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01-september-2016

Cestna vozila - Valjasti preskuševalniki zavor za vozila z nosilnostjo nad 3,5 t - Varnostne zahteve

Road vehicles - Roller brake testers for vehicles of more than 3,5 tons GVW - Safety requirements

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Véhicules routiers - Freinomètres à rouleaux pour véhicules supérieurs à 3,5 t - Exigences de sécurité

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43.180	Diagnostična, vzdrževalna in preskusna oprema	Diagnostic, maintenance and test equipment

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EUROPEAN STANDARD

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Road vehicles - Roller brake testers for vehicles of more than 3,5 tons GVW - Safety requirements

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 301.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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European foreword

This document (prEN 17003:2016) has been prepared by Technical Committee CEN/TC 301 “Road vehicles”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

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.

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

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Introduction

This document is a type C standard as stated in EN ISO 12100:2010.

The machinery concerned and the extent to which hazards, hazardous situations and hazardous events are covered are indicated in the scope of this document. In addition, machinery should comply as appropriate with EN ISO 12100 for hazards which are not covered by this standard.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

The object of this European Standard is to define rules for safeguarding persons against the risk of accidents associated with the operation of roller brake testers.

While elaborating this standard it was assumed that only authorized persons operate the roller brake testers.

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1 Scope

This European Standard applies to roller brake testers (brake test benches) designed for roadworthiness tests on categories M2, M3, N_2, N3, O3 and O4 vehicles and that might be also used to test M1, N1 categories.

This European Standard covers fixed-bed roller brake testers with or without inspection pits and whose chassis are inside or outside the building.

This European Standard is not covering mobile roller brake testers.

These roller brake testers are fitted to produce measurements for testing and assessing the efficiencies of the brake systems equipping vehicles in the above-cited categories.

The users of the roller brake tester are all kind of staff that for any reason operates the roller brake testers (e.g staff working in public transport, vehicle rental, vehicle maintenance, vehicle repair, training, test laboratories and vehicle inspection sectors, …).

This document is applicable to roller brake testers manufactured 12 months after the date of its publication as EN.

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.

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EN 614-1, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

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EN 614-2, *Safety of machinery — Ergonomic design principles — Part 2: Interactions between the design of machinery and work tasks*

CEN/TR 614-3, *Safety of machinery — Part 3: Ergonomic principles for the design of mobile machinery*

EN 953, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards*

EN 12464-1, *Light and lighting — Lighting of work places — Part 1: Indoor work places*

EN 60204-1, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1)*

EN 61000-6-2, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments (IEC 61000-6-2)*

EN 61000-6-3, *Electromagnetic compatibility (EMC) — Part 6-3: Generic standards — Emission standard for residential, commercial and light-industrial environments (IEC 61000-6-3)*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 13849-1, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1)*

EN ISO 13850, *Safety of machinery — Emergency stop function — Principles for design (ISO 13850)*

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EN ISO 13855, *Safety of machinery — Positioning of safeguards with respect to the approach speeds of parts of the human body (ISO 13855)*

EN ISO 13857:2008, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857:2008)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100 and the following apply.

3.1
roller brake tester or roller brake test bench
system fitted to produce measurements for testing and assessing the efficiencies of vehicle brake system

Note 1 to entry: There are also plate roller brake testers that are not covered under this standard.

3.2
brake tester
term that, in this standard, refers to roller brake tester (or brake test bench)

3.3
chassis
term that, in this standard, refers to embedded or mounted mechanical floor units comprising the measuring rollers, drive and gearbox motors, and measuring devices, and that carry the wheel or axle under test

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3.4
fixed-bed control console
console that features at minimum the human-machine interface: display, control devices, data storage

3.5
secondary (screen) display
fixed-bed or movable device that duplicates test-related information but without offering any control action

3.6
remote control
remote control which is used to navigate the human-machine interface at distance

3.7
electrical box
box which provides the interface between the control console and the chassis, which may be integrated into the fixed-bed control console and which comprises at least:

— the main switch;

— the motor control devices;

— electrical safety components

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3.8
wheel presence sensor
term used for a sensor whose function is to provide guaranteed confirmation that a wheel is detected as safely located in the rollers, in compliance with the test conditions required

Note 1 to entry: The axle weight measurement can be used to confirm the reading or to detect a presence detection device failure.

3.9
inspection pit
cavity dug into the floor, and in which a technician stands inside to inspect the under-vehicle

Note 1 to entry: There are also brake testers without pit.

Note 2 to entry: Many two-block chassis are installed on either side of an inspection pit, enabling access under the vehicle.

3.10
active opto-electronic protective device
AOPD
device whose sensing function is performed by opto-electronic emitting and receiving elements detecting the interruption of any optical radiation generated, within the device, by an opaque object present in the specified detection zone (or for a light beam device, on the axis of the light beam)

[SOURCE: EN 61496-2:2013, 3.201, modified — "optical radiations" is replaced here with "any optical radiation".]

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3.11
light curtain
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AOPD comprising an integrated assembly of one or more emitting element(s) and one or more receiving element(s) forming a detection zone with a detection capability specified by the supplier

Note 1 to entry: A light curtain with a large detection capability is sometimes referred to as a light grid.

[SOURCE: EN 61496-2:2013, 3.205]

3.12
enabling device
additional manually-operated device used in conjunction with a start control and which, when continuously actuated, allows a machine to function

[SOURCE: EN ISO 12100:2010, 3.28.2]

3.13
brake tester trapping zone
zone at the interface between a wheel of the axle under test and the brake tester rollers spinning in opposite direction, towards the closest generatrix

Note 1 to entry: The trapping zone creates a draw-in and crushing hazard (see the informative Annex A).

Note 2 to entry: The trapping zone is sometimes called angle or re-entrant point.

3.14
operator
person performing test sequences

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3.15
driver
person who drives the vehicle during the test sequences who may be also the operator

3.16
mobile control console
control console that features at minimum the human-machine interface: display, control devices, data storage and which is movable

3.17
hazard zone
space within and/or around machinery in which a person can be exposed to a hazard

[SOURCE: EN ISO 12100:2010, 3.11]

3.18
no-trespassing area
area with permanent fully marked surface (yellow & black) on the ground, and where access is prohibited during vehicle test

4 Safety requirements for the roller brake testers and/or protective/risk reduction measures

4.1 General

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The machinery shall comply with the requirements and/or preventive measures of this clause.

In addition, the machinery shall be designed according to the principles of EN ISO 12100 for relevant hazards but non-significant hazards, which are not dealt with in this document.

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Safety devices shall ensure that the risk of an intrusion in a trapping zone and/or contact with moving parts (from brake tester and vehicle moving parts, such as drive shaft, put in movement by the roller brake tester) is reduced to the lowest possible level.

During the functioning of the machinery, in case of a chassis fitted on an inspection pit, they shall prevent or detect access to the area under the floor level close to the bench to prevent contact with the moving parts of the machinery and the vehicle under test.

If a safety device stops the brake tester running, the system shall be only re-engaged by a voluntary action from the operator on a control device of the roller brake tester. The automatic restart of the system after a stop caused by a safety device shall not be possible under any circumstances.

Safety devices shall be designed in a way to authorize the test bench motor start and control the stop, keeping into account the possibility of stops by unintended response of the safety device (e.g. by dust, snow or smoke, by slightly moving vehicle, by sensor cables). The option of operating the machinery without the vehicle and with the safety devices disabled shall be only foreseen for maintenance and calibration operations, with dedicated procedures carried out only by trained personnel, as foreseen at Subclauses 4.3.3.4 and 4.3.3.5 and subsequent. If possible, the condition and use of safety devices should be registered on IT support.

Safety devices necessary for the safe functioning of the roller brake tester shall be considered part of the machinery itself. In some cases, as the correct functioning of safety devices can depend on specific installation conditions, the characteristic of such devices shall be evaluated according to the specifics of the installation.

All safety devices which control the start-up and/or emergency-stop of the motors (Stop Category 0 or Category 1 under EN 60204-1) shall deliver performance level according to Table 1 (see 4.5).

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If safety devices are not able to eliminate every risk completely, then residual risks shall be underlined and adequately managed in the user manual.

Before putting the roller brake tester into service, the manufacturer or his authorized representative (or in specific case the installer) shall:

a) ensure that it satisfies the relevant essential health and safety requirements;

b) ensure that the technical file is available;

c) provide, in particular, the necessary information, such as instructions;

d) carry out the appropriate procedures for assessing conformity according to the manufacturer's prescription;

e) draw up the EC declaration of conformity and ensure that it accompanies the machinery;

f) affix the CE marking.

4.2 Protection around chassis zone

4.2.1 Protection against hazard arising from moving parts

The chassis shall be designed in such a way as to make it impossible to access internal moving parts (drive chains, gears).

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The guard shall be designed according to EN 953.

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4.2.2 Axle presence detection

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Each side of the roller brake tester shall be fitted with a wheel presence sensor. The 2-wheel presence sensors shall be simultaneously activated to allow the bench to start.

The axle presence detection device shall prohibit the roller brake tester to start in case of axle lack and shall interrupt roller brake tester operation if axle presence information is lost.

If the roller brake tester is equipped with weight measurement, a crosscheck with the presence detection can be used to detect a sensor failure.

The system shall deliver a PL_r = c.

4.2.3 Access protection to the chassis via the floor, around wheels and rollers

The chassis shall be provided with appropriate means to prevent any unintentional entrance inside the no-trespassing area.

The lateral access to the chassis via the floor, around wheels and rollers shall be prevented by barriers.

If there is a free access way of at least 800 mm wide, 2 physical barriers shall be designed and installed accordingly to EN ISO 13857 on each side of the bench. These 2 safeguards shall have a height of 1,40 m and a minimum total length of 3 m centred on the mid-axle of the rollers.

The risk of front and rear access to the chassis shall be managed by (at least) signalling the no-trespassing area using adequate visual elements like stripes on the floor, warning lights, and similar (see Figure 1).

The no-trespassing area shall be at least the area delimited by the physical barriers.

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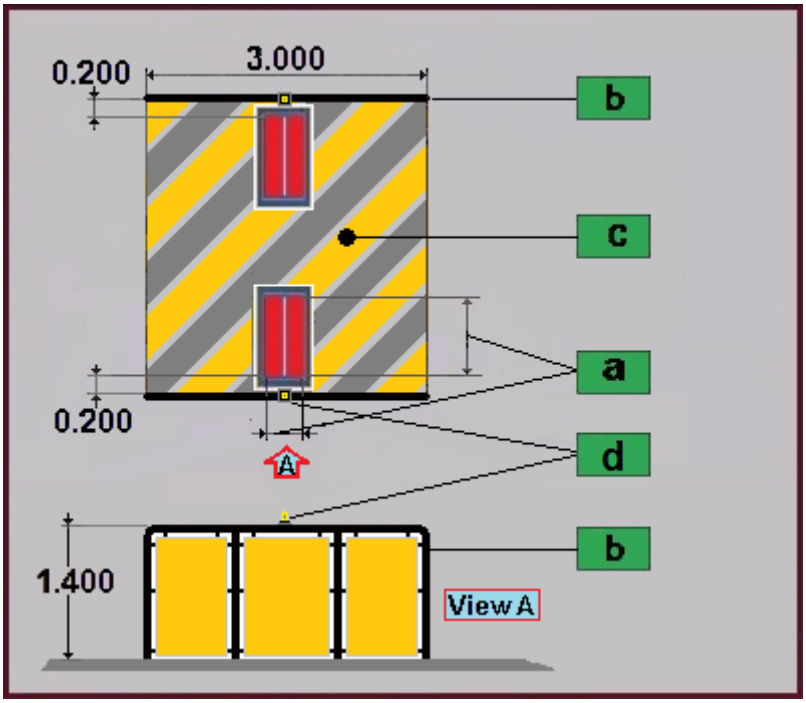

Key

a area of danger identified with the area of the rollers

b safety device. Physical lateral barriers

c no-trespassing area

d lamp with emission light yellow flashing with the rotation of the rollers

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Figure 1 — Surface protection

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In the case of an installation to replace a roller brake tester in an existing installation pit which is located closer than 800 mm from a wall then specific equivalent provisions shall be taken to prevent access to the area between the roller brake tester and the wall.

4.2.4 Access protection to the chassis from the inspection pit (if exists)

When the roller brake tester is fitted on an inspection pit or close to an inspection pit, then the rotation of the rollers shall be stopped or prevented from starting in case of access to the hazard zone from the inspection pit to prevent the presence of persons in dangerous areas of the rotating drive shafts, the vehicle wheels, or the rollers of the test bench.

For a roller brake tester stopping time of 0,8 s max then the protection distance before the bench from the top of the first roller shall be minimum 2,4 m and 5,0 m after the bench from the top of the second roller.

The design of all auxiliary equipment, like air pressure sensors, should be compatible with the use of the safety device.

In the Informative Annex C, examples of solutions are given.

In case of use of detection devices, they shall be compliant with EN ISO 13855.

The system shall deliver a PL_r = d.

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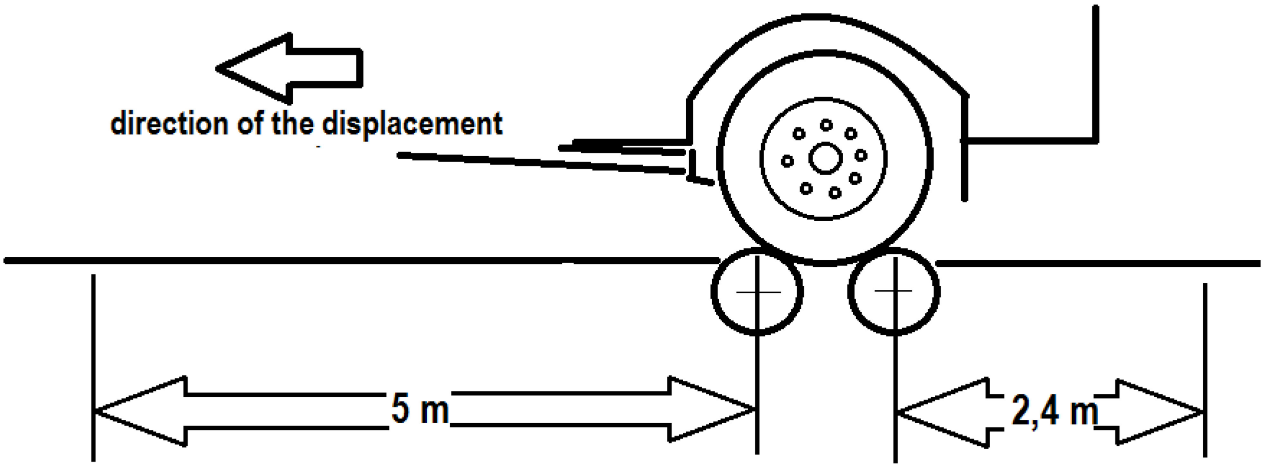

Figure 2 — Protection distance geometry

4.2.5 Protection on access via the vehicle cabin

For the access from the cabin to the hazard zone, without available measures for protection, the risk is residual and shall be underlined and adequately managed in the user manual.

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4.3 Control console

4.3.1 Location

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The brake tester control console shall be moved away from the chassis in order to make impossible for the operator to access to the no-trespassing area and to the vehicle while giving a start-up command. A fixed or portable control (or repeater) station shall remain in the vehicle driver's field of view at all times throughout the entire all-axle protocol.

The control console shall be located such that the operator is able to keep watch over the entire test zone via all appropriate means provided (such as mirrors, webcams, etc.). Control console location shall meet the ergonomics requirements stipulated in EN 614-1, EN 614-2 and CEN/TR 614-3.

4.3.2 Control devices

When a machine is fitted with several control devices, each such device shall be equipped with all the requisite control, including an emergency stop device (see 4.4) without there being mutual interference between operators and without operators placing each other in a hazard situation.

When there are several active control devices, the control system shall be designed so that:

— The start-up command can only be given by the control device selected to lead the test in progress,

— The stop and emergency stop devices are actives on all simultaneously-active control devices.

As a general rule, and regardless of the type of control device installed, the stop command shall override the start command.

All control devices shall be safeguarded against inadvertent actuation.

NOTE 1 For example, the start commands can be fitted with flush-mounted or embedded controls while the stop commands are fitted with salient controls.

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NOTE 2 On the inadvertent actuation issue, a computer keyboard will by definition propose a series of salient pushbuttons and so cannot issue a start command using just one single button.

When a wireless-link control is used, the control circuit shall be engineered such that if the remote control is paired to the brake tester console, it will be able to control only the paired brake tester at any point during the entire brake test.

Any remote-control or auxiliary control that features a start-up function shall also possess at least basic stop and emergency stop functions.

When the operator is also the driver, and using a remote control, he shall be able to keep watch over the entire test zone via all appropriate means provided (such as mirrors, webcams, etc.).

An enabling device shall be set up to minimize the possibility of subsequent disabling of the safety function, for example by requiring the validation device to be disabled before machine operation can be reset. An enabling device should be engineered in such a way that it cannot be disabled by basic means (without using a tool).

4.3.3 Operating mode

4.3.3.1 General

Each machine shall be equipped with a suitable switch device for selecting machine mode. This safety feature shall deliver PL_r = d according to EN ISO 13849-1.

4.3.3.2 Normal mode operation

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Machine start-up shall only be realized by the voluntary action from the operator on the defined control actuator, combined with the confirmed presence of a fully-mounted axle in the rollers (as defined in 4.2.2) and the machine should provide a clear indication that start-up is possible.

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When a protective device launches the roller emergency stop, those cannot be restarted until being re-engaged followed a voluntary action from the operator.

4.3.3.3 Failsafe mode operation

The machine may be equipped with a failsafe mode operation for the use in specific condition (rain, snow, etc.) threatening to disrupt normal operation of the safety devices.

In case that the machine is equipped, the failsafe operating mode shall disable normal-mode operation to only allow operation in response to a hold-to-run command on the control actuator purpose-fitted on the control console. This manual activation shall compulsorily be re-engaged before the system can be restarted. This mode operation shall inhibit the remote control and disrupt protective devices except the axle locator detection systems and emergency stops.

Failsafe mode shall deliver PL_r = d.

4.3.3.4 Maintenance–Inspection mode operation

If the system manufacturer has fitted the system with a maintenance–inspection mode, then this mode of operation shall disable normal-mode operation and enables:

— either start-up by a stop–go limited movement control device triggering limited rotation on the purpose-fitted control actuator, inhibiting only the axle presence device,

— or start-up by a hold-to-run command triggering on the purpose-fitted control actuator, inhibiting only the axle presence device,

— or a release of the brakes so that the rollers can rotate freely but making start-up impossible.