.

6 SPECIFICATIONS

This chapter describes the requirements and their objectives. For several requirements verifications are included. Verification describes how compliance to the requirement will be verified.

Definitions and further clarifications applying to this specification can be found in the document "EuroSpec Requirements Management" at www.eurospec.eu.

The columns of the specification are summarised as follows:

ID

Unique Identification of the requirement

Requirement classification

Importance and legal status of the requirement to the project to differentiate between the requirements with regard to relevance and legal status like Requirement (RE - mandatory), Design Recommendation (DR) or Optional Requirement (OR)

Requirement-text

Description of the requirement

Rationale

Reason to state the requirement

Product element EN 15380-2

Link between requirement and the product element of the EN 15380-2

Change since last release

Description of the modifications that have been made to one or more attributes of this requirement since the last release.

Note: Textual changes not influencing the functionality of the requirement or the rationale are marked as "Minor change".

Verification

Verification type and point of time

With regard to the section on verifications, the following is applicable:

The Verification describes how compliance to the requirement will be verified.

Where "system description" is mentioned as a means of compliance, it means that the *system description* describes how the specific requirement is to be complied with.

Where "maintenance instructions" are mentioned as a means of compliance, it means that the *maintenance instructions* describe how the specific requirement is to be complied with.

If a means of proof is mentioned at the First Installation Inspection (FII) and it is possible to verify this requirement at the First Article Inspection (FAI), then it shall be verified at the FAI.

If a means of proof is mentioned at the FAI stage and it is not possible to verify this at this time because not all relevant parts or constructions are representative, the means of proof shall be performed at the FII.

If "drawings" are mentioned as a means of proof, it could be acceptable to deliver 3D CAD files if approved by the customer. Format to be determined in consultation with the customer.

If "drawings" are mentioned as a means of proof, parts list if applicable shall be included.

ID	Requirement classification	Requirement text	Rationale	Product element EN15380-2	Change since last release	Verification				
						Offer of Tenderer(s)	Design Review	First Article Inspection (FAI)	First Integration Inspection (FI)	Hand-over
TOI-0001		Scope								
TOI-0002	RE	Each toilet shall as a minimum have: <ul style="list-style-type: none"> ● a toilet bowl with a seat and a lid; ● a toilet paper dispenser; ● a wash bowl unit including a water tap; ● a soap dispenser; ● a facility for drying hands; ● a waste bin; ● two hooks which can be used for coats and bags; ● a mirror. 	The toilet is to provide necessary facilities to passengers.	CA	minor change	Compliance statement, Technical description	System description; Drawings	Inspection		Statement of conformity
TOI-0003	OR	The toilet shall have an electric hand dryer.	Passengers are to be able to dry their hands. Dryers can be cleaner and produce less waste than towels.	DD	minor change	Compliance statement	System description; Drawings	Inspection		Statement of conformity
TOI-0004	OR	The toilet shall have a hand paper dispenser.	Passengers are to be able to dry their hands.	DD	minor change	Compliance statement	System description; Drawings	Inspection		Statement of conformity
TOI-0005	OR	The toilet shall have a sanitiser dispenser.	Passengers are to be able to clean and sanitise the toilet seat and their hands.	DD	new	Compliance statement	System description; Drawings	Inspection		Statement of conformity
TOI-0006	RE	The supplier shall supply a complete maintenance plan in accordance with the Eurospec "Specification for the documentation of railway vehicles" with instructions for all maintenance activities during the life of the toilet.	The toilet is to be designed to facilitate maintenance and to align with the existing maintenance regime of the operator. Detailed maintenance instructions includes all preventive- and corrective maintenance activities, including replacement of broken components caused by vandalism.	DD	changed	Compliance statement	Concept maintenance plan		Final maintenance plan	Statement of conformity
TOI-0007		Toilet system								
TOI-0008	RE	The toilet system shall prevent contamination of fresh water with waste water. Remark: The EN1717-2000 can be used as a guideline for preventing contamination.	The contamination of fresh water by bacteria is to be prevented.	DD	changed	Compliance statement	System description; Drawings			Statement of conformity
TOI-0009	RE	The toilet system shall prevent back syphoning of the fresh water from the toilet bowl to the fresh water tank. Remark: The EN1717-2000 can be used as a guideline for preventing back syphoning.	The contamination of fresh water by bacteria is to be prevented.	DD	new	Compliance statement	System description; Drawings		Demonstration	Statement of conformity
TOI-0010	DR	The waste pipe and interface design shall be according to paragraph 5.2.1 of the EN 16922-2017.	The contamination of fresh water by bacteria is to be prevented.	DD	new	Compliance statement	System description; Drawings		Inspection	Statement of conformity
TOI-0011	RE	The fresh water and the waste water systems shall be separate discrete systems.	The contamination of fresh water by bacteria is to be prevented.	DD	minor change	Compliance statement	System description; Drawings			Statement of conformity
TOI-0012	RE	If waste water from the toilet bowl or its connections leaks inside the carbody and is not visible without removing any parts, the toilet system shall detect leaked waste water automatically.	Leaked waste water from the toilet system is to be detected before the waste water pollutes or damages the carbody.	DD	changed	Compliance statement	System description		System description and test	Statement of conformity
TOI-0013	RE	Leaked waste water that is detected shall initiate a failure message. This failure message shall alert the on-board train staff and if a TCMS is available, these signals shall be reported to it.	Leaked waste water from the toilet system is to be detected before the waste water can pollute or damage the carbody.	JC	minor change	Compliance statement	System description		System description and test	Statement of conformity
TOI-0014	RE	The toilet system shall be able to flush the toilet every 90 seconds.	The flushing capacity is to be sufficient for normal-use as well as during peak-use and cause no limitations on the availability. This number of flushes is not to be used for calculating capacity for fresh- and waste water tanks.	DD	changed	Compliance statement	System description		Type test	Statement of conformity
TOI-0015	RE	The toilet system shall be able to flush a second time within 30 seconds after the first flush. This sequence shall be able to be repeated after 90 seconds.	The flushing capacity is to be sufficient for normal use as well as during peak use and cause no limitations on the availability. This number of flushes is not to be used for calculating capacity for fresh- and waste water tanks.	DD	new	Compliance statement	System description		Type test	Statement of conformity
TOI-0016	RE	The toilet system shall start up automatically after maintenance, failure signals have been resolved or events such as refilling fresh water,	The toilet system is to start up automatically as much as possible. A manual reset only being used if necessary.	DD	minor change	Compliance statement	System description		Type test	Statement of conformity

ID	Requirement classification	Requirement text	Rationale	Product element EN15380-2	Change since last release	Verification				
						Offer of Tenderer(s)	Design Review	First Article Inspection (FAI)	First Integration Inspection (FI)	Hand-over
		emptying full waste water tanks, etc. have been carried out; unless a manual reset is required.								
TOI-0017	RE	The supplier shall indicate which specific failures of the toilet system would require a manual reset.	The toilet system is to start up automatically, a manual reset only being used if necessary.	DD	minor change	Compliance statement	System description; Concept maintenance plan		Type test; Final maintenance plan	Statement of conformity
TOI-0018	RE	The toilet system shall have a mean number of flushes between failures of at least 120.000. Failures of the toilet bowl and the flushing system shall be considered as part of this total.	The reliability of the flushing system is to be as high as possible.	DD	minor change	Compliance statement	Reliability calculation matrix The reliability of all individual components that influence the reliability of the toilet system shall be included. The total reliability of the system shall comply with the requirement.			Statement of conformity
TOI-0019	RE	If the internal and external temperature of the vehicle is -10°C and higher, the toilet system shall be able to operate within the defined startup time of the train after the heating system of the train is turned on.	When the train is heated up from -10°C, the toilet is to be ready for service within the start up time for the train. Within this start up time, the temperature of the critical components of the toilet system is to be above the temperature at which the automatic freeze protection (draining) function is deactivated.	DD	changed	Compliance statement	System description including the measures taken for compliance to this requirement. Including a summary of the critical components, the relevant temperature sensors and a substantiation of the expected thermic behaviour.	Concept test protocol; If a climate chamber tests of the complete coach is not foreseen, alternative methods can be used with the approval of the customer.	Test report; Test complete coach in a climate chamber. The water system including all pipes, valves and fittings shall be completely empty, after the defined start-up time the water tanks shall be filled with water at a temperature of maximum 5°C. If a climate chamber test of the complete coach is not foreseen, alternative methods can be used with the approval of the customer.	Statement of conformity
TOI-0020	RE	With the vehicle subjected to an external temperature of -10°C, with the vehicle heating operative and with the interior at +20°C, the vehicle heating system is then switched off. The toilet system shall remain functional and undamaged for a subsequent period of 12 hours. It is not permitted to have an automatic freeze drain for the water tank in this period.	The toilet is to be designed with a high resistance to damage caused by freezing. It is expected that the toilet system or at least all critical parts are sufficiently thermally insulated or are drained in time before damage occurs. Note: the thermal insulation of the train itself can be a large factor and should be taken into account.	DD	minor change	Compliance statement	System description	Concept test protocol; If a climate chamber tests of the complete coach is not foreseen, alternative methods can be used with the approval of the customer.	Test report: Test complete coach in a climate chamber. The water system including all pipes, valves and fittings shall be completely empty, after the defined startup time the water tanks shall be filled with water at a temperature of maximum 5°C. Verification is according to Annex C of EN16362-2013. If a climate chamber test of the complete coach is not foreseen, alternative methods can be used with the approval of the customer.	Statement of conformity
TOI-0021	OR	With the vehicle subjected to an external temperature of -10°C, with the vehicle heating operative and with the interior at +20°C, the vehicle heating system is then switched off. The toilet system shall remain functional and undamaged for a subsequent period of 24 hours. It is not permitted to have an automatic freeze drain for the water tank in this period.	The toilet is to be designed with a high resistance to damage caused by freezing. It is expected that the toilet system or at least all critical parts are sufficiently thermally insulated or are drained in time before damage occurs. Note: the thermal insulation of the train itself can be a large factor and should be taken into account.	DD	minor change	Compliance statement	System description	Concept test protocol; If a climate chamber tests of the complete coach is not foreseen, alternative methods can be used with the approval of the customer.	Test report: Test complete coach in a climate chamber. The water system including all pipes, valves and fittings shall be completely empty, after the defined startup time the water tanks shall be filled with water at a temperature of maximum 5°C. Verification is according Annex C of EN16362-2013. If a climate chamber test of the complete coach is not foreseen, alternative methods can be used with the approval of the customer.	Statement of conformity

ID	Requirement classification	Requirement text	Rationale	Product element EN15380-2	Change since last release	Verification				
						Offer of Tenderer(s)	Design Review	First Article Inspection (FAI)	First Integration Inspection (FI)	Hand-over
TOI-0022	RE	After a system drain process, the toilet system shall generate the signals to confirm whether or not the draining process was performed as intended. If a TCMS is available, these signals shall be reported in the TCMS.	The draining process is to be monitored by the TCMS. Damage by freezing is to be prevented.	JC	minor change	Compliance statement	System description		Type test	Statement of conformity
TOI-0023	RE	The toilet shall function under all inclination angles of the vehicle that can occur during service.	The toilet is to remain fully functional under all conditions that can occur during service: Inclination angles, cant, forces due to lateral and longitudinal accelerations are to be taken into account.	CA	minor change	Compliance statement	System description			Statement of conformity
TOI-0024	DR	The toilet shall function with the vehicle at an inclination of at least 11° in both longitudinal directions and 8° in both transverse directions. (Design Recommendation for RE TOI-0023)	The toilet is to remain fully functional under all conditions that can occur during service: Inclination angles, cant, forces due to lateral and longitudinal accelerations are to be taken into account. Note: For verification purposes, the dynamic effects of heavy braking is represented by an additional static value for the longitudinal direction resulting in a larger inclination angle.	CA	changed	Compliance statement	System description	Test; The functions of the toilet shall be tested at an inclination of 11° in both longitudinal directions and 8° in both transverse directions. The following shall be included: <ul style="list-style-type: none"> • Doors (excluded is the self closing mechanism of manual operated doors); • flush system; • waste water system. excluded is the emptying functionality) • fresh water system For this test, the watertank shall be full. The spillage of water during this test shall be not more than 2 litres. During the test it is permitted that water can remain behind in pipes of the fresh water system and the waste water system.		Statement of conformity
TOI-0025	INFO	Technicians dedicated to rectifying technical problems on board have a limited, standard set of tools at their disposal.			no change					
TOI-0026	RE	On-board maintenance shall be possible with a standard set of tools. The standard set of tools is to be agreed between customer and supplier.	On-board corrective maintenance is to be possible with the limited set of tooling as available to the technician. Typically, screwdrivers, spanners, keys It is to be made clear to the supplier which tools are available for the rectifying of technical maintenance tasks on board.	DD	minor change	Compliance statement	Concept maintenance plan		Final maintenance plan	Statement of conformity
TOI-0027	RE	The toilet system shall have an interval for preventive maintenance of at least 4 months. Refilling of consumables and daily/weekly cleans and inspections are not included.	The toilet is to be designed to facilitate maintenance that aligns with the existing maintenance regime of the operator.	DD	changed	Compliance statement	Concept maintenance plan		Final maintenance plan	Statement of conformity
TOI-0028	RE	Components that are difficult to clean shall not be located directly under the waste water level sensors.	When removing the waste water sensor(s), waste water is not to drop on other components in the vicinity, external to the waste water tank.	DD	minor change	Compliance statement	Drawing		Inspection	Statement of conformity
TOI-0029	DR	A cone-shaped area directly below the waste water level sensor(s) shall be free of components that are difficult to clean. The top point of the cone(s) is on the centerline of the sensor(s) and the sides of the cone(s) shall have an angle of 20° to the vertical. (Design recommendation for RE TOI-0028)	When removing the waste water sensor(s), waste water is not to drop on other components in the vicinity, external to the waste water tank.	DD	new	Compliance statement	Drawing		Inspection	Statement of conformity
TOI-0030	RE	The electric, pneumatic and hydraulic connections which need disconnecting for regular maintenance shall be quick release connectors.	In order to minimise the time frame for regular maintenance jobs. Earthing as part of the quick-release connector rather than bolted to the component is preferred when allowed. Past experience with bolted earth connections has found them broken or not reconnected after maintenance. This connection does not apply to the body-end earth connection which is to be bolted.	DD	changed	Compliance statement	Drawing	Inspection		Statement of conformity


ID	Requirement classification	Requirement text	Rationale	Product element EN15380-2	Change since last release	Verification				
						Offer of Tenderer(s)	Design Review	First Article Inspection (FAI)	First Integration Inspection (FI)	Hand-over
TOI-0031	RE	Quick release connectors shall prevent incorrect re-assembly. This is valid for electrical, pneumatic and hydraulic connectors.	The mixing-up of connectors, is not to be possible.	DD	minor change	Compliance statement	Drawing	Inspection		Statement of conformity
TOI-0032	RE	Quick release connectors which are needed for connecting the toilet bowl unit shall be operable with one hand. This means that one part of the connector shall be fixed to a structure.	The toilet bowl is to be removable by one person. Holding the toilet bowl with one hand and plugging and un-plugging connections with the other.	DD	changed	Compliance statement	Drawing		Demonstration	Statement of conformity
TOI-0033	RE	The toilet system shall have a service flush routine, which shall be initiated by operating the flush button while the toilet is out of order due to a blocked toilet bowl.	Initiating a service flush is to be easy and intuitive particularly for non technical personnel.	DD	minor change	Compliance statement	System description		Type test	Routine test
TOI-0034	RE	The toilet system shall have an automatic unblocking routine.	An automatic unblocking routine that clears minor blockages gives increased availability.	DD	changed	Compliance statement	System description		Type test	Statement of conformity
TOI-0035	RE	An unsuccessful automatic unblocking routine shall be repeated after a specific period for a specific number of attempts.	Valves blocked by hand towels or excessive use of toilet paper can sometimes be unblocked if the unblocking routine is repeated after a defined time period.	DD	minor change	Compliance statement	System description		Type test	Statement of conformity
TOI-0036	RE	The period between the unblocking routines and the number of unblocking routines of RE TOI-0035 shall be an adjustable software parameter.	To give increased availability by optimising the automatic unblocking routine to optimise the customer needs.	DD	minor change	Compliance statement	System description, Concept maintenance instructions		Demonstration; Final maintenance instructions	Statement of conformity
TOI-0037	RE	The following functions shall be available only for train staff and maintenance personnel: - Service flushing (flushing without fresh water); - Reverse flushing, including increasingly intensive reverse flushing. These functions shall be available also in case of the toilet being blocked or degraded. The control for these functions shall be close to the toilet and the local diagnostic information display.	To enable train staff to clear blocked toilets.	DD	minor change	Compliance statement	System description, Concept maintenance instructions		Demonstration; Final maintenance instructions	Statement of conformity
TOI-0038	RE	If a failure of the Electric Train Supply occurs, the toilet shall be functional for an average* number of at least 20 flushing cycles. Under such circumstances battery supply shall be available for at least 90 minutes. The electric hand-dryer does not need to be operational. There shall be a sufficient reserve of compressed air capacity available for the toilet system to permit the requisite number of flushes to be performed. * average calculated over the number of toilets in the trainset.	When the ETS (Electric Train Supply) fails, the toilet is to be available for passengers for as long as possible.	DD	changed	Compliance statement	Calculation for air consumption and electric scheme showing that the toilet system is connected to the battery. The minimum working pressure of the toilet system and a realistic air consumption of the toilet and all other air consumers which influence the available air capacity for the toilet, during a period of 90 minutes shall be taken into account.		Type test; Test complete coach, flushings shall be spread over a period of 90 minutes.	Statement of conformity
TOI-0039	OR	If a failure of the Electric Train Supply occurs, the toilet shall be functional for an average* number of at least 40 flushing cycles. Under such circumstances battery supply shall be available for at least 180 minutes. The electric hand-dryer does not need to be operational. There shall be a sufficient reserve of compressed air capacity available for the toilet system to permit the requisite number of flushes to be performed. * average calculated over the number of toilets in the trainset.	When the ETS (Electric Train Supply) fails, the toilet is to be available for passengers for as long as possible.	DD	changed	Compliance statement	Calculation for air consumption and electric scheme showing that the toilet system is connected to the battery. The minimum working pressure of the toilet system and a realistic air consumption of the toilet and all other air consumers which influence the available air capacity for the toilet, during a period of		Type test; Test complete coach, flushings shall be spread over a period of 180 minutes.	Statement of conformity

ID	Requirement classification	Requirement text	Rationale	Product element EN15380-2	Change since last release	Verification				
						Offer of Tenderer(s)	Design Review	First Article Inspection (FAI)	First Integration Inspection (FI)	Hand-over
							180 minutes shall be taken into account.			
TOI-0040	RE	If a vacuum pump is used, the air outlet of the vacuum pump shall not enter into the waste water system. An exception may be made for the air outlet going into the overflow pipe of the waste water tank.	The air output of a vacuum pump is not to pollute passenger areas with bad odours. The length of the ejector outlet is to be minimised, and preferably have an open connection to the open air, to minimise the pressure build-up at the vacuum pump outlet.	DD	minor change	Compliance statement	System description		Inspection	Statement of conformity
TOI-0041	RE	If a vacuum pump is used, the air outlet of the vacuum pump shall not be close to the inlet of the HVAC fresh-air supply or to passenger doors.	The air output of a vacuum pump is not to pollute passenger areas with bad odours.	DD	minor change	Compliance statement	System description		Inspection	Statement of conformity
TOI-0042	INFO	If more than one toilet is located inside a vehicle, It may be beneficial to share components. Sharing components will reduce the availability of the toilet systems.			new					
TOI-0043	RE	If multiple toilets are located in the same vehicle the only common parts permitted are fresh water and/or waste water tanks, provided that the availability and reliability of these toilet systems shall not be reduced by more than 5%.	The availability of at least one toilet per vehicle is not to be significantly reduced by the use of shared parts between the toilet systems.	DD	changed	Compliance statement	Reliability calculation matrix. The reliability of all individual components influencing the reliability of the toilet system shall be included. The influence of the parts shared by both toilets shall be made clear.			Statement of conformity
TOI-0044		Toilet module								
TOI-0045	RE	The toilet system shall limit the presence of unpleasant odours within the toilet module.	Unpleasant odours in the toilet module are to be prevented.	DD	minor change	Compliance statement			Type test	Statement of conformity
TOI-0046	RE	When the toilet door is closed, the toilet system shall prevent unpleasant odours escaping to other passenger areas.	When the toilet door is closed, the escape of unpleasant odours into surrounding passenger areas, including vestibules, is to be prevented. The passenger saloon is to be free from toilet odours as much as possible.	DD	minor change	Compliance statement			Type test	Statement of conformity
TOI-0047	DR	When the toilet door is closed, the air pressure inside the toilet shall be lower than the air pressure of the area outside the toilet. (Design Recommendation for RE TOI-0046)	The interior of the passenger saloon is to be free from unpleasant odours.	CA	minor change	Compliance statement	Calculation of air inlet and air outlet flow rates.		Type test. Pressure difference or smoke test.	Statement of conformity
TOI-0048	RE	Passengers shall be able to exit the toilet under all degraded situations of the toilet, degraded situations of the vehicle or other emergency conditions.	Passengers are to be able to exit the toilet under all circumstances.	NC	minor change	Compliance statement	Analyses of all relevant degraded situations and emergency conditions. For each degraded situation or emergency condition the supplier shall indicate how exiting the toilet is guaranteed.	Demonstration of exiting the toilet in all relevant degraded situations and emergency conditions.		Statement of conformity
TOI-0049	RE	The train staff shall be able to view the entire toilet area while standing in the door opening.	The toilet design is to allow train staff to be able to detect passengers in need, persons trying to hide or suspicious items.	CA	changed	Compliance statement	Lay-out drawing	Inspection		Statement of conformity
TOI-0050	RE	When the toilet door is closed, the interior of the toilet module shall not be visible from the passenger area.	Passengers expect privacy when using the toilet. When the door is closed, there are to be no gaps between the toilet's interior and the passenger area.	DD	minor change	Compliance statement	System description	Inspection		Statement of conformity
TOI-0051	RE	The toilet interior shall not be visible from the outside of the train.	Passengers expect privacy when using the toilet. Windows, where fitted are not to be transparent.	CA	minor change	Compliance statement	System description		Inspection	Statement of conformity
TOI-0052	RE	If a mirror is used as a maintenance hatch, it shall be designed to prevent damage to the mirror when opened completely.	Damage to the mirror resulting from maintenance activities is to be prevented.	DD	minor change	Compliance statement	System description	Demonstration. When opening the mirror to its limits, it shall not bang into any objects other than the device intended for this purpose (bump stop or other opening limiter).		Statement of conformity
TOI-0053	RE	A broken mirror shall not result in access to train equipment located behind the mirror.	Passengers are not to have access to technical equipment.	DD	minor change	Compliance statement	System description; Drawings	Inspection		Statement of conformity

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TOI-0054	RE	Adjustable fixings shall be accessible for re-adjustments without the need to remove any other items. It is permitted to cover adjustable fixings with a hatch.	Adjustable fixings are to be accessible for adjustments. Adjustable fixings can be used for example to adjust hinges or latches or for alignment of panels.	DD	minor change	Compliance statement	System description; Drawings; Concept maintenance plan	Inspection	Final maintenance plan	Statement of conformity
TOI-0055	RE	The floor of the toilet module shall be a single water-tight unit with a vertical height of minimum 50 mm. This does not apply to the floor at the door opening.	Cleaning the floor is to be easy and straightforward. The floor is to be watertight.	CC	changed	Compliance statement	Cross section drawing	Inspection; Demonstration may be requested.		Statement of conformity
TOI-0056	RE	The interface between the toilet floor and the connecting train floor shall be watertight.	Cleaning the floor is to be easy and straightforward. The floor is to be watertight.	CC	minor change	Compliance statement	Cross section drawing	Inspection; Demonstration may be requested.		Statement of conformity
TOI-0057	RE	The transition between the horizontal part and the vertical part of the floor shall be rounded with a radius of at least 40 mm. Where a sliding door slides inside the toilet cabin, the radius can be reduced in the area of the door runner. This to maximize the floor space.	Cleaning the floor is to be easy and straightforward.	CC	changed	Compliance statement	Cross section drawing	Inspection		Statement of conformity
TOI-0058	OR	The floor of the toilet shall have a gradual slope and a flush drain at the lowest point.	Liquids on the toilet floor are not to form puddles and are to be drained promptly.	CC	minor change	Compliance statement	System description; Drawings	Demonstration		Statement of conformity
TOI-0059	RE	If the floor has a drain, the drain shall prevent outside air and noise from entering the toilet module.	To stop smells, draughts and noise entering the toilet through the drain.	DD	minor change	Compliance statement	System description; Drawings	Inspection; Demonstration may be requested		Statement of conformity
TOI-0060	RE	The toilet system shall consist of materials which, in combination with their application, will not be affected by urine. This requirement is not applicable for parts above a height of 1,8 metre above floor level.	The interior of the toilet is to be resistant to staining or contamination by urine.	CA	changed	Compliance statement	Datasheets and drawings showing that the used materials do not absorb any liquids or that these materials are not exposed to liquids at all.	inspection		Statement of conformity
TOI-0061	RE	Materials and constructions used in the toilet interior shall prevent spilled liquids accumulating or being absorbed in to them.	Open cell rubbers and materials which can absorb liquids and allow bad odours to form inside the toilet over time are not to be used. Urine or waste water leakage is to be easy and straightforward to clean.	CA	changed	Compliance statement	Datasheets and drawings showing that the used materials do not absorb any liquids or that these materials are not exposed to liquids at all.	inspection		Statement of conformity
TOI-0062	RE	If removing the toilet bowl can lead to spillage from the black water pipe, for instance if the flow of the black water pipe from the toilet bowl is upwards, the area where this spillage occurs shall be easy and straightforward to clean without the need for demounting other parts.	Cleaning spilled waste water after removing a toilet bowl is to be easy and straightforward.	DD	minor change	Compliance statement	System description; Drawings	Demonstration		Statement of conformity
TOI-0063		Toilet paper dispenser								
TOI-0064	OR	The toilet paper dispenser shall fit rolls of toilet paper according to UIC Code 563-1990.	Standard toilet paper rolls are to fit in the toilet paper dispenser.	DD	minor change	Compliance statement	System description	Inspection		Statement of conformity
TOI-0065	RE	If standard rolls of toilet paper are used, the toilet paper dispenser shall have space for at least two rolls of toilet paper.	Sufficient spare toilet paper is to be available to passengers.	DD	minor change	Compliance statement	System description	Inspection		Statement of conformity
TOI-0066	RE	If standard rolls of toilet paper are used, the second roll of toilet paper shall only become available to passengers when the first roll is finished.	Sufficient spare toilet paper is to be available to passengers. Misuse of toilet paper is to be prevented.	DD	minor change	Compliance statement	System description	Inspection		Statement of conformity
TOI-0067		Wash bowl unit								
TOI-0068	RE	The wash bowl unit shall have a drain with a mesh.	The wash bowl outlet is to be designed to prevent it becoming blocked. A mesh prevents larger objects passing into the drain.	DD	minor change	Compliance statement	System description	Inspection		Statement of conformity
TOI-0069	RE	The wash bowl unit shall prevent odours entering the toilet through the grey water system.	Bad odours from the waste water system are not to enter the toilet through the wash bowl unit.	DD	minor change	Compliance statement	System description; Drawings	Inspection; Demonstration may be requested		Statement of conformity
TOI-0070	RE	The wash bowl unit shall prevent outside noise entering the toilet through the grey water system.	Outside noise is not to enter the toilet through the wash bowl unit.	DD	minor change	Compliance statement	System description; Drawings	Inspection; Demonstration may be requested		Statement of conformity

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TOI-0071	RE	The wash bowl unit shall not be provided with a plug.	To prevent overflow of the bowl.	DD	minor change	Compliance statement	System description	Inspection		Statement of conformity
TOI-0072	RE	The washbowl unit and its fixings shall withstand a static force of 1000 N without damage. The load may be applied at any accessible part of the washbowl unit. The size of the load application point to be used shall be approximately 50 mm x 50 mm or Ø 55 mm.	The washbowl unit is to be of sufficient strength to hold at least a person standing on it and be vandalism proof.	DD	minor change	Compliance statement	Calculation The critical positions shall be identified for applying the static force. The calculation shall show compliance to the requirement.	Type test The critical positions shall be identified for applying the static force. Plastic deformation and breakage is not allowed.		Statement of conformity
TOI-0073		Soap dispenser								
TOI-0074	RE	The soap dispenser shall be accessible with a square socket key according to RIC (i.e. a Berne key).	The soap dispenser tank is to be easily accessible for stocking by train crew and maintenance staff, but be reasonably secure.	DD	minor change	Compliance statement	System description	Inspection		Statement of conformity
TOI-0075	RE	For liquid soap dispensers intended to be refilled whilst on board the vehicle, it shall be possible to refill by pouring soap from above from a separate container, without removing the soap dispenser tank.	The soap dispenser tank is to be easily accessible for stocking by train crew and maintenance staff.	DD	minor change	Compliance statement	Drawings	Demonstration: It shall be possible to fill the soap dispenser tank from a commercial 5 litre refill container. For this test, the container contains approximately 0,5 litre of soap. It is not permitted to use any additional equipment. Filling the soap tank without spilling shall be easy and straightforward. The dimensions of the can shall not exceed a height of 300mm, a depth of 200 mm, a width of 140 mm and an opening diameter of 45 mm.		Statement of conformity
TOI-0076	RE	Components that are difficult to clean shall not be located directly under the filling opening of the liquid soap dispenser tank.	Spilt liquid soap is not to lead to additional cleaning activities.	DD	minor change	Compliance statement	Drawings	Inspection		Statement of conformity
TOI-0077	DR	A cone-shaped area directly below the liquid soap dispenser shall be free of components that are difficult to clean. The top point of the cone is on the centerline of the filling point of the soap dispenser tank and the sides of the cone shall have an angle of 20° to the vertical. (Design Recommendation for Requirement TOI-0076)	Spilt liquid soap is not to lead to additional cleaning activities.	DD	new	Compliance statement	Drawings	Inspection		Statement of conformity
TOI-0078	RE	The soap dispenser outlet shall be positioned directly above the washbowl.	Pollution by dripping soap from the soap dispenser outlet is to be prevented. Soap dripping from the soap dispenser outlet is to fall into the washbowl.	DD	minor change	Compliance statement	Drawings	Demonstration		Statement of conformity
TOI-0079		Sanitiser dispenser								
TOI-0080	RE	If a sanitiser dispenser is provided. The sanitiser dispenser shall be accessible with a square socket key according to RIC (i.e. a Berne key).	The sanitiser dispenser tank is to be easily accessible for stocking by train crew and maintenance staff, but be reasonably secure.	DD	new	Compliance statement	Drawings	Inspection		Statement of conformity
TOI-0081	RE	If a sanitiser dispenser is provided. For sanitiser dispensers intended to be refilled whilst on board the vehicle, it shall be possible to refill by pouring product from above from a separate container, without removing the dispenser tank.	The sanitiser dispenser tank is to be easily accessible for stocking by train crew and maintenance staff.	DD	new	Compliance statement	Drawings	Demonstration It shall be possible to fill the sanitiser dispenser tank from a commercial 5 litre refill container. For this test, the container contains approximately 0,5 litre of soap. It is not permitted to use any additional equipment. Filling the sanitiser tank without spilling shall be easy and straightforward. The dimensions of the can shall not exceed a height of 300mm, a depth of 200 mm, a width of 140 mm and an opening diameter of 45 mm.		Statement of conformity
TOI-0082	RE	If a sanitiser dispenser is provided. Components that are difficult to clean shall not	Spilt sanitiser product is not to lead to additional cleaning activities.	DD	new	Compliance statement	Drawings	Inspection		Statement of conformity

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		be located directly under the filling opening of the sanitiser dispenser tank.								
TOI-0083	DR	If a sanitiser dispenser is provided. A cone-shaped area directly below the sanitiser dispenser shall be free of components that are difficult to clean. The top point of the cone is on the centerline of the filling point of the sanitiser dispenser tank and the sides of the cone shall have an angle of 20° to the vertical. (Design Recommendation for Requirement TOI-0082)	Spilt sanitiser product is not to lead to additional cleaning activities.	DD	new	Compliance statement	Drawings	Inspection		Statement of conformity
TOI-0084	RE	If a sanitiser dispenser is provided. Dripping of sanitiser product from the sanitiser dispenser shall not lead to a slippery floor.	Spilt sanitiser product is not to lead to a slippery floor where persons would normally walk or stand.	DD	new	Compliance statement	Drawings	Demonstration		Statement of conformity
TOI-0085		Hand paper dispenser								
TOI-0086	RE	If the toilet is equipped with a hand paper dispenser, it shall dispense paper on the basis of a single sheet of paper at a time.	To prevent overconsumption and potential blocking of the toilet bowl as a result of misuse.	DD	minor change	Compliance statement	System description	Demonstration		Statement of conformity
TOI-0087		Waste bin								
TOI-0088	RE	The waste bin shall be located in front of a passenger standing facing the wash bowl.	To encourage passengers to use the waste bin instead of the toilet bowl for disposal of waste.	DD	minor change	Compliance statement	System description	Inspection		Statement of conformity
TOI-0089	RE	The waste bin shall be removable only by authorised personnel.	Removal of the waste bin is not to be possible by passengers.	DD	minor change	Compliance statement	System description	Demonstration		Statement of conformity
TOI-0090	RE	The waste bin shall be accessible for emptying by the use of a square socket key according to RIC (i.e. a Berne key).	Removing the waste bin is to be only possible by authorised personnel.	DD	minor change	Compliance statement	System description; Drawings	Demonstration		Statement of conformity
TOI-0091	RE	Emptying the waste bin shall be possible by the use of only one hand.	Emptying the waste bin by the cleaning staff is to be possible with one hand since the other hand is used for holding the collecting bag.	DD	minor change	Compliance statement	System description	Demonstration		Statement of conformity
TOI-0092	RE	The waste bin shall withstand typical waste originating from the use of the toilet.	The waste bin is not to be affected by human waste and cleaning agents.	DD	minor change	Compliance statement	System description; Drawings	inspection		Statement of conformity
TOI-0093		Toilet bowl								
TOI-0094	RE	The toilet bowl shall withstand cleaning in a wash machine and cleaning with a high pressure water cleaner. Cleaning fluids to be PH neutral.	Once removed from the train, the toilet bowl is to be cleaned in a wash machine or with a high pressure water cleaner without the need to remove further components and without them being damaged.	DD	changed	Compliance statement	System description; Concept maintenance plan	Type test. The toilet bowl shall be cleaned in the customer's wash machine for a period of 8 h The toilet bowl shall be cleaned with a high pressure water cleaner (min. distance 0,5 metre) Result: The bowl and components shall not be damaged nor shall the electrical and pneumatic components contain any water after the above mentioned tests. The toilet bowl shall be functional after these tests.	Final maintenance plan	Statement of conformity
TOI-0095	RE	The toilet bowl shall be cleanable with an acid solution. The supplier shall describe which parts need to be removed prior to cleaning.	To ensure sufficient cleaning and prevent damage to sensible parts.	DD	new	Compliance statement	System description; Concept maintenance plan	Demonstration	Final maintenance plan	Statement of conformity
TOI-0096	RE	The operating elements for flushing the toilet shall not be covered by a toilet seat or lid when these are in the raised position.	Operating elements for passengers are to be visible and reachable for passengers at all times.	DD	minor change	Compliance statement	Drawings	Inspection		Statement of conformity
TOI-0097	RE	The toilet system shall prevent unintentional reversing of the waste water into the toilet bowl.	Passengers are not to be exposed to waste water.	DD	minor change	Compliance statement	A FMEA and MTBF calculation. All unintentional back flush scenarios shall be included. An unintentional reverse flush shall not be possible if one component fails. If an unintentional reverse flush can happen when more components fail			Statement of conformity

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							simultaneously, the MTBF of these simultaneous failures shall be calculated. The calculation shall be supplied to the customer.			
TOI-0098	RE	The toilet bowl seat and lid shall be stable in the upright position for the entire range of train running conditions.	The toilet seat and lid are not to fall down due to movements of the train.	DD	minor change	Compliance statement	System description, Drawings.		Demonstration	Statement of conformity
TOI-0099	DR	The angle between the closed and raised position of the toilet lid and seat shall exceed 98°. (Design Recommendation for Requirement TOI-0098)	The toilet seat and lid are not to fall down due to movements of the train.	DD	minor change	Compliance statement	Drawings		Measurement report; Inspection	Statement of conformity
TOI-0100	RE	In the closed position, the toilet lid and seat shall withstand a static vertical force of 1000 N at any point without damage. The size of the load application point to be used shall be approximately 50 mm x 50 mm or Ø 55 mm.	The toilet seat and lid are to be able to hold at least a person standing on them and be vandalism-proof.	DD	changed	Compliance statement	Calculation The calculation shall show the critical positions for applying the static force and show compliance to the requirement. Where a datasheet gives this information, a calculation is not necessary.	Test The critical positions shall be used for applying the static force to show compliance to the requirement. Where a datasheet gives this information, a test is not necessary.		Statement of conformity
TOI-0101	RE	The toilet bowl shall withstand a minimum force of 3000 N applied across the centre of the aperture of the toilet bowl without damage.	The toilet seat and lid are to be able to hold at least a person standing on them and be vandalism-proof.	DD	changed	Compliance statement	System description		The test load shall be applied for a period of 30 minutes by means of a beam with a cross section of 100 mm by 100 mm positioned across the centre of the aperture of the bowl. The test is successful when the toilet bowl, the fixings and the surroundings do not plastically deform. see figure 1  Figure 1	Statement of conformity
TOI-0102		Fresh water system								
TOI-0103	RE	The fresh water system and its surroundings shall incorporate design features to prevent, or detect and report water leaking into the car body.	Leakage of water can damage the car body. Measures are to be present to minimise the contaminated area and consequential damage. All critical components and connections are to be considered.	DD	changed	Compliance statement	System description; Drawings	Inspection	If water leakage detection is part of the system, a type test shall be performed	Statement of conformity
TOI-0104	RE	All fresh water pipes shall be protected from damage due to freezing.	Damage to pipes by freezing water is to be prevented.	DD	minor change	Compliance statement	System description			Statement of conformity
TOI-0105	DR	Pipes of the fresh water system shall continuously decline with a gradient of at least 3%. (Design Recommendation for Requirement TOI-0104)	Damage to pipes by freezing water is to be prevented. Water filling pipes are only to contain water during the filling process. Water is not to remain behind in pipes after a freeze drain or fresh water tank refill.	DD	minor change	Compliance statement	System description; Drawings	Inspection		Statement of conformity
TOI-0106	RE	The pipes of the fresh water system, the toilet bowl and the wash basin shall be drained automatically when the temperature of the area where these parts are located is below 4°C. (small freeze drain)	Damage to pipes by freezing water is to be prevented. If the toilet system is not active in specific train modes, an automated drain is to be executed when entering these train modes	DD	new	Compliance statement	System description		Type test	Statement of conformity

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		This functionality shall be available in all *functional train modes. When the loads from the battery are to be disconnected to preserve sufficient capacity to start up the train and protect the batteries, this drainage shall be performed before the loads are disconnected from the battery. *All train modes except train modes commonly used when the train is stored away without any electric consumers active.								
TOI-0107	OR	The toilet system shall have an automatic drainage functionality for the fresh water tank.	Damage to the fresh water tank by freezing water is to be prevented.	DD	new	Compliance statement	System description		Type test	Statement of conformity
TOI-0108	RE	If the toilet system has an automatic drainage functionality for the fresh water tank, this automatic drainage of the fresh water tank shall be performed when the temperature of the water in the water tank is below 4°C. This functionality shall be available in all train modes.	Damage to the fresh water tank by freezing water is to be prevented. Water is not to remain behind in pipes after a freeze drain.	DD	new	Compliance statement	System description		Type test	Statement of conformity
TOI-0109	RE	The fresh water system shall prevent water from the water tank flowing back into the filler pipes as a result of movements of the train during service.	Freezing of filler pipes and the filling interfaces is to be prevented.	DD	minor change	Compliance statement	System description	Type test or simulation 1. Level the water tank(s) 2. Fill water tank to maximum level (overflow level). 3. Water tank(s) shall be inclined to 11° to the horizontal in the most critical directions. (If more than one water tank is used, the water tanks shall be inclined together, as a fixed combination). The spillage of water during this test shall be not more than 2 litres.		Statement of conformity
TOI-0110	RE	Inside the fresh water tank, the outlet of the filler pipes shall be positioned at a higher level than the entrance of the overflow pipe.	Water from the fresh water tank is not to flow back into the filler pipes, nor during filling of the water tank or by movements of the train during service.	DD	minor change	Compliance statement	System description; Drawings	Inspection		Statement of conformity
TOI-0111	RE	Fresh water tanks shall have a hatch for inspecting and cleaning the fresh water tanks.	To be able to visually inspect the inside of the fresh water tank and to have access to the inside of it for manual cleaning.	DD	minor change	Compliance statement	System description; Drawings	Inspection		Statement of conformity
TOI-0112	RE	The access hatch of the fresh water tank shall have an opening of at least 40.000 mm ² .	To be able to visually inspect the inside of the fresh water tank and to have access to the inside of it for manual cleaning.	DD	minor change	Compliance statement	Drawings with relevant dimensions to determine the access hatch area.	Inspection		Statement of conformity
TOI-0113	RE	The access hatch of the fresh water tank shall be accessible without removing the fresh water tank.	To be able to visually inspect the inside of the fresh water tank and to have access to the inside of it for manual cleaning without having to remove it.	DD	minor change	Compliance statement	System description; Concept maintenance instructions		Demonstration; Final maintenance instructions	Statement of conformity
TOI-0114	RE	The access hatch of the fresh water tank shall be accessible without removing any other parts (excluding insulation materials). When the fresh water tank is located inside a cabinet or behind a panel, it is permitted to have access to the hatch of the fresh water tank by opening a door or other hatch.	To have easy access to the fresh water tank for inspection and cleaning.	DD	changed	Compliance statement	System description; Concept maintenance instructions		Demonstration; Final maintenance instructions	Statement of conformity
TOI-0115	RE	For trainsets and trains of multiple trainsets, emptying the fresh water tanks, pipework and toilets shall be possible from a single location on the train.	The emptying of systems holding water are to be optimised. In case of a trainset or a train of multiple trainsets, the possibility to empty all the watertanks, pipework and toilets from a single location in the train is preferred. This functionality is not to influence automated freeze drain systems. Damage by freezing water is to be prevented.	DD	minor change	Compliance statement	System description; Concept maintenance instructions		Demonstration; Final maintenance instructions	Statement of conformity

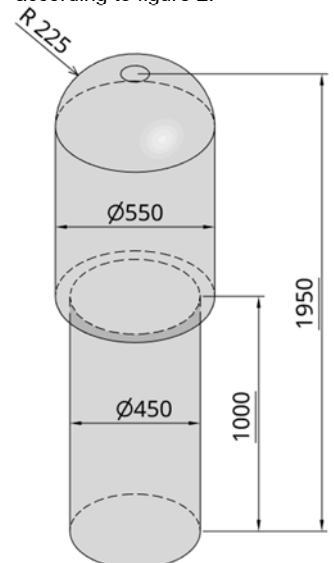
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TOI-0116	RE	For trainsets, draining the pipework and toilets shall be possible from a single location on the train without emptying the fresh water tanks.	The emptying of systems holding water are to be optimised. This functionality is not to influence automated freeze drain systems. Damage by freezing water is to be prevented.	DD	minor change	Compliance statement	System description; Concept maintenance instructions		Demonstration; Final maintenance instructions	Statement of conformity
TOI-0117	RE	Draining the fresh water tanks, pipework and toilet shall be possible per system, by operating a single control.	The emptying of systems holding water are to be optimised. This functionality is not to influence automated freeze drain systems. Damage by freezing water is to be prevented.	DD	minor change	Compliance statement	System description; Concept maintenance instructions		Demonstration; Final maintenance instructions	Statement of conformity
TOI-0118	RE	Draining the pipework and toilet shall be possible per system, by operating a single control.	The emptying of systems holding water are to be optimised. This functionality is not to influence automated freeze drain systems. Damage by freezing water is to be prevented.	DD	minor change	Compliance statement	System description; Concept maintenance instructions		Demonstration; Final maintenance instructions	Statement of conformity
TOI-0119	RE	Draining the fresh water tank manually shall be possible without the presence of Low Voltage supply and/or compressed air.	Manual draining is to be possible under all circumstances. Damage by freezing water is to be prevented.	DD	minor change	Compliance statement	System description; Concept maintenance instructions		Demonstration; Final maintenance instructions	Statement of conformity
TOI-0120	RE	The draining flow of the fresh water tank shall be compliant with EN 16362-2013 clause 4.1.4.	In order to reduce maintenance effort and costs, the process time is to be limited.	DD	minor change	Compliance statement	Analysis of the expected draining flow, e.g. calculation or return of experience data.		Type test 1. fill tank to maximum level (water tank is levelled straight). 2. Drain the tank manually and measure the time until water stops flowing. 3. The average measured flow rate shall be at least 1 litre per second. Tank(s) and draining shall be the final design	Statement of conformity
TOI-0121	RE	The fresh water tank shall not be damaged by the process of filling with water.	Damage to the fresh water tank is to be prevented. There is to be no pressure difference between the inside and the outside of the water tank that could damage the tank. In winter conditions it is to be considered that the filling pipe that is not used for filling is blocked due to ice or snow build-up.	DD	minor change	Compliance statement	Drawings containing relevant dimensions to determine the cross section of the filler and overflow pipes and their connections.		Test: One filling pipe is to be used, the other filling pipe shall be blocked. The maximum filling flow rate shall not cause a pressure build-up exceeding the maximum working pressure of the water tank. Test continues after fresh water tank overflows until the built up pressure is stable. When the design is according to the design recommendation TOI-0122 this test is not required.	Statement of conformity
TOI-0122	DR	The overflow pipe shall have a cross section exceeding twice the cross section of the filler pipe. (Design Recommendation for Requirement TOI-0121)	The filling of fresh water tanks is not to damage the water tanks, i.e. no damaging pressure build-up in the water tanks during filling.	DD	minor change	Compliance statement	Drawings containing relevant dimensions to determine the cross section of the filler and overflow pipes and their connections.		Inspection	Statement of conformity
TOI-0123	RE	The fresh water tank shall have an open connection to the atmosphere.	Damage to the fresh water tank is to be prevented. There is to be no pressure difference between the inside and the outside of the water tank.	DD	minor change	Compliance statement	System description; Drawings		Inspection	Statement of conformity
TOI-0124	RE	The fresh water tank shall be equipped with an overflow pipe.	Overflow is not to occur through the filling pipes.	DD	minor change	Compliance statement	System description; Drawings		Inspection	Statement of conformity
TOI-0125	RE	The overflow pipe shall be located such that water from the overflow pipe shall flow between the rails onto the ballast.	In order to prevent ice build-up on the train, the overflow of water is to fall between the rails.	DD	minor change	Compliance statement	System description; Drawings		Inspection; Demonstration may be required.	Statement of conformity
TOI-0126	INFO	The fresh water tank and the filler pipes will be cleaned periodically with acid. For this purpose it is necessary to connect flushing equipment to the filler pipes and to the fresh watertank. Cleaning these parts is done in a single process.			no change					
TOI-0127	RE	The fresh water tank shall be equipped with a separate connection for cleaning the fresh water tank and filler pipes.	In order not to have to disconnect any pipes a separate connection to allow cleaning of the fresh water system is to be provided. The interface for the maintenance equipment is to be standardised.	DD	minor change	Compliance statement	Drawings; System description; Concept maintenance instructions	Inspection	Final maintenance instructions	Statement of conformity
TOI-0128	RE	The separate connection for cleaning the fresh water system shall be placed between the tank and the drain valve as close as possible to the drain valve.	In order not to have to disconnect any pipes a separate connection to allow cleaning of the fresh water system is to be provided. The interface for the maintenance equipment is to be standardised.	DD	minor change	Compliance statement	Drawings; System description; Concept maintenance instructions	Inspection	Final maintenance instructions	Statement of conformity

ID	Requirement classification	Requirement text	Rationale	Product element EN15380-2	Change since last release	Verification				
						Offer of Tenderer(s)	Design Review	First Article Inspection (FAI)	First Integration Inspection (FI)	Hand-over
TOI-0129	DR	The drain valve of the fresh water tank shall be a three way valve. The third connection shall be used for the cleaning process. (Design Recommendation for Requirement TOI-0127 and TOI-0128)	In order not to have to disconnect any pipes a separate connection to allow cleaning of the fresh water system is to be provided. The interface for the maintenance equipment is to be standardised.	DD	minor change	Compliance statement	Drawings; System description; Concept maintenance instructions	Inspection	Final maintenance instructions	Statement of conformity
TOI-0130	RE	The separate connection for cleaning the fresh water system shall have an internal 1 inch thread and a blanking plug.	In order not to have to disconnect any pipes a separate connection to allow cleaning of the fresh water system is to be provided. The interface for the maintenance equipment is to be standardised.	DD	minor change	Compliance statement	Drawings; System description; Concept maintenance instructions	Inspection	Final maintenance instructions	Statement of conformity
TOI-0131	RE	The connector with internal 1 inch thread for cleaning and rinsing the fresh water tank and the filling pipes shall be accessible with a 1 inch service hose without dismantling other parts.	Connecting the equipment for cleaning and rinsing is to be easy and straightforward.	DD	minor change	Compliance statement	Drawings; System description; Concept maintenance instructions		Demonstration Demonstration of installed situation, all components adjacent to the water tank shall also be mounted. Final maintenance instructions	Statement of conformity
TOI-0132	RE	Pipes of the fresh water system that are included in the circuit of the cleaning process of the fresh water tank as mentioned in requirements TOI-0127, TOI-0128, TOI-0129, TOI-0130 and TOI-0131 shall have an internal diameter of at least 25 mm.	In order to provide a sufficient flow of cleaning product during the cleaning process.	DD	minor change	Compliance statement	Drawings; System description			Statement of conformity
TOI-0133	RE	After the cleaning process is finished, the system shall be ready for operation and no residue from the cleaning process shall be left behind in the fresh water system.	To prevent additional rinsing and additional cleaning of the system and damage caused by cleaning residue.	DD	minor change	Compliance statement	Drawings; System description; Concept maintenance instructions		Demonstration; Final maintenance instructions	Statement of conformity
TOI-0134	INFO	The fresh water circuit of the toilet bowl and the water tap system will be cleaned periodically with acid. For this process the toilet bowl needs to be flushed repeatedly and the water tap needs to be operated repeatedly.			no change					
TOI-0135	RE	The toilet system shall have a functionality for cleaning the fresh water circuit of the toilet bowl and the water tap with acid. After starting this function, the toilet bowl shall initiate an automated series of flushes and the water tap shall initiate an automated series of cycles.	An easy and straightforward cleaning and rinsing process for the toilet and the water tap. To prevent intensive manual operating of the toilet and water tap during maintenance.	DD	minor change	Compliance statement	Drawings; System description; Concept maintenance instructions		Demonstration; Final maintenance instructions	Statement of conformity
TOI-0136	RE	The number of flushes of the automated series of flushes and the number of water tap cycles as mentioned in Requirement TOI-0135 shall be adjustable software parameters.	Optimising the maintenance process to the customer needs.	DD	minor change	Compliance statement	Drawings; System description; Concept maintenance instructions		Final maintenance instructions	Statement of conformity
TOI-0137		Waste water system								
TOI-0138	RE	The waste water system and its surroundings shall incorporate design features to prevent waste leaking into the car body.	Leakage of waste water is not to damage or pollute the car body. Measures are to be taken to minimise the contaminated area and consequential damage. All critical components (toilet bowl, filters for constant vacuum systems, etc.) and all connections are to be considered.	DD	changed	Compliance statement	System description		Inspection; Demonstration may be required	Statement of conformity
TOI-0139	RE	Waste water shall not remain behind in the pipes of the waste water system.	To prevent damage caused by freezing.	DD	minor change	Compliance statement	System description		Inspection	Statement of conformity
TOI-0140	DR	Pipes of the waste water system shall continuously decline with a gradient of at least 3%. (Design Recommendation for Requirement TOI-0139)	To prevent damage caused by freezing.	DD	minor change	Compliance statement	Drawings		Inspection	Statement of conformity
TOI-0141	RE	Pipe bends in the waste water system shall have a radius of at least 3 times the pipe diameter.	Generous radii prevent blockage of waste water pipes.	DD	minor change	Compliance statement	Drawings		Inspection	Statement of conformity
TOI-0142	RE	In the flow of waste water from the toilet bowl to the waste water tank, the cross section and the diameter of the opening at the exit of the toilet bowl shall be the smallest of the entire system.	To limit the size of objects getting into the system and blocking the waste water pipes.	DD	minor change	Compliance statement	System description		Test: A rigid ball with a smooth surface and a diameter equal to the diameter of the exit of the toilet bowl (tolerance 0/-0,5 mm) shall pass the piping of the waste system until it ends in the waste tank. It is permitted to use pressurised air for this test.	Statement of conformity

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						Offer of Tenderer(s)	Design Review	First Article Inspection (FAI)	First Integration Inspection (FI)	Hand-over
TOI-0143	RE	In the direction of flow, the inner diameter of the pipes of the waste water system shall not reduce.	To prevent blockage of waste water pipes.	DD	minor change	Compliance statement	System description; drawings		Inspection	Statement of conformity
TOI-0144	RE	The pipes for black waste water and their connections shall withstand inside cleaning with a high pressure water cleaner.	Clearing blockages and cleaning with commercial high pressure water cleaners is sometimes used. This is not to damage the waste water pipes or their connections.	DD	minor change	Compliance statement	System description; Concept maintenance instructions.		Inspection; Demonstration may be required	Statement of conformity
TOI-0145	RE	The waste water pipes and the connections of the waste water pipes that are not accessible for unblocking and inspection shall withstand a static pressure of at least 8 bar.	Workshop air supplies are often at 8 bar and are used to unblock waste water pipes. This methodology is not to cause damage to pipes that are not accessible.	DD	changed	Compliance statement	System description; Data sheets; Concept maintenance instructions	Datasheets and test Datasheets of all connections and flexible hoses. A test of the inaccessible piping and connections shall be done.	Final maintenance instructions	Statement of conformity
TOI-0146	RE	Inspecting and cleaning the inside of the waste water tank shall be possible without removing the tank.	To have easy access to the inside of the waste water tank for inspection and cleaning.	DD	minor change	Compliance statement	System description; drawings; Concept maintenance instructions		Demonstration of the built-in situation, all components adjacent to the waste tank shall be mounted. Final maintenance instructions	Statement of conformity
TOI-0147	RE	Waste water tanks shall have a hatch for inspecting and cleaning the waste water tanks.	To be able to visually inspect the inside of the waste water tank and to have access to its inside for manual cleaning.	DD	minor change	Compliance statement	System description; drawings; Concept maintenance instructions		Inspection; Final maintenance instructions	Statement of conformity
TOI-0148	RE	The access hatch of the waste water tanks shall have an opening of at least 40.000 mm ² .	To have a sufficient opening for a visual inspection of the the inside of the waste water tank and to have access to its inside of the waste water tank for manual cleaning.	DD	minor change	Compliance statement	Drawings		Inspection	Statement of conformity
TOI-0149	RE	The access hatch of the waste water tank shall be accessible without removing any other parts (excluding insulation materials). In case the waste water tank is located inside a cabinet or behind a panel, it is permitted to have access to the hatch of the waste water tank by opening a door or other hatch.	To have easy access to the waste water tank for inspection and cleaning.	DD	changed	Compliance statement	System description; Drawings		Demonstration	Statement of conformity
TOI-0150	RE	The level sensor(s) and inlet pipe-end(s) inside the waste water tank shall be directly visible, when the access hatch is removed.	To be able to visually inspect the level sensors and inlet pipe ends inside the waste tank when the hatch is removed.	DD	minor change	Compliance statement	System description; Drawings		Demonstration	Statement of conformity
TOI-0151	RE	The access hatch shall give direct access to the inside of the waste water tank to enable removal of any blocking objects. It is permitted to have an additional hatch to comply with this requirement.	To have good access to the inside of the tank for cleaning and removing any blocking objects.	DD	minor change	Compliance statement	System description; Drawings; Concept maintenance plan		Demonstration; Final maintenance plan	Statement of conformity
TOI-0152	RE	Rinsing the pipework and the waste water tank shall be possible without dismantling the waste water tank.	To be able to rinse the piping and the waste water tank in an easy and straightforward manner in a minimum amount of time.	DD	minor change	Compliance statement	System description; Concept maintenance plan		Demonstration; Final maintenance plan	Statement of conformity
TOI-0153	RE	The level sensors inside the waste water tank shall not be exposed to the ejected waste coming directly from the inlet pipe.	To prevent pollution of the level sensors.	DD	minor change	Compliance statement	Drawings showing that the sensor is not located in the trajectory area of the waste coming from the inlet pipe-end inside the waste tank.	Inspection, Demonstration may be required		Statement of conformity
TOI-0154	RE	For gravity operated grey water systems, the cross section of the grey water outlet (hoses and piping) shall be at least 800 mm ² . The shape shall be circular or elliptical.	To prevent blockage of grey water drain pipes.	DD	minor change	Compliance statement	Drawings	Inspection	Inspection	Statement of conformity
TOI-0155	RE	The free space around the interfaces for servicing the waste water tanks shall be according to figures 4 and 5 of the EN 16922-2017.	To have sufficient working space for connecting the emptying equipment.	DD	changed	Compliance statement	System description; Drawings		Inspection	Statement of conformity
TOI-0156	RE	The waste water system shall facilitate emptying from both sides of the vehicle.	To be able to empty waste water from both sides of the vehicle.	DD	minor change	Compliance statement	System description		Inspection	Statement of conformity
TOI-0157	RE	All components that come into contact with waste water shall be resistant to waste water.	To prevent degradation of components.	DD	minor change	Compliance statement	System description; list of materials; Datasheets		Inspection	Statement of conformity
TOI-0158	RE	The grey water system shall be connected to the waste water tank with a dedicated pipe.	To prevent a flush back in the wash bowl.	DD	minor change	Compliance statement	System description; Drawings		Inspection	Statement of conformity

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						Offer of Tenderer(s)	Design Review	First Article Inspection (FAI)	First Integration Inspection (FI)	Hand-over
TOI-0159		Diagnostic system								
TOI-0160	RE	The toilet shall have a diagnostic system.	A diagnostic system is to monitor the toilet's functions and detect and store failures of the system. The stored information is to be easily accessible.	JC	minor change	Compliance statement	System description	Inspection		Statement of conformity
TOI-0161	RE	The diagnostic system shall have a local HMI with an information display.	The stored information is to be easily accessible.	JC	minor change	Compliance statement	System description	Inspection		Statement of conformity
TOI-0162	RE	The diagnostic system shall combine the signals from fresh water system, waste water system, toilet module and toilet flush system in its diagnostic assessments.	System diagnostics are to combine signals of different connected systems for improved diagnostics.	JC	changed	Compliance statement	Diagnostic logic scheme The required signals shall be used for the diagnostic input.		Type test.	Statement of conformity
TOI-0163	RE	The diagnostic system shall detect degraded conditions of the toilet system.	System diagnostics are to detect failures of the toilet system.	JC	minor change	Compliance statement	System description; A FMEA and a diagnostic logic scheme All input signals and all outputs i.e automated corrective actions and trouble shooting solutions shall be included in the diagnostic logic scheme.		Type test	Statement of conformity
TOI-0164	RE	The diagnostic system shall initiate corrective actions and provide trouble shooting solutions.	System diagnostics are to detect failures of the toilet system and if possible correct these automatically.	JC	minor change	Compliance statement	System description; Concept maintenance plan.		Type test; Final Maintenance plan	Statement of conformity
TOI-0165	RE	Trouble shooting solutions provided by the diagnostic system shall be presented in text and/or pictograms and shall identify the defective part and the necessary action to solve the failure.	Diagnostic information is to be clearly, concisely and completely presented.	JC	minor change	Compliance statement	System description; Concept maintenance plan; Proposal for text and pictograms	Demonstration	Final maintenance plan	Statement of conformity
TOI-0166	RE	As a minimum the following undesired conditions shall lead to corrective actions from the toilet system itself: - Blocking of the toilet bowl; - Overflow of the toilet bowl. A reverse flushing shall not be initiated automatically.	System diagnostics are to correct failures, if possible automatically.	JC	minor change	Compliance statement	System description; Concept maintenance plan		Type test; Final Maintenance plan	Statement of conformity
TOI-0167	RE	The diagnostic system shall store the following user data: ● The total number of flushing cycles per toilet module; ● The total number of flushing cycles per toilet module since last overhaul; ● The total number of flushing cycles per toilet module per day.	The user data is to be recorded for future analysis.	JC	minor change	Compliance statement	System description; Concept maintenance plan	Demonstration	Final maintenance plan	Statement of conformity
TOI-0168	RE	User data and diagnostic information about the toilet bowl unit shall be available and accessible on-board.	The user data and the diagnostic information from the toilet bowl unit is to be able to be read whilst powered from the vehicle Low Voltage supply.	JC	minor change	Compliance statement	System description; Concept maintenance plan	Demonstration	Final maintenance plan	Statement of conformity
TOI-0169	RE	User data and diagnostic information about the toilet bowl unit shall be available and accessible when the toilet bowl is removed from the train (diagnostic memory read-out).	When the toilet bowl unit is removed from the vehicle, interrogation of the user data and diagnostic information, without the need for dedicated equipment, is to be possible.	JC	changed	Compliance statement	System description; Concept maintenance plan	Demonstration	Final maintenance plan	Statement of conformity
TOI-0170	RE	If additional equipment is needed for accessing the data and diagnostic information, it shall be a standard laptop. If dedicated software is needed this software shall be supplied. Note: The use of alternative equipment can be offered as an option.	When the toilet bowl unit is removed from the vehicle, interrogation of the user data and diagnostic information, without the need for dedicated equipment, is to be possible.	JC	new	Compliance statement	System description; Concept maintenance plan	Demonstration	Final maintenance plan	Statement of conformity
TOI-0171	RE	The functionality described in Requirements TOI-0168, TOI-0169 and TOI-0170 shall also be applicable for other sanitary systems with dedicated controllers.	Diagnostic information is to be available on-board and in the workshop.	JC	changed	Compliance statement	System description; Concept maintenance plan	Demonstration	Final maintenance plan	Statement of conformity
TOI-0172	RE	The diagnostic and user data shall be accessible at the vehicles HMI. If a TCMS is	Data is to be available for on-board access without the need for an external computer or other tools.	PB	minor change	Compliance statement	System description; Concept maintenance plan		Demonstration; Final maintenance plan	Statement of conformity

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		available, this data shall be reported in the TCMS.								
TOI-0173	RE	In the event of a failure of the flush function of the toilet system, an indication to the on-board train staff shall be provided.	To restore the availability of the toilet more promptly, train staff are to be made aware of a non-available toilet as soon as possible.	JC	minor change	Compliance statement	System description; Concept maintenance plan		Demonstration; Final maintenance plan	Statement of conformity
TOI-0174	RE	If a TCMS is available, a non-availability of the toilet due to failure, shall be reported in the TCMS.	A non-functional toilet system is to be detected and reported in the TCMS.	JC	minor change	Compliance statement	System description; Concept maintenance plan		Demonstration; Final maintenance plan	Statement of conformity
TOI-0175	RE	If a TCMS is available, the state "fresh water tank empty" shall be reported in the TCMS.	Empty fresh water tanks are to be detected and recorded in the TCMS.	JC	minor change	Compliance statement	System description; Concept maintenance plan		Demonstration; Final maintenance plan	Statement of conformity
TOI-0176	RE	The toilet system shall indicate to passengers if the toilet is vacant.	A clear indication is to be given to the passengers so that it is obvious that the toilet is vacant.	PB	minor change	Compliance statement	System description		Demonstration	Routine test
TOI-0177	RE	The toilet system shall indicate to passengers if the toilet is occupied.	A clear indication is to be given to the passengers so that it is obvious that the toilet is occupied.	PB	minor change	Compliance statement	System description		Demonstration	Routine test
TOI-0178	RE	The toilet system shall indicate to passengers if the toilet is out-of-order.	A clear indication is to be given to the passengers so that it is obvious that the toilet is not-available and out-of-order.	PB	minor change	Compliance statement	System description		Demonstration	Routine test
TOI-0179		Controller								
TOI-0180	RE	Software parameters related to the operation of the toilet shall be adjustable.	To optimise the operation of the toilet by adjusting the controller parameters.	DD	changed	Compliance statement	System description; Concept maintenance instructions		Demonstration; Final maintenance plan	Statement of conformity
TOI-0181	RE	If additional equipment is needed for adjusting the software parameters, it shall be a standard laptop. Note: The use of alternative equipment can be offered as an option.	To optimise the operation of the toilet by adjusting the controller parameters.	DD	new	Compliance statement	System description; Concept maintenance instructions		Demonstration; Final maintenance plan	Statement of conformity
TOI-0182	RE	If software for adjusting controller parameters is needed, the supplier shall provide this software.	To optimise the operation of the toilet by adjusting the controller parameters.	DD	minor change	Compliance statement	Concept maintenance instructions		Demonstration; Final maintenance plan	Statement of conformity
TOI-0183	RE	The supplier shall provide the definition of the controller, including equipment design, input and output definition and documentation.	Function modifications of the controller are to be possible during the lifetime of the train. New developments of toilet controllers or future upgrades are to be possible.	DD	minor change	Compliance statement	System description			Statement of conformity
TOI-0184	OR	The supplier shall provide the source code and compilation tool of the controller.	Function modifications of the controller are to be possible during the lifetime of the train. New developments of toilet controllers or future upgrades are to be possible.	DD	minor change	Compliance statement	System description	Demonstration		Statement of conformity
TOI-0185	RE	The controller shall have spare input and output channels.	To cater for future (as yet unspecified) requirements, extension of the functionality of the controller is to be possible.	DD	minor change	Compliance statement	System description			Statement of conformity
TOI-0186	DR	The controller shall have 20% spare channel capacity. (Design Recommendation for Requirement TOI-0185)	To cater for future (as yet unspecified) requirements, extension of the functionality of the controller is to be possible.	DD	minor change	Compliance statement	System description			Statement of conformity
TOI-0187	RE	The controller shall have spare power capacity.	To cater for future (as yet unspecified) requirements, reserve power is to be available.	DD	minor change	Compliance statement	System description			Statement of conformity
TOI-0188	DR	The controller shall have 30% spare power capacity. (Design Recommendation for Requirement TOI-0187)	To cater for future (as yet unspecified) requirements, reserve power is to be available.	DD	minor change	Compliance statement	System description			Statement of conformity
TOI-0189		Doors and locks								
TOI-0190	RE	The on-board train staff shall be able to lock the toilet door from the outside under all circumstances (including all degraded situations of the toilet and train).	The train staff are to be able to lock the toilet door out-of-service to prevent passengers entering the toilet.	NC	minor change	Compliance statement	System description; Concept user documentation	Type test	Final user documentation	Statement of conformity
TOI-0191	RE	The on-board train staff shall be able to unlock and open the toilet door from the outside under all circumstances (including all degraded situations of the toilet and train).	The train staff are to be able to access the toilet under all circumstances.	NC	minor change	Compliance statement	System description; Concept user documentation	Type test	Final user documentation	Statement of conformity
TOI-0192	RE	The lock as described in requirements 4.14.01 and 4.14.02 shall be operable with a square socket key according to RIC. (i.e. a Berne key)	The train staff are to be able to lock the toilet door out-of-service to prevent passengers entering the toilet. The train staff are to be able to unlock and open the toilet door from the outside.	NC	minor change	Compliance statement	System description	Type test		Statement of conformity
TOI-0193	RE	In case of a failure of the door drive, it shall be possible to open and close the toilet door by hand and to lock and unlock the door.	To increase the availability of the toilet, it is to be available to passengers in the event of a door drive failure.	NC	minor change	Compliance statement	System description; Concept user documentation	Type test.	Final user documentation	Statement of conformity

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						Offer of Tenderer(s)	Design Review	First Article Inspection (FAI)	First Integration Inspection (FI)	Hand-over
								Simulate a broken belt and simulate a power loss of the motor.		
TOI-0194	RE	The toilet door shall only be locked automatically when there is a temporary failure to flush. This shall not prevent egressing from the toilet.	The toilet module is to have a high availability. The toilet door is to be only locked in case of a non-functional flushing function. This to prevent excessive pollution of the toilet module.	NC	minor change	Compliance statement	System description; Concept maintenance instructions,	Type test	Final maintenance plan	Statement of conformity
TOI-0195	RE	A temporary failure to flush shall only be caused either by critical failures of the toilet system or by one of the following conditions: - Lack of fresh water; - Waste water reservoir full. Note: a critical failure is caused by a defect of one or more components of the toilet system preventing the toilet to flush when operated as intended.	The toilet module is to have a high availability. Minor failures shall not lead to a temporary failure to flush.	NC	minor change	Compliance statement	System FMEA; diagnostic logic scheme; Concept maintenance instructions,		Type test; Final maintenance plan	Statement of conformity
TOI-0196	RE	Pulling an automatic toilet door in the opening or closing direction manually shall not damage the door drive system.	To ensure that operating an automatic door manually does not lead to any damage.	NC	changed	Compliance statement	System FMEA; Concept user documentation	Type test The test force shall be increased until the door opens or closes and shall not exceed 500N. For this test, the door should not be locked.	Final user documentation	Statement of conformity
TOI-0197	RE	If the toilet module has a hinged door, it shall rotate into the toilet module when opened.	Passengers outside the toilet are not to be hindered by the opening and closing movement of the toilet door.	NC	minor change	Compliance statement	System description; Drawing		Inspection	Statement of conformity
TOI-0198	RE	For the complete rotation movement of a hinged door, the clearway inside the toilet shall be according to figure 2.  Figure 2	There is to be sufficient space to stand inside the toilet whilst opening and closing the door (As a hinged door rotates into the toilet module it reduces the free space inside the toilet).	NC	changed	Compliance statement	Lay-out drawing including indication of door rotation area	Inspection		Statement of conformity
TOI-0199	RE	If the toilet has a manual sliding door, it shall be self-closing with a damped movement. The closing speed shall be lower than 0.25 m/s and shall function at an inclination angle of 2,5° in the most critical directions. it is permitted to use a time delay function or a brake (hold open function) for the closing movement.	When the toilet is not used, the door is to be closed.	NC	changed	Compliance statement	System description; Concept maintenance plan	Type test A complete representative door and door mechanism including interfacing components shall be tested.	Final maintenance plan	Routine test

7 APPENDIX

The Excel document “Appendix to Eurospec toilet specification 3.0.xlsx” with all attributes is available on request (see contact on website).

8 BIBLIOGRAPHY

Technical specification for interoperability	Technical specification for interoperability relating to the rolling stock subsystem of the trans-European conventional rail system referred to in Annex II (1) to Directive 2008/57/EC (2011/291/EU – published 26/05/2011)
TSI PRM-2014	Technical Specification of Interoperability relating to ‘persons with reduced mobility’
EN15380-2-2013	Designation system for railway vehicles - Part 2: product groups
EN1717-2000	Protection against pollution of potable water in water installations and general requirements of devices to prevent pollution by backflow

EuroSpec

“EuroSpec” stands for European Specifications for railway rolling stock. The activity is an initiative of several European train operating companies (TOC). The main focus is on trains consisting of self-propelled carriages, using electricity as the motive power (EMU).

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