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Railway applications - Braking - Brake pipe accelerator valve

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accélératrice de vidange

Bahnanwendungen - Bremse -
Schnellbremsbeschleunigungsventil

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prEN 15612:2018 (E)

European foreword

This document (prEN 15612:2018) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 15612:2008+A1:2010.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive 2008/57/EC.

For relationship with EU Directive 2008/57/EC, see informative Annex ZA, which is an integral part of this document.

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1 Scope

This document is applicable to brake pipe accelerator valves designed to vent the brake pipe of railway vehicles when an emergency brake application is initiated, without taking the type of vehicles and track-gauge into consideration.

This document specifies the requirements for the design, manufacture and testing of brake pipe accelerator valves.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 14478, *Railway applications – Braking – Generic vocabulary*

EN 14601, *Railway applications – Straight and angled end cocks for brake pipe and main reservoir pipe*

EN 15355, *Railway applications – Braking – Distributor valves and distributor-isolating devices*

EN 50125-1, *Railway applications – Environmental conditions for equipment – Part 1: Rolling stock and on-board equipment*

EN 60721-3-5:1997, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 5: Ground vehicle installations (IEC 60721-3-5:1997)*

EN 61373:2010, *Railway applications – Rolling stock equipment – Shock and vibration tests (IEC 61373:2010)*

EN ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads – Part 1: Dimensions, tolerances and designation (ISO 228-1)*

ISO 8573-1:2010, *Compressed air – Part 1: Contaminants and purity classes*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14478 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

brake pipe accelerator valve

device connected to the brake pipe of a vehicle, which operates in response to seeing a rapid fall in brake pipe pressure to ensure a continuing rapid fall to below 2,5 bar

prEN 15612:2018 (E)**3.2****brake mode “good”****brake mode “freight”****brake mode “G”**

brake mode characterized by slow brake application and release times specific for distributor valves used on freight trains for slow speed

3.3**brake mode “passenger”****brake mode “P”**

brake mode characterized by fast brake application and release times specific for distributor valves used on trains for passenger traffic

3.4**normal litre****NI**

unit of mass for gases equal to the mass of 1 l at a pressure of 1,013 2 bar (one atmosphere) and at a standard temperature, often 0 °C or 20 °C

Note 1 to entry: Airflow is often stated in normal litres per minute (NI/min).

3.5**operating pressure**

reference input pressure in full release position

Note 1 to entry: This is normally 5 bar brake pipe pressure but can be 4 bar or 6 bar.

3.6**quick service function**

function of a distributor valve which allows, when applying the brake from stand-by and released position, the local fast venting of brake pipe pressure by a certain specified amount and at a certain specified gradient, to provide pneumatic brake signal transmission through a train

3.7**quick service device**

device that fulfils the quick service function

3.8**emergency brake application**

brake pipe pressure fall seen at the accelerator valve as a result of a demand for an emergency brake application from any source

3.9**overcharge**

increase in brake pipe pressure above normal operating pressure

4 Design and manufacture**4.1 General**

The design and manufacture of the brake pipe accelerator valves shall take the requirements of this standard into account for all intended operating conditions.

4.2 Functional requirements

4.2.1 General

Brake pipe accelerator valves shall be able to operate with all interoperable distributors and existing interoperable brake pipe accelerator valves.

The brake pipe accelerator valve shall be ready to operate when the brake pipe has reached its operating (running) pressure. The brake pipe accelerator valve shall operate in response to a defined rapid fall of brake pipe pressure to ensure a continuing rapid fall to below 2,5 bar.

4.2.2 Operating requirements

The following operating requirements are defined in relation to a 5 bar brake pipe operating (running) pressure. When an emergency brake application occurs, the brake pipe accelerator valves shall create a sufficiently rapid reduction in brake pipe pressure to ensure the rapid increase in brake cylinder pressure on every vehicle in the train set. When the pressure in the brake pipe has fallen quickly to below 2,5 bar, and within no more than 4 s after the brake pipe accelerator valve commences operation, the brake pipe accelerator valve shall stop venting air in such a way that the brake pipe can rapidly be refilled. This requirement shall be proven by testing in accordance with 6.2.4.4.

No functional errors shall occur in the operation of the brake pipe accelerator valve at operating (running) pressures of (5 ± 1) bar. This requirement shall be proven by testing in accordance with 6.2.4.10.

4.2.3 Train/vehicle behaviour

The brake pipe accelerator valve shall exhaust the air from the brake pipe without causing any adverse effect on vehicle/train behaviour. This requirement shall be proven by testing in accordance with 6.3.

4.2.4 Affect of overcharge

4.2.4.1 Overcharge after full service application

The brake pipe accelerator valve shall not come into operation due to the effect of an operating pressure overcharge after a full service brake application, which allows a build-up of brake pipe pressure above normal operating pressure to 6 bar. It shall be taken into account that this overcharge can be present for up to 40 s in brake mode "G" and 10 s in brake mode "P" after a full service application. This requirement shall be proven by testing in accordance with 6.2.4.8.

4.2.4.2 Overcharge starting from operating pressure

The brake pipe accelerator valve shall not come into operation if the brake pipe pressure, starting from the operating pressure, is raised to 6 bar for 2 s, then is reduced to 5,2 bar in 1 s, followed by a return to the operating pressure at a rate of 0,15 bar in 60 s. This requirement shall be proven by testing in accordance with 6.2.4.9.

4.2.5 Affect of individual vehicle

The operation of the brake pipe accelerator valve shall not be affected by an individual vehicle with a brake pipe volume not exceeding 25 l, where a brake pipe accelerator valve is not fitted or the brake has been isolated. This shall apply irrespective of the position of that vehicle in the train consist. This requirement shall be proven by testing in accordance with 6.3.

4.2.6 Subsequent emergency application

The brake pipe accelerator valve shall come into operation when an emergency brake application is made after a full service brake application. This requirement shall be proven by testing in accordance with 6.2.4.7.

prEN 15612:2018 (E)**4.2.7 Sensitivity**

The brake pipe accelerator valve shall come into operation no later than 2 s after the pressure in the brake pipe, venting to atmosphere, has fallen from 5 bar to 3,2 bar within 3 s. This requirement shall be proven by testing in accordance with 6.2.4.4.

4.2.8 Insensitivity of brake pipe pressure fall

The brake pipe accelerator valve shall not come into operation when the pressure in the brake pipe falls uniformly from 5 bar to 3,2 bar over 6 s with the distributor inoperative. Continuing the pressure fall down to 2,5 bar shall not cause the brake pipe accelerator valve to operate. This requirement shall be proven by testing in accordance with 6.2.4.5.

4.2.9 Insensitivity to distributor valve quick service device operation

The brake pipe accelerator valve shall not operate during the initial stage of service braking due to operation of the distributor valve internal quick service device. This requirement shall be proven by testing in accordance with 6.2.4.6.

4.2.10 Isolation

4.2.10.1 If the brake pipe accelerator valve is incorporated in the distributor, it shall be inoperative after the distributor has been isolated. This requirement shall be proven by testing in accordance with EN 15355 as part of the distributor valve test.

4.2.10.2 If the brake pipe accelerator valve is fitted separately from the distributor it shall be possible to isolate the brake pipe accelerator valve from the brake pipe and vent its pressure, using a suitable valve or device in the pipework such that it can be sealed in the normal open position with the isolating handle in the vertical down position.

NOTE This requirement will be specified in the relevant system standard.

4.2.11 Leakage

Leakage of the brake pipe accelerator valve shall be such that technical performance as specified by this standard is met without restrictions.

The sealing arrangement within the brake pipe accelerator valve shall prevent loss of air as follows when considering a brake pipe operating pressure of 6 bar:

- At an environmental temperature of $(20 \pm 5) ^\circ\text{C}$, the brake pipe accelerator valve shall not have a leakage rate of greater than 0,005 Nl/min. This requirement shall be proven by testing in accordance with 6.2.4.3;
- At $-25 ^\circ\text{C} \leq$ environmental temperature $< 15 ^\circ\text{C}$, also at $25 ^\circ\text{C} <$ environmental temperature $\leq 70 ^\circ\text{C}$, the brake pipe accelerator valve shall not have a leakage rate of greater than 0,01 Nl/min at the normal working pressures. This requirement shall be proven by testing in accordance with 6.2.5;
- At $-40 ^\circ\text{C} \leq$ environmental temperature $< -25 ^\circ\text{C}$, the brake pipe accelerator valve shall not have a leakage rate of greater than 0,1 Nl/min at normal working pressures. This requirement shall be proven by testing in accordance with 6.2.5.

4.3 Vibration and shocks requirements

The brake pipe accelerator valve shall be able to operate without restriction under vibration and shock conditions as specified by EN 61373:2010, Category 1, Class A or B. This requirement shall be proven by testing in accordance with 6.2.4.11.

4.4 Environment requirements

4.4.1 General

The design shall take into account that the brake pipe accelerator valve shall be able to be put into service and operate normally in the conditions and climatic zones for which it is intended to operate and in which it is likely to run, as specified in this standard.

NOTE 1 The environmental conditions are expressed in classes for temperature, humidity, etc. thereby giving the vehicle designer the choice of a brake pipe accelerator valve suitable for operation on a vehicle all over Europe, or have a restricted use.

NOTE 2 The environment range limits specified are those that have a low probability of being exceeded. All specified values are maximum or limit values. These values can be reached, but do not occur permanently. Depending on the situation there can be different frequencies of occurrence related to a certain period of time.

NOTE 3 The environment requirements of this document cover the environment requirements of the HS RST TSI which only refers to EN 50125-1.

The brake pipe accelerator valve shall be tested in accordance with requirements given in Clause 6 of this standard including where required environmental/climatic testing.

4.4.2 Temperature

Brake pipe accelerator valves covered by this standard shall be able to operate

- at $-25\text{ °C} \leq \text{environmental temperature} \leq 70\text{ °C}$, without any deviation from the technical requirements specified in Clause 4 in this standard,
- at $-40\text{ °C} \leq \text{environmental temperature} < -25\text{ °C}$, with allowed deviation from the technical requirements specified in this standard but without affecting the function of the brake pipe accelerator valve.

Deviations from the technical requirements when testing at extremes are defined in 6.2.5.

The purchaser can specify higher or lower extreme temperature limit values if operational constraints demand it. In this case the temperature limit values used in the extreme temperature tests in 6.2.5 shall be changed accordingly.

4.4.3 Other environmental conditions

4.4.3.1 General

The following environmental conditions shall be considered in the design of the brake pipe accelerator valve.

It shall be demonstrated that these environmental conditions have been taken into account in the design of the brake pipe accelerator valve. It is sufficient for the supplier to make a declaration of conformity stating how the environmental conditions in the following clauses have been taken into account.

If not specifically required to be tested as part of the type testing requirements in Clause 6 of this standard, suitable tests and/or design assessments considering the effect of the following environmental conditions on the brake pipe accelerator valve, shall be used in the development/design proving of the brake pipe accelerator valve, prior to type testing.

4.4.3.2 Altitude

The brake pipe accelerator valve shall be able to operate without restrictions up to altitude of 2 000 m.