SLOVENSKI STANDARD
SIST EN 15625:2009

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Železniške naprave - Zavore - Naprave za samodejno zaznavanje spremembe obtežbe

Railway applications - Braking - Automatic variable load sensing devices

Bahnanwendungen - Bremse - Automatisch kontinuierlich wirkende Lasterfassungseinrichtungen

Applications ferroviaires - Freinage - Dispositifs de pesée variable automatiques

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45.040	Materiali in deli za železniško tehniko	Materials and components for railway engineering

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Railway applications - Braking - Automatic variable load sensing devices

Applications ferroviaires - Freinage - Dispositifs de pesée variable automatiques

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 15625:2008) has been prepared by Technical Committee CEN/TC 256 “Railway applications”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2009, and conflicting national standards shall be withdrawn at the latest by April 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN/CENELEC/ETSI by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directives 96/48/EC and 2001/16/EC, as amended by Directive 2004/50/EC.

For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard applies to automatic variable load sensing devices designed to continuously sense the load of a railway vehicle and provide a signal that can be used by a relay valve for the automatic variation of the air pressure used for brake application, thereby adjusting the brake force accordingly to achieve the required brake performance.

This European Standard specifies the requirements for the design, dimensions, manufacture and testing of automatic variable load sensing devices.

2 Normative references

The following referenced documents are indispensable for the application 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 14478:2005, *Railway applications — Braking — Generic vocabulary*

EN 50125-1, *Railway applications — Environmental conditions for equipment — Part 1: Equipment on board rolling stock*

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 61373:1999, *Railway applications — Rolling stock equipment — Shock and vibration tests (IEC 61373:1999)*

EN ISO 228-1, *Pipe threads where pressure-tight joints are not made on the threads — Part 1: Dimensions, tolerances and designation (ISO 228-1:2000)*

ISO 8573-1:2001, *Compressed air — Part 1: Contaminants and purity classes*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14478:2005 and the following apply.

3.1.1
automatic variable load sensing device
weighing device
device connected to the vehicle, which responds to the loading of that vehicle to provide a continuous load proportional signal to the brake control device

NOTE The load input is normally a share of the wagon's mass because of the devices position in the vehicle suspension system. The result is a pneumatic output signal pressure that can be any value between a minimum at tare mass and a maximum at maximum mass. Most of the existing self-adjusting load-dependant brakes generate the load signal using a weighing device.

3.1.2
mechanically operated pneumatic device
device or mechanism having both mechanical and pneumatic elements

3.1.3
hydraulic to pneumatic converter
device or mechanism which transforms the hydraulic pressure generated by the mass of the vehicle into a pneumatic pressure with a defined transmission ratio

3.1.4
elastomeric to pneumatic converter
device or mechanism having both elastomeric and pneumatic components, which transforms the pressure in the elastomer generated by the mass of the vehicle into a pneumatic pressure with a defined transmission ratio

3.1.5
output signal pressure
load continuous pressure
Lcp
output pressure delivered by the automatic variable load sensing device, which signals the load of the vehicle to the brake control mechanism

3.1.6
supply pressure
input pressure of the air supply to a pneumatic automatic variable load sensing device

NOTE Typically supplied from the vehicle's distributor auxiliary reservoir, or from the vehicle distributor output pressure/brake cylinder pressure system.

3.1.7
normal litre
Nl
unit of mass for gases equal to the mass of 1 l at a pressure of 1,013 2 bar (1 atmosphere) and at a standard temperature, often 0 °C or 20 °C

NOTE Airflow is often stated in normal litres per minute (Nl/min).

3.1.8
sensitivity
minimum change of load which causes a variation of the output signal pressure (*Lcp*), when the change of load (input) is in the same direction

3.1.9
hysteresis
difference in output signal pressure (*Lcp*) with the same load, where the load is first rising to a value and then, having been taken past that value, subsequently falls to the same value

3.2 Symbols

F [kN] mechanical force, generated by the share of vehicle weight acting at the automatic variable load sensing device

4 Design and manufacture

4.1 General

The design and manufacture of the automatic variable load sensing device shall, for all intended operating conditions, take into account the following requirements.

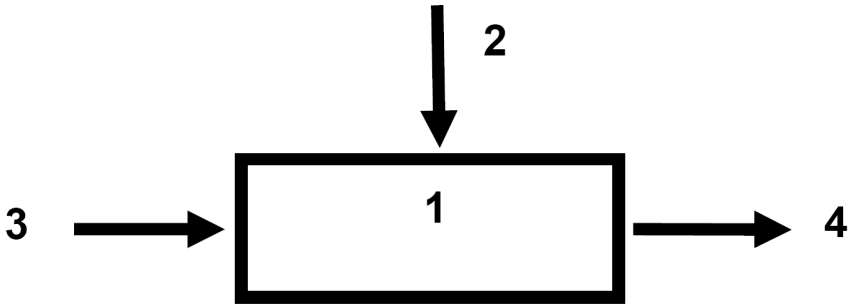
4.2 Functional requirements

4.2.1 Operating requirements

The automatic variable load sensing device shall, in all cases, supply a pneumatic output signal pressure (*Lcp*) which is a function of the load. The transmission of this load signal to the brake control system shall be pneumatic.

The method of producing the pneumatic signal *Lcp* can be a mechanically operated pneumatic device, a hydraulic to pneumatic converter or an elastomeric to pneumatic converter.

Figure 1 indicates the principles of operation of an automatic variable load sensing device.



Key

1 automatic variable load sensing device

2 *F*, mechanical force, generated by a share of the vehicle weight

3 supply pressure, typically taken from the distributor auxiliary reservoir

4 *Lcp*, output signal pressure

Figure 1 — Principles of operation of the automatic variable load sensing device

4.2.2 Characteristics of weighing valves

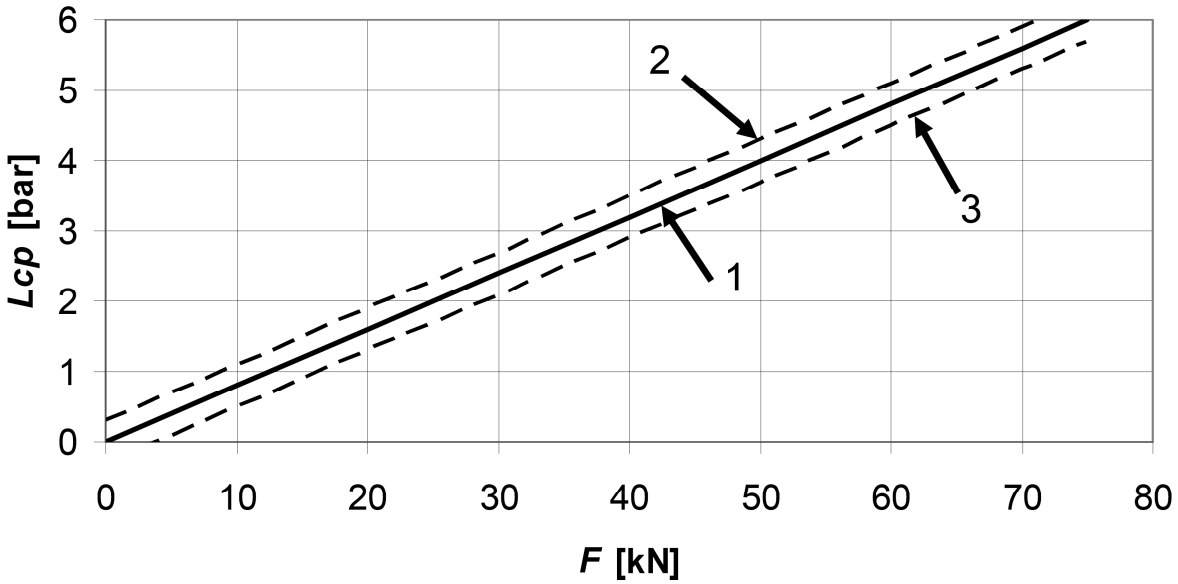
Two characteristics of weighing valves are defined:

— type 1: (0,8 ± 0,1) bar/10 kN (see Figure 2);

— type 3: (1,0 ± 0,1) bar/10 kN (see Figure 3).

The characteristics for type 1 and type 3 shall be tested in accordance with 6.2.6.

NOTE These types are recommended for new interoperable freight wagons. For applications other than interoperable freight wagons other characteristics may be used by agreement between the manufacturer and the customer.



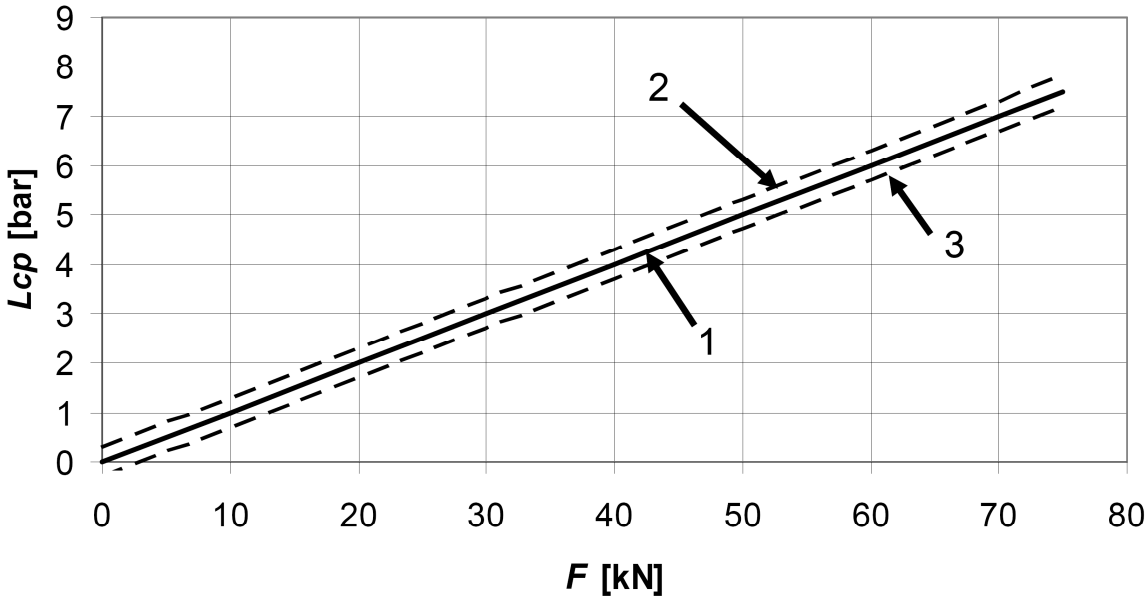
Key

1 characteristic (nominal value)

2 upper limit of tolerance

3 lower limit of tolerance

Figure 2 — Characteristic of the automatic variable load sensing device type 1



Key

1 characteristic (nominal value)

2 upper limit of tolerance

3 lower limit of tolerance

Figure 3 — Characteristic of the automatic variable load sensing device type 3

4.2.3 Mechanical requirements

The automatic variable load sensing device shall be designed to operate with at least a static force *F* of 60 kN without any damage or change of its characteristic. This shall be tested in accordance with 6.2.6.

4.2.4 Leakage

The sealing arrangement within the automatic variable load sensing device shall prevent any unacceptable loss of air.

At of (20 ± 5) °C the automatic variable load sensing device shall not have a leakage rate greater than 0,005 Nl/min at the normal working pressure. This requirement shall be tested in accordance with 6.2.5.2, 6.2.5.3 and 6.2.5.4.

At an environmental temperature of – 25 °C, also at + 70 °C, the automatic variable load sensing device shall not have a leakage rate greater than 0,01 Nl/min at the normal working pressure. This requirement shall be tested in accordance with 6.2.7.2, 6.2.7.3 and 6.2.7.4.

At – 40 °C ≤ environmental temperature < – 25 °C the automatic variable load sensing device shall not have a leakage rate greater than 0,1 Nl/min at the normal working pressure. This requirement shall be tested in accordance with 6.2.7.2, 6.2.7.3 and 6.2.7.4.

4.3 Vibrations and shock

The automatic variable load sensing device shall be able to operate without restriction under vibration and shock conditions as specified by EN 61373:1999, Category 2. This requirement shall be tested in accordance with 6.2.8.

The automatic variable load sensing device shall fulfil the specified requirements during a random vibration test in accordance with EN 61373:1999, Clause 8.

The automatic variable load sensing device shall withstand a simulated long life test at increased random vibration levels in accordance with EN 61373:1999, Clause 9, without any loss of performance.

The automatic variable load sensing device shall withstand shock testing in accordance with EN 61373:1999, Clause 10, without any loss of performance.

The above shall be tested in accordance with 6.2.8.

4.4 Environment

4.4.1 General

The design shall take into account that the automatic variable load sensing device shall be able to be put into service and operate normally in the conditions and climatic zones for which it is designed and in which it is likely to run, as specified in this European Standard.

NOTE 1 The environmental conditions are expressed in classes for temperature etc. thereby giving the vehicle designer the choice of an automatic variable load sensing device 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 may 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 European Standard cover the environment requirements of the HS RST TSI which only refers to EN 50125-1:1999.

The automatic variable load sensing device shall be tested in accordance with requirements given in Clause 6 including where required environmental/climatic testing.

4.4.2 Temperature

The automatic variable load sensing device covered by this European Standard shall be able to operate:

— at – 25 °C ≤ environmental temperature ≤ 70 °C without any deviation from the technical requirements specified in Clause 4;

— at – 40 °C ≤ environmental temperature < – 25 °C with allowed deviation from the technical requirements specified in this European Standard but without affecting the function of the automatic variable load sensing device.

Deviations from the technical requirement when testing at extremes are defined in 6.2.7.

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 of 6.2.7 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 automatic variable load sensing device.