



**SLOVENSKI STANDARD**  
**SIST EN 15220:2016**

**01-oktober-2016**

**Nadomešča:**

**SIST EN 15220-1:2009+A1:2011**

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**Železniške naprave - Kazalniki zavor**

Railway applications - Brake indicators

Bahnanwendungen - Bremsanzeigevorrichtungen

Applications ferroviaires - Indicateurs de freins

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**ICS:**

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tehniko      for railway engineering

**SIST EN 15220:2016**

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EUROPEAN STANDARD

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## Railway applications - Brake indicators

Applications ferroviaires - Indicateurs de freins

Bahnanwendungen - Bremsanzeigevorrichtungen

This European Standard was approved by CEN on 12 June 2016.

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EN 15220:2016 (E)

## European foreword

This document (EN 15220:2016) 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of an identical text or by endorsement, at the latest by February 2017, and conflicting national standards shall be withdrawn at the latest by February 2017.

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

This document supersedes EN 15220-1:2008+A1:2011.

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 2008/57/EC.

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

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

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## 1 Scope

This European Standard specifies the requirements for the design, dimensions, performance and testing of single double and multiple brake indicators. It applies to pneumatically and electrically operating brake indicators visible from the outside of the vehicle.

NOTE Brake indicators are for giving information about release and application of the brake.

This European Standard applies to brake indicators on railway vehicles used on the main national networks, urban networks, underground railways, trams and private networks (regional railways, company railways etc.).

This document does not apply to brake indicator for magnetic track brake or eddy current brake.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 45545-2, *Railway applications — Fire protection on railway vehicles — Part 2: Requirements for fire behaviour of materials and components*

EN 50121-3-2, *Railway applications - Electromagnetic compatibility - Part 3-2: Rolling stock – Apparatus*

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

EN 50155, *Railway applications - Electronic equipment used on rolling stock*

EN 60529:1991 + A1:2000 + A2:2013 *Degrees of protection provided by enclosures (IP Code)* (IEC 60529:1989 + A1:1999 + A2:2013)

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 228-2, *Pipe threads where pressure-tight joints are not made on the threads - Part 2: Verification by means of limit gauges (ISO 228-2)*

EN ISO 9227, *Corrosion tests in artificial atmospheres - Salt spray tests (ISO 9227)*

ISO 5208, *Industrial valves — Pressure testing of metallic valves*

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.

**EN 15220:2016 (E)**

**3.1  
brake indicator**  
apparatus for visual indication of the brake status of a vehicle by means of a red indication (brake applied) with black line or black dot, and the release status by means of a green indication that can be driven by electrical or pneumatic energy

Note 1 to entry: Pneumatically applied brake indicator can be equipped with electric switches for remote indication

**3.2  
single brake indicator and single parking brake indicator**  
device indicating the application or release status of a single brake system, normally either air brake or parking brake system, with or without electrical switches for remote indication

Note 1 to entry: Examples for single brake indicators are contained in Figure A.1, Figure A.2 and Figure A.4.

**3.3  
double brake indicator and double parking brake indicator**  
device indicating the application or release status of two brake systems (normally either air brake or parking brake system) or of two different entities of the same brake system (two different axles), with or without electrical switches for remote indication

Note 1 to entry: Examples for double brake indicator and double parking brake indicator are contained in Figure A.3 and Figure A.5.

**3.4  
multiple brake indicators**  
device indicating the application or release status of more than two brake systems or of more than two different entities of the same brake system (more than two different axles), with or without electrical switches for remote indication

**3.5  
uncertain status of the parking brake**  
parking brake indication becoming uncertain in case of isolated parking brake with possibility of manual release or lack of air pressure in the brake control system

Note 1 to entry: This status does not need for remote indication.

**3.6  
application status of the air brake**  
condition which indicates that the brake is applied or not completely released in which the brake indicator air pressure exceeds its set value

**3.7  
application status of the parking brake**  
condition of pressure reflecting that the brake is applied or not completely released in which the brake indicator air pressure is below its set value

Note 1 to entry: This applies to both: stored energy systems requiring release by air pressure and mechanical systems sensing pneumatically.



**3.8****release status of the air brake**

condition which indicates that the brake is released and the pressure in the brake indicator is below its set value

**3.9****release status of the parking brake**

condition of pressure reflecting that the brake is not applied in which the brake indicator air pressure exceeds its set value

Note 1 to entry: This applies to both: stored energy systems requiring release by air pressure and mechanical systems sensing pneumatically.

**3.10****connector**

component, to which wire may be connected, for the transmission of the electric signal

**3.11****temperature range**

range of the temperature within which the apparatus shall be able to operate in accordance with the requirements of this European Standard

**3.12****leakage**

leakage of the compressed air from the brake indicator to the atmosphere

**3.13****life expectancy****service life declared**

working period during which a component or system will maintain a specified level of performance under specified conditions

**3.14****RAL**

colour standardisation system of the German Institute for Quality Assurance and Certification e.V

**4 Symbols and abbreviations**

$U_n$  nominal voltage

UV ultraviolet (UV irradiation)

“ inch

IP International Protection Marking as defined in EN 60529.

NOTE IP is a coding system to indicate the degrees of protection provided by an enclosure against access to hazardous particles, ingress of solid foreign objects, ingress of water and to give additional information in connection with such protection.

## 5 Requirements

### 5.1 Design and manufacturing

The design and manufacture of the brake indicator shall conform to the requirements of 5.2, 5.3 and 5.4 for all intended operating conditions.

### 5.2 Operating conditions

#### 5.2.1 General conditions

##### 5.2.1.1 General

To withstand the external ingress of dust and water as specified in EN 60529:1991 + A1:2000 + A2:2013, (code IP 55, IP 65 for electrical indicators), the brake indicator shall be tested in accordance with 6.3.4.

To withstand the external corrosion due to normal atmospheric pollutants as specified in EN 50125-1, the brake indicator shall be tested in accordance with 6.3.12.

The device shall meet with the requirements included in EN 61373:2010, Category 1, Class B, body mounted or Category 2, bogie mounted, at an ambient temperature of  $(20 \pm 5) ^\circ\text{C}$ . This is to be tested in accordance with 6.3.9.

The brake indicator shall be able to withstand shocks and shall be tested in accordance with 6.3.10.

##### 5.2.1.2 Ambient temperature

Brake component shall be able to operate within the temperature class TX as specified by EN 50125-1, where the upper limit for TX is  $+70 ^\circ\text{C}$  external air temperature. This requirement shall be tested in accordance with 6.3 for pneumatic indicators and 6.4 for electrical indicators.

##### 5.2.1.3 Humidity

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The following external humidity levels shall be considered:

- yearly average:  $\leq 75$  % relative humidity;
- on 30 days in the year continuously: between 75 % and 95 % relative humidity;
- on the other days occasionally: between 95 % and 100 % relative humidity;
- maximum absolute humidity:  $30 \text{ g/m}^3$  occurring in tunnels.

##### 5.2.1.4 Rain

Rain rate of 6 mm/min shall be taken into account. The effect of rain shall be considered depending on the possible equipment installation together with wind and vehicle movement.

##### 5.2.1.5 Snow, ice and hail

Consideration shall be given to the effect of all kinds of snow, ice and hail. The maximum diameter of hailstones shall be taken as 15 mm, larger diameter can occur exceptionally. The effect of snow, ice and hail shall be considered depending on the equipment installation together with wind and vehicle movement.

### 5.2.1.6 Solar radiation

Equipment design shall allow for direct exposure to solar radiation at the rate of  $1\,120\text{ W/m}^2$  for a maximum duration of 8 h.

### 5.2.1.7 Resistance to pollution

The effects of pollution shall be considered in the design of equipment and components. Means may be provided to reduce pollution by the effective use of protection of the device. The severity of pollution can depend upon the location of the equipment therefore the effects of the kinds of pollution indicated in Table 1 shall be considered as a minimum.

**Table 1 — Pollution**

Pollution	Class to be considered
Chemically active substances	Class 5C2 of EN 60721-3-5:1997
Contaminating fluids	Class 5F2 (electrical engine) of EN 60721-3-5:1997 Class 5F3 (thermal engine) of EN 60721-3-5:1997
Biologically active substances	Class 5B2 of EN 60721-3-5:1997
Dust	Class 5S2 of EN 60721-3-5:1997
Stones and other objects	Ballast and other objects of maximum 15 mm diameter
Sand	Class 5S2 of EN 60721-3-5:1997
Sea spray	Class 5C2 of EN 60721-3-5:1997

### 5.2.2 Specific requirements for pneumatic brake indicators

To respect the upper pressure limit of the compressed air supply of 10 bar, it shall be able to withstand a hydraulic test with a pressure of 15 bar in accordance with 6.3.3.

It shall be possible to operate the pneumatic brake indicators without restrictions with at least the compressed air quality in accordance with the following classes defined by ISO 8573-1:2010:

- Class 3 – for the maximum particle size and the maximum concentration of solid contaminants;
- Class 4 – for the water dew point;
- Class 4 – for the maximum total (droplets, aerosols and vapours) oil concentration.

This requirement is verified when tests are carried out in accordance with 6.3.7.1.

When the voltage supply is at upper and lower limit it shall be able to withstand the temperature range in accordance with 6.3.8.

### 5.2.3 Specific requirements for electrical brake indicators

The electrical brake indicators shall be in conformity with the requirements of EN 50155 and EN 50121-3-2.

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**5.3 Functional characteristics****5.3.1 Application/release status (pneumatic brake indicator)**

The operating conditions of the application/release flag and its change in status is defined and shall be tested in accordance with 6.3.8.

**5.3.2 Lubrication (pneumatic brake indicator)**

It shall be possible to operate the brake indicator at all pressures without additional lubrication.

**5.3.3 Leakage (pneumatic brake indicator)**

The sealing arrangement within the brake indicator shall prevent any unacceptable loss of air. The allowable loss of air shall be less than the leakage values when tested in accordance with 6.3.7.1.

**5.3.4 Electrical characteristics**

For pneumatic brake indicators, the electrical circuits within the brake indicator shall withstand an insulation test of at least 500 V DC and a dielectric test (flash test) in accordance with EN 50155. This requirement shall be tested in accordance with 6.3.5 and 6.3.6.

For electrical brake indicators the requirements of EN 50155 and EN 50121-3-2 apply.

**5.4 Design requirements****5.4.1 External appearance**

The external surfaces of the brake indicator shall be free of sharp edges which could be a danger to those persons handling the brake indicator or to other equipment in the proximity of the brake indicator. This requirement shall be checked while testing the other constructional features in accordance with 6.3.2.

**5.4.2 Fire/smoke behaviour**

Brake indicators shall comply with requirements defined in EN 45545-2.

**5.4.3 Connections****5.4.3.1 Pneumatic connections**

The body of the brake indicator shall have an internal G 1/4" thread for connection(s) in accordance with EN ISO 228-2 to the brake cylinder pipe(s). This requirement shall be checked while testing the other constructional features in accordance with 6.3.2.

**5.4.3.2 Electric connections**

The body of the brake indicator shall have either internal thread in accordance with EN 60423 for cable gland mounting or a suitable interface for an electrical connector.

**5.4.4 Electric contacts and operating voltage (pneumatic brake indicator)**

The contacts shall have "snap action operation" and be capable of operating within voltage limits of  $0,7 U_n$  and  $1,25 U_n$ .

NOTE Contact characteristics (voltage, current, protection etc.) and cabling will be declared by the supplier.