

Vehicle type: 227M	Component: Annex 1 to 096-BR1-2019 Fire protection system	03.07.2019 version 8
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No.	Parameter	Requirement	Comments
1.	Operating and environmental conditions		
1.1.	Installation of fire protection system devices	In the interior of the vehicle	v4
1.2.	Service speed of the vehicle	160 km/h	
1.3.	Conditions at standstill	Standstill of the vehicle at an outdoor square	
1.4.	Environmental operating conditions for the equipment of the fire protection system	The air temperature outside the vehicle from -30°C to +40°C and inside the vehicle from -30°C to +50°C In terms of: <ul style="list-style-type: none"> altitude ASL - A1; relative air humidity - max. 90% at 20°C (the annual average: 75%); and for other environmental conditions in accordance with PN-EN 50125-1.	
1.5.	Environmental operating conditions for electronic devices	In terms of shock and vibration - category 1, class B according to PN-EN 61373. In terms of: <ul style="list-style-type: none"> altitude ASL - A1; relative air humidity - max. 90% at 20°C (the annual average: 75%); according to PN-EN 50125-1 standard. Within the operating temperature range from -30°C to +55°C. In terms of sudden changes in temperature - category H1 acc. to PN-EN 50155.	
2.	General requirements		
2.1.	Vehicle category	Vehicle (in accordance with TSI SRT sec. 4.2.3. and TSI LOC&PAS sec. 4.1.4.) shall be designed in fire hazard category A.	
2.2.	Certificates	Installed equipment shall have the appropriate fire certificates in accordance with PN-EN 45545-2 standard.	
2.3.	Operational category of the vehicle	Category 2 (OC2) in accordance with the requirements of PN-EN 45545-1 standard.	
2.4.	Design category of the vehicle	Category N in accordance with the requirements of PN-EN 45545-1 standard.	
2.5.	Fire hazard level	HL2 in accordance with the requirements of PN-EN 45545-2 standard.	
3.	System equipment and location		
3.1.	Fire alarm	-	

No.	Parameter	Requirement	Comments
3.1.1.	Fire detectors	All sections (areas and spaces at particular fire risk) of the vehicle shall be equipped with repeatable use detectors, responding to the increased temperature or the presence of smoke.	2 in control desktops 2 in driver cabs 1 in staff compartment 9 in passenger compartments v4 4 in machinery compartments *4) v5 2 in WC cubicles 6 in equipment cabinets v4 *3) v5
3.1.2.	Fire system control unit.	Fire system control panel works with the TCMS vehicle control system via the CANOpen bus. Visualization of the fire system status on the TCMS terminal screen.	v8
3.2.	Fire extinguishing system	-	
3.2.1.	-	Machinery compartments particularly vulnerable to fire shall be equipped with a fixed fire extinguishing system that uses generators (containers with extinguishing agent suitable for extinguishing machinery and electric devices) triggered manually by the driver.	2 machinery compartments with internal combustion engines and their equipment. Dimensions of compartments: L x W x H - 3.7 x 1.06 x 2.9 m
3.2.2.	-	The fire extinguishing system in each section of the passenger compartment and in the driver's cab shall be equipped with appropriate dry powder extinguishers.	
3.2.3	-	In terms of fire protection systems, the vehicle shall meet the requirements of TSI LOC&PAS sec. 4.2.10.3. and PN-EN45545-6 standard.	
3.3.	Material requirements	According to TSI LOC&PAS p. 4.2.10.2. and PN-EN 45545-2.	
3.4.	Electrical equipment of the system	According to PN-EN 45545-5 standard.	
4.	Functional requirements		
4.1.	Continuity of power supply	Continuity of power supply after switching off the on-board supply of 24 VDC shall be provided by an additional on-board backup battery.	v5
4.2.	Recording events	During normal operation, and after switching off the on-board supply of 24 VDC, the central control unit shall record any events.	

No.	Parameter	Requirement	Comments
4.3.	Control and diagnostics	Fire protection system shall operate using digital CANopen bus.	v6
4.4.			v6
4.5.	Tampering alarm	The fire protection system shall be equipped with a system detecting tampering attempts (e.g. theft of detectors) and diagnosing the state of system components.	v5
4.6	Fire alarm	The system must be adapted to signaling a fire within its occurrence (locally) and on the desks in the driver's cabs - using CANOpen (along with identification of the location of the fire). In addition, it is required to signal the fire by the fire system control panel by means of the relay contact.	v8
5.	Other requirements		
5.1.	Electric operating conditions	-	
5.1.1.	Power supply voltage	Power supply voltage for control and electronic devices 24 VDC.	
5.1.2.	Range of voltage changes	$0.7U_n \div 1.25U_n$, in accordance with PN-EN 50155.	
5.1.3.	Momentary voltage fluctuations	$0.6U_n \div 1.4U_n$, in accordance with PN-EN 50155.	
5.2.	Electronic equipment	In addition to the requirements specified in sec. 1.5. and 5.1, the electronic equipment and devices installed in the fire protection system shall meet also other requirements of PN-EN 50155 standard (within M tests, par. 13.3, Table 12).	v7
5.3.	Electromagnetic compatibility	In terms of emissions and the equipment resistance, the applied devices shall meet the requirements of PN-EN 50121-3-2.	
5.4.	System safety	The system and software shall meet requirements of the following standards: PN-EN 50126-1, PN-EN 50126-2, PN-EN 50128, to ensure adequate Safety Integrity Level (SIL0).	v5
5.5.	-	For maintenance reasons, the set of fire protection system devices and equipment shall be supplied by the same manufacturer.	
6.	Documentation		
6.1.	-	Installation instructions of the set and its individual components, assembly drawings.	Required within two weeks of signing the contract.
6.2.	-	2D and 3D drawings of system components, wiring diagram	Required within two weeks of

No.	Parameter	Requirement	Comments
			signing the contract
6.3.	-	Delivery specifications (list of components)	The Tenderer shall provide it with the tender. v7
6.4.	-	<p>Operation and maintenance manuals, compliant with the Announcement of the Minister of Infrastructure and Construction Industry of 27 January 2016 on the announcement of the uniform text of the Regulation of the Minister of Infrastructure, on the general technical conditions of using railway vehicles (Dz. U. item. 226), shall include:</p> <ul style="list-style-type: none"> • determination of the intended use; • technical data; • description of the structure and principles of operation; • user manual; • illustrative drawings; • requirements concerning the use and safety of operation; • guidelines for care and maintenance; • description of methods for checking the technical conditions and list of parameters; • description of typical faults and methods of their removal; • list of spare parts • attachments including, in particular: flowcharts, diagrams, assembly drawings, charts, drawings and software algorithms; • recycling rules, detailed scope of data to be discussed during the technical meetings after selecting the tenderer. 	<p>To be provided by the Contractor with the first delivery of the subject of the contract.</p> <p style="text-align: right;">v7</p> <p style="text-align: right;">v3</p>
6.5	-	Illustrated catalogue of spare parts	To be provided by the Contractor with the first delivery of the subject of the contract.

No.	Parameter	Requirement	Comments
6.6.	-	Software instructions and description of data read-out from the system controller, licenses for use issued for FPS.	To be provided by the Contractor with the first delivery of the subject of the contract. v7
6.7.	-	Data for RAMS/LCC analysis - at least FIT (Failures in Time), MTTR (Mean Time To Repair), MTBF (Mean Time Between Failures) according to standard PN-EN 50126-1, scope of technical maintenance activities for levels P1 - P5. The detailed scope of data to be discussed during technical meetings after selecting the tenderer.	The Contractor shall provide it within 3 months of signing the contract. v7
6.8.	-	Technical Terms of Acceptance of the subject of the delivery of vehicle sub-assembly.	The Contractor shall provide it within 3 months of signing the contract. v7
6.9.	CANopen	Providing the description of frames transmitted by the device to on-board diagnostics.	The Contractor shall provide it within 3 months of signing the contract.
6.10.			v2, v6
6.11.	Software	All software documents required throughout the software life cycle shall be subject to the management of revisions. It shall apply to: <ul style="list-style-type: none"> software version; description of the newly implemented functionality; removed errors; customer requirements; issues still open; annexes for software verification. The Contractor shall immediately send information on introduced changes together with the documents, which relate to these changes.	To be provided by the Contractor with the first delivery of the subject of the contract. v2
7.	Acceptance and quality		
7.1.	Declaration of Conformity	The declaration of conformity containing a list of standards and regulations - according to the Act on the systems of assessing conformity and	To be provided by the Contractor

No.	Parameter	Requirement	Comments
		market surveillance (Dz. U. of 2017 item 1398) as amended.	with the first delivery of the subject of the contract. v3
7.2.	Acceptance certificates of the equipment	Acceptance certificates 3.1 in accordance with PN-EN 10204 standard.	To be provided by the Contractor with the first delivery of the subject of the contract. v2
7.3.	Approval for use in railway industry	Document indicating suitability for use in the railway industry, issued by an accredited evaluation body - compliant with PN-EN ISO/IEC 17065 standard.	Preferred To be provided by the Contractor with the first delivery of the subject of the contract. v3
7.4.	Certification of meeting the standards and regulations	Declaration of the tenderer on meeting the standards and provisions required in sec. 8 of this document.	The Tenderer shall provide it with the tender. v3, v7
7.5.	Combustibility certificates	Confirmation of compliance with current standards: PN-EN 45545-1, PN-EN 45545-2.	To be provided by the Contractor with the first delivery of the subject of the contract. v3
8.	Standards and documents *1),*2),*5) v3, v5, v7		
8.1.			v7
8.2.	PN-EN 45545-2	Requirements for fire behaviour of materials and components.	v7
8.3.	TSI SRT	Safety requirements in railway tunnels.	
8.4.	PN-EN 50121-3-2	Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock - Apparatus	
8.5.	PN-EN 50125-1	Requirements for operational and environmental conditions.	
8.6.			v7
8.7.	PN-EN 50128	Requirements for security and integrity of software	
8.8.	PN-EN 50155	Requirements for electronic equipment	

No.	Parameter	Requirement	Comments
8.9.	PN-EN 61373	Requirements for equipment resistance to shock and vibration	
8.10.			v6
8.11.			v7
8.12.			v7
8.13			v7

Notes:

*1) In matters not specified in these requirements the provisions of the above standards shall apply.

*2) Dating of standards shall be valid at the date of submitting the tender for a sub-assembly.

*3) The number of detectors used in equipment cabinets may increase due to the need to use additional space in the interior for the electric and pneumatic equipment of the vehicle.

v5

*4) Instead of repeatable use detectors, it is allowed to use line heat sensors (2 pcs. for each machine compartment). **v5**

*5) The contracting authority allows presenting relevant documents proving the compliance with equivalent standards and regulations. However, the Contractor shall document the equivalence of these standards and regulations at own expense and the acknowledgement of the equivalence shall be provided by an accredited assessing unit, having relevant authorisations.

The rating is based on the attached copies of supporting documents. **v7**