



Co-funded by  
the European Union



# **Technical Specification for Certification intermediary service of the NYSMART Dual-Fuel System**

## Table of contents

1. Definitions.....	5
2. Introduction.....	5
3. Scope .....	6
4. Selection criteria.....	6
5. Subcontracting.....	11
6. Submission of offer.....	11
7. Functional description of the NYSMART dual-fuel system on retrofitted locomotive .....	12
7.1. Gas system .....	12
7.2. Control system .....	15
7.2.1. Electronic control units (ECU's).....	15
7.2.2. Sensors .....	17
7.2.3. Executive devices .....	18
7.2.4. Safety system .....	18
7.2.4.1. Mechanical safety devices.....	19
7.2.4.2. Safety subsystem .....	19
7.2.4.3. Fire signaling and gas leak detection system .....	20
8. Applicable legislation.....	21
8.1. Dual-fuel system legislative standards .....	21
8.1.1. Interoperability .....	21
8.1.1.1. Locomotive and passenger rolling stock – LOC & PAS TSI.....	24
8.1.1.2. Safety in railway tunnels – SRT TSI .....	34
8.1.1.3. Noise – NOI TSI .....	35
8.1.1.4. Operation and traffic management – OPE TSI .....	36
8.1.1.5. Control command and signaling – CCS TSI .....	37
8.1.2. Safety.....	37
8.1.3. Conformity assessment.....	38
8.1.4. R110 Natural gas component and installation requirements.....	40
8.1.5. Railway emissions standards.....	42
8.2. Applicable legislation in the European Union.....	44
<b>Confirmation of Service providers Financial Standing.....</b>	<b>1</b>

## List of figures

<b>Figure 1</b> – CNG component layout (view 1).....	13
<b>Figure 2</b> – CNG component layout (view 2).....	14
<b>Figure 3</b> – Overview of control and safety systems (view 1).....	16
<b>Figure 4</b> – Overview of control and safety systems (view 2).....	17
<b>Figure 5</b> – Sensors and executive devices .....	18
<b>Figure 6</b> – Control panel .....	20
<b>Figure 7</b> – Documentation workflow in the conformity assessment procedure .....	39

## List of tables

<b>Table 1</b> - Locomotive types and countries.....	12
<b>Table 2</b> – Interoperability regulatory base .....	22
<b>Table 3</b> – LOC & PAS TSI regulatory base.....	24
<b>Table 4</b> - Assessment of the rolling stock subsystem applicable for <b>NYSMART</b> .....	24
<b>Table 5</b> - Applicable standards/normative documents for NYSMART referred to in LOC & PAS TSI.....	27
<i><b>Table 6</b> - Applicable standards/normative documents NOT referred to in LOC &amp; PAS TSI BUT are applicable to NYSAMRT according to current understanding and knowledge level .....</i>	<i>29</i>
<b>Table 7</b> – Safety in railway tunnels – SRT TSI regulatory base .....	34
<b>Table 8</b> - Basic SRT TSI parameters and their correspondence to the essential requirements .....	34
<b>Table 9</b> - SRT interfaces with LOC&PAS TSI .....	34
<b>Table 10</b> – SRT TSI assessment procedures .....	35
<b>Table 11</b> – Noise NOI TSI regulatory base .....	35
<b>Table 12</b> - NOI TSI basic parameters and correspondence to essential requirements .....	36
<b>Table 13</b> – NOI TSI assessment procedure .....	36
<b>Table 14</b> - Operational and traffic management – OPE TSI regulatory base .....	36
<b>Table 15</b> - Control command and signalling – CCS TSI regulatory base .....	37
<b>Table 16</b> - <b>NYSMART</b> applicable safety regulatory base .....	37
<b>Table 17</b> - EU regulations for mandatory safety processes.....	37
<b>Table 18</b> - Conformity assessment regulatory base .....	39
<b>Table 19</b> - Regulation on Natural gas components quality requirements and installation methods.....	40
<b>Table 20</b> - <b>NYSMART</b> applicable standards or normative documents referred to in R110 .....	41
<b>Table 21</b> - Regulatory framework for NRMM emissions legislation.....	42
<b>Table 22</b> – Applicable legislative standards in the European Union with respective applicable national standards for Latvia and Poland .....	46

## 1. Definitions

**Contracting party** – DiGas Ltd. The company is a pioneer in state-of-the-art dual fuel technology and has designed a game changing product for high horsepower diesel engine applications, particularly locomotives to promote competitive and sustainable transport in Europe, and globally. Currently DiGas is executing H2020 project No. 784620 „Novel dual-fuel system for modernization of air polluting diesel locomotives to clean and efficient gas operation — NYSMART”.

**Project** - Project No. 784620 „Novel dual-fuel system for modernization of air polluting diesel locomotives to clean and efficient gas operation — NYSMART”, which is carried out in accordance with the Grant Agreement signed between the Executive Agency for Small and Medium-sized Enterprises and SIA “DiGas”. Information on the project: <https://cordis.europa.eu/project/rcn/213222/factsheet/en>

**Service Provider** – Intermediary party which meets the requirements of this document and undertakes to provide the service described in this document according to the guidelines set out in this document.

**NYSMART** – patented dual-fuel technology that is tailored for modernization and upgrade of air-polluting diesel locomotives, to ensure their clean and efficient operation on natural gas. Due to its modular form, NYSMART can be quickly and simply installed onto any diesel engine type.

**Service** – legal management of the certification and type approval process for 3 shunter locomotives like ChME3/S200, SM42, and TEM2, and 1 mainline locomotive like GE C36-7i, TE116, or M62 or equivalent types of 3 shunter and 1 mainline locomotives retrofitted with **NYSMART** dual-fuel system according to technical specification described in this document in accordance to modules SB and SF and in line with the requirements and guidelines set out in this document.

## 2. Introduction

- 2.1. In order to ensure further implementation of the **Project**, DiGas wants to contract a Service provider to execute the Services for 4 locomotives. Therefore, DiGas will prefer a **Service provider**, who is also a notified body, who is having the ability to execute the legal side of certification with all parties involved, including local authorities having jurisdiction, railway certification bodies, gas component certification bodies, and other parties.
- 2.2. **Contracting party** currently has chosen the following 11 countries as main target markets – Czech Republic, Estonia, Georgia, Hungary, Latvia, Lithuania, Moldova, Poland, Slovakia, Slovenia, Serbia. But DiGas is planning to expand also to other EU countries.

2.3. The details of this specification, necessary documentation and various other requirements as stated in this document may not be complete. The Service provider may suggest modification/alteration in the specification if such modifications/alterations would overall provide useful in reaching the goals set out by the specification.

### 3. Scope

3.1. The **Service provider** shall provide certification for locomotives type approval, which applies to all EU countries and shows that locomotives with **NYSMART** system meet a set of regulatory, technical and safety requirements. Type approval certification and testing procedures should be conducted taking into consideration both EU and local regulations if applicable in order to ensure type approval acceptance by other EU member states.

3.2. The **Service provider** shall provide all management of the certification process. This includes, but is not limited to communication with respective countries' notified bodies, producing and submission of all required certification documentation according to legislation requirements. Managing and following up on the certification process.

3.3. The **service provider** can propose other territories preserving principles of efficiency, availability and best price while securing type approval acceptance and increasing impact.

3.4. In the process of certification, the **Service provider** shall ensure that the following work is carried out:

- initial analysis of the application for certification and enclosed technical documentation;
- compliance expertise of technical project;
- selection and identification of samples of railway products;
- selection of accredited testing laboratories and interaction in order to carry out necessary certification tests;
- evaluation of test results, inspections, examinations, calculations, simulations, expertise reports and other necessary documents;
- preparation of conclusions about the possibility of certification of railway products;
- the decision on the certification of the type of railway products;
- issuance of type-approval certificate or written justification for refusal;
- verification (inspection) and testing of each subsystem (if necessary);
- the decision on approval of the unit of railway products;
- issuance of verification certificate or written justification for the refusal.

### 4. Selection criteria

#### 4.1. Legal standing

No	Requirement	Document to be submitted
1	Service provider or all members of partnership (if the Service provider is a partnership) must be registered in the Registry of Enterprises or Registry of Inhabitants, or and equivalent register in their country of residence, if the legislation of respective country requires registration of natural or legal persons	<ul style="list-style-type: none"> <li>- For a Service provider which is legal person (or a member of a partnership, a person on whose capacities a Service provider relies) registered in Latvia, the Contracting party shall verify the information itself in publicly available databases</li> <li>- For a Service provider which is legal person (or a member of a partnership, a person on whose capacities a Service provider relies) – a copy of an identification card or passport.</li> <li>- For a Service provider which is legal person (or a member of a partnership, a person on whose capacities a Service provider relies) which is legal person registered abroad (with its permanent place of residence abroad) – a copy of a valid registration certificate or similar document issued by foreign authority in charge of the registration of legal persons in the a country of their residence wherefrom at least the fact of registration, shareholders officials and procura holders (if any) can be determined.</li> <li>- If an application is submitted by partnership, the application shall include an agreement (or letter of intension to enter into agreement) signed by all members on the participation in the Competition, which lists responsibilities of each and every partnership member and a joint commitment to fulfil the Contract, and which authorises one key member to sign the application and other documents, to receive and issue orders on behalf of the partnership members, and with whom all payments will be made</li> <li>- If the application or any other document including agreement, is not signed by the legal representative of the Service provider, members of the partnership, person on whose capacities the Service provider relies, then a document certifying the rights of the persons who have signed the application or any other documents, to represent the Service provider, a member of the partnership, a person on whose capacities the Service</li> </ul>

		provider is relying (power of attorney, authorisation agreements etc.) must be included
--	--	---

#### 4.2. Technical and professional ability

No	Requirement	Document to be submitted
1	Service provider has provided NoBo or legal management services of certification and consultation within the railway industry, preferably in CNG/LNG locomotive certification. If the Service provider is a partnership, this experience requirement applies to each member of the partnership.	Filled and signed Annex No 2 Detailed reference project description on no more than 15 pages, as described in Annex No 2
2	The Service provider shall ensure sufficient human resources capacity for the successful provision of the Service. Service provider's personnel must have provable previous real-life experience with legal management of certification processes within the railway industry.	Relevant documentation proving personnel qualifications, experience and permits before starting any of the works described in this document.
3	Preferable requirement: The Service provider is Notified Body under Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community (Recast).	Regarding registration in the respective NANDO database the Contracting Party shall verify the information itself.

#### 4.3. Economic and financial standing

No	Requirement	Document to be submitted
----	-------------	--------------------------



1	<p>The Service provider or each member of the partnership (if the Service provider is a partnership) on whose capacities the Service provider is relying has to certify it's financial and economical performance and who will be responsible for fulfilment of the procurement contract and entity on whose abilities Service provider is relying to certify it's financial and economic performance and who will be financially and economically responsible for fulfilment of the procurement contract , shall have stable financial and economic performance, namely, in the last financial year (2018) liquidity ratio (current assets divided by short-term liabilities) shall be equal to or exceed 0,75 and shall have positive equity</p>	<ul style="list-style-type: none"> <li>- Filled and signed Annex No 3.</li> <li>- Audited or self-approved by a Service provider (only in a case when the audited yearly report is not required by the law of the country of residence of the Service provider) annual reports for financial year 2018 showing financial and economic performance the of the Service provider and each member of the partnership on whose abilities the Service provider is relying to certify its financial and economical performance and who will be financially responsible for the execution of the Contract (if the Service provider is partnership) and a company on whose capacities the Service provider is relying to certify it's financial and economic performance</li> <li>- If an application is submitted by a partnership, the Service provider shall indicate the member of the partnership on whose capacities the Service provider is relying to certify its financial and economic performance and who will be financially and economically responsible for fulfilment of the Contract including this information in the agreement of cooperation (or letter of intention to enter into agreement) stipulated in Section 4.1. of the Regulations.</li> </ul>
---	--	---

#### 4.4. Exclusion grounds

No	Requirement	Document to be submitted
	<p>Within previous 3 (three) years before submission of the application the Service provider or person who is the Service provider's management board or supervisory board member, person with representation rights or procura holder, or person who is authorized to represent the Service provider in operations in relation to branch, has been found guilty or has been subjected to coercive measures for committing any of the following criminal offences by such public prosecutor's order regarding punishment or a court judgment that has entered into force</p>	<ul style="list-style-type: none"> <li>- For Service provider and person who is the Service provider's management board or supervisory board member, person with representation rights or a procura holder, or a person who is authorized to represent the Service provider in operations in relation to a branch, which are registered or residing in Latvia, the Contracting shall verify the information itself in publicly available databases</li> <li>- For Service provider and person who is the Service provider's management board or supervisory board member, person with representation rights or a procura holder, or a person who is authorized to represent the Service provider in operations in relation to a branch, which are registered or residing outside</li> </ul>

	<p>and may not be challenged and appealed:</p> <p>a) Establishment, management of, involvement in a criminal organization or in a criminal organization or in a organized group included in the criminal organization or other criminal formation, or participation in criminal offences committed by such an organization,</p> <p>b) Bribe-taking, bribery, bribe misappropriation, intermediation in bribery, unauthorized participation in property transaction taking prohibited benefit, commercial bribing, unlawful claiming of benefits, accepting or providing benefits, trading influences</p> <p>c) Fraud, misappropriation or money-laundering,</p> <p>d) Evasion from payments of taxes or similar payments</p>	<p>of Latvia the Service provider shall submit an appropriate statement from the competent authority of the country of registration or residence</p>
	<p>It has been detected that on the last day of the term of submitting applications or on the day when a decision has been made on possible granting of rights to conclude the procurement contract, the Service provider has tax debts in Latvia or a country where it has been incorporated or is permanently residing, including debts of mandatory state social insurance contribution in excessive amount.</p>	<ul style="list-style-type: none"> <li>- For Service provider registered or residing in Latvia, The Contracting party shall verify the information itself in publicly available databases</li> <li>- For Service provider registered or residing outside of Latvia the Service provider shall submit an appropriate statement from competent authority of the country if registration or residence</li> </ul>
	<p>Service provider's insolvency proceedings have been announced, the Service provider's business activities have been suspended, the Service provider is under liquidation.</p>	<ul style="list-style-type: none"> <li>- For Service provider registered or residing in Latvia, The Contracting party shall verify the information itself in publicly available databases</li> <li>- For Service provider registered or residing outside of Latvia the Service provider shall submit an appropriate statement from competent authority of the country if registration or residence</li> </ul>
	<p>The Service provider has provided false information to prove its compliance with provisions of this Section 4.4. or qualification criteria or has not provided the required information at all</p>	<ul style="list-style-type: none"> <li>- No obligation to submit documents, unless specifically requested by Contracting party</li> </ul>

4.5. Notices and other documents, which are issued by Latvian competent institution are accepted and recognised by Contracting party, if they are issued no earlier than 1 (one)

month prior to submission thereof of if the notice contains a shorter validity term. Notices and other documents, which are issued by foreign competent institutions are accepted and recognized by Contracting party if they are issued not earlier than 6 (six) months prior to submission thereof of if the notice contains shorter validity term. The Service provider must verify the latter. This rule does not apply to expert's diploma providing relevant level of education, fact of registration supporting documents, copies of ID cards, passports, marriage certificates or documents certifying economic standing of the Service provider.

## 5. Subcontracting

- 5.1. **Service provider** will be required to provide information about any subcontractors used.
- 5.2. The **Contracting party** shall evaluate subcontractors of the **Service provider**. In case such subcontractors will not comply with any of the requirements mentioned in section 4. *Selection criteria*, the **Contracting party** shall request the **Service provider** to change such subcontractor.
- 5.3. **Contracting party** reserves the right to request **Service provider** to identify all the subcontractors involved in delivery of services irrespective of the amount of participation in the provision of services.

## 6. Submission of offer

- 6.1. **The service provider** shall submit an offer in a free form until 8 November 2019, 16:30
- 6.2. Submission:
  - Properly formatted and signed paper-based application must be sent to **Contracting party's** registered office address: 69-22 Matisa street, Riga, LV-1009, Latvia
  - A scanned version of the application must be submitted by e-mail to [info@digasgroup.com](mailto:info@digasgroup.com)
- 6.3. **The service provider** must include the following information in the offer:
  - Applicant's details and contact information (name, phone, address, e-mail);
  - Offer price shall be expressed in euros (EUR), showing the bid price separately excluding VAT and the total amount of the offer with VAT.
  - Offer price should include all costs that may occur during service (administrative, transport, materials, etc.). Additional costs will not be accepted at a later stage.
  - Applicant's offer should include price offer for every one of target locomotive types and include the differences in the price (if there is such) depending on the country where the certification is carried out in the form which is laid out in table Nr.1
- 6.4. Application offer must be valid for no less than 120 days from the time of submission of application.
- 6.5. Evaluation criterion for offers: lowest price. The contract will be awarded to the company that meets the requirements and quotes the lowest price for the chosen 3 shunter and 1 mainline locomotives.

**Table 1 - Locomotive types and countries**

	<b>Locomotive type</b>	<b>Country</b>	<b>Estimated price of the Service</b>
Shunter locomotives	ChME3	Poland	
		Latvia	
	SM42	Poland	
	TEM 2	Estonia	
		Lithuania	
		Poland	
Mainline locomotives	TE116	Latvia	
		Lithuania	
	GE C36-7i	Estonia	
	M62	Latvia	
		Lithuania	
		Poland	

## 7. Functional description of the NYSMART dual-fuel system on retrofitted locomotive

DiGas has developed dual fuel system for diesel locomotives, which is based on a modular design principle. Installation of it on different locomotive types is fast and easy. Due to its modular form and high versatility of its components, **NYSMART** can be quickly and simply installed onto any diesel engine type.

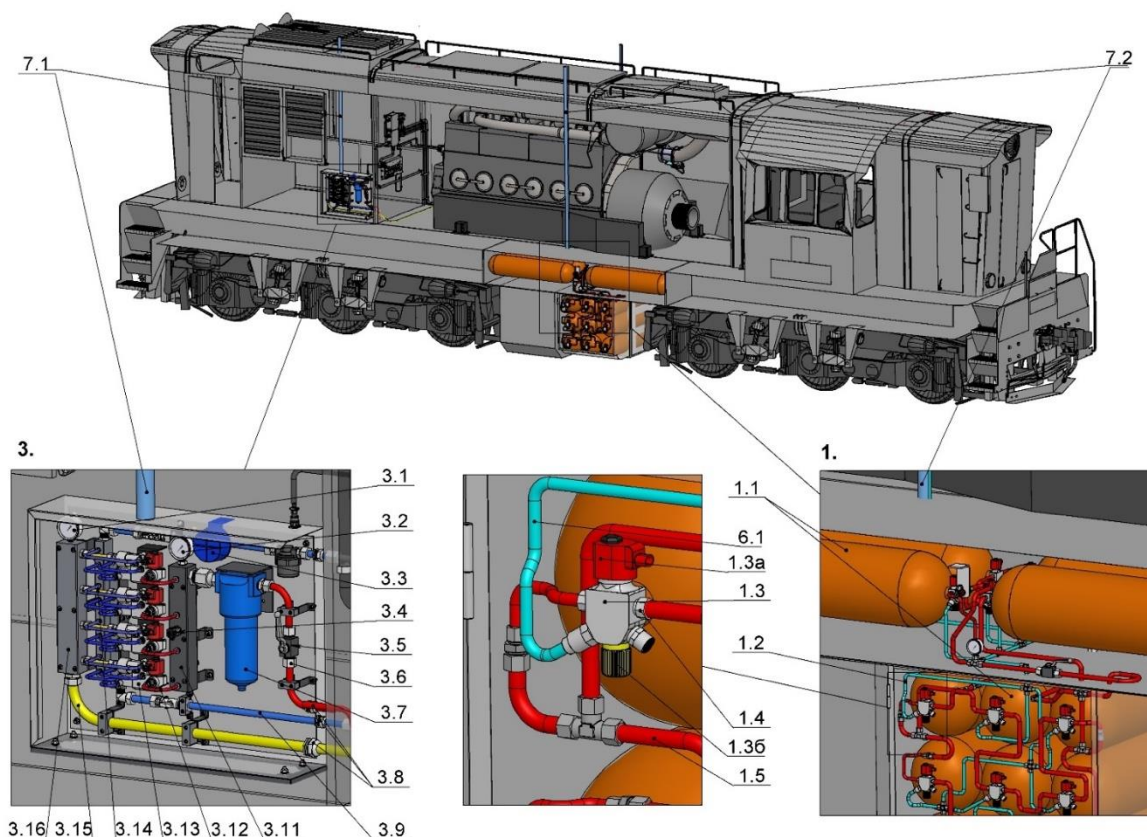
The dual-fuel system on locomotive represents the equipment, which is intended for storage, preparation of dual-fuel mixture and ensuring safe work of a locomotive. Main components of dual-fuel system are:

- 1) gas system (cylinders, shutoff valves, fitting, tubes, reducer, gas injectors, filter);
- 2) engine management system (electronic control units (ECU), software (S), sensors, executive devices, wire harnesses);
- 3) safety system (control panel, fire detection sensors, gas analyzers, mechanical security aids).

### 7.1. Gas system

The Gas system is intended for storage of natural gas under pressure, gas pressure reduction and regulation and gas supply into each cylinder of a diesel engine.

The compressed natural gas is stored under operating pressure up to 200 Bars in cylinders 1.1 (figure 1) made of high carbon steel. Each cylinder is equipped with the electromagnetic valve 1.3a, the high-speed flow valve, pressure relief device and temperature triggered pressure relief device. Gas from cylinders via valves comes to seamless tubes 1.5 made of stainless steel (with the maximum operating pressure of 400 Bars), connected by valves fitting 1.4. Cylinders, valves, storage construction 1 are located under the locomotive frame in place of the modified diesel fuel tank and in the locomotive frame.



**Figure 1 – CNG component layout (view 1)**

**1 - Gas storage module:**

1.1 - cylinders; 1.2 – depressurization pipeline; 1.3 – cylinder valve; 1.3a – electromagnetic valve; 1.3.b - the manual valve; 1.4 - fitting; 1.5 - high pressure pipes.

**3 - Gas reduction module:**

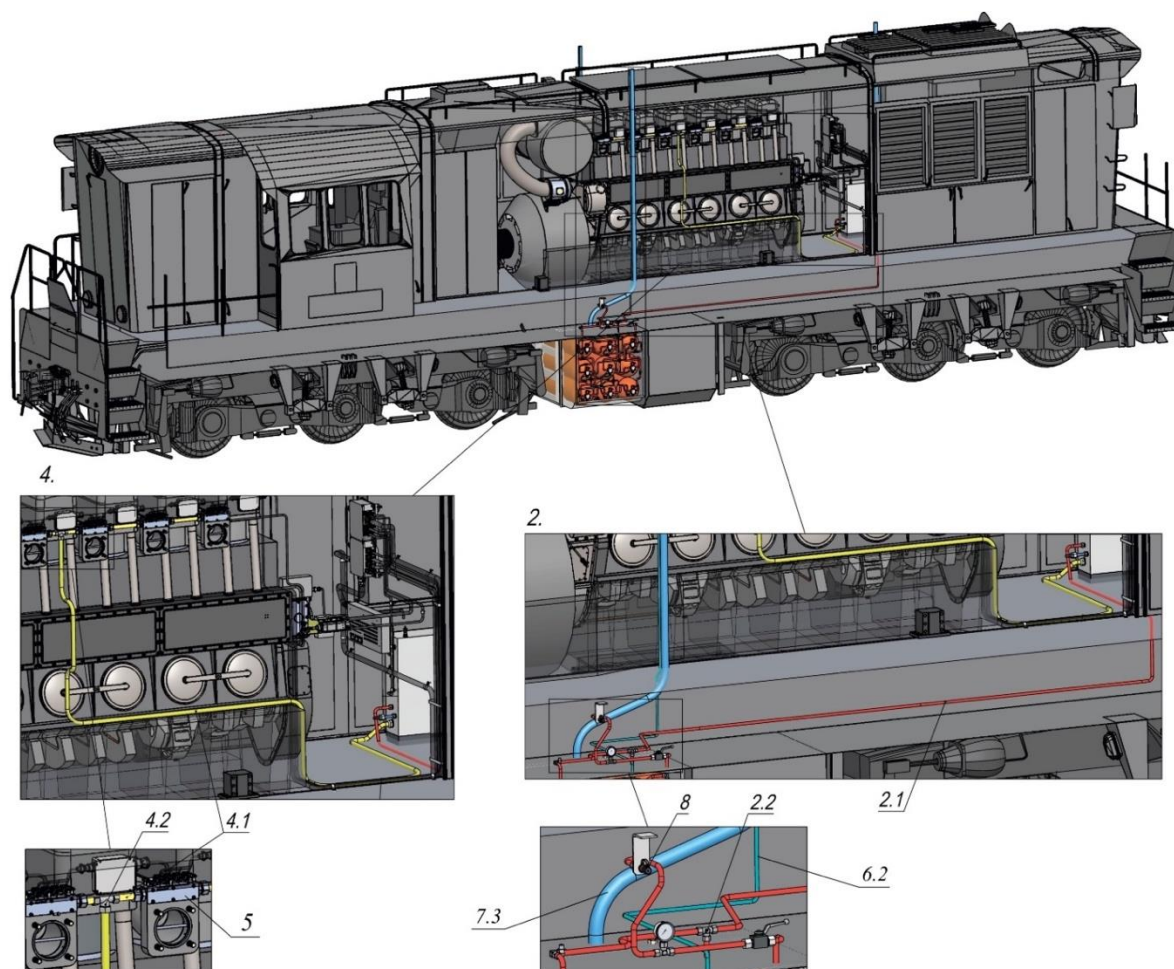
3.1 - low pressure manometer; 3.2 - high pressure manometer; 3.3 - gas analyzer; 3.4 - high pressure gas sensor; 3.5 - manual high pressure valve; 3.6 - fitting; 3.7 - filter; 3.8 - pipe inputs; 3.9 – coolant pipeline; 3.10 - manual low pressure gas valve; 3.11 - high pressure gas rail; 3.12 - high pressure gas pipe; 3.13 - reducer; 3.14 - low pressure tube; 3.15 – high flow low pressure pipe; 3.16 low pressure gas rail.

**6.1. Gas storage module gas blow-off line.**

**7.1. Gas reduction module air vent pipe.**

**7.2. Air vent pipe of locomotive frame compartment.**





**Figure 2 – CNG component layout (view 2)**

**2 – CNG high-pressure pipeline (200 – 15 Bars):**

2.1 - High-pressure pipe (200 – 15 Bars); 2.2 - fitting.

**4 - Low-pressure pipeline:**

4.1 - Low-pressure pipe; 4.2 - fitting.

**5 - Gas injection module:**

6.2 - Gas storage module gas blow-off line.

7.3 - Gas reduction module air vent pipe.

8 – Filling receptacle.

From the gas storage module 1, gas under high pressure is delivered to the high-pressure pipeline 2 (figure 2), connected on the one hand to the module of gas storage by means of fitting 2.2 (figure 2), and on the other hand - with the module of gas reduction by means of fitting 3.6 (figure 1). High-pressure pipeline is made of seamless stainless tube with the maximum operating pressure of 330 Bars. and is laid in locomotive frame that protects it from external influences and consists of an integral tube.

From high-pressure pipeline gas is delivered to the gas reduction module 3 (figure 1) in which it passes through coalescing filter 3.7, and the subsequent reduction (reducers 3.13) from high pressure of 200 - 15 Bars to 9,3 Bars is made. Gas reduction module is equipped with connecting fitting and pipes 3.12, 3.14, 3.15, manual valves of low 3.10 and high pressure 3.5,

manometers 3.1,3.2, high pressure sensor 3.4, which are grouped in the metal case. All main joints of the module are protected by hermetic seals.

From gas reduction module 3, low-pressure gas enters pipeline 4 (figure 2) connected on the one hand to the gas reduction module (through tight input 3.8), and on the other hand with the gas injection module by means of fitting 4.2. Low-pressure pipeline is made of the flexible reinforced sleeve and protected by housing, fixed on the engine consisting of the integral sleeve and two fittings which are pressured up on its both ends.

Gas injection modules 5 are installed between intake manifold and heads of the cylinder block of the diesel. Gas fuel supply is done by means of the gas spray jets installed in each module, implementing the principle of distributed phased injection in each of cylinders separately during intake timing period after engine valve overlap phase is finished, thereby preventing the possibility of gas leakage in the exhaust manifold. Each of six modules of injection of gas 5 consists of the aluminium case with the mixer and four electromagnetic gas spray jets which provide an exact dosage of gas fuel according to the signal calculated by ECU.

Injected gas forms a homogeneous mixture with the intake air and enters the combustion chamber.

## 7.2. Control system

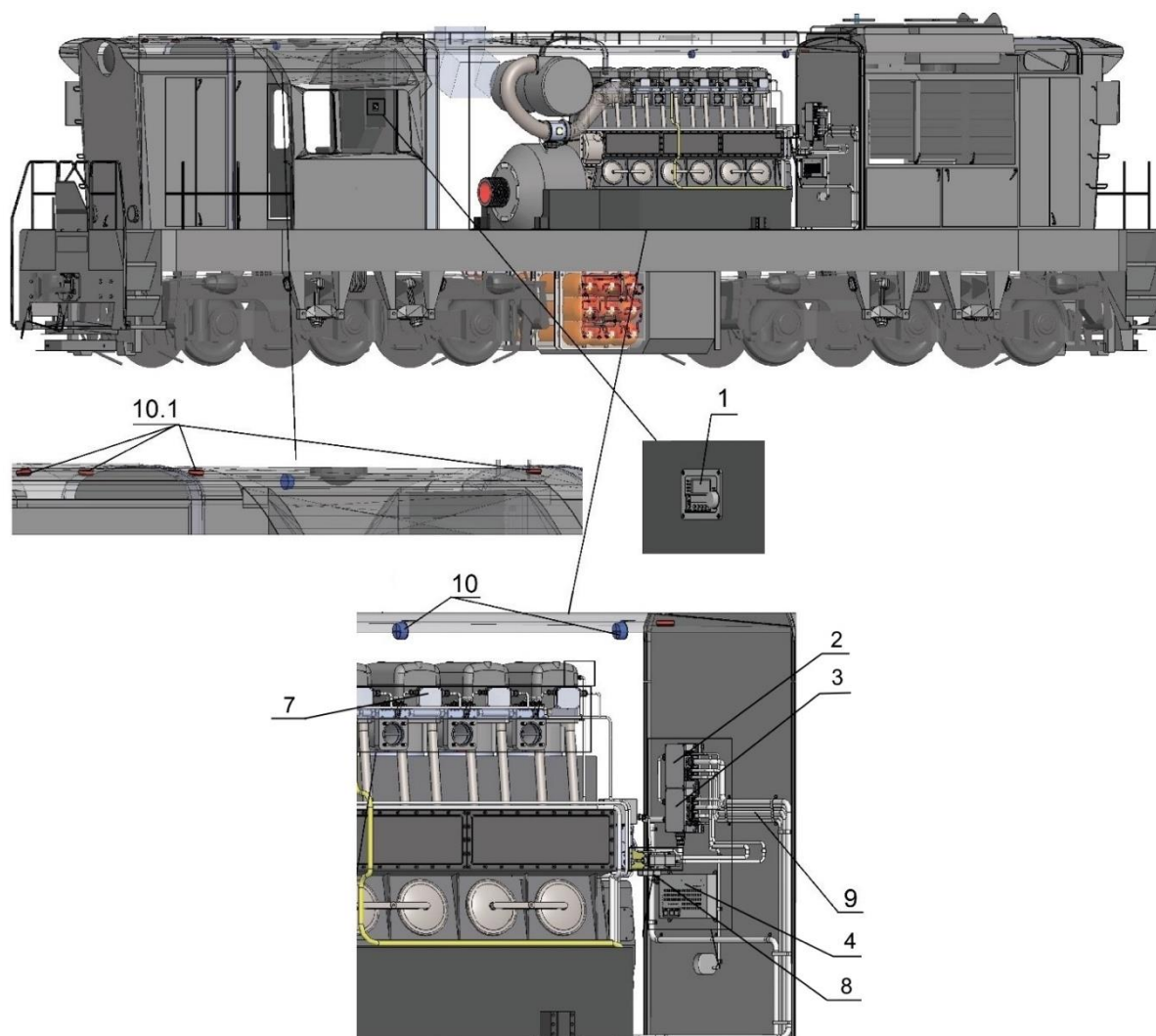
The system is intended for reception, processing, signal analysis from sensors and control signals formation for executive devices steering on the basis of work of control algorithms of the dual-fuel engine management system (figure 3 and figure 4).

The control system is sectioned as:

- 1) electronic control units;
- 2) sensors;
- 3) executive devices.

### 7.2.1. Electronic control units (ECU's)

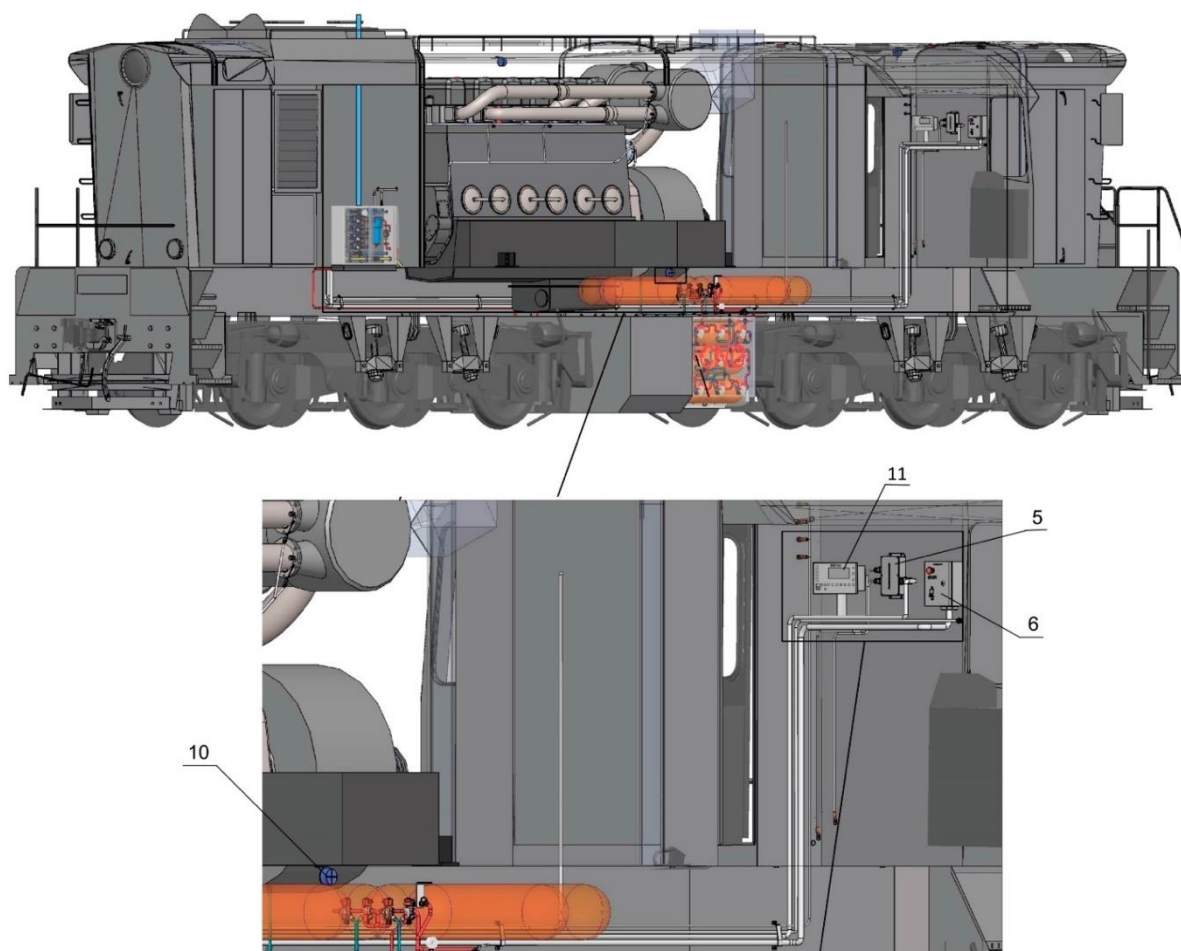
Control units use electronic components and microcontrollers for the purpose of reception, processing, analysis of signals from sensors and executive devices and formation of signals of steering for executive devices on the basis of work of control algorithms of the dual fuel engine management system.



**Figure 3 – Overview of control and safety systems (view 1)**

1 – control panel; 2 - ECU; 3 – distribution module; 4 – DC-DC converter; 7 – gas injection modules drivers; 8 - rheostat; 9 - wiring harnesses; 10 - gas analyzers; 10.1 - fire detection sensors.



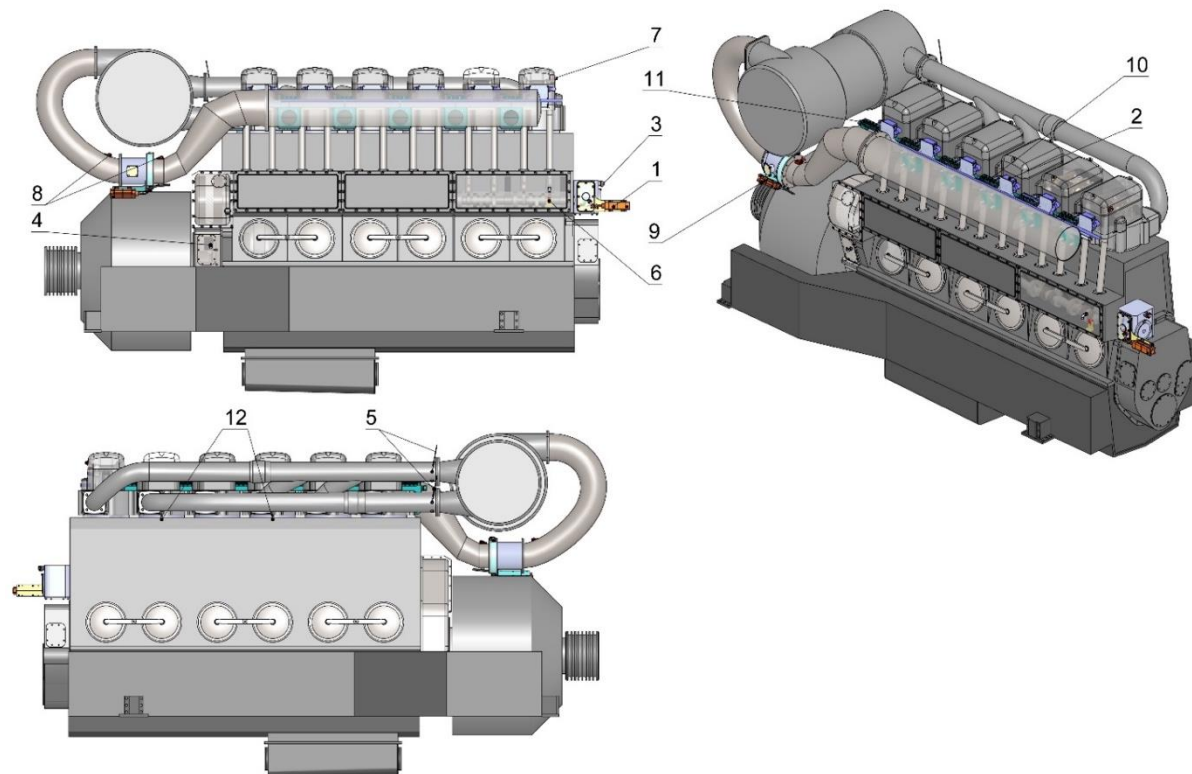


**Figure 4 – Overview of control and safety systems (view 2)**

5 – voltage and current meter; 6 - emergency power off device;  
10 - gas analyzers; 11 - control panel of fire and explosion safety.

### 7.2.2. Sensors

Sensors (figure 5), that are part of the engine management system and designed for measuring of physical values and, depending on functional use, housed in variable ICE nodes and components, and in its auxiliary systems.



**Figure 5 – Sensors and executive devices**

1 – fuel rack positioning device; 3 – diesel fuel injection system position sensor; 4 - crankshaft sensor; 5 - thermocouple unit; 6 - phase sensor; 7 – valves sensor; 8 – air pressure and temperature sensor; 9 – air-fuel ratio control, device; 10 – gas injection module; 11 – low pressure and gas temperature detector; 12 –knock sensor.

### 7.2.3. Executive devices

Executive devices include components of electromechanical type, designed for physical impact on air, diesel fuel and natural gas fuel supply systems of the converted engine, which are controlled by electronic control units in order to perform engine management tasks and safety control. Executive devices consist of air-fuel ratio control device 9 (figure 5), fuel rack positioning device 1, the gas injection module 10. All executive devices are equipped with independent ECUs in case of main system failure.

### 7.2.4. Safety system

Safety system consists of:

- 1) mechanical safety facilities;
- 2) safety subsystem integrated to the operating system;
- 3) gas leak detection and fire alarm system.

#### 7.2.4.1. Mechanical safety devices

Mechanical safety devices consist of automatic cylinder valves (high-speed, fire, pressure valve and electromagnetic valve), injection and gear valves (electromagnetic valves) that get activated by deviations in characteristics controlled by regulating system. At emergency case of fire or overpressure, natural gas is removed outside the locomotive through blow-off pipes 6.1 (figure 1) and 6.2 (figure 2). In the case of gas leakage from gas pipe-line or fittings, gas escapes through ventilation line over locomotive 7.1 (figure 1) and 7.3 (figure 2). Mechanical safety devices include also hand valve cylinder, hand valve of high-pressure manifold, manually operated gate-valve of charged air control device and stem of fuel supply control device, emergency switch off, which provides mechanical deactivation of all electromagnetic valves (valves are transmitted to normally closed position) and power supply disconnect for the whole all system.

#### 7.2.4.2. Safety subsystem

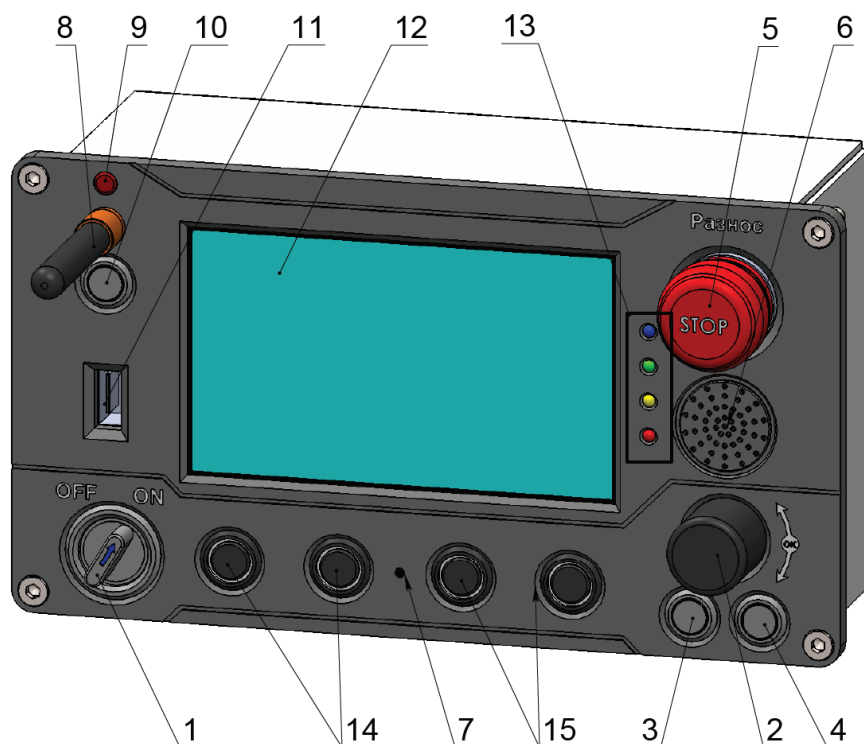
Safety subsystem is part of the control system. Components of safety subsystem are: control panel and display module (figure 6); sensors; executive devices.

The functioning of safety subsystem:

- minimum pressure level checking algorithm in the manifold of low gas pressure is sensing of low limit preset pressure to 7 Bar at the low-pressure sensor.
- depressurization rate checking algorithm in the manifold of high gas pressure is sensing of pressure reduction in the manifold of high gas pressure for 0.6 Bar/min at the high-pressure sensor.
- pressure checking algorithm in the manifold of high gas pressure is defined excess of preset pressure in 280 Bar at the high-pressure sensor.
- pressure checking algorithm in the manifold of low pressure is defined excess of preset pressure over 11.3 Bar at the low-pressure sensor.
- depressurization rate checking algorithm in the manifold of high gas pressure is defined pressure reduction in the manifold of high gas pressure for 0.28 Bar per second at the high-pressure sensor. This pressure reduction will signal of gas leakage in high-pressure manifold in 0.546 m<sup>3</sup>/s.
- minimum pressure level checking algorithm in the manifold of high gas pressure at the functioning locomotive is based on pressure indexes definition in manifold in 30 Bar/min at the high-pressure sensor.
- minimum pressure level checking algorithm in the manifold of low gas pressure is sensing of reduction of preset pressure to 7 Bar at the low-pressure sensor.

In the case of break-down, display module by means of light-emitting diode, informs the driver about fault mode and actions necessary for further locomotive operation safety.

Depending on the seriousness of possible defect or excess of some regulated indexes, control subsystems at first seek the way of breakdown or improper work correction, and, if these actions fail, one of the error codes is assigned to breakage with corresponding system response and actions of the driver in the following case.



**Figure 6 – Control panel**

1 – “dual-fuel” mode switch on and off; 2 – menu switching; 3 – home page; 4 – return to previous menu; 5 – emergency engine stop; 6 – speaker; 7 – microphone; 8 – GSM antenna; 9 – light density sensor; 10 – telemetry switching on and off (data transmission to server); 11 – USB-connection interface; 12 – screen; 13 – light diodes

### 7.2.4.3. Fire signaling and gas leak detection system

The fire signaling and gas leak detection system is a separate independent complex of detection of a gas leak and fire consisting of the control panel (figure 6), gas analyzers (figure 3 and figure 4), fire and smoke detection sensors (figure 3), wiring harnesses 9 and a sound siren. The system possesses its own displaying system with the indication of the location of the activated sensors.

The fire signaling and gas leak detection system is intended for installation on the rolling stock of railway transport for the purpose of automatic detection of signs of fire or gas leak and also the location of their emergence.

#### Fire signaling

Detecting of fire happens by means of four fire sensors (one linear detector, in the form of thermo-cable, is located in the engine room, and three combined detectors - in compartments of electric devices). Fire detectors react on:

- smoke which temperature reaches: 70 °C (for the combined announcers);
- threshold of achievement of temperature: 138 °C (for the linear announcer);
- speed of increase of temperature: 10 °C/min.

## Gas leak detection

Detecting of a gas leak is carried out by means of gas analyzers (figure 3 and figure 4) located in the driver's cabin, in the engine compartment and in the gas reduction module respectively. Gas sensors constantly measure gas concentration in installed locations and, in case of an explosion risk, safety system stops gas delivery and informs railway personnel.

## **8. Applicable legislation**

### **8.1. Dual-fuel system legislative standards**

Legislation applicable in specific railway industry applications, verification and approval procedures listed in this section is structured as follows:

1. Interoperability
  - LOC&PAS TSI
  - SRT TSI
  - NOI TSI
  - OPE TSI
  - CCS TSI
2. Safety
3. Conformity Assessment
4. R110 Natural gas components and installation requirements
5. Exhaust gases pollutant emissions

**NOTE:** *The list of applicable Technical Specifications for Interoperability (TSIs) mentioned above were suggested by national safety authorities in Latvia and Poland.*

#### **8.1.1. Interoperability**

Interoperability is "the ability of the rail system to allow the safe and uninterrupted movement of trains which accomplish the required levels of performance".

The regulations apply to work on new, upgraded or renewed structural subsystems (vehicles and infrastructure) on the parts of the rail system located in the EU.

Projects within the scope of the regulations will require an authorisation to place into service for **NYSMART** upgraded structural subsystems. The project will be assessed against relevant Technical Specifications for Interoperability (TSIs) and notified national technical rules. TSIs apply both on and off the Trans-European transport network (TEN) referred to in Annex I of Directive 2008/57/EC.

*Table 2 – Interoperability regulatory base*

Short name	Interoperability of the rail system
<b>Base</b>	<p>Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on the interoperability of the rail system within the European Union</p> <p>Directive 2008/57/EC of the European Parliament and of the Council of 17 June 2008 on the interoperability of the rail system within the Community OJ L 191 of 18 July 2008</p> <p>The technical specifications for interoperability (TSIs) TSIs are the specifications by which each rail subsystem or part of it is covered in order to meet the essential requirements set out by Directive 2008/57/EC and to ensure the interoperability of the rail system within the European Union.</p>
<b>Modification</b>	<p>Directive 2008/57/EC on the interoperability of the rail system within the Community (repealing Directives 96/48/EC and 2001/16/EC from 19 July 2010);</p> <p>Directive 2014/106/EU of 5 December 2014 amending Annexes V and VI to Directive 2008/57/EC of the European Parliament and of the Council on the interoperability of the rail system within the Community</p> <p>Directive 2014/38/EU of 11 March 2014 amending Annex III to Directive 2008/57/EC of the European Parliament and of the Council as far as noise pollution is concerned</p> <p>Directive 2013/9/EU of 11 March 2013 amending Annex III to Directive 2008/57/EC of the European Parliament and of the Council on the interoperability of the rail system within the Community</p> <p>Directive 2011/18/EU of 1 March 2011 amending Annexes II, V and VI to Directive 2008/57/EC of the European Parliament and of the Council on the interoperability of the rail system within the Community</p> <p>Directive 2009/131/EC of 16 October 2009 amending Annex VII to Directive 2008/57/EC of the European Parliament and of the Council on the interoperability of the rail system within the Community</p>
<b>Support documents</b>	<p>Commission Recommendation 2014/897/EU [59] of 5 December 2014 on matters related to the placing in service and use of structural subsystems and vehicles under Directives 2008/57/EC and 2004/49/EC of the European Parliament and of the Council (DV29bis), repealing Commission Recommendation 2011/217/EU</p>

Short name	Interoperability of the rail system
<b>Directives repealed</b>	<p>Council Directive 96/48/EC of 23 July 1996 on the interoperability of the trans-European high-speed rail system OJ L 235 of 17 September 1996</p> <p>Directive 2001/16/EC of the European Parliament and of the Council of 19 March 2001 on the interoperability of the trans-European conventional rail system OJ L 110 of 20 April 2011</p>
<b>General scope of TSIs application applicable for NYSMART</b>	<p>Upgrade (7.1.2.3.)</p> <p>The basis for determining the application of this TSI in case of upgrade:</p> <ol style="list-style-type: none"> <li>(1) Parts and basic parameters of the subsystem that have not been affected by the upgrading works are exempt from conformity assessment against the provisions in this TSI.</li> <li>(2) A new assessment against the requirements of this TSI is only needed for the basic parameters in this TSI which have their performance influenced by the modification(s).</li> <li>(3) When during the upgrade it is not economically feasible to fulfil the TSI requirement, the upgrade could be accepted if it is evident that a basic parameter is improved in the direction of the TSI defined performance.</li> <li>(4) Guidance to the Member State for those modifications that are deemed to be upgraded is given in the application guide.</li> <li>(5) National migration strategies related to the implementation of other TSIs (e.g. TSIs covering fixed installations) may have an impact to what extent this TSI needs to be applied.</li> <li>(6) For a project including elements not being TSI conform, the procedures for the assessment of conformity and EC verification to be applied should be agreed with the Member State.</li> </ol>

Rail TSIs are common, harmonized, technical standards that ensure that the essential requirements of rail interoperability are met. These include standards on safety, reliability and availability, health, environmental protection and technical compatibility.

The application of TSIs removes the need for individual contracting entities to decide how the essential requirements should be met since they set out the means whereby, for the specific situations within their scope, these will be met. TSIs also drive standardization by mandating interfaces and assessment methodologies.

TSIs are 'decisions' under European Community law and have effect as if they were domestic regulations (secondary legislation). As such they are binding on member states.



8.1.1.1. Locomotive and passenger rolling stock – LOC & PAS TSI

**Table 3 – LOC & PAS TSI regulatory base**

Base	COMMISSION REGULATION (EU) No 1302/2014 of 18 November 2014 concerning a technical specification for interoperability relating to the ‘rolling stock – locomotives and passenger rolling stock’ subsystem of the rail system in the European Union
Regulations repealed	Decisions 2008/232/EC and 2011/291/EU are repealed from 1 January 2015

**ESSENTIAL REQUIREMENTS**

Table 4 indicates basic parameters of this TSI and their correspondence to the essential requirements as set out and numbered in Annex III to Directive 2008/57/EC.

**Table 4 - Assessment of the rolling stock subsystem applicable for NYSMART**

1		2	3	4	5
Characteristics to be assessed, as specified in clause 4.2 of this TSI		Design and development phase		Production phase	Particular assessment procedure
		Design review	Type Test	Routine Test	
Element of the Rolling Stock sub-system	Clause				Clause
<b>Structure and mechanical parts</b>	<b>4.2.2</b>				
Strength of vehicle structure	4.2.2.4	X	X	n/a	—
Passive safety	4.2.2.5	X	X	n/a	—
Fixing of devices to car body structure	4.2.2.7	X	n/a	n/a	—
Staff and freight access doors	4.2.2.8	X	X	n/a	—
Load conditions and weighted mass	4.2.2.10	X	X	X	6.2.3.1
<b>Track interaction and gauging</b>	<b>4.2.3</b>				
Wheel load	4.2.3.2.2	X	X	n/a	6.2.3.2
Running dynamic behavior requirements	4.2.3.4.2 (a)	X	X	n/a	6.2.3.4
Active systems — safety requirement	4.2.3.4.2 (b)	X	n/a	n/a	6.2.3.5
Limit values for running safety	4.2.3.4.2.1	X	X	n/a	6.2.3.4
Track loading limit values	4.2.3.4.2.2	X	X	n/a	6.2.3.4



1	2	3	4	5	
Characteristics to be assessed, as specified in clause 4.2 of this TSI	Design and development phase	Production phase	Particular assessment procedure	Clause	
					Design review
Element of the Rolling Stock sub-system	Clause				Clause
Structural design of bogie frame	4.2.3.5.1	X	X	n/a	—
Minimum curve radius	4.2.3.6	X	n/a	n/a	—
<b>Braking performance</b>	<b>4.2.4.5</b>				
Wheel slide protection system (IC)	5.3.3	X	X	X	6.1.3.2
<b>Environmental conditions and aerodynamic effects</b>	<b>4.2.6</b>				
<b>Environmental conditions</b>	<b>4.2.6.1</b>				
Temperature	4.2.6.1.1	X	n/a X	n/a	—
Snow, ice and hail	4.2.6.1.2	X	n/a X	n/a	—
<b>External lights &amp; visible and audible warning devices</b>	<b>4.2.7</b>				
Lamp controls	4.2.7.1.4	X	X	n/a	—
<b>Traction and electrical equipment</b>	<b>4.2.8</b>				
<b>Traction performance</b>	<b>4.2.8.1</b>				
<b>General</b>	<b>4.2.8.1.1</b>				
Requirements on performance	4.2.8.1.2	X	n/a	n/a	—
<b>Power supply</b>	<b>4.2.8.2</b>				
General	4.2.8.2.1	X	n/a	n/a	—
Operation within range of voltages and frequencies	4.2.8.2.2	X	X	n/a	—
System energy disturbances	4.2.8.2.7	X	X	n/a	—
Electrical protection of the train IC Main circuit breaker	4.2.8.2.10 5.3.12	X	X	n/a	—
Diesel and other thermal traction systems	4.2.8.3	—	—	—	
Protection against electrical hazards	4.2.8.4	X	X	n/a	—
<b>Cab and operation</b>	<b>4.2.9</b>				

1		2	3	4	5
Characteristics to be assessed, as specified in clause 4.2 of this TSI		Design and development phase		Production phase	Particular assessment procedure
		Design review	Type Test	Routine Test	
Element of the Rolling Stock sub-system	Clause				Clause
Driver's Cab	4.2.9.1	X	n/a	n/a	—
General	4.2.9.1.1	X	n/a	n/a	—
Access and egress	4.2.9.1.2	X	n/a	n/a	—
Access and egress in operating conditions	4.2.9.1.2.1	X	n/a	n/a	—
Interior layout	4.2.9.1.4	X	n/a	n/a	—
Driver's desk- Ergonomics	4.2.9.1.6	X	n/a	n/a	—
Internal lighting	4.2.9.1.8	X	X	n/a	—
<b>Driver machine interface</b>	<b>4.2.9.3</b>				
Driver's activity control function	4.2.9.3.1	X	X	X	—
Speed indication	4.2.9.3.2	—	—	—	—
Driver display unit and screens	4.2.9.3.3	X	X	n/a	—
Controls and indicators	4.2.9.3.4	X	X	n/a	—
Labelling	4.2.9.3.5	X	n/a	n/a	—
Radio remote control function by staff for shunting operation	4.2.9.3.6	X	X	n/a	—
Onboard tools and portable equipment	4.2.9.4	X	n/a	n/a	—
Storage facility for staff personal effects	4.2.9.5	X	n/a	n/a	—
Recording device	4.2.9.6	X	X	X	—
<b>Fire safety and evacuation</b>	<b>4.2.10</b>				
General and categorization	4.2.10.1	X	n/a	n/a	—
Measures to prevent fire	4.2.10.2	X	X	n/a	—
Measures to detect/control fire	4.2.10.3	X	X	n/a	—
Requirements related to emergencies	4.2.10.4	X	X	n/a	—
Requirements related to evacuation	4.2.10.5	X	X	n/a	—
<b>Servicing</b>	<b>4.2.11</b>				

1		2	3	4	5
Characteristics to be assessed, as specified in clause 4.2 of this TSI		Design and development phase		Production phase	Particular assessment procedure
		Design review	Type Test	Routine Test	
Element of the Rolling Stock sub-system	Clause				Clause
Refueling equipment	4.2.11.7	X	n/a	n/a	—
<b>Documentation for operation and maintenance</b>	<b>4.2.12</b>				
General	4.2.12.1	X	n/a	n/a	—
General documentation	4.2.12.2	X	n/a	n/a	—
Documentation related to maintenance	4.2.12.3	X	n/a	n/a	—
The maintenance design justification file	4.2.12.3.1	X	n/a	n/a	—
The Maintenance description file	4.2.12.3.2	X	n/a	n/a	—
Operating documentation	4.2.12.4	X	n/a	n/a	—
Rescue related descriptions	4.2.12.5	X	n/a	n/a	—

**Table 5 - Applicable standards/normative documents for NYSMART referred to in LOC & PAS TSI**

Index No	TSI		Normative document	
	Characteristics to be assessed	Clause	Document No	Mandatory points
1.	Strength of vehicle structure — general categorization of rolling stock method of verification	4.2.2.4 Annex C	EN 12663-1:2010	5.2 9.2 6.1 – 6.5
2.	Passive safety — general categorization scenarios obstacle deflector	4.2.2.5	EN 15227:2008 +A1:2011	Except Annex A 4–table 1 5–table 2, 6 5-table 3, 6.5
3.	Fixing of devices to car body structure	4.2.2.7	EN 12663-1:2010	6.5.2
4.	Load conditions and weighed mass — load conditions hypothesis of load conditions	4.2.2.10	EN 15663:2009 /AC:2010	2.1

Index No	TSI		Normative document	
	Characteristics to be assessed	Clause	Document No	Mandatory points
5.	Running dynamic behavior	4.2.3.4.2 Annex C	EN 14363:2005	
6.	Running dynamic behavior — track loading limit values	4.2.3.4.2.2	EN 14363:2005	5.3.2.3
7.	Structural design of the bogie frame	4.2.3.5.1	EN 13749:2011	6.2, Annex C
8.	Wheel slide protection system — design verification method wheel rotation monitoring system	4.2.4.6.2	EN 15595:2009	4 5, 6 4.2.4.3
9.	Environmental conditions — temperature	4.2.6.1.1	EN 50125-1:2014	4.3
10.	Environmental conditions — snow, ice and hail conditions	4.2.6.1.2	EN 50125-1:2014	4.7
11.	Protection against electrical hazard	4.2.8.4	EN 50153:2002	
12.	Measures to prevent fire — material requirements	4.2.10.2.1	EN 45545-2:2013	
13.	Emergency lighting — lighting level	4.2.10.4.1	EN 13272:2012	5.3
14.	Main circuit breaker — coordination of protection	5.3.12	EN 50388:2012	11
15.	Wheel slide protection — method of verification test program	6.1.3.2	EN 15595:2009	5 only 6.2.3 of 6.2
16.	Wheel slide protection, method of verification of performance	6.2.3.10	EN 15595:2009	6.4
17.	Slipstream effect — meteorological conditions, sensors, sensor accuracy, selection of valid data and processing of the data	6.2.3.13	EN 14067-4:2005 +A1:2009	8.5.2
18.	Structural strength	Annex C.1	EN 12663-2:2010	5.2.1-5.2.4

**Table 6** - Applicable standards/normative documents NOT referred to in LOC & PAS TSI BUT are applicable to NYSAMRT according to current understanding and knowledge level

ESO	Reference and title of the standard (and reference document)	Reference of superseded standard
CEN	EN ISO 3381:2011 Railway applications - Acoustics - Measurement of noise inside rail-bound vehicles (ISO 3381:2005)	
CEN	EN 12663-1:2010+A1:2014 Railway applications - Structural requirements of railway vehicle bodies - Part 1: Locomotives and passenger rolling stock (and alternative method for freight wagons)	EN 12663-1:2010
CEN	EN 12663-2:2010 Railway applications - Structural requirements of railway vehicle bodies - Part 2: Freight wagons	
CEN	EN 13749:2011 Railway applications - Wheelsets and bogies - Method of specifying the structural requirements of bogie frames	
CEN	EN 15595:2009+A1:2011 Railway applications - Braking - Wheel slide protection	
CEN	EN 16186-3:2016 Railway applications - Driver's cab - Part 3: Design of displays	
CEN	EN 16729-1:2016 Railway applications - Infrastructure - Non-destructive testing on rails in track - Part 1: Requirements for ultrasonic inspection and evaluation principles	
CEN	EN 45545-1:2013 Railway applications - Fire protection on railway vehicles - Part 1: General	
CEN	EN 45545-2:2013+A1:2015 Railway applications - Fire protection on railway vehicles - Part 2: Requirements for fire behavior of materials and components	EN 45545-2:2013
CEN	EN 45545-3:2013 Railway applications - Fire protection on railway vehicles - Part 3: Fire resistance requirements for fire barriers	

ESO	Reference and title of the standard (and reference document)	Reference of superseded standard
CEN	EN 45545-4:2013 Railway applications - Fire protection on railway vehicles - Part 4: Fire safety requirements for rolling stock design	
CEN	EN 45545-6:2013 Railway applications - Fire protection on railway vehicles - Part 6: Fire control and management systems	
CEN	EN 45545-7:2013 Railway applications - Fire protection on railway vehicles - Part 7: Fire safety requirements for flammable liquid and flammable gas installations	
Cenelec	EN 50122-1:2011 Railway applications - Fixed installations - Electrical safety, earthing and the return circuit - Part 1: Protective provisions against electric shock	
Cenelec	EN 50124-1:2001 Railway applications - Insulation coordination - Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment	
Cenelec	EN 50124-1:2017 Railway applications - Insulation coordination - Part 1: Basic requirements - Clearances and creepage distances for all electrical and electronic equipment	EN 50124-1:2001 + A1:2003 + A2:2005
Cenelec	EN 50124-2:2001 Railway applications - Insulation coordination - Part 2: Overvoltage and related protection	
	EN 50124-2:2001/AC:2010	
Cenelec	EN 50124-2:2017 Railway applications - Insulation coordination - Part 2: Overvoltage and related protection	EN 50124-2:2001

ESO	Reference and title of the standard (and reference document)	Reference of superseded standard
Cenelec	EN 50125-3:2003 Railway applications - Environmental conditions for equipment - Part 3: Equipment for signaling and telecommunications	
Cenelec	EN 50126-1:1999 Railway applications - The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS) - Part 1: Basic requirements and generic process	
	EN 50126 Railway applications. Communications, signaling and processing systems. Software for railway control and protection systems	
Cenelec	EN 50129:2003 Railway applications - Communication, signaling and processing systems - Safety related electronic systems for signaling	
Cenelec	EN 50159:2010 Railway applications - Communication, signaling and processing systems - Safety-related communication in transmission systems	EN 50159-1:2001 EN 50159-2:2001
Cenelec	EN 50553:2012 Railway applications - Requirements for running capability in case of fire on board of rolling stock	
Cenelec	EN 61375-1:2012 Electronic railway equipment - Train communication network (TCN) - Part 1: General architecture IEC 61375-1:2012	
Cenelec	EN 61375-2-1:2012 Electronic railway equipment - Train communication network (TCN) - Part 2-1: Wire Train Bus (WTB) IEC 61375-2-1:2012	

ESO	Reference and title of the standard (and reference document)	Reference of superseded standard
Cenelec	EN 61375-2-2:2012 Electronic railway equipment - Train communication network (TCN) - Part 2-2: Wire Train Bus conformance testing IEC 61375-2-2:2012	
Cenelec	EN 61375-2-5:2015 Electronic railway equipment - Train communication network (TCN) - Part 2-5: Ethernet train backbone IEC 61375-2-5:2014	
Cenelec	EN 61375-3-1:2012 Electronic railway equipment - Train communication network (TCN) - Part 3-1: Multifunction Vehicle Bus (MVB) IEC 61375-3-1:2012	
Cenelec	EN 61375-3-2:2012 Electronic railway equipment - Train communication network (TCN) - Part 3-2: MVB (Multifunction Vehicle Bus) conformance testing IEC 61375-3-2:2012	
Cenelec	EN 61375-3-3:2012 Electronic railway equipment - Train communication network (TCN) - Part 3-3: CAN open Consist Network (CCN) IEC 61375-3-3:2012	
IEC	IEC 60077-1:2017 RLV Railway applications - Electric equipment for rolling stock - Part 1: General service conditions and general rules	
IEC	IEC 60571:2012 Railway applications - Electronic equipment used on rolling stock	
IEC	IEC 61133:2016 RLV Railway applications - Rolling stock - Testing of rolling stock on completion of construction and before entry into service	
IEC	IEC 61373:2010 Railway applications - Rolling stock equipment - Shock and vibration tests	



ESO	Reference and title of the standard (and reference document)	Reference of superseded standard
IEC	IEC 62128-1:2013 Railway applications - Fixed installations - Electrical safety, earthing and the return circuit - Part 1: Protective provisions against electric shock	
IEC	IEC 62236-3-2:2008 Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock - Apparatus	
IEC	IEC 62279:2015 Railway applications - Communication, signaling and processing systems - Software for railway control and protection systems	
IEC	IEC 62278:2002 Railway applications - Specification and demonstration of reliability, availability, maintainability and safety (RAMS)	
IEC	IEC TR 62278-4:2016 Railway applications - Specification and demonstration of reliability, availability, maintainability and safety (RAMS) - Part 4: RAM risk and RAM life cycle aspects	
IEC	IEC 62279:2015 Railway applications - Communication, signaling and processing systems - Software for railway control and protection systems	
IEC	IEC 62425:2007 Railway applications - Communication, signaling and processing systems - Safety related electronic systems for signaling	
IEC	IEC 62625-1:2013 Electronic railway equipment - On board driving data recording system - Part 1: System specification	
IEC	IEC 62847:2016 Railway applications - Rolling stock - Electrical connectors - Requirements and test methods	

### 8.1.1.2. Safety in railway tunnels – SRT TSI

**Table 7 – Safety in railway tunnels – SRT TSI regulatory base**

Base	COMMISSION REGULATION (EU) No 1303/2014 of 18 November 2014 concerning the technical specification for interoperability relating to ‘safety in railway tunnels’ of the rail system of the European Union.
Regulations repealed	Decision 2008/163/EC is repealed with effect from 1 January 2015

### ESSENTIAL REQUIREMENTS

Table 8 indicates basic parameters of this TSI and their correspondence to the essential requirements as set out and numbered in Annex III to Directive 2008/57/EC.

**Table 8 - Basic SRT TSI parameters and their correspondence to the essential requirements**

Element of the rolling stock sub-system	Ref. Clause	Safety	Reliability Availability	Health	Environmental protection	Technical compatibility
Measures to prevent fire	4.2.3.1	1.1.4 2.4.1		1.3.2	1.4.2	
Measures to detect and control fire	4.2.3.2	1.1.4 2.4.1				
Requirements related to emergencies	4.2.3.3	2.4.1	2.4.2			1.5 2.4.3
Requirements related to evacuation	4.2.3.4	2.4.1				

**Table 9 - SRT interfaces with LOC&PAS TSI**

Interfaces with LOC&PAS TSI		
SRT TSI		LOC&PAS TSI
Parameter	Clause	Clause
Material requirements	4.2.3.1.1	4.2.10.2.1.
Portable fire extinguishers	4.2.3.2.1	4.2.10.3.1
Fire detection systems	4.2.3.2.2	4.2.10.3.2.

Interfaces with LOC&PAS TSI		
SRT TSI		LOC&PAS TSI
Parameter	Clause	Clause
Automatic fire fighting system for freight diesel units	4.2.3.2.3	4.2.10.3.3.
Fire containment and control systems for freight locomotives and freight self-propelling unit	4.2.3.2.5	4.2.10.3.5.
Emergency lighting system in the train	4.2.3.3.1.	4.2.10.4.1.
Smoke control	4.2.3.3.2	4.2.10.4.2.

**Table 10 – SRT TSI assessment procedures**

Subsystem to be assessed	Module SB+SD	Module SB+SF	Module SG	Module SH1
Rolling Stock Subsystem	X	X		X

### 8.1.1.3. Noise – NOI TSI

**Table 11 – Noise NOI TSI regulatory base**

Base	<b>COMMISSION REGULATION (EU) No 1304/2014</b> of 26 November 2014 on the technical specification for interoperability relating to the subsystem ‘rolling stock – noise’ amending Decision 2008/232/EC and repealing Decision 2011/229/EU.
Regulations repealed	Decision 2011/229/EU is repealed with effect from 1 January 2015

### ESSENTIAL REQUIREMENTS

Table 12 indicates basic parameters of this TSI and their correspondence to the essential requirements as set out and numbered in Annex III to Directive 2008/57/EC.

**Table 12 - NOI TSI basic parameters and correspondence to essential requirements**

Point	Basic parameter	Essential requirements				
		Safety	Reliability availability	Health	Environment protection	Technical compatibility
4.2.1	Limits for stationary noise				1.4.4	
4.2.2	Limits for starting noise				1.4.4	
4.2.3	Limits for pass-by noise				1.4.4	
4.2.4	Limits for driver's cab interior noise				1.4.4	

**Table 13 – NOI TSI assessment procedure**

Characteristics to be assessed, as specified in Section 4.2		Design review	Type Test	Routine Test	Particular assessment procedure
Element of the rolling stock sub-system	Point				Point
Stationary noise	4.2.1	X	X	n/a	6.2.2.1
Starting noise	4.2.2	X	X	n/a	6.2.2.2
Pass-by noise	4.2.3	X	X	n/a	6.2.2.3
Driver's cab interior noise	4.2.4	X	X	n/a	6.2.2.4

**8.1.1.4. Operation and traffic management – OPE TSI**
**Table 14 - Operational and traffic management – OPE TSI regulatory base**

<b>Base</b>	<b>COMMISSION REGULATION (EU) 2015/995</b> of 8 June 2015 amending Decision 2012/757/EU concerning the technical specification for interoperability relating to the 'operation and traffic management' subsystem of the rail system in the European Union
<b>Regulations repealed</b>	Decision 2011/314/EU (12 May 2011) amended by Decision 2012/464/EU (23 July 2012) Decision 2006/920/EC (11 August 2006) amended by Decision 2009/107/EC (23 January 2009) and Decision 2010/640/EU (21 October 2010)

**8.1.1.5. Control command and signaling – CCS TSI**

**Table 15 - Control command and signalling – CCS TSI regulatory base**

<b>Base</b>	COMMISSION REGULATION (EU) 2016/919 of 27 May 2016 on the technical specification for interoperability relating to the ‘control-command and signaling’ subsystems of the rail system in the European Union
<b>Regulations repealed</b>	Commission Decision 2012/88/EU as amended by Commission Decisions 2012/696/EU and (EU) 2015/14

**NOTE:** The above TSIs are not directly in the scope of the **NYSMART**, but due to National safety body requirements, relevant technical specifications, which are interfaced with OPE and CCS TSIs are covered within LOC&PAS TSI essential requirements and regulated by corresponding legislation, mentioned in LOC&PAS TSI chapter.

**8.1.2. Safety**

**Table 16 - NYSMART applicable safety regulatory base**

<b>Base</b>	DIRECTIVE (EU) 2016/798 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 11 May 2016 on railway safety
<b>Directives repealed</b>	Directive 2004/49/EC (OJ L 164, 30.4.2004, p. 44) Directive 2008/57/EC (OJ L 191, 18.7.2008, p. 1) Directive 2008/110/EC (OJ L 345, 23.12.2008, p. 62) Commission Directive 2009/149/EC (OJ L 313, 28.11.2009, p. 65) Corrigendum, 2004/49/EC (OJ L 220, 21.6.2004, p. 16) Commission Directive 2014/88/EU
<b>General scope of applicability for NYSMART</b>	Common safety method for risk evaluation and assessment Common safety method for conformity assessment (safety certificates) Common safety method for conformity assessment (safety authorizations) Common safety method for monitoring Common safety method for supervision

**Table 17 - EU regulations for mandatory safety processes**

<b>Mandatory safety process</b>	<b>Legislation</b>
Common safety method for risk evaluation and assessment	REGULATION (EU) 2015/1136 of 13 July 2015 amending Implementing Regulation (EU) No 402/2013 on the common safety method for risk evaluation and assessment

Mandatory safety process	Legislation
Common safety method for conformity assessment (safety certificates)	COMMISSION REGULATION (EU) No 1158/2010 of 9 December 2010 on a common safety method for assessing conformity with the requirements for obtaining railway safety certificates
Common safety method for conformity assessment (safety authorizations)	COMMISSION REGULATION (EU) No 1169/2010 of 10 December 2010 on a common safety method for assessing conformity with the requirements for obtaining a railway safety authorization
Common safety method for monitoring	COMMISSION REGULATION (EU) No 1078/2012 of 16 November 2012 on a common safety method for monitoring to be applied by railway undertakings, infrastructure managers after receiving a safety certificate or safety authorization and by entities in charge of maintenance
Common safety method for supervision	COMMISSION REGULATION (EU) No 1077/2012 of 16 November 2012 on a common safety method for supervision by national safety authorities after issuing a safety certificate or safety authorization

### 8.1.3. Conformity assessment

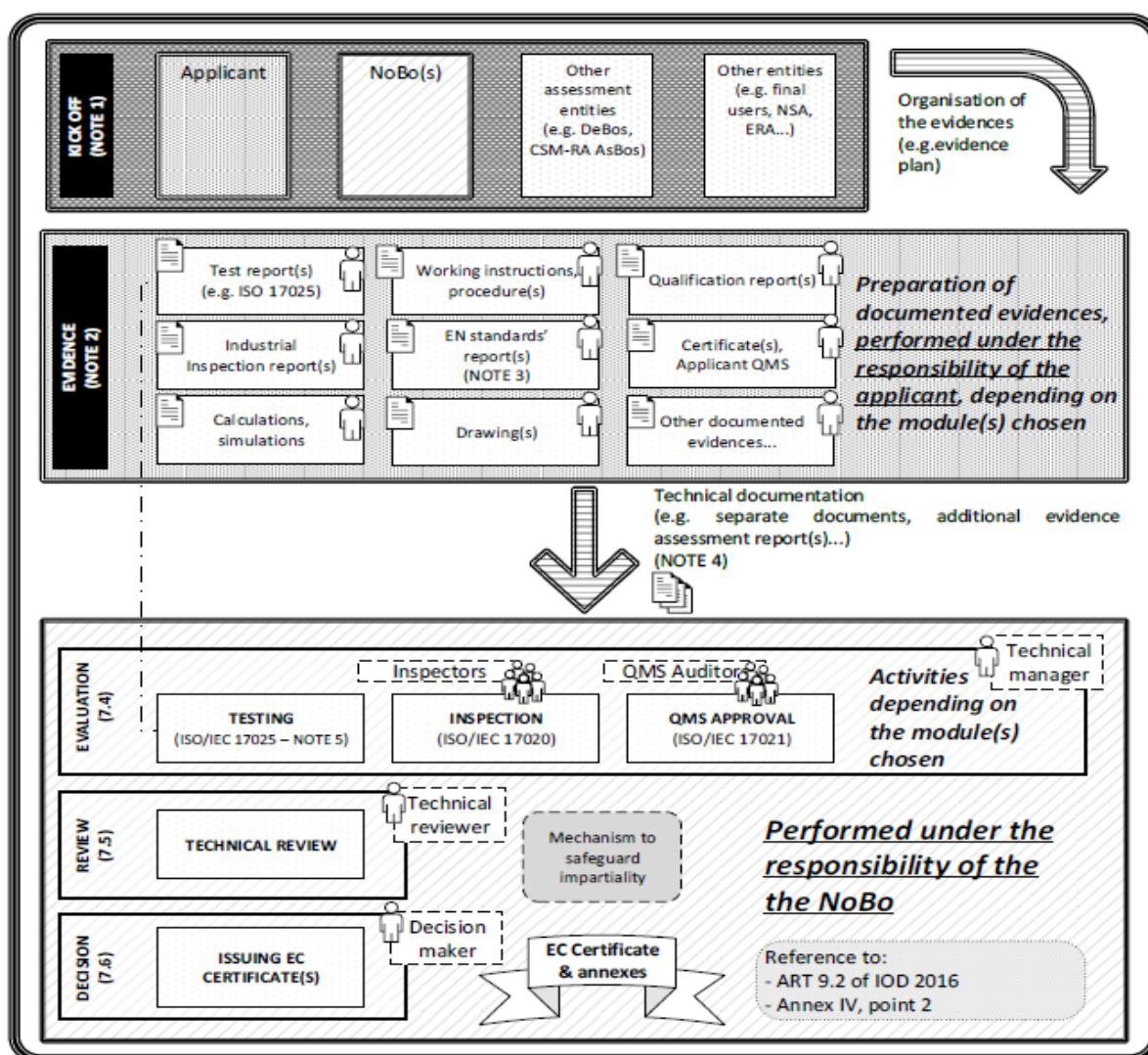
In the European Union harmonization legislation, conformity assessment procedures cover both design and production phases of a product; those procedures are called “modules”. EU Decision No 768/2008/EC distinguishes following modules for the procedures for assessment of conformity, suitability for use and EC verification to be used in the technical specifications for interoperability:

- Module CA. Internal production control
- Module CA1. Internal production control plus product verification by individual examination
- Module CA2. Internal production control plus product verification at random intervals
- Module CB. EC-type examination
- Module CC. Conformity to type based on the quality management system of the production process
- Module CF. Conformity to type based on product verification
- Module CH. Conformity based on the full quality management system
- Module CH1. Conformity based on full quality management system plus design examination
- Module CV. Type validation by in-service experience
- **Module SB. EC-type examination**

- Module SD. EC verification based on the quality management system of the production process
- **Module SF. EC verification based on product verification**
- Module SG. EC verification based on unit verification
- Module SH1. EC verification based on full quality management system plus design examination

**Table 18 - Conformity assessment regulatory base**

<b>Base</b>	Conformity assessment legislation, which lays down the modules usable for all the regulated sectors -Decision No 768/2008/EC
	Specific railway modules - Decision 2010/713/EU



**Figure 7 – Documentation workflow in the conformity assessment procedure**

#### 8.1.4. R110 Natural gas component and installation requirements

**Table 19** - Regulation on Natural gas components quality requirements and installation methods

<b>Base</b>	Regulation No 110 of the Economic Commission for Europe of the United Nations (UN/ECE) — Uniform provisions concerning the approval of I. specific components of motor vehicles using compressed natural gas (CNG) in their propulsion system; II. vehicles with regard to the installation of specific components of an approved type for the use of compressed natural gas (CNG) in their propulsion system
-------------	---

Although Regulation No. 110 is applied only to road vehicles, in this case taking into account that there are no regulations established specially for rail vehicles, Regulation No 110 is used to show that the system design is sufficiently robust and safe.

Regulation No. 110 is applied to the following parts of the compressed natural gas fuel system:

- cylinder;
- pressure relief valve (temperature and pressure triggered);
- automatic cylinder valve;
- manual valves;
- pressure regulator;
- excess flow limiting device;
- pressure indicators (manometers);
- filling unit;
- flexible fuel line;
- rigid fuel line;
- fuel line fittings;
- pressure sensors;
- fuel rail (distributing block);
- injector.

The compliance of all parts regulated with Regulation No 110 was assessed against the requirements laid down in Regulation No 110, other parts were assessed on the basis of general principles of pressure equipment design.

Parts, which will be manufactured by SIA DiGas, are assessed in detail to find out whether or not they comply to general principles of pressure system design and fulfil requirements laid down in Regulation No 110.

Such parts are:

- high gas pressure collector (manifold);
- low gas pressure collector (manifold);
- water heating collector (manifold);
- injection-mixer unit.

The assessment included the examination of:

- material strength;
- material compatibility to product;



- material applicability to operating temperatures;
- strength of product;
- compatibility to Regulation No 110.

These parts should be manufactured according to general principles of pressure system design and conform to Regulation No 110.

**Table 20 - NYSMART applicable standards or normative documents referred to in R110**

Index No	Characteristics to be assessed	Document No
1.	Test Method of Salt Spray (Fog) Testing	ASTM B117-90
2.	Mandrel Bend Test of Attached Organic Coatings	ASTM D522-92
3.	Chipping Resistance of Coatings	ASTM D3170-87
4.	Standard Test, Method for Measurement of Fatigue Crack Growth Rates	ASTM E647-93
5.	Standard Practice for Operating Light and Water — Exposure Apparatus (Fluorescent UV-Condensation Type) for Exposure of non-metallic materials	ASTM G53-93
6.	Test Method for JIC, a Measure of Fracture Toughness	ASTM E813-89
7.	Transportable Gas Containers — Specification for Seamless Steel Gas Containers	BS 5045: Part 1
8.	Charpy Impact Test	ISO 148-1983 Steel
9.	Steel Hardenability Test by End Quenching	ISO 642-79
10.	Paints and Varnishes — Determination of Film Thickness	ISO 2808-91
11.	Metallic Materials — Tensile Testing	ISO 6982-84
12.	Metallic Materials — Hardness test	ISO 6506-1981
13.	Metallic Materials	ISO 6508-1986
14.	Quality Assurance in Design/Development. Production, Installation and Servicing	ISO 9001:1994
15.	Quality Assurance in Production and Installation	ISO 9002:1994
16.	Metallic Materials	ISO/DIS 12737

### 8.1.5. Railway emissions standards

**Table 21** - Regulatory framework for NRMM emissions legislation

Short name	Emission standards for railway shunter locomotives	General scope applicable for NYSMART
Base	REGULATION (EU) 2016/1628 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 14 September 2016 on requirements relating to gaseous and particulate pollutant emission limits and type-approval for internal combustion engines for non-road mobile machinery, amending Regulations (EU) No 1024/2012 and (EU) No 167/2013, and amending and repealing Directive 97/68/EC	Applies to Stage V newly manufactured or Stage V certified remanufactured engines or repowered locomotives. Doesn't apply to <b>NYSMART</b> target market
Directives repealed	Directive 97/68/EC of the European Parliament and of the Council of 16 December 1997 on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery	Stage I/II standards adopted. Engines used in ships, railway locomotives, aircraft, and generating sets were excluded from the Stage I/II standards scope.
	Directive 2002/88/EC of the European Parliament and of the Council of 9 December 2002 amending Directive 97/68/EC on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery	Extended the scope of 97/68/EC to cover spark ignited engines (petrol engines) up to 18 kW
	Directive 2004/26/EC of the European Parliament and of the Council of 21 April 2004 amending Directive 97/68/EC on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery	Stage III/IV emission standards for nonroad engines were adopted. 97/68/EC scope extended on railway. Stage III/IV legislation applies only to new vehicles and equipment;
	Council Directive 2006/105/EC of 20 November 2006 adapting Directives 73/239/EEC, 74/557/EEC and 2002/83/EC in the field of environment, by reason of the accession of Bulgaria and Romania	Modifications of 97/68/EC concerning the approval certificate numbering system, with the code for each MS.

Short name	Emission standards for railway shunter locomotives	General scope applicable for NYSMART
	Commission Directive 2010/26/EU 31 March 2010 amending Directive 97/68/EC on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery	Modified type-approval requirements for stages IIIB and IV.
	Directive 2011/88/EU of the European Parliament and of the Council of 16 November 2011 amending Directive 97/68/EC as regards the provisions for engines placed on the market under the flexibility scheme	Revision of the flexibility percentage for Stage IIIB engines.
	Commission Directive 2012/46/EU of 6 December 2012 amending Directive 97/68/EC on the approximation of the laws of the Member States relating to measures against the emission of gaseous and particulate pollutants from internal combustion engines to be installed in non-road mobile machinery	Updated 97/68/EC so as to reflect technical progress in areas such as: <ul style="list-style-type: none"> <li>• Symbols and abbreviations, specifications and tests, specification of conformity (ANNEX I)</li> <li>• Type-approval process (ANNEX II)</li> <li>• Test procedures (ANNEX III)</li> <li>• Analytical and sampling procedures (ANNEX IV)</li> <li>• Type approval certificate modifications (ANNEX VII)</li> <li>• Data sheet for type approved engines (ANNEX XI)</li> <li>• Recognition of alternative type approvals (ANNEX XII)</li> </ul>
Alternative legislation	UIC Leaflet 624, "Exhaust emission tests for diesel traction engines."	Applies only to all new engines used in new locomotives or for repowering of existing ones.

Short name	Emission standards for railway shunter locomotives	General scope applicable for NYSMART
Support documents	<p>ISO 8178-1:2017 Part 1: Test-bed measurement systems of gaseous and particulate emissions</p> <p>ISO 8178-2:2008 Part 2: Measurement of gaseous and particulate exhaust emissions under field conditions</p> <p>ISO 8178-3:1994 Part 3: Definitions and methods of measurement of exhaust gas smoke under steady-state conditions</p> <p>ISO 8178-4:2017 Part 4: Steady-state and transient test cycles for different engine applications</p> <p>ISO 8178-5:2015 Part 5: Test fuels</p> <p>ISO 8178-6:2000 Part 6: Report of measuring results and test</p> <p>ISO 8178-7:2015 Part 7: Engine family determination</p> <p>ISO 8178-8:2015 Part 8: Engine group determination</p> <p>ISO 8178-9:2012 Part 9: Test cycles and test procedures for test bed measurement of exhaust gas smoke emissions from compression ignition engines operating under transient conditions</p> <p>ISO 8178-10:2002 Part 10: Test cycles and test procedures for field measurement of exhaust gas smoke emissions from compression ignition engines operating under transient conditions</p> <p>ISO 8178-11:2006 Part 11: Test-bed measurement of gaseous and particulate exhaust emissions from engines used in nonroad mobile machinery under transient test conditions (Withdrawn in 2014-08-13)</p>	

## 8.2. Applicable legislation in the European Union

Table 2 contains summarized applicable legislation in the European Union with the addition of applicable national standards for Latvia and Poland for respective European standards. The applicable national standards for Latvia and Poland have been previously researched by the **Contracting party**. Applicable national standards for other **Target countries** shall be researched by the **Service provider**. Provided list of base legislation shall be assessed by the **Service provider**.

*Abbreviations used in applicable standards (Table 22):*

**NOISE TSI** - “Commission Regulation (EU) No 1304/2014 of 26 November 2014 on the technical specification for interoperability relating to the subsystem ‘rolling stock — noise’ amending Decision 2008/232/EC and repealing Decision 2011/229/EU”.

**OPE TSI** - “Commission Regulation (EU) 2015/995 of 8 June 2015 amending Decision 2012/757/EU concerning the technical specification for interoperability relating to the ‘operation and traffic management’ subsystem of the rail system in the European Union”.

**CCS TSI** - “Commission Regulation (EU) 2016/919 of 27 May 2016 on the technical specification for interoperability relating to the ‘control-command and signaling’ subsystems of the rail system in the European Union”.

\* - Shunters (as defined in TSI LOC & PASS Section 2.2) are not in the scope of this TSI LOC & PAS; when they are intended to operate on the Union railway network (movement between shunting yards, stations and depots), Articles 24 and 25 of Directive 2008/57/EC (referring to national rules) are applicable. Also, see relevant NOTES for each of the TSI normative documents.

\*\* - Specific case Estonia, Finland, Latvia and Lithuania: For units from third countries with 1520mm wheel set gauge the application of national technical rules instead of the requirements in this TSI is permitted.

**NOTE: SRT TSI** in case of renewal or upgrade of existing rolling stock, the implementation rules as set out in the clause 7.1.2 of LOC&PAS TSI shall be applied. For new rolling stock, the implementation rules set out in clause 7.1.1 of the LOC&PAS TSI shall be applied.

**NOTE: TSI CCS** The requirement to be equipped with ETCS does not apply to new shunting locomotives and other new vehicles not intended for operating on high-speed lines if they are intended exclusively for national service operated outside the corridors defined in point 7.3.4 of Annex III of Decision 2012/88/EU and outside the lines ensuring the connections to the main European ports, marshalling yards, freight terminals and freight transport areas defined in point 7.3.5 of the Annex of Decision 2012/88/EU or if they are intended for off-TEN cross-border service, i.e. service until the first station in the neighboring country or to the first station where there are connections further in the neighboring country. **Upgrading and renewal of existing vehicles:** It is mandatory to fit ETCS on-board existing vehicles if installing any new train protection part of a control- command and signaling on-board subsystem on existing high-speed vehicles. **Applicable standards:** ETSI - EN 301 515, EN 50126, EN 50128, EN 50129

**Table 22 – Applicable legislative standards in the European Union with respective applicable national standards for Latvia and Poland**

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
<b>1. General documentation</b>	LOC&PASS TSI 4.2.12, 4.2.12.1	03.08.2010. Rules of Cabinet of Ministers Nr.724 "Rules on Technical Exploitation" (TEN) (376.p means article 376) TEN 376 p., 28.12.2010. Rules of Cabinet of Ministers Nr.1211 "The order how to put into exploitation new rolling stock and the rolling stock after special repair and updating" (MK_1211) 4 appendix	
<b>1.1 General documentation</b>	LOC&PASS TSI 4.2.12.2	LOC&PAS TSI 4.2.2.6	§ 11 Order of the Minister for Infrastructure of 12 October 2005 on the general technical conditions for the operation of railway vehicles (Journal of Laws, No 212, item 1771 with later amendments)
<b>1.2.1 Maintenance instructions</b>	LOC&PAS TSI 4.2.12.3	TEN 7.3.chapter	§ 12 Order of the Minister for Infrastructure of 12 October 2005 on the general technical conditions for the operation of railway vehicles (Journal of Laws, No 212, item 1771 with later amendments)
<b>1.2.2 The maintenance design justification file</b>	LOC&PASS TSI 4.2.12.3.1, 4.2.12.3.2	TEN 7.3.chapter	§ 13 Order of the Minister for Infrastructure of 12 October 2005 on the general technical conditions for the operation of railway vehicles (Journal of Laws, No 212, item 1771 with later amendments)
<b>1.3.1 Instructions for operation in normal and degraded modes of the vehicle</b>	LOC&PASS TSI 4.2.12.4, OPE TSI 4.2.2.5	TEN 839 p., TEN 840 p., MK_1211 26 p., 59 p.,4 appendix	§ 11 Order of the Minister for Infrastructure of 12 October 2005 on the general technical conditions for the operation of railway vehicles (Journal of Laws, No 212, item 1771 with later amendments)

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
1.4 Track side tests of the complete vehicle		MK_1211 26 p., 66 p., 67 p., 68 p.	§ 9 first subparagraph Order of the Minister for Infrastructure and Construction of April 21, 2017 on rail interoperability (Journal of Laws of 2017, item 934)
2.1.1 Strength and integrity	LOC&PASS TSI 4.2.2.4, Appendix C C (EN 12663-1+A1:2015)	To be set by the producer Rules of Cabinet of Ministers MK_1211 chapter 2	PN-EN 12663-1+A1:2015-01, PN-EN 12663-2:2010 PN-EN 14033 series PN-EN 15663 series UIC 566, UIC 577, UIC 625-7, UIC 651
2.1.2.1 Load conditions and weighted mass	LOC&PASS TSI 4.2.2.10 (EN 15663:2017)	EN15663	PN-EN 14363:2016-04, annex TM-1
2.1.2.2 Axle load and wheel load	LOC&PASS TSI 4.2.3.2.1, 4.2.3.2.2 (EN 15528:2018) OPE TSI 4.2.2.5	Requirement on axle load for 1520mm regarding train detection is given from IM specification C-108, which prescribes min. axle load at least 11 t.	PN-EN 14363:2016-04, annex TM-1
2.1.3 Joining technology		LVS EN15085-5	PN-EN15085 series
2.1.4 Lifting and jacking	LOC&PASS TSI 4.2.2.6 (EN 16404:2016, EN 12663-1+A1:2015, EN 15877-2:2014)	LVS EN12663-1:2010	PN-EN 12663-1+A1:2015-01 PN-EN 12663-2:2010 PN-EN 14033 (series) PN-EN 15746 (series) UIC 566 UIC 569 UIC 581
2.1.5 Fixing of devices to car body structure	LOC&PASS TSI 4.2.2.7 (EN 12663-1+A1:2015)	LVS EN12663-1:2010	PN-EN 12663-1+A1:2015-01 PN-EN 12663-2:2010 PN-EN 14033 (series) PN-EN 15746 (series) UIC 566 UIC 577 UIC 625-7
2.1.6 Connections used between different parts of the vehicle			PN-EN 12663-2:2010 PN-EN 14363:2016-04 UIC 510-1
2.3 Passive safety	LOC&PASS TSI 4.2.2.5 (EN 15227+A1:2011)	TEN 3 p., LVS 282:2015 / LVS EN 15227:2008+A1:2011 Railway applications - Crashworthiness requirements for railway vehicle bodies. Applicable in case of EMU and DMU.	PN-EN 15227+A1:2011

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
<b>3.1 Vehicle gauge</b>	LOC&PASS TSI 4.2.3.1 (EN 15273-1+A1:2017, EN 15273-2+A1:2017)	TEN 3 p., 8.p., national standard LVS 282:2015 Construction and rolling stock clearance diagrams for railways	PN-EN 14033 (series) PN-EN 15273-2:2013-09 PN-EN 15746 (series) UIC 505-1 UIC 505-6 UIC 506 § 4 Order of the Minister for Infrastructure of 12 October 2005 on the general technical conditions for the operation of railway vehicles (Journal of Laws, No 212, item 1771 with later amendments)
<b>3.2.1 Running safety and dynamics</b>	LOC&PASS TSI 4.2.3.4 (EN 14363:2016, EN 15686:2010)	Agreement with Infrastructure Manager, LVS EN14363:2005	PN-EN 12299:2009 PN-EN 14033 (series) PN-EN 14363:2016-04 PN-EN 15746 (series) PN-EN 15839+A1:2015-12 PN-EN 16235:2013-12 UIC 432 UIC 518 UIC 530-2
<b>3.2.4 Track loading compatibility parameters</b>		LVS EN14363:2005	PN-EN 14363:2016-04 UIC 518
<b>Influence of ground-based systems (train detection systems, compatibility with loop equipment, board detection equipment, compatibility with trackside equipment)</b>	LOC & PASS TSI 4.2.3.3, CCS TSI 7.6.2.5 (special case for Lithuania, Latvia and Estonia regarding ChME3 locomotives), 4.2.10, 4.2.11		
<b>4. Braking - general</b>	LOC&PASS TSI 4.2.4.1, 4.2.4.3 (EN 14198:2017), 4.2.4.8 (EN 14198:2017, EN 15179:2008, EN 15355+A1:2011, EN 15611+A1:2011, EN 15612+A1:2011, EN 15625+A1:2011)		



Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
4.1 Functional Requirements at train level	LOC&PASS TSI 4.2.4.2	TEN 388 – 393 p.	PN-EN 16452:2015-08 PN-EN 14198:2005 PN-EN 15734-1:2011 UIC 540 UIC 541-3 UIC 541-5 UIC 541-6 UIC 544-2 UIC 546 PN-K-88177:1998+Az1:2002 PN-EN 15355+A1:2011 UIC-541-06
4.2 Safety requirements for braking at train level	LOC&PASS TSI 4.2.4.2.2 (EN 50126-1:2018)	TOR 7.1 chapter	
4.2.1 Traction/braking interlocking		TOR 383 p. / TEN 3.7 chapter	
4.2.1 Reliability of main brake system functionality		TEN 8.3 chapter and infrastructure manager specification DR-19/2000	
4.2.2 Reliability of traction/braking interlocking		LVS EN50215:2010 Railway applications - Rolling stock - Testing of rolling stock on completion of construction and before entry into service	
4.2.4 Reliability of parking brake		TEN 7.1. chapter and infrastructure manager specification DR-19/2000	
4.3 Brake system - Recognized architecture and associated standards			
4.4.1 Emergency braking command	LOC&PASS TSI 4.2.4.4.1, CCS TSI 4.2.2	TEN Chapter 7.1., Infrastructure Manager specification LDz Nr.DR-19/2000	PN-K-88177:1998+Az1:2002 PN-EN 16334:2014-10 PN-EN 15612+A1:2011 UIC 541-3 UIC 541-1 UIC 541-5
4.4.2 Service braking command	LOC&PASS TSI 4.2.4.4.2	TEN Chapter 7.1., Infrastructure Manager specification LDz Nr.DR-19/2000	PN-K-88177:1998+Az1:2002 PN-EN 14198:2005 UIC 540 UIC 541-3
4.4.3 Direct braking command	LOC&PASS TSI 4.2.4.4.3	TEN Chapter 7.1., Infrastructure Manager specification LDz Nr.DR-19/2000	PN-K-88177:1998+Az1:2002 UIC 612-1
4.4.4 Dynamic braking command	LOC&PASS TSI 4.2.4.4.4	TEN Chapter 7.1., Infrastructure Manager specification LDz Nr.DR-19/2000	UIC 544-1 UIC 544-2

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
Braking performance	LOC&PASS TSI 4.2.4.5.1 (EN 14531-1:2016), OPE TSI 4.2.2.6		
4.5.1 Emergency braking performance	LOC&PASS TSI 4.2.4.5.2 (EN 14531-1:2016)	TEN Chapter 7.1., Infrastructure Manager specification LDz Nr.DR-19/2000	UIC 543 UIC 546 UIC 567-1 UIC 567-2
4.5.2 Service braking performance	LOC&PASS TSI 4.2.4.5.3 (EN 14531-1:2016)	TEN Chapter 7.1., Infrastructure Manager specification LDz Nr.DR-19/2000	
4.5.5 Brake performance calculation	LOC&PASS TSI 4.2.4.5.5 (EN 14531-1:2016), 4.2.4.6.1, 4.2.4.5.4 (UIC 544-1:Oct 2004 Additional guidance to EN 14531-1 & 6)	TEN Chapter 7.1., Infrastructure Manager specification LDz Nr.DR-19/2000	PN-EN 14531-1:2016-02 UIC 544-1
4.6.2 Wheel slide protection system	LOC&PASS TSI 4.2.4.6.2 (EN 15595+A1:2011)	No requirements defined on national level	PN-EN 15595+A1:2011 UIC 541-5
4.7.2 Dynamic brake linked to traction	LOC&PASS TSI 4.2.4.7		UIC 544-2
4.8 Brake state and fault indication	LOC&PASS TSI 4.2.4.9 (EN 15220:2016)	TEN, Infrastructure Manager specification LDz Nr.DR-19/2000	PN-EN 15220-1+A1:2011 UIC 541-3 UIC 545
4.9 Brake requirements for rescue purposes	LOC&PASS TSI 4.2.4.10 (EN 15807:2011)	TEN chapter 8.19., Infrastructure Manager specification LDz Nr.DR-19/2000	UIC 627-4
Environmental conditions – general	LOC&PASS TSI 4.2.6.1 (EN 50125-1:2014, CEN/TR 16251:2016)		
6.1.1.1 Altitude		LVS EN50125-1 Railway applications. Environmental conditions for equipment. Part 1. Equipment on board rolling stock.	PN-EN 50125-1:2014-06
6.1.1.2 Temperature	LOC&PASS TSI 4.2.6.1.1 (EN 50125-1:2014)	LVS EN50125-1 Railway applications. Environmental conditions for equipment. Part 1. Equipment on board rolling stock.	PN-EN 50125-1:2014-06
6.1.1.3 Humidity		LVS EN50125-1 Railway applications. Environmental conditions for equipment. Part 1. Equipment on board rolling stock.	PN-EN 50125-1:2014-06

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
6.1.1.4 Rain		LVS EN50125-1 Railway applications. Environmental conditions for equipment. Part 1. Equipment on board rolling stock.	PN-EN 50125-1:2014-06 point 4.1.6. ERRI B12 Report 17 edition 8
6.1.1.5 Snow, ice and hail	LOC&PASS TSI 4.2.6.1.2 (EN 50125-1:2014)	LVS EN50125-1 Railway applications. Environmental conditions for equipment. Part 1. Equipment on board rolling stock.	PN-EN 50125-1:2014-06
6.1.1.6 Solar radiation		LVS EN50125-1 Railway applications. Environmental conditions for equipment. Part 1. Equipment on board rolling stock.	PN-EN 50125-1:2014-06
6.1.1.7 Resistance to pollution		LVS EN50125-1 Railway applications. Environmental conditions for equipment. Part 1. Equipment on board rolling stock.	PN-EN 50125-1:2014-06
6.2 Impact of the vehicle on the environment		Rules of Cabinet of ministers No.1047 "Rules of internal combustion engines to be installed in non-road mobile machinery type approval and emission of pollutions limitation"	

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
6.2.1.2 Exhaust gas emissions		27.12.2005. Rules of Cabinet of Ministers Nr.1047 "Rules about polluted emissions from mobile mechanics with internal combustions engines travelling on ways another that motorways"	§ 4 Order of the Minister of Economy of April 30, 2014 on specific requirements for internal combustion engines to limit emissions of gaseous and particulate pollutants by these engines (Journal of Laws of 2014, item 588) UIC 623-1 UIC 623-2 UIC 623-3 UIC 624 PN-ISO 8178-3:1997, PN-EN ISO 8178-6:2003, PN-ISO 8178-7:2002, PN-ISO 8178-8:2002, PN-ISO 8178-9:2005/A1:2007, PN-ISO 8178-10:2005
6.2.2 Chemical and particulate emissions		LVS EN60721-3-5:2002 Classification of environmental conditions - Part 3: Classification of groups of environmental parameters and their severities - Section 5: Ground vehicle installations	
6.2.2.2 Exhaust gas emissions		27.12.2005. Rules of Cabinet of Ministers Nr.1047 "Rules about polluted emissions from mobile mechanics with internal combustions engines travelling on ways another that motorways"	
6.2.1.3 Chemical and particulate emission			PN-EN 50125-1:2014-06 PN-EN 60721-3-5:2010
6.2.2.1 Stationary noise impact	NOISE TSI 4.2.1**	NOISE TSI	PN-EN ISO 3095:2013-12, attachment TM-2
6.2.2.2 Starting noise impact	NOISE TSI 4.2.2**	NOISE TSI	PN-EN ISO 3095:2013-12, attachment TM-2
6.2.2.3 Pass-by noise impact	NOISE TSI 4.2.3**	NOISE TSI	PN-EN ISO 3095:2013-12, attachment TM-2

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
7.1 Integrity of software employed for safety-related functions		LVS EN 50128:2011 Railway applications - Communication, signaling and processing systems - Software for railway control and protection systems	PN-EN 50126:2002 PN-EN 50126:2002/AC:2006 PN-EN 50126:2002/AC:2011 PN-EN 50128:2011 PN-EN 50128:2011/AC:2014-04 PN-EN 50129:2007 PN-EN 50129:2007/AC:2010 PN-EN 50155:2007 PN-EN 61508 (series) UIC 556 UIC 558
7.2.1 Vehicle marking	LOC&PASS TSI 4.2.7, OPE TSI 4.2.2.1, 7.3.2.1. Temporary specific case for Latvia, Lithuania and Estonia: For the implementation of point 4.2.2.1.3.2 and 4.2.2.1.3.3, trains which are operated solely on the 1520 mm gauge network of Estonia, Latvia and Lithuania may use another specified train rear-end signal.	TEN 377 p., 378 p.	ISO 3864-1:2011 PN-EN ISO 7010:2012 PN-EN 15877-1:2012 PN-EN 15877-2:2013-12 UIC 438-1 UIC 438-2 UIC 438-3 UIC 438-4 UIC 552 UIC 545 UIC 580 UIC 640 PN-K 88200:2002 Annex 11 to the General Agreement About the use of freight wagons (AVV) - Inscriptions and signs on freight wagons, § 20, 23, 24, 26 And Attachment 5 of the Order of the Ministry of Transport, Construction and Maritime Economy of 3 January 2013 on how to keep a register and how to mark rail vehicles (Journal of Laws of 2013, item 211)
7.2.4 Brackets		03.08.2010. Rules of Cabinet of Ministers Nr.724 "Rules on Technical Exploitation" (TEN)	UIC 532 UIC 534 PN-K-88200:2002
8.0 Onboard power supply and control systems		TEN 4.3 chapter; Infrastructure Manager's specification LDz TE-3199 (for all the chapter)	
8.1 Traction performance requirements	LOC&PASS TSI 4.2.8.1.1, 4.2.8.1.2, 4.2.4.6.1	LOC&PAS TSI p.4.2.8.1.2. / LOC&PAS TSI p.4.2.4.6.1.	

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
8.1.2 Residual traction capability in degraded mode	LOC&PASS TSI 4.2.8.1.2, 4.2.10.4.4	LOC&PAS TSI p.4.2.8.1.2. / LOC&PAS TSI p.4.2.10.4.4.	
8.3.4 Earthing	LOC&PASS TSI 4.2.12.6	LOC&PAS TSI p.4.2.12.6.	PN EN 50153:2014-11 UIC 533
8.4.1 EMC within the vehicle		EN 50121-1 EMC - General; EN 50121-3-2 EMC Rolling stock Apparatus	PN-EN 50121-1:2015-10 PN-EN 50121-3-2:2015-10 PN-EN 50500:2008/A1:2015-10 PN-EN 62311:2010 PN-EN 45502-2-1:2005 PN-EN 45502-2-2:2008 PN-EN 50155:2007 PN-EN 45502-2-1:2005 PN-EN 45502-2-2:2008 UIC 737-4 PN-EN 50155:2007/AC:2010
8.4.2 Electromagnetic compatibility with the signaling and telecommunications network	LOC&PASS TSI 4.2.3.3	LVS EN 50121-4:2015 Railway applications - Electromagnetic compatibility - Part 4: Emission and immunity of the signaling and telecommunications apparatus	
8.4.3 Electromagnetic compatibility with other vehicles and with the trackside part of the railway system	LOC&PASS TSI 4.2.3.3	LVS EN 50121-3-1:2015 Railway applications - Electromagnetic compatibility - Part 3-1: Rolling stock - Train and complete vehicle LVS EN 50121-3-2:2015 Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock – Apparatus LVS EN 50121-5:2015 Railway applications - Electromagnetic compatibility - Part 5: Emission and immunity of fixed power supply installations and apparatus	

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
8.4.2.1.3 Interference current under the vehicle		EN 50121-4 2015 / EN 50121-3-1 2015, EN 50121 3-2 2015	PN-EN 50238:2003 CLC/TS 50238-3:2013 PN-EN 50617-2:2015-12 PN-EN 50617-2:2015-12/AC:2016-02 CLC/TS 50238-2:2010 PKN-CLC/TR 50507:2007 UIC 550-3
8.4.2.2.1 Electro-magnetic fields/Induced voltages in the track/under the vehicle		EN 50121-4 2015	PN-EN 50238:2003 CLC/TS 50238-3:2013 PN-EN 50617-2:2015-12 PN-EN 50617-2:2015-12/AC:2016-02
8.4.2.2.2 Electro-magnetic fields/Induced voltages outside the track		EN 50121-1 EMC -General and EN 50121-3-1 EMC Rolling stock - Train and complete vehicle	PN-EN 50121-1:2015-10 PN-EN 50121-3-1:2015-10 PN-EN 50238:2003 CLC/TS 50238-2:2015 PN-EN 50617-2:2015-12 PN-EN 50617-2:2015-12/AC:2016-02
8.4.2.3 Vehicle entrance impedance			PKN-CLC/TR 50507:2007
8.4.2.5 Transverse voltage limits for compatibility voice/data circuits		EN 50121-3-1 2015, EN 50121 3-2 2015	PN-EN 50121-1:2015-10 PN-EN 50121-3-1:2015-10
8.4.3.1 Maximum electro-magnetic fields		EN 50121-2 2015	PN-EN 50121-1:2015-10 PN-EN 50121-2:2015-10 PN-EN 50500:2008/A1:2015-10 PN-EN 62311:2010 PN-EN 45502-2-1:2005 PN-EN 45502-2-2:2008
8.4.3.2 Induced interference current/voltage		EN 50121-1 EMC -General and EN 50121-3-1 EMC Rolling stock - Train and complete vehicle	PN-EN 50121-1:2015-10 PN-EN 50121-3-1:2015-10
8.4.4 Electromagnetic compatibility with the environment		LVS EN 50121-2:2015 Railway applications - Electromagnetic compatibility - Part 2: Emission of the whole railway system to the outside world	

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
8.5 Protection against electrical hazards	LOC&PASS TSI 4.2.8.4 (EN 50153:2014/A1:2017)	LOC&PAS TSI p.4.2.8.4.	PN EN 50153:2014-11 UIC 533 UIC 550 UIC 611 PN-EN 50388:2012/AC:2014-03 PN-EN 60077 (series), Annex TE-2
8.6 Diesel and other thermal traction system requirements	LOC&PASS TSI 4.2.8.3	LOC&PAS TSI p.4.2.8.3.	
8.7 Systems requiring special monitoring and protection measures		Needs to be investigated	
8.7.1 Tanks and pipe systems for flammable liquids	LOC&PASS TSI 4.2.10.2.2, SRT TSI 4.2.3.1.2 (EN 45545-7:2013)	LOC&PAS TSI 4.2.10.2.2	art. 13 Journal of laws about technical supervision from 21 Dec 2000
8.7.2 Pressure vessel systems / pressure equipment		Directive 2009/105/EC on simple pressure vessels	art. 5 Journal of laws about technical supervision from 21 Dec 2000
8.7.4 Technical systems in potentially explosive atmospheres		97/23/EC the pressure equipment directive	art. 5 Journal of laws about technical supervision from 21 Dec 2000
8.7.5 Hydraulic/pneumatic supply and control systems		to be investigated	art. 5 Journal of laws about technical supervision from 21 Dec 2000
9.1.1 Interior layout	LOC&PASS TSI 4.2.9.1.1, 4.2.9.1.4	LOC&PAS TSI p.4.2.9.1.4.	PN-EN 14033 (series) PN-EN 15746 (series) UIC 651
9.1.2.1 Access, egress and doors	LOC&PASS TSI 4.2.9.1.2.1 (EN 16116-1:2014)	LVS 282:2015	PN-EN 14033 (series) PN-EN 15746 (series) UIC 651
9.1.2.2 Driver's cab emergency exits	LOC&PASS TSI 4.2.9.1.2.2, 4.2.10.5.2. SRT TSI 4.2.3.4.2 (EN 45545-4:2013, EN 15227+A1:2011)	LOC&PAS TSI 4.2.9.1.2.2. Requirement described by respective standard is applicable only for the new products	PN-EN 14033 (series) PN-EN 15746 (series) UIC 651
9.1.3.3 Equipment	LOC&PASS TSI 4.2.9.2.3	LOC&PAS TSI 4.2.9.2. Requirement described by respective standard is applicable only for the new products	PN-EN 14033 (series) PN-EN 15746 (series) UIC 651
9.1.3.4 Front visibility	LOC&PASS TSI 4.2.9.2, 4.2.9.1.3.1. OPE TSI 4.2.2.8. CCS TSI 4.2.15.	LOC&PAS TSI 4.2.9.2.	PN-EN 14033 (series) PN-EN 15746 (series) UIC 651
9.1.4 Desk ergonomics	LOC&PASS TSI 4.2.9.1.6	LOC&PAS TSI p.4.2.9.1.6. Requirement described by respective standard is applicable only for the new products	PN-EN 14033 (series) PN-EN 15746 (series) UIC 651



Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
9.1.5 Driver's seat	LOC&PASS TSI 4.2.9.1.5 (UIC 651 of July 2002)	LOC&PAS TSI p.4.2.9.1.5. Requirement described by respective standard is applicable only for the new products	PN-EN 14033 (series) PN-EN 15746 (series) UIC 651
9.2.1.2 Noise in driver cabs	NOISE TSI 4.2.4**		PN-EN ISO 3381:2011 PN-EN 14033 (seria) PN-EN 15746 (seria) Annex TM-2 UIC 651 Annex 2 to the Order of the Minister of Labor and Social Policy of 6 June 2014 on maximum permissible concentrations and intensities of agents harmful to health in the work environment (Journal of Laws, Journal of Laws, 2003, item 817) Annex to the Order of the Minister of Economy and Labor of 5 August 2005 on occupational safety and health in work involving noise or mechanical vibration (Journal of Laws of 2005, No. 157, item 1318)
9.2.1.3 Lighting in driver cabs	LOC&PASS TSI 4.2.9.1.8, OPE TSI 4.2.2.8 (EN 13272:2012)		PN-EN 13272:2012
9.2.2 Other health and safety requirements			PN EN 14253+A1:2011 Annex 2 to the Order of the Minister of Labor and Social Policy of 6 June 2014 on maximum permissible concentrations and intensities of agents harmful to health in the work environment (Journal of Laws, Journal of Laws, 2003, item 817) Annex to the Order of the Minister of Economy and Labor of 5 August 2005 on occupational safety and health in work involving noise or mechanical vibration (Journal of Laws of 2005, No. 157, item 1318)

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
9.3.2 Driver display unit and screens			PN-EN 50126:2002 PN-EN 50126:2002/AC:2006 PN-EN 50126:2002/AC:2011 PN-EN 50128:2011 PN-EN 50128:2011/AC:2014-04 PN-EN 50129:2007 PN-EN 50129:2007/AC:2010 PN-EN 50155:2007 PN-EN 50155:2007/AC:2010 UIC 651
9.3.3 Controls and indicators	LOC&PASS TSI 4.2.9.3.4 (UIC 612)		PN-EN 50155:2007 PN-EN 50155:2007/AC:2010 UIC 612-0 UIC 612-01 UIC 612-03 UIC 612-04 UIC 612-05 UIC 640 UIC 651
9.4 Marking in Driver cabs	LOC&PASS TSI 4.2.9.3.3, 4.2.9.3.4, 4.2.9.3.5 (UIC 612-0, UIC 612-01, UIC 612-03, ISO 3864-1:2011)	LOC&PAS TSI 4.2.9.3.3.	UIC 640
9.5.1.3 Storage facilities for use by staff	LOC&PASS TSI 4.2.9.5		UIC 651
9.5.2 Staff and freight Access doors	LOC&PASS TSI 4.2.2.8		UIC 560
9.6 Recording device	LOC&PASS TSI 4.2.9.6 (EN/IEC 62625-1:2013), OPE TSI 4.2.3.5.2, CCS TSI 4.2.14		PN-EN 50126:2002 PN-EN 50126:2002/AC:2006 PN-EN 50126:2002/AC:2011 PN-EN 50129:2007 PN-EN 50129:2007/AC:2010 PN-EN 50155:2007 PN-EN 50155:2007/AC:2010 PN-EN 50159:2011 PN-EN 62625-1:2014-04
9.7 Remote control function	LOC&PASS TSI 4.2.9.3.6 (EN 50239:2018)		PN-EN 50239:2002

<p><b>10.1 Fire safety</b></p>	<p>LOC&amp;PASS TSI 4.2.10.1, 4.2.10.2 (EN 45545-2+A1:2016), 4.2.10.3, 4.2.10.4.2, 4.2.10.3.1, 4.2.10.2.1, 4.2.10.3.3, 4.2.10.3.5 During a transitional period ending three years after the date of application of LOC&amp;PASS TSI, it is permitted, as an alternative to material requirements specified in clause 4.2.10.2.1 of the present TSI, to apply the verification of conformity to the material fire safety requirements of the notified national rules (using the appropriate operation category) from one of the following sets of standards: The British standards BS6853, GM/RT2130 issue 3. The French standards NF F 16-101:1988 and NF F 16-102/1992. The German standard DIN 5510-2:2009 including toxicity measurements. The Italian standards UNI CEI 11170-1:2005 and UNI CEI 11170-3:2005. The Polish standards PN-K-02511:2000 and PN-K-02502:1992. The Spanish standard DT-PCI/5A. During this period, it is permitted to substitute individual materials by materials which are compliant with EN 45545-2+A1:2016 (as specified in clause 4.2.10.2.1 of LOC&amp;PASS TSI). Requirements for diesel fire detection system and cutting of fuel supply + shutting down equipment actions. EN 45545-6:2013 cl 6.3, EN 3-7, EN 3-8 and EN 3-10 Portable fire extinguisher requirements and</p>	<p>National rules for rolling stock construction, upgrade, renewal, conformity assessment and acceptance for service Nr.1211</p>	<p>PN-EN 14033 (series) PN-EN 15746 (series) PN-EN 45545-1:2013-07 PN-EN 45545-2+A1:2015-12 PN-EN 45545-3:2013-07 PN-EN 45545-4:2013-07 PN-EN 45545-5+A1:2016-01 PN-EN 45545-6:2013-07</p>
--------------------------------	--	--	--

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
	situation in the vehicle EN 45545-6:2013 Table 1 and 2, cl. 5.2, 5.3 and 5.4 (excluding 5.4.5) Requirements for Fire detection systems and automatic actions. SRT TSI 4.2.3.3.2, 4.2.3.2.1, 4.2.3.1.1, 4.2.3.2.2, 4.2.3.2.3, 4.2.3.2.5 (EN 45545-6:2013)		
<b>10.2.2 Rescue services' information, equipment and access</b>		Technical operational rules (TOR) Nr.724	UIC 560 UIC 564-1 UIC 580 UIC 640
<b>10.3 Emergency running capabilities</b>	LOC&PASS TSI 4.2.10.4.4 (EN 50553:2012). SRT TSI 4.2.3.3.4.	LOC&PAS TSI p.4.2.10.4.4	PN-EN 45545-4:2013-07
<b>11.2.3 Further supply facilities</b>			PN-EN 50547:2014-01
<b>11.2.4 Interface to refueling equipment for non-electric rolling stock</b>	LOC&PASS TSI 4.2.11.7 (EN 16507:2015)		PN-EN 16507:2014-11 UIC 627-2
<b>12.1.1 Non-GSM-R radio system</b>		Technical operational rules (TOR) Nr.724 4.2. chapter 29/02/1996 Infrastructure manager rules TA0696 L23/96 "Instruction of Automatic locomotive signaling of continuous operation and for driver surveillance control"  IM rules No.PP-31/494 from 18.12.2014. "Operational rules for train, station and shunting yard radio communication"	§§ 6, 9 third subparagraph Order of the Minister of Infrastructure of 18 July 2005 on the general terms and conditions of railway traffic and signaling (Journal of Laws of 2015, item 360) And the technical regulations issued on this regulation PN-ETSI EN 300 086-1 V1.3.1:2008 PN-EN 50129:2007 PN-EN 50129:2007/AC:2010

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
12.2.1 National on-board signaling facilities		<p>ALSN: Automatic locomotive signaling of continuous operation - (General, technical and functional description)</p> <p>IM rules from 26.08.2004. order Nr.DV-3/367 "Operational rules on diesel locomotive continuous type automatic locomotive signaling and driver vigilance devices"</p> <p>IM rules from 06.15.1994. "Locomotive speed register 3SL-2M, operational and maintenance instructions"</p>	<p>PN-EN 15437-1:2009 § 21 fourth subparagraph</p> <p>Order of the Minister of Infrastructure of 18 July 2005 on the general terms and conditions of railway traffic and signaling (Journal of Laws of 2015, item 360) Annex S-04</p>
12.2.2 STM requirements		The Specific Transmission Module	§§ 6, 9 third subparagraph Order of the Minister of Infrastructure of 18 July 2005 on the general terms and conditions of railway traffic and signaling (Journal of Laws of 2015, item 360) Annex TS-1
12.2.4.3 Metal and inductive components-free space between wheels			PN-EN 50121-1:2015-10, PN-EN 50121-4:2015-10
12.2.4.5 Compatibility with fixed installations of CCS			PN-EN 50121-1:2015-10, PN-EN 50121-4:2015-10
13.1 Specific items to place on-board	LOC&PASS TSI 4.2.9.4		§ 3 Order of the Minister for Infrastructure of 12 October 2005 on the general technical conditions for the operation of railway vehicles (Journal of Laws, No 212, item 1771 with later amendments)
13.2 Ferry transport			UIC 507 UIC 569 UIC 627-5
13.3 Lifting diagram and instructions for rescue	LOC&PASS TSI 4.2.2.6, 4.2.12.5, 4.2.12.6. OPE TSI 4.2.3.7	LOC&PAS TSI p.4.2.2.6.	
Vehicle identification	OPE TSI 4.2.2.3		
Safety of load	OPE TSI 4.2.2.4.1		

Point / Area / Confirming documents	Requirements TSI* / Applicable Standards	Requirements LATVIA / Applicable Standards	Requirements POLAND / Applicable Standards
Train braking	OPE TSI 4.2.2.6		
Ensuring that the train is in running order	OPE TSI 4.2.2.7		
Degraded operation	OPE TSI 4.2.3.6		
Servicing	LOC&PASS TSI 4.2.11.1, 4.2.11.6		
14.1 Design, operation and maintenance constraints for the transport of dangerous goods		Regulation concerning the International Carriage of Dangerous Goods by Rail (RID) and The Agreement on International Goods Transport by Rail (SMGS).	PN-EN 12972:2015-04 PN-EN 13081+A1:2012 Art. 6 of the Act of 19 August 2011 on the Carriage of Dangerous Goods (Journal of Laws of 2011, No. 227, item. 1367, later. Zm.) Regulations for the International Carriage of Dangerous Goods by Rail (RID), Annex C to the Convention About international carriage by rail (COTIF), issued in Bern on 9 May 1980 (Journal of Laws of 2007 No. 100, item 674, as amended)
14.2 Specific facilities for the transport of freight		Regulation concerning the International Carriage of Dangerous Goods by Rail (RID) and The Agreement on International Goods Transport by Rail (SMGS).	UIC 560 UIC 567-4 UIC 576
14.3 Doors and loading facilities		Regulation concerning the International Carriage of Dangerous Goods by Rail (RID) and The Agreement on International Goods Transport by Rail (SMGS).	

## Financial offer

## 1. Applicant

Applicant's name	Applicant details

## 2. Contact person

Name, Surname	
Address	
Phone number	
e-mail address	

## 3. Financial Offer

	Locomotive type	Country	Estimated price of the Service
Shunter locomotives	ChME3	Poland	
		Latvia	
	SM42	Poland	
	TEM 2	Estonia	
		Lithuania	
		Poland	
Mainline locomotives	TE116	Latvia	
		Lithuania	
	GE C36-7i	Estonia	
	M62	Latvia	
		Lithuania	
		Poland	

Signature of the applicant



Co-funded by  
the European Union



## ANNEX 2

Service provider has provided NoBo or legal management services of certification and consultation within the railway industry, preferably in CNG/LNG locomotive certification. If the Service provider is a partnership, this experience requirement applies to each member of the partnership:

No	Name of project	Start and finish (if project is finished) dates of the contract	Contracting Authority	Contact information for references
1.				

\* Detailed reference project description according to 4.2.(1) shall be provided on no more than 15 pages and include:

- Project structure, including main technical and operational parameters of the railway infrastructure relevant to EC-verification;
- Full summary of EC-verification services, verification objects and modules used;





Co-funded by  
the European Union



ANNEX 3

### Confirmation of Service providers Financial Standing

1. (4.3.(1)) The Service provider or each member of the partnership (if the Service provider is a partnership) on whose abilities the Service provider is relying has to certify it's financial and economic performance and who will be financially and economically responsible for fulfilment of the procurement contract and entity on whose abilities the Service provider is relying to certify it's financial and economic performance and who will be financially and economically responsible for fulfilment of the procurement contract, shall have stable financial and economic performance, namely, in the last audited financial year the liquidity ratio (current assets divided by short-term liabilities) shall be equal to or exceed 0,75 and shall have positive equity.

---

Name of the Service provider/member of partnership/entity \*

$$\text{liquidity ratio} = \frac{\text{current assets}}{\text{short - term liabilities}} = \underline{\hspace{2cm}}$$

$$\text{equity ratio} = \text{total assets} - \text{total liabilities} = \underline{\hspace{2cm}}$$

*\*Please continue and provide information regarding each entity to which this requirement applies.*