SLOVENSKI STANDARD
SIST EN 15355:2019+A1:2023

01-julij-2023

Železniške naprave - Zavore - Krmilni ventili in naprave za ločitev krmilnih ventilov od zavornega voda (vključuje dopolnilo A1)

Railway applications - Braking - Distributor valves and distributor-isolating devices

Bahnanwendungen - Bremse - Steuerventile und Bremsabsperreinrichtungen

Applications ferroviaires - Freinage - Distributeurs de freinage et robinet d'isolement

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ICS:

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

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Railway applications - Braking - Distributor valves and distributor-isolating devices

Applications ferroviaires - Freinage - Distributeurs de freinage et robinet d'isolement

Bahnanwendungen - Bremse - Steuerventile und Bremsabsperreinrichtungen

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European foreword

This document (EN 15355:2019+A1:2023) 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of an identical text or by endorsement, at the latest by November 2023, and conflicting national standards shall be withdrawn at the latest by November 2023.

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 A1⟩ EN 15355:2019 ⟨A1.

This document includes Amendment 1 approved by CEN on 25 December 2022.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1⟩ ⟨A1.

This document has been prepared under a Standardization Request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s) / Regulation(s).

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document applies to distributor valves and distributor-isolating devices.

The distributor valves contained in this document are of graduable release type. Direct release types are not included.

Functionally they are regarded as not containing relay valves of any type, even if the relay valves are physically an integral part of the distributor valves.

This document applies to both distributor-isolating devices mounted separate from the distributor valve and distributor-isolating devices integral with the distributor valve.

This document specifies the requirements for the design, testing and quality assurance of distributor valves and distributor-isolating devices.

The distributor valve and distributor-isolating device are intended to be part of a brake system mounted in a vehicle with maximum length of 31 m and maximum brake pipe volume of 25 l taking into consideration brake pipe inner diameters between 25 mm and 32 mm.

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 14198, *Railway applications — Braking — Requirements for the brake system of trains hauled by locomotives*

EN 14478:2017, *Railway applications — Braking — Generic vocabulary*

EN 15611, *Railway applications — Braking — Relay valves*

EN 45545-2, *Railway applications — Fire protection on railway vehicles — Part 2: Requirements for fire behaviour of materials and components*

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)*

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:

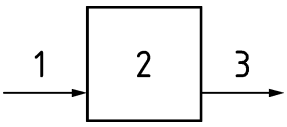
- IEC Electropedia: available at http://www.electropedia.org/;
- ISO Online browsing platform: available at http://www.iso.org/obp.

NOTE Some of the curves in this clause are simplified, not showing the real pressure development. This is considered to be sufficient for the purpose of this clause.

3.1
distributor valve
apparatus to control a pneumatic output pressure as an inverse function of the variation of the brake pipe pressure (input pressure)

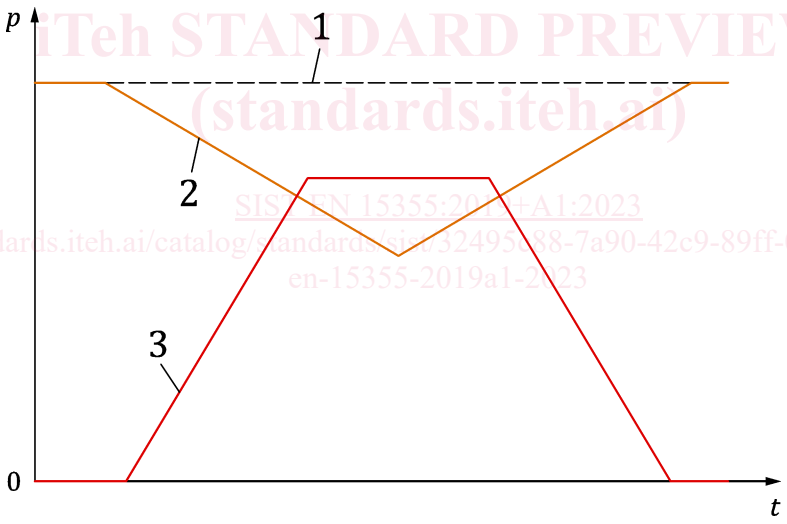
Note 1 to entry: See Figure 1 and Figure 2.

Note 2 to entry: For the purpose of this European Standard, input pressure is considered to be the brake pipe pressure and output pressure is usually considered to be the pilot pressure, which controls the brake cylinder pressure usually via a relay valve.



Key
1 input pressure
2 distributor valve
3 output pressure

Figure 1 — Distributor valve, main function and block diagram

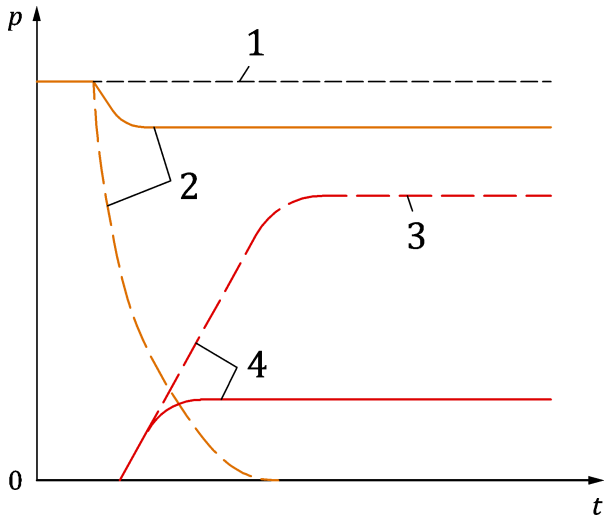


Key
1 normal working pressure level
2 input pressure
3 output pressure

Figure 2 — Distributor valve, main function and pressure diagram

3.2
brake application
establishment of a certain output pressure fed by the auxiliary reservoir, initiated by a drop of input pressure (brake pipe pressure)

Note 1 to entry: See Figure 3.



Key

1	normal working pressure level	4	output pressure
2	input pressure		service brake application
3	maximum output pressure		emergency brake application

Figure 3 — Service and emergency brake application

3.3
service brake application
establishment of an output pressure less than the possible maximum, initiated by a drop of input pressure (brake pipe pressure) beginning at the normal working pressure level down to a value between the minimum reduction and the level of input pressure necessary for full service braking (equivalent to "service braking" in EN 14478)

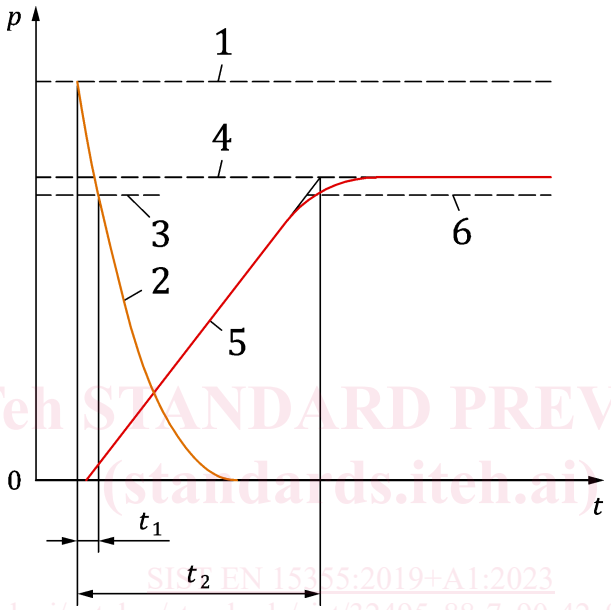
Note 1 to entry: This pressure drop causes the distributor valve to establish a corresponding output pressure.

3.4
full service brake application
establishment of the maximum output pressure initiated by a defined drop of input pressure (brake pipe pressure), beginning from the normal working pressure level down to the specific input pressure level (equivalent to "full service braking" in EN 14478)

3.5
emergency brake application
establishment of the maximum output pressure caused by a drop of input pressure starting with the value for normal working pressure down to the level necessary for reaching the maximum output pressure in time t_1, faster than the specified time for reaching the maximum output pressure, t_2 (equivalent to "emergency braking" in EN 14478)

Note 1 to entry: This causes the distributor valve to operate at his maximum capacity, meeting the system requirements (see Figure 4).

Note 2 to entry: Usually during emergency braking the input pressure is reduced to 0.



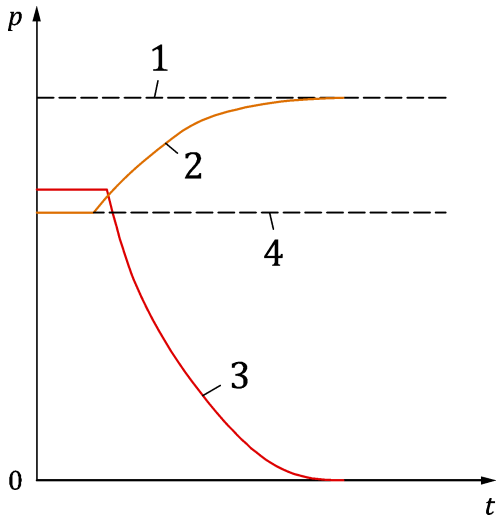
Key

1 normal working pressure level
2 input pressure
3 input pressure level necessary for reaching maximum output pressure
4 maximum output pressure
5 output pressure
6 95 % of the maximum output pressure
t_1 time to reach the input pressure necessary to establish maximum output pressure
t_2 time to reach 95 % of the maximum output pressure

Figure 4 —Emergency brake application

3.6
brake release
venting the output pressure to atmosphere, initiated by an increase of input pressure (brake pipe pressure) after a brake application (equivalent to “graduable application and release” in EN 14478)

Note 1 to entry: See Figure 5.



Key
1 normal working pressure level
2 input pressure
3 output pressure
4 1,50 bar below normal working pressure level

Figure 5 — Brake release

3.7
full release
complete venting of output pressure, initiated by an increase of input pressure (brake pipe pressure) after a brake application up to the normal working pressure level

3.8
graduable application and release
incremental increase/reduction of output pressure initiated by an incremental reduction/increase of input pressure in the range of pressure from full service braking to full release

3.9
build-up time
time for increasing output pressure from when it starts to rise from 0,00 bar up to 95 % of the maximum output pressure, when input pressure is reduced from normal working pressure level down to 0,00 bar with a time of less than 2 s for the first pressure drop of 1,50 bar

3.10
release time
time for reducing the maximum output pressure from the moment when it starts to decrease until it reaches 0,40 bar, when input pressure is increased up to the normal working pressure level, starting from 1,50 bar below it, in less than 2 s

3.11
manual release
function which requires deliberate and intentional manual action in order to cancel brake application (to release the distributor valve) provided by one distributor valve

Note 1 to entry: Manual release function can be achieved in two ways (see 6.3.16).

3.12
automatic manual release
operation, which requires manual action by the command element after which the release function is completed automatically

3.13
non-automatic manual release
operation, which requires manual action by the command element during the entire process until the release function is completed

Note 1 to entry: Stopping action before complete release results in incomplete release.

3.14
stand-by position (ready for operation)
condition of the distributor valve in which braking can be initiated in compliance with all specifications

3.15
normal working pressure
pressure in the brake pipe that corresponds with the brake release condition

[SOURCE: EN 14478:2017, 4.10.4.2]

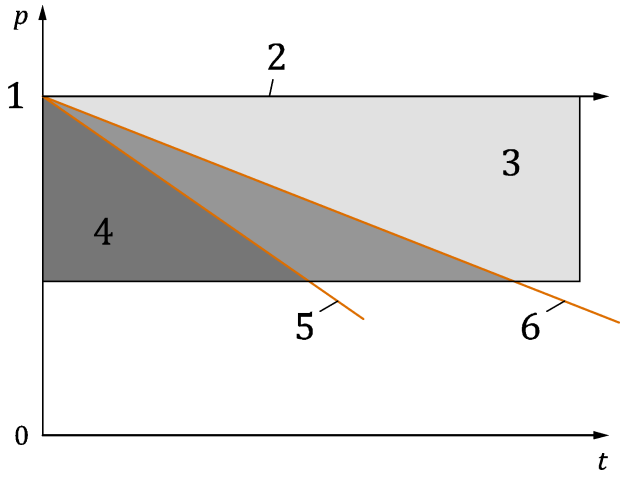
3.16
sensitivity
ability of the distributor valve to supply an output pressure under certain conditions of input pressure reduction

Note 1 to entry: See Figure 6.

Note 2 to entry: If a certain value is specified, it gives the minimum gradient of input pressure reduction which causes the distributor valve to react after a certain time.

3.17
insensitivity
ability of the distributor valve to prevent establishing an output pressure under certain conditions of input pressure reduction

Note 1 to entry: If a certain value is specified, it gives the maximum (fastest) gradient of the input pressure reduction which will not cause the distributor valve to react.



Key

1	input pressure		
2	normal working pressure		distributor valve shall react
3	insensitivity area		distributor valve may react
4	sensitivity area		
5	sensitivity limit		distributor valve shall not react
6	insensitivity limit		

Figure 6 — Sensitivity and insensitivity areas and limits

3.18
quick service function
function of a distributor valve, when applying the brake from stand-by and released position, which allows 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

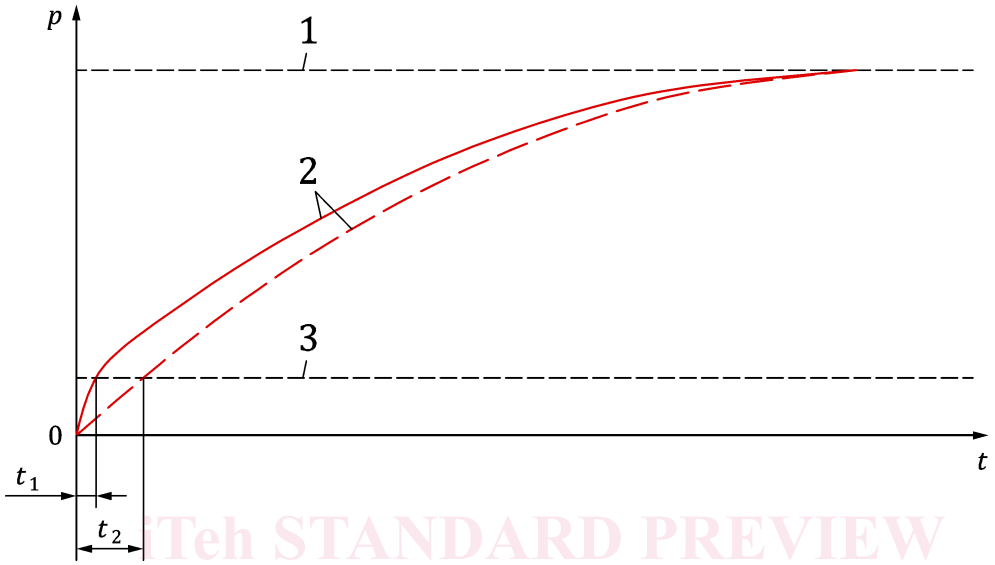
3.19
propagation time
time between the initiation of an emergency brake application by the driver's brake handle and the beginning of brake cylinder pressure build-up on the last vehicle of a train

3.20
propagation speed
length of brake pipe divided by propagation time

3.21
normal working pressure overcharge
build-up input pressure above normal working pressure to reduce the release time of a train and/or to adjust the distributors control chamber pressure of all vehicles of a complete train (equivalent to "overcharge" in EN 14478)

3.22
inshot function
function of the distributor valve which allows a faster increase of the output pressure at the beginning of brake application (t_1 against t_2 without inshot function)

Note 1 to entry: The purpose is the quick build-up of the necessary pressure for initiating the friction braking process, most effective in brake mode G (see Figure 7).



Key

1 maximum output pressure level
2 output pressure
3 pressure necessary for starting the friction process
t_1 with inshot function
t_2 without inshot function

Figure 7 — Inshot function, output pressure development with and without inshot function

3.23
control chamber
air volume connected to, or part of a brake distributor valve, the pressure in which is compared to the local brake pipe pressure within the distributor valve, and used to determine the distributor valve output pressure

[SOURCE: EN 14478:2017, 4.10.6.3]

3.24
auxiliary reservoir
container designed to store air under pressure which is protected and dedicated for use by the brakes on the vehicle to which it is fitted

[SOURCE: EN 14478:2017, 4.10.6.2]

3.25
pilot volume
volume fed by the output pressure of the distributor valve and used to provide the pilot pressure to the downstream relay valve

3.26
direct release
function which allows a complete reduction of output pressure in one step initiated by a limited increase of the brake pipe pressure even if not reaching the normal working pressure

3.27
maximum output pressure
output pressure which is reached after an emergency braking or full service braking

Note 1 to entry: See Figure 3.

3.28
control sensitivity
ability of the distributor valve to respond accurately and sensitively to input pressure modifications by delivering corresponding output pressure variations

3.29
distributor isolation device
device which isolates the distributor valve from the brake pipe

3.30
normal litre
Nl
unit of amount of a gas equal to the amount of 1 l at a pressure of 1,00 bar and at a standard temperature, at 20 °C

Note 1 to entry: Air flow is often stated in normal litres per minute (Nl/min).

3.31
distributor dump valve
optional valve within or attached to the distributor valve to eliminate an overcharge in the control chamber as the input pressure of the distributor valve is reduced to 0,00 bar and (optional) increased again up to service pressure