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Ročna orodja za pritrjevanje in trdo označevanje s prašnim pogonom - Varnostne zahteve

Powder actuated hand-held fixing and hard marking tools - Safety requirements

Pulverkraftbetriebene handgeführte Befestigungs- und Markierungswerkzeuge - Sicherheitsanforderungen

Outils portatifs de scellement et de marquage actionnés par poudre - Prescriptions de sécurité

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Other hand-held tools

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Powder actuated hand-held fixing and hard marking tools - Safety requirements

Outils manuels de fixation et de marquage dur
actionnés par poudre - Prescriptions de sécurité

Pulverbetriebene handgeführte Befestigungs- und
Markierungswerkzeuge - Sicherheitsanforderungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 213.

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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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prEN 15895:2023 (E)**European foreword**

This document (prEN 15895:2023) has been prepared by Technical Committee CEN/TC 213 “Powder actuated hand-held tools - Safety”, the secretariat of which is held by SNV.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 15895:2011+A1:2018.

This document specifies up-to-date requirements for powder actuated hand-held fixing and hard marking tools. Requirements are mainly based on safety functions. This approach significantly increases the design details of the safety aspects.

In comparison with the previous edition, the following technical modifications have been made:

- applicability for single cartridge, collated cartridges in disks as well as collated cartridges in strips;
- enhanced design requirements for safety-related parts;
- improved compatibility with EN 16264:2014 to enable conformity assessments of new tool/cartridge systems;
- updated requirements for drop tests;
- new and updated terms and definitions and enhanced drawings;
- new and updated standard references;
- updated Annex ZA.

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.

This European standard has been drawn up in co-operation with representatives of manufacturers of cartridge-operated hand-held tools and health and safety authorities (Schweizerische Unfallversicherung (SUVA)).

The “Permanent International Commission for the Proof of Small Arms, C.I.P.” has given substantial contributions to this standard. The C.I.P. regulations pertinent to powder actuated hand-held tools have been largely integrated in the present standard.

Normative and informative annexes to this standard are indicated in the contents list.

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. 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.

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1 Scope

This document covers safety requirements for powder actuated fixing and hard marking tools which operate with an intermediate member (piston) and are handled manually.

This document deals with all significant hazards, hazardous situations and events relevant to powder actuated fixing and hard marking tools, when they are used as intended and under conditions of misuse which are reasonably foreseeable (see Clause 4). It deals with the significant hazards in the different operating modes and intervention procedures as referred to in EN ISO 12100:2010, 5.4, 5.5, 5.6.

Although the safe use of powder actuated tools depends to an important extent on the use of appropriate cartridges and fasteners, this document is not formulating requirements for the cartridges and fasteners to be used with the tools (see Clause 7).

This document applies to tools designed for use with cartridges with casings made of metal or plastic and with solid propellant and containing a minor quantity of primer mix with a composition different from that of the main propellant.

This document applies to tools designed for use with single cartridges or with cartridges collated in disks or in strips.

The fixing tools in the scope are those intended for use with fasteners made from metal.

NOTE Information about cartridges can be found either in EN 16264:2014 or the publication of the Permanent International Commission for the Proof of Small Arms (C.I.P.).

This document is not applicable to powder actuated fixing and hard marking tools which are manufactured before the date of its publication as EN.

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 614-1:2006+A1:2009, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN 16264:2014, *Pyrotechnic articles — Other pyrotechnic articles — Cartridges for powder actuated tools*

EN 61310-1:2008, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals (IEC 61310-1:2007)*

EN ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO 3744:2010)*

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 ISO 13732-1:2008, *Ergonomics of the thermal environment — Methods for the assessment of human responses to contact with surfaces — Part 1: Hot surfaces (ISO 13732-1:2006)*

ISO 2768-1:1989, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

Comprehensive edition of adopted C.I.P. Decisions. Permanent International Commission for Firearms Testing, Brussels, Belgium, 2011

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 <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

powder actuated tool (PAT)

tool with a piston powered by the hot combustion gases from a cartridge and comprising powder actuated fixing and hard marking tools; also called cartridge operated tools, e.g. in 2006/42/EU, Annex IV, Clause 18

3.1.1

tool for single cartridges

tool designed for the use of single cartridges (single-shot tools)

3.1.2

tool for collated cartridges

tool designed for the use of single cartridges (single-shot tools)

3.2

fixing tool

tool to drive fasteners into base materials

3.3

hard marking tool

tool for embossing characters, symbols or letters on the surface of workpieces by means of punches, e.g. made of hardened steel

3.4

universal tool

tool which is intended for use in any possible operating direction and which can be held with one or two hands

3.5

stand-up tool

tool which is intended for the operating direction vertically downward and which is operated with both hands and with the operator in a standing position

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Note 1 to entry: A universal tool which is operated in the vertically downward operating direction with a long auxiliary handle or in a fixture is not considered a stand-up tool.

3.6**pole tool**

tool which is affixed to the end of a pole and which is intended exclusively for the operating direction vertically upward and which is operated with both hands and with the operator in a standing position

Note 1 to entry: A universal tool affixed to a pole which is an accessory is not considered a pole tool.

3.7**cartridge**

device which contains a primer mix and a propellant creating hot high-pressure combustion gas used to drive the piston



Figure 1 — Cartridge (example: calibre 6,8/11; external view and section)

3.7.1**single cartridge**

cartridge intended to be inserted by hand in the cartridge chamber one at a time

3.7.2**collated cartridge**

cartridge that is contained with a number of others in a means of collation, either a disk or a strip

3.7.3**proof cartridge**

cartridge used exclusively for strength testing of tools and loaded with a stronger than usual propellant charge

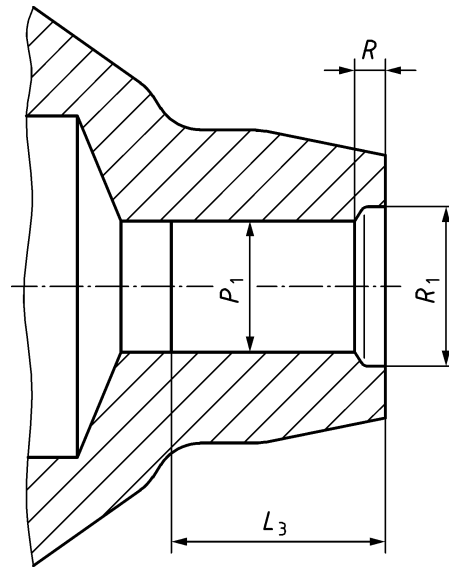
Note 1 to entry: See 6.4.2 and Annex A.

3.8**cartridge chamber**

essentially cylindrical or conical bore in a powder actuated fixing or hard marking tool which contains and supports the cartridge; located in the rear end of the piston guide; the safety-relevant minimum allowable dimensions of the cartridge chamber correspond to the cartridge calibre and are listed in Table G.1 (see also 3.8.1 – 3.8.2)

Note 1 to entry: In order to ensure correct chambering, the minimum dimensions of the cartridge chamber are larger than or equal to the corresponding maximum allowable dimensions of the cartridge of the respective calibre. EN 16264:2014 provides information on maximum cartridge dimensions

3.8.1 cartridge chamber (tool for single cartridges)



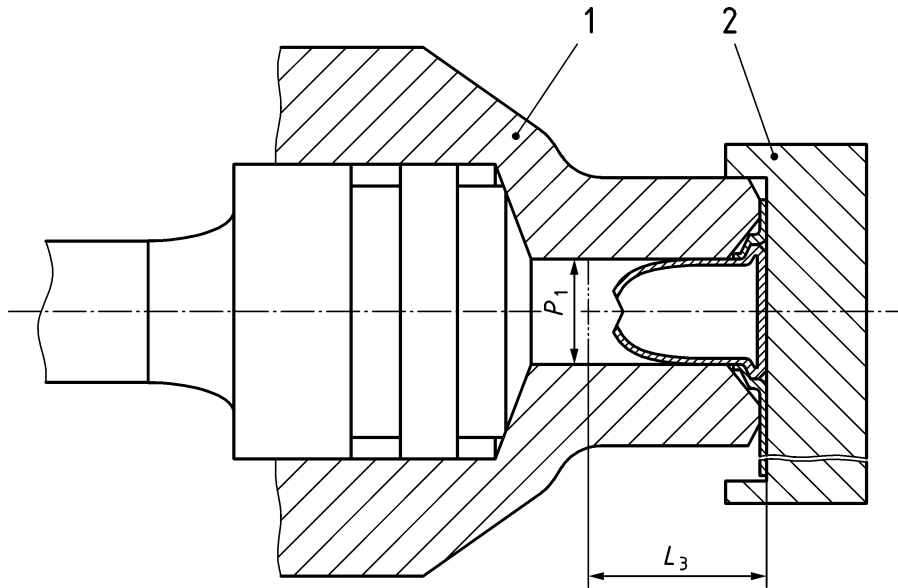
Key

- P_1 minimum diameter of cartridge chamber
- L_3 minimum length of cartridge chamber
- R minimum axial depth of recess in cartridge chamber receiving rim of cartridge
- R_1 minimum diameter of recess in cartridge chamber receiving rim of cartridge

Adequate chambering in a tool for single cartridges is assured by observing the calibre-specific dimensions of P_1 , L_3 , R , and R_1 in the design of the tool.

Figure 2 — Cartridge chamber (tool for single cartridges)

3.8.2 cartridge chamber (tool for cartridges collated in disks)

**Key**

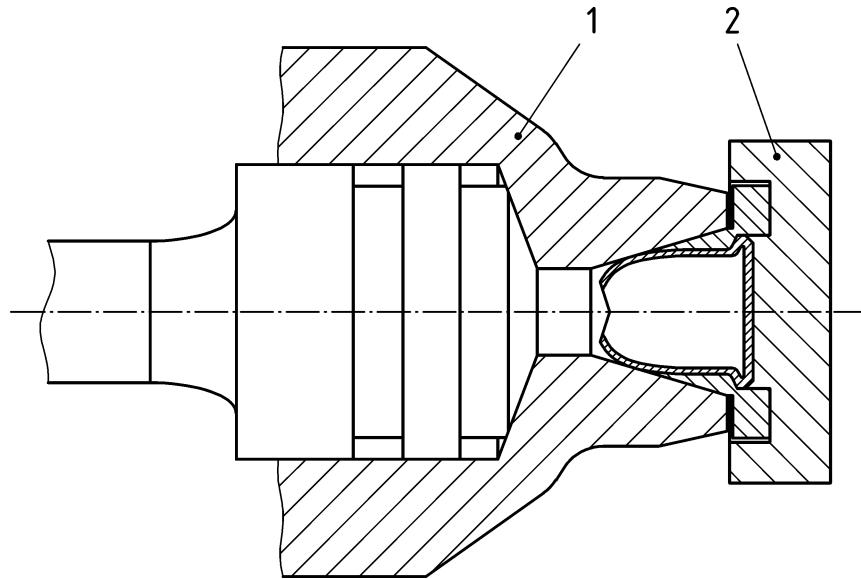
- 1 cartridge chamber
- 2 breech block with breech face (left)
- P_1 minimum diameter of cartridge chamber
- L_3 minimum length of cartridge chamber
- R minimum axial depth of recess in cartridge chamber receiving rim of cartridge
- R_1 minimum diameter of recess in cartridge chamber receiving rim of cartridge

Adequate chambering in a tool for disk collated cartridges is assured by observing the calibre-specific dimensions of P_1 and L_3 in the design of the tool.

Note 1 to entry: R and R_1 requirements as in a single-shot tool are less relevant in a disk collated tool as any deviation from suitable R and R_1 will lead to incomplete breech block closing and/or no actuation or inefficient percussion of the cartridge.

Figure 3 — Cartridge collated in a disk (chambered)

3.8.3 cartridge chamber (tool for cartridges collated in strips)



Key

- 1 cartridge chamber
- 2 breech block with breech face (left)

Adequate chambering in a tool for cartridges collated in strips is proven by the testing procedure in Annex G (see 6.4.5).

Note 1 to entry: In a tool for cartridges collated in strips, the dimensions of the cartridge chamber cannot be measured on the tool. The collar of the collation strip surrounding the cartridge acts as a gasket between the cylindrical cartridge and the conical cartridge chamber.

Note 2 to entry: The dimensions of the bore of the strip roughly correspond to the cartridge chamber dimensions in a tool for single cartridges. However, to prevent loss of the cartridge and maintain its tight fit, the bore diameter is designed and manufactured slightly tighter than the outer diameter (calibre) of the cartridge. The strip deforms and retains the cartridge by the friction created by the undersize.

Note 3 to entry: Similarly, the conical outer surface of the collar corresponds approximately to the shape and dimensions of the conical chamber bore of the tool.

Note 4 to entry: During chambering, the advancing breech face pushes the cartridge forward together with the strip and compresses the strip against the cartridge chamber. The strip is slightly deformed and seals the chamber against the breech face against the gas pressure which will build up after firing.

Note 5 to entry: Therefore, before firing and unlike in a tool for single cartridges, the cartridge does not necessarily make contact with the cartridge chamber of the tool to create a gas-tight seal.

Figure 4 — Cartridge collated in a strip (chambered)

3.9 chambering

the act of loading a cartridge into the chamber prior to firing the tool

Note 1 to entry: Correct chambering requires adequate and near-complete enclosure of the cartridge by components of the tool so as to adequately support the cartridge walls and prevent the cartridge from rupturing under the gas pressure.

prEN 15895:2023 (E)**3.10****calibre**

designation of a cartridge, derived from the main dimensions and normally expressed in the form “body diameter/length” (see Annex A)

3.11**fastener**

fixing device intended for use in a fixing tool

Note 1 to entry: The fixing device may be a nail, a threaded stud, an eyelet or a similar object intended to be driven into a base material.

3.12**base material**

material into which the fastener is driven

3.13**average muzzle velocity (fixing tools)**

\bar{v}_{10}

mean arithmetic value of test element/piston velocity evaluated out of 10 single test values

3.14**maximum muzzle velocity (fixing tools)**

v_e

maximum test element/piston velocity to be expected calculated on the basis of the average muzzle velocity and the standard deviation for the 10 tests

3.15**volumes**

V_x

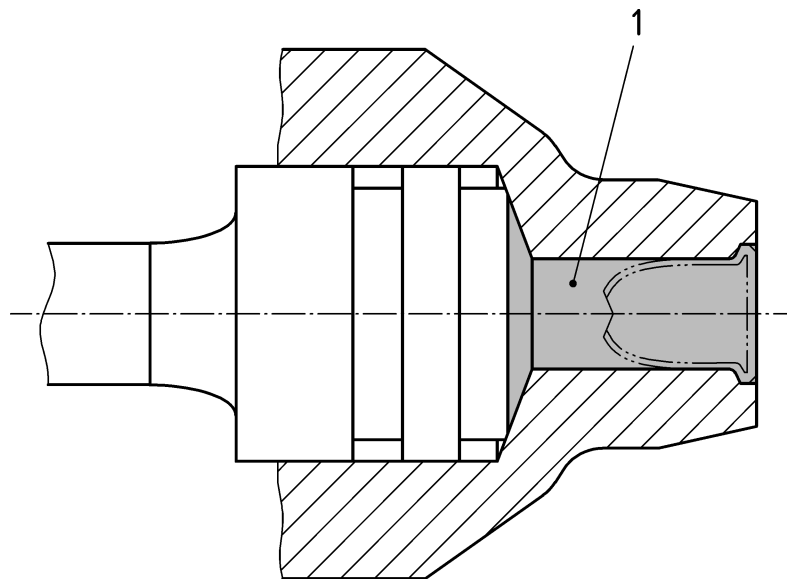
empty spaces inside the tool and / or the cartridge relevant for internal ballistics, i.e. determining the maximum gas pressure p_{\max} developed by the combustion of the propellant; in single shot tools, the volumes can be directly calculated based on dimensional measurements in combination with the volumes V_h^* and V_{ET} tabulated in Annex A

Note 1 to entry: In case of tools for collated cartridges, volumes shall be calculated based on CAD analysis because not all the relevant dimensions (or none of them) are represented in the tool, but in the collation system (compare 3.8.2, 3.8.3 and the informative Annex B for relations between the volumes defined in 3.16 – 3.23).

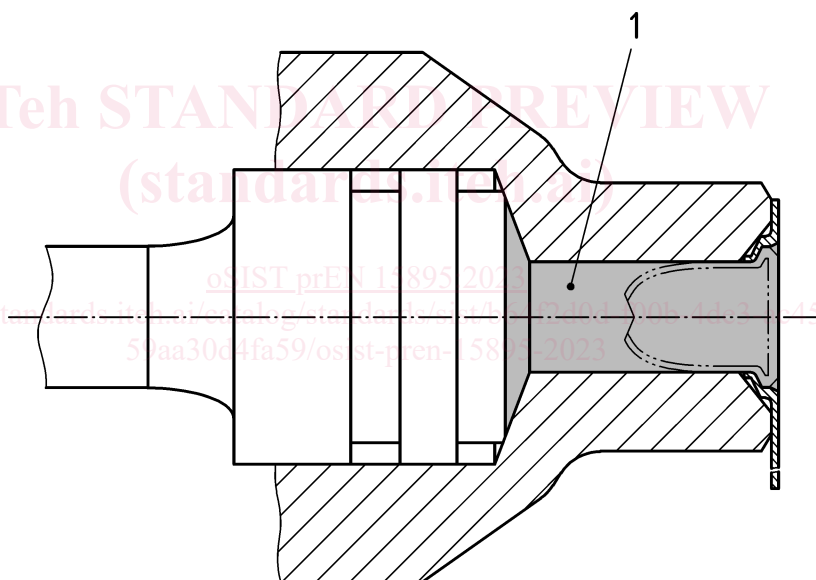
3.16**total volume**

V_{tot}

sum of the volumes of the combustion chamber and the empty cartridge chamber as determined from the design drawings or CAD models



Total volume V_{tot}
(tool for single cartridges)



Total volume V_{tot}
(tool for cartridges collated in disks)