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Cestna vozila - Stroji za montažo in demontažo pnevmatik - Varnostne zahteve

Road vehicles - Machines for mounting and demounting vehicle tyres - Safety requirements

Straßenfahrzeuge - Maschinen für die Montage von Fahrzeugreifen - Sicherheitsanforderungen

Véhicules routiers - Machines pour le montage et le démontage des pneumatiques - Prescriptions de sécurité

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sécurité

Straßenfahrzeuge - Maschinen für die Montage von
Fahrzeugreifen - Sicherheitsanforderungen

This European Standard was approved by CEN on 10 March 2021.

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EN 17347:2021 (E)**European foreword**

This document (EN 17347:2021) has been prepared by Technical Committee CEN/TC 301 “Road vehicles”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by September 2021, and conflicting national standards shall be withdrawn at the latest by September 2021.

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 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(s).

For relationship with EU Directive(s), 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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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Introduction

This document defines the specific safety requirements for machines for mounting and demounting vehicle tyres. It examines all the main hazards and the hazard situations and conditions relating to the type of machine in question, when used as indicated by the manufacturer or in improper conditions reasonably foreseen by the manufacturer. The document defines the necessary technical measures for eliminating or reducing risks caused by significant hazards or danger situations and conditions during transport, use and maintenance.

This document is type “C”, as defined in EN ISO 12100:2010.

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

The type of machine in question, and the degree to which the hazards and danger situations/events, are indicated in the “aim and application” section of this document.

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EN 17347:2021 (E)**1 Scope**

This document specifies the safety requirements and their verification for the design and building of machines (see the definition in 3.1) for mounting and demounting tyres on the vehicles listed below and identified according to the international categories M1, M2, N1, O1, O2, L4 and L5:

- a) cars
- b) buses
- c) lorries
- d) motor-vehicles for specific or special transport
- e) mobile homes
- f) cargo trailers
- g) car trailers
- h) motorised quadricycles
- i) motor vehicles
- j) mopeds
- k) agricultural machines (if the wheel/tyre dimensions are compatible with the maximum dimensions indicated in the tyre changer user instructions)

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The vehicles listed in points a) to f) have an overall full-load mass no greater than 3,5 t.

These machines are designed to ensure the tyre is correctly fitted on the wheel in safe conditions. The document describes how to eliminate or reduce the risks resulting from the foreseen use (or improper but reasonably foreseeable use) of these machines by the operator during normal operation and service. In addition, it specifies the type of information that the manufacturer will supply with regard to safe working procedures.

The document describes all the significant hazards (as listed in Table 1) and the danger situations and events relating to these machines.

This document does not apply to hazards regarding maintenance or repairs carried out by professional maintenance personnel.

This document does not apply to automatic machines (machine, which, after initiation of start by the operator, is capable of independently perform one or more defined sequences of movements that lead to the complete assembly and disassembly of the tyre from the wheel. The operator has the task of supervising the process by intervening, if necessary).

This document does not cover the reliability of control circuits.

This document does not cover the risk of mechanical failure in operating conditions.

This document does not apply to machines manufactured before its date of publication.

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 894-2:1997+A1:2008, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 2: Displays*

EN 894-3:2000+A1:2008, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 3: Control actuators*

EN 894-4:2010, *Safety of machinery - Ergonomics requirements for the design of displays and control actuators - Part 4: Location and arrangement of displays and control actuators*

EN 12645:2014, *Tyre pressure measuring instruments - Devices for inspection of pressure and/or inflation / deflation of tyres for motor vehicles - Metrology, requirements and testing*

EN ISO 4413:2010, *Hydraulic fluid power - General rules and safety requirements for systems and their components (ISO 4413:2010)*

EN ISO 4414:2010, *Pneumatic fluid power - General rules and safety requirements for systems and their components (ISO 4414:2010)*

EN ISO 4871:2009, *Acoustics - Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)*

EN ISO 11201:2010, *Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO 11201:2010)*

EN ISO 11688-1:2009, *Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning (ISO/TR 11688-1:1995)*

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

EN 60204-1:2006, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements*

ISO 7010:2019, *Graphical symbols — Safety colours and safety signs — Registered safety signs¹⁾*

ISO 3864-1:2011, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs and safety markings*

¹⁾ Document impacted by AMD 1:2020.

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3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 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>

3.1

tyre changer

machine operated pneumatically, electro-mechanically, electro-pneumatically or electro-hydraulically to mount/demount tyres on vehicle wheels

Note 1 to entry: see the machine examples in Annex A.

3.2

wheel

combination of the rim and the disc

3.3

bead breaking

operation to detach the tyre bead from the rim by forcing it out of its seat

3.4

bead seating insertion

positioning of the tyre bead in its seat on the rim

3.5

deflation phase

release of the air inside the tyre through the valve

3.6

self centering chuck

device that centres and clamps the wheel on the rim

3.7

manual or automatic central clamping

device that supports and clamps the wheel and can hold a rim centering/clamping system on the central hole

3.8

centering and locking system

manual, mechanical or motorized device fitted with an interchangeable cone, that can centre and clamp the wheel on the manual wheel support plate by means of the central hole

3.9

mounting head

suitably shaped mechanical device that can demount and remount the tyre on the rim thanks to a lever manually controlled by the operator

3.10**movable mounting head**

suitably shaped mechanical device (manually or automatically controlled) that can demount and remount the tyre on the rim without the need for levers

3.11**(mounting) tool arm**

mechanical device that moves the tool so it's correctly positioned (both vertically and horizontally)

3.12**wheel lift**

device that raises the tyre-wheel assembly (driven by an actuator)

3.13**dangerous work area**

circular sector starting from the tool (or mobile tool) and the wheel surface, extending away from the tool in a specular manner to cover an overall angle of 120 degrees

Note 1 to entry: the dangerous area is shown in Figure 1.

3.14**Tyre Pressure Monitoring System****TPMS**

any system fitted on a vehicle, able to evaluate the pressure of the tyres or the variation of the pressure over time and to transmit corresponding information to the user while the vehicle is running

[SOURCE: ISO 21750:2006, 3.7]

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3.15**bead pressor**

device that keeps the bead in the correct position during the work phases

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4 List of significant hazards

Table 1 lists the significant hazards, main hazards situations and hazardous events (that emerged from an assessment of the risks considered "significant" for this type of machine) requiring risk elimination/reduction interventions.

Table 1 — List of significant hazards

No.	Hazard	Dangerous situation or event	Corresponding requirements [relative clause of this document]
1	Mechanical hazards		
	a) Relating to installation	a.1) risk of crushing feet between the pallet and the floor while positioning the machine	7
	b) Relating to machine use	b.1) risk of crushing	5.2.1, 5.3.1, 5.3.2, 5.3.3
		b.2) risk of getting entangled	5.2.1 and 5.3.1
		b.3) risk of collision	5.2.1, 5.2.2, 5.2.3, 5.2.4, 5.2.5 and 5.3.4
		b.4) risk due to ejection of pressurized fluid	5.3.5 and 7
		b.5) risk of projection during the bead insertion phase	7
2	Electric hazards		5.3.6
3	Noise		5.3.12, 7 and Annex E
4	Hazards due to failure to observe the ergonomic principles when designing the machine		
	Uncomfortable positions or excessive strain	<i>During handling with lift</i>	5.3.7 and 5.3.8
	Human error, human behaviour	Control actuators	5.3.8, 5.2.2, 5.2.3, 5.2.4, 5.2.5 and 5.3.15
5	Hazards caused by unexpected start-up in overstroke position, or unexpected speed increase, or similar anomalies		
		Outside influence on electrical equipment – unexpected movement of mechanical parts	5.3.9, 5.3.13 and 5.3.14
6	Breakage during operation	Failure of pneumatic and hydraulic parts	5.3.10
7	Falling/projected objects or fluids	<i>During handling with lift:</i> – accidental falling of the wheel	7

8	Machine loss of stability or overturning	<i>During transport/handling:</i>	
		- risk of crushing	7
		- risk of collision	7
		<i>During use:</i>	
		- risk of crushing	5.3.11
		- risk of collision	5.3.11
9	People slipping, tripping or falling (near the machine)	risk of collision	5.3.4

5 Safety requirements and/or protection measures

5.1 General information

The machine shall comply with the safety requirements and/or protection measures indicated in this point. In addition, it shall be designed to comply with the principles of EN ISO 12100:2010, Clause 4, with regard to relevant but not significant hazards not examined by this Standard.

5.2 Control actuators

5.2.1 Types of control actuators

The machine shall be fitted with devices:

- an “hold-to-run” control actuator, with a stop function of at least category 0 (EN 60204-1:2006, 9.2.2),

and

- a bistable control actuator, for movements with a specific stroke or rotation, with a stop function of at least category 2 (EN 60204-1:2006, 9.2.2).

The following movements can use bistable control actuator types:

- Mounting and demounting tool displacement
- Locking and unlocking wheel on central clamping or self-centering chuck
- Movable mounting head
- Lifting wheel

5.2.2 Command operation logic

The control actuators shall be designed in such a way that their movements and positions are coherent with the commanded action.

EN 17347:2021 (E)**5.2.3 Position of the commands**

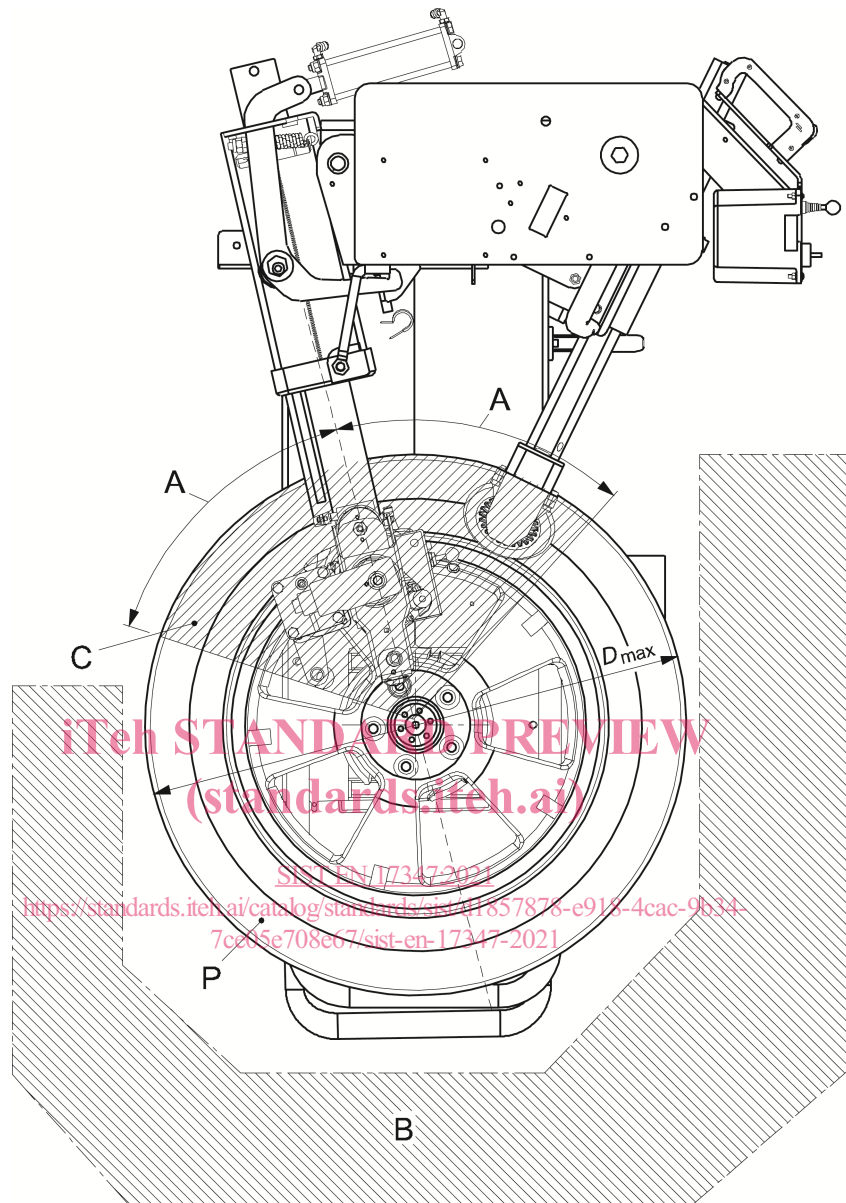
The control actuators shall be positioned so that:

- they are outside the physical space identified by positions Dmax and Hmax (see Figures 1 and 2)
- they shall easily be reached by an operator standing up (see Figures 1 and 2), and satisfy at least area B of EN 894-4:2010, 5.3.1.1 and 5.3.1.4, EN 894-3:2000+A1:2008, Clauses 3 and 4 and EN 894-2:1997+A1:2008, 4.1.1
- they shall be easy to identify from the natural position assumed by the operator during the various work phases
- they are outside the dangerous work area

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Key

- A the angle of the dangerous area in relation to the tool ($A = 60^\circ$)
- B the operator's working space
- C the dangerous work area
- D_{\max} the maximum diameter of the tyre (indicated in the tyre changer user instructions)
- P the tyre

Figure 1 — The operator's working space and the dangerous work area (overhead view)