



SLOVENSKI STANDARD

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Kmetijski stroji - Kmetijska in gozdarska vozila z lastnim pogonom - Zahteve za zaviranje

Agricultural machinery - Self-propelled agricultural and forestry vehicles - Requirements for braking

Landmaschinen - Selbstfahrende Arbeitsmaschinen - Anforderungen an Bremsanlagen

Matériel agricole - Véhicules agricoles et forestiers automoteurs - Exigences en matière de freinage

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Agricultural machinery - Self-propelled agricultural and forestry vehicles - Requirements for braking

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 144.

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European foreword

This document (prEN 17344:2018) has been prepared by Technical Committee CEN/TC 144 “Tractors and machinery for agriculture and forestry”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

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Introduction

This document applies to braking systems for on-road use, installed on self-propelled agricultural and forestry machinery. These vehicles are not primarily designed to pull heavy trailers or implements. For this reason, this standard does not contain provisions for assisted trailer braking control. Information about such systems can be found in EU Regulation 2015/68, last amended by 2018/828, or in UNECE Regulation No. 13, or in any national legislation dealing with braking systems on vehicles.

This document can be used during an EU or national type approval process for self-propelled agricultural or forestry machines.

The sources of this document are, among others:

- EU Regulation 2015/68, as last amended by 2018/828
- ISO 10998:2008 Agricultural tractors – Requirements for steering

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1 Scope

This document applies to wheeled and/or track-laying self-propelled agricultural and forestry vehicles when used on public roads. It specifies the definitions, construction and performance requirements and the means for verification of braking systems on vehicles with a maximum design speed not exceeding 60 km/h.

Following items are excluded from the scope of this document:

- coupling force control;
- endurance braking systems;
- Anti-Lock Braking Systems and EBS;
- vacuum braking systems;
- safety related parts of complex electronic control systems;
- trailer braking control systems.

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.

ISO 9128:2006, *Road vehicles — Graphical symbols to designate brake fluid types*

ISO 3767-1:2016, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 1: Common symbols*

ISO 3583:1984, *Road vehicles — Pressure test connection for compressed-air pneumatic braking equipment*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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

braking system

combination of parts whose function is to reduce progressively the speed of a moving vehicle or to bring it to a halt, or to keep it stationary if it has already halted

Note 1 to entry: the system consists of the control device, the transmission and the brake

3.2

brake

part in which the forces opposing the movement of the vehicle develop

Note 1 to entry: This may be a friction brake, or an electrical brake, or a fluid brake, or an engine/transmission brake

prEN 17344:2018 (E)**3.2.1****friction brake**

brake where the braking forces are generated only by the friction brakes without taking into account of the braking effect of the CVT braking system

3.2.2**fluid brake**

brake where the braking forces are generated by the action of a fluid situated between two parts of the vehicle moving relatively to one another

3.2.3**electrical brake**

brake where the braking forces are generated by electromagnetic action between two parts of the vehicle moving relatively to another but not in contact with one another

3.2.4**engine brake**

brake where the forces are generated by a controlled increase of the braking action from the engine which remains connected with the wheels or tracks by the transmission

3.3**service braking system**

braking system that enables the driver to control the movement of the vehicle and to halt it safely, speedily and effectively, for all the range of speed and load that the vehicle is approved to operate, on any up or down gradient

3.4**graduated braking**

braking which, within the normal range of operation of the equipment, during either the application or the releasing of the brakes, fulfils all the following conditions:

- the driver can, at any time, increase or reduce the braking force through action of the control device; and
- it is easily possible to make a sufficiently fine adjustment to the braking force

3.5**control device**

device actuated directly by the driver to supply to the transmission the energy required for braking or controlling it. This energy may be the muscular energy of the driver, or energy from another source controlled by the driver or in appropriate cases the kinetic energy of a towed vehicle, or a combination of these various kinds of energy

3.6**transmission**

combination of components comprised between the control device and the brake, and linking them functionally through mechanical, hydraulic, pneumatic or electric means or through the use of a combination of those means; where the braking power is derived from or assisted by a source of energy

3.7**parking braking system**

system that enables the vehicle to be held stationary on an up or down gradient even in the absence of the driver

3.8**secondary braking system**

means the braking system that allows the driver to halt the vehicle within a reasonable distance in the event of a failure of the service braking system

3.9**inertia braking**

braking by utilizing the forces generated by the towed vehicle's moving up on the towing vehicle

3.10**laden vehicle**

vehicle laden at its technically permissible maximum laden mass as declared by the manufacturer for on road operation

3.11**unladen vehicle**

vehicle with its mass in running order for road operation

Note 1 to entry: This includes the coupling device(s), coolants, oils, liquids, fuel and DEF (Diesel Emission Fluid) tanks, if provided and filled minimum 90 % and a driver of 75 kg

[SOURCE: UNECE R.E.3]

3.12**axle load**

sum of the vertical static forces of the road surface in the contact area on the wheels of the axle

3.13**maximum stationary axle load**

stationary axle load achieved under the condition of the technically permissible maximum laden mass of the vehicle

3.14**towed vehicle**

agricultural trailer or an interchangeable towed equipment

3.15**attachment trailer**

any towed vehicle which is designed to be towed by a self-propelled vehicle, and only intended to carry the harvesting attachment of its towing vehicle during road operation

3.16**spring compression chamber**

chamber where the pressure variation that induces the compression of the spring is actually produced

3.17**energy source**

device that provides the energy required to actuate the brakes, either directly or indirectly through an energy storage device

3.18**energy storage device**

device that stores the energy provided by the energy source to apply or release the brakes

prEN 17344:2018 (E)**3.19****energy reserve**

pneumatic, hydraulic or electric energy that is stored in a energy storage device

3.20**technically permissible maximum laden mass**

maximum laden mass declared by the manufacturer on the basis of its construction features and design performances, irrespective from the load capacity of the tires or tracks

3.21**technically permissible maximum mass per axle**

mass corresponding to the maximum permissible static vertical load transmitted to the ground by the wheels of the axle or the tracks, on the basis of the construction features and of the vehicle and their design performances, irrespective from the load capacity of the tires

3.22**brake assisted steering function**

system allowing to brake a single wheel on one axle, by means of two separate controls, with the aim to shorten the turning radius during off-road use

3.23**measured maximum design speed**

measured speed exceeding the nominal value for the maximum design speed by maximum 3 km/h plus an additional 5 % tolerance taking into account variations due to tire size

Note 1 to entry: This is justified to take account of various unavoidable errors due, in particular to the measuring technique and to the increase in running speed of the engine with a partial load.

3.24**unbraked towed vehicle mass**

sum of the maximum stationary axle loads of the towed vehicle

3.25**spring braking system**

braking system for which the energy required for braking is supplied by one or more springs acting as an energy storage device

3.26**Continuously Variable Transmission****CVT**

stepless transmission with a substantial braking capability other than by friction and having at least one speed range going from forward to reverse and vice versa

Note 1 to entry: The variable component of the CVT can be mechanic, hydraulic, or electric. The connection between engine and output shaft to the wheels or tracks shall remain connected at standstill

3.27**combination CVT braking system**

braking system utilising both, the CVT and friction braking effect, where, however, the braking forces are generated by a predominant proportion generated by the CVT transmission

3.28**combination friction braking system**

braking system utilising both, the friction and CVT braking effect, where, however, the braking forces are generated by a predominant proportion generated by the friction brakes

3.29**graduated CVT braking**

CVT braking through which the driver is able to increase or decrease the vehicle speed at any time by a progressive action on its CVT control device

3.30**CVT control device**

device, such as a lever or pedal, used to vary the vehicle speed

3.31**service brake control device**

control device by whose operation the prescribed service braking performance is attained

3.32**inch device**

device that affects the speed of the vehicle independently of the CVT transmission control. The inch device may be used in confined spaces or where inching of the vehicle is required, e.g. to pick-up or set off attachments

3.33**class I vehicles**

self-propelled vehicles with a maximum design speed ≤ 12 km/h

3.34**class II vehicles**

self-propelled vehicles with a maximum design speed > 12 km/h and ≤ 30 km/h

3.35**class III vehicles**

self-propelled vehicles with a maximum design speed > 30 km/h and ≤ 40 km/h

3.36**class IV vehicles**

self-propelled vehicles with a maximum design speed > 40 km/h and ≤ 60 km/h

4 Construction requirements**4.1 Braking components and braking surfaces**

4.1.1 For the purpose of this document, the brake, all mechanical parts of the transmission and the control device, hereafter called 'braking equipment' shall not be regarded as liable to breakage if they are amply dimensioned, readily accessible for maintenance and exhibit safety features at least equal to those prescribed for other essential components (such as the steering system).

4.1.2 The braking equipment shall be designed, constructed and fitted, so that it is capable of withstanding the stresses arising during normal operation for which the vehicle is designated it.

4.1.3 Brake linings shall not contain asbestos.

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4.1.4 Unless otherwise specified, it is not permitted to fit any adjustable valves that would allow the performance of the braking system to be changed by the user of the vehicle such that, in service, it falls outside the requirements of this document. An adjustable valve that can only be operated by the manufacturer through the use of special tool or the provision of a tamper proof seal or both shall be permitted provided that the user of the vehicle is not able to adjust this valve, or that any user modification is readily identifiable.

4.1.5 For Class IV vehicles, the wear of the service brakes shall be compensated by means of a system of automatic adjustment. In addition, the control device and the components of the transmission and of the brakes shall possess a reserve of travel and, if necessary, suitable means of compensation such that, when the brakes become heated or when the brake linings have reached a certain degree of wear, effective braking shall be ensured without immediate adjustment being necessary.

4.1.6 It shall be possible for the wear of the service brakes to be compensated by means of a system of manual or automatic adjustment. It shall be possible to easily check this wear on service brake linings from the outside or underside of the vehicle, utilizing only the tools or equipment normally supplied with the vehicle, for instance, by the provision of appropriate inspection holes. Alternatively, acoustical or optical devices warning the driver at his driving position when lining replacement is necessary are acceptable.

4.1.7 The requirements of point 4.1.6 are not applicable to oil immersed brakes which are designed for a long life in the vehicle without servicing.

4.2 Functions of the braking system and the basic requirements

4.2.1 Service braking system: It shall be possible to graduate the service braking system action. The driver shall be able to achieve this braking action from his driving position without removing his hands from the steering control device or with one hand on the steering control device and the other on the CVT control device. The service braking system can be one of the following braking systems, as declared by the manufacturer:

- a mere friction braking system;
- a combination friction braking system;
- a combination CVT braking system;
- a mere CVT braking system.

4.2.1.1 In the case that the manufacturer declares the CVT transmission to act as a braking system, it shall not be possible to disconnect the transmission between the engine and the drive wheels during on-road use, in order to ensure that the CVT transmission maintains its braking capabilities in all cases. This shall not apply to the presence of an inch device.

4.2.1.2 However, to facilitate vehicle recovery, the Operators Manual shall outline how to tow the vehicle without the risk for damage to the CVT transmission. If a dedicated tool is needed for this purpose, it shall be carried on the vehicle.

4.2.1.3 The control device of the CVT transmission shall be made in a way that inadvertent change of direction is prevented.

4.2.1.4 It is allowed to automatically engage the parking brake system at the end of the brake cycle, in order to bring the vehicle to a stop on a gradient or in the event of residual creep.