SLOVENSKI STANDARD
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Cartridge operated hand-held tools - Safety requirements - Part 1: Fixing and hard making tools

Kartuschenbetriebene tragbare Werkzeuge - Sicherheit - Teil 1: Befestigungs- und Markierwerkzeuge

Outils portatifs à charge propulsive - Exigences de sécurité - Partie 1: Outils de scellement et de marquage

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EUROPEAN STANDARD

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English Version

Cartridge operated hand-held tools - Safety requirements - Part 1: Fixing and hard making tools

Outils portatifs à charge propulsive - Exigences de sécurité - Partie 1: Outils de scellement et de marquage

Kartuschenbetriebene tragbare Werkzeuge - Sicherheit - Teil 1: Befestigungs- und Markierwerkzeuge

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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

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (prEN 15895-1:2009) has been prepared by Technical Committee CEN/TC 213 “Cartridge operated hand-held tools - Safety”, the secretariat of which is held by SNV.

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 EC Directive(s).

For relationship with EC 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 (Deutsche Gesetzliche Unfallversicherung (DGUV), Swedish Work Environment Authority).

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 cartridge operated 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.

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.

1 Scope

This standard covers safety requirements for cartridge operated fixing and hard marking

tools which operate with an intermediate member (piston).

This European standard deals with all significant hazards, hazardous situations and events relevant to cartridge operated fixing and hard marking tools, when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see clause 4). It deals with the significant hazards in the different operating modes and intervention procedures as defined in 5.3 of EN ISO 12100-1.

Although the safe use of cartridge operated tools depends to an important extent on the use of appropriate cartridges and fasteners, this standard is not formulating requirements for the cartridges and fasteners to be used with the tools (see clause 7).

This European Standard applies to tools using cartridges with casings made of metal or plastic and containing a minor quantity of primer with a composition different from that of the main propellant.

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

Note: Information about cartridges can be found in the publication of the Permanent International Commission for the Proof of Small Arms (C.I.P.).

This European standard is not applicable to cartridge operated fixing and hard marking tools which are manufactured before the date of its publication as EN.

2 Normative references

The following referenced documents are indispensable for the application 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, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

EN ISO 3744:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure. Engineering method in an essentially free field over a reflecting plane*

EN ISO 4871:1996, *Acoustics — Declaration and verification of noise emission values of machinery and equipment*

EN ISO 11201:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Engineering method in an essentially free field over a reflecting plane*

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles*

EN 12549:1999, *Acoustics — Noise test code for fastener driving tools — Engineering method*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003 and the following apply.

3.1
fixing tool
tool to drive fasteners into a base material

3.1.1
single shot tool
tool which is designed for a single (loose) cartridge

3.1.2
tool for collated cartridges
tool designed for the use of multiple (collated) cartridges

3.1.3
universal cartridge operated tool
cartridge operated tool which is intended for use in any possible operating direction and which can be held with one or two hands.

Examples of operating directions: horizontal, vertically downward, or vertically upward (overhead)

3.1.4
cartridge operated stand-up tool for floor operation
cartridge operated 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

3.1.5
cartridge operated pole tool
cartridge operated tool which is affixed to the end of a pole and which is intended for the operating direction vertically upward and which is operated with both hands and with the operator in a standing position

3.2
hard marking tool
tool to mark materials by imprinting e.g. letters and numerals

3.3
cartridge
device which contains solid propellant used to drive the piston

3.3.1
single cartridge (loose cartridge)
cartridge that is not mechanically joined to other cartridges and is inserted individually in the cartridge chamber (by hand)

3.3.2
collated cartridge
cartridge that is contained with a number of others in a means of collation, e.g. a plastic collation strip or a metal disc

3.3.3
proof cartridge
cartridge used exclusively for strength testing of tools

NOTE: It is loaded with a stronger than usual propellant charge such as to produce an operating pressure of 1,3 p_{max} of the respective calibre (see values in Annex A).

3.4
calibre
designation of a cartridge, normally expressed in the form “body diameter/length” (see Annex A)

3.5
fastener
fixing device intended for use in a fixing tool which may be a nail, a threaded stud, an eyelet or similar object that is driven into the base material

3.6
base material
material into which the fastener is driven

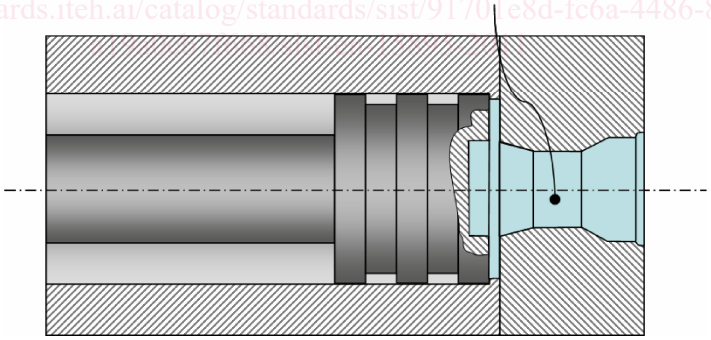
3.7
average muzzle velocity $\bar{v}_{10}$ (fixing tools)

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

3.8
maximum muzzle velocity v_e (fixing tools)
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

3.9
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

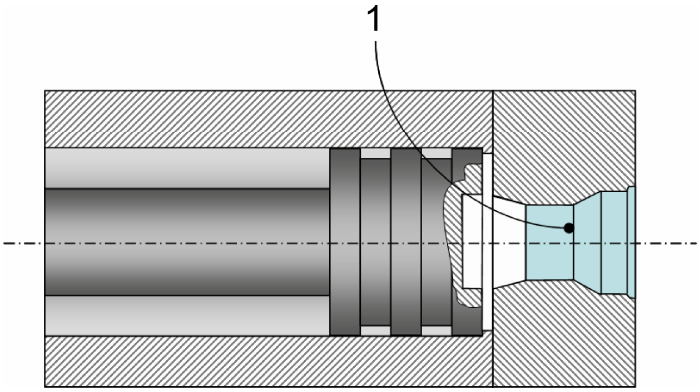
NOTE: V_{tot} is a design-specific value for each tool.



Legend
1 total volume V_{tot}

3.10
minimum volume of the cartridge chamber V_{ET}
smallest technically possible cartridge chamber for a given calibre

NOTE: V_{ET} is a constant value for each calibre laid down in Table A.1 of Annex A.



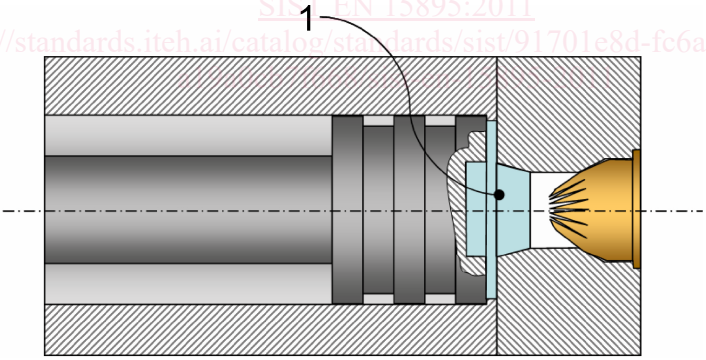
Legend

1 minimum volume of the cartridge chamber V_{ET}

3.11
minimum operational volume of the combustion chamber V_a
volume consisting of the volume of the combustion chamber with the piston in its extreme top position and the open volume in the piston head

NOTE: V_a is a design-specific value for each tool and is calculated as the difference between the design-specific volume V_{tot} and the calibre-specific volume V_{ET}:

$$V_a = V_{tot} - V_{ET}$$

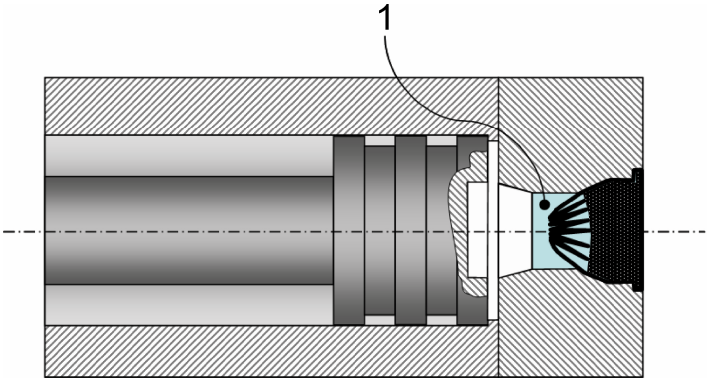


Legend

1 minimum operational volume of the combustion chamber V_a

3.12
reduced volume of the cartridge chamber V_h^*
volume of the minimum size cartridge chamber V_{ET} minus the volumes of the cartridge casing and the propellant

NOTE: V_h^* is a constant value for a given calibre laid down in Table A.1 of Annex A.

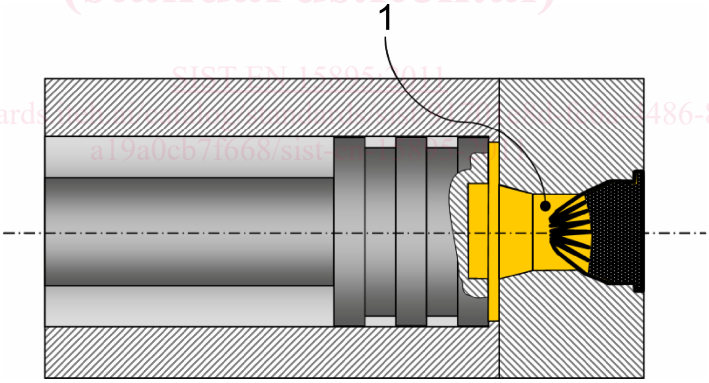


Legend

1 reduced volume of the cartridge chamber V_h^*

3.13
effective combustion volume V_{eff}
effective (total) volume of all connecting voids between the cartridge and the piston before the firing of the cartridge; calculated by

$$V_{eff} = V_h^* + V_a = V_h^* + V_{tot} - V_{ET}$$



Legend

1 effective combustion volume V_{eff}

NOTE 1: V_{eff} is the volume which in combination with the selected cartridge strength effectively determines the combustion pressure generated in a tool.

NOTE 2: V_{eff} is a design-specific value for each tool.

3.14
Maximum allowable gas pressure p_{max}
maximum allowable value of gas pressure in the cartridge chamber depending on the calibre and the effective volume of the combustion chamber, calculated according to the combustion equation

$$p_{max} = a \times V_{eff}^{\ b}$$

or, with $V_{eff} = V_h^* + V_a$ as the effective combustion volume

$$p_{max} = a \times \left(V_h^* + V_a\right)^b$$

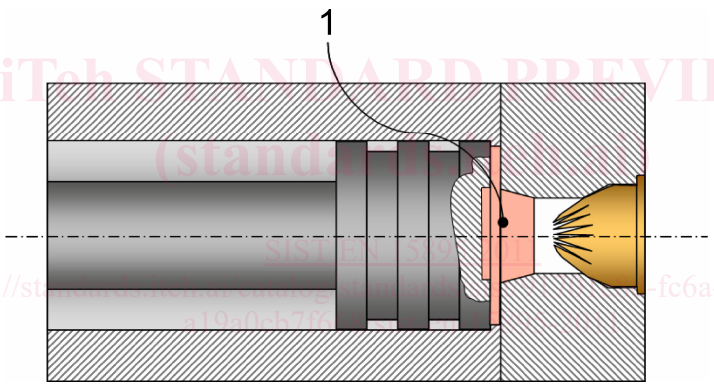
a, b: coefficients determined experimentally

NOTE The maximum allowable gas pressure p_{max} is a constant value per tool with its individual minimum operational volume of the combustion chamber V_a and thus its individual effective combustion volume V_{eff}. It refers to the strongest possible cartridge of the respective calibre.

Table A.1 of Annex A contains all the necessary values of a, b, V_h^* etc. per calibre.

3.15
Reduced proof volume of the combustion chamber V_E
reduced proof volume of the combustion chamber for resistance testing with an overpressure of $1{,}3 \cdot p_{max}$, calculated using the equation

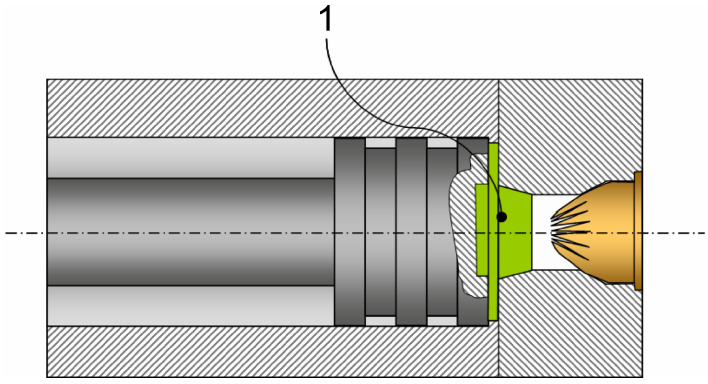
$$V_E = 1{,}3^{\frac{1}{b}} \times V_a + \left(1{,}3^{\frac{1}{b}} - 1\right) \times V_h^*$$



Legend
1 Reduced proof volume of the combustion chamber V_E

3.16
reduced system testing volume of the combustion chamber V_S
reduced volume of the combustion chamber for system testing with an overpressure of 1,15 times of the maximum operating pressure p_{max}, of each tested cartridge strength calculated using the equation

$$V_S = 1{,}15^{\frac{1}{b}} \times V_a + \left(1{,}15^{\frac{1}{b}} - 1\right) \times V_h^*$$



Legend

1 reduced system testing volume of the combustion chamber V_S

3.17
A-weighted single event emission sound pressure level $L_{pA,\,1s}$ in dB

A-weighted and time-integrated emission sound pressure level of an isolated single sound event of specified duration T (or specified measuring time T), related to T_0 = 1 s; given by the following equation:

$$L_{pA,1s} = 10\ \mathrm{lg}\left[\frac{1}{T_0}\int_0^T \frac{p^2(t)}{p_0^2}\mathrm{d}t\right]\mathrm{dB} = L_{pAeq,T} + 10\ \mathrm{lg}\left(\frac{T}{T_0}\right)\mathrm{dB}$$

NOTE: The reference sound pressure is p_0 = 20 µPa

3.18
A-weighted single event emission sound power level $L_{WA,\,1s}$ in dB

A-weighted sound power level determined from measurements of the single-event sound pressure level

NOTE: The reference sound power is 1 pW (1 pW = 10^{-12} W).

3.19
C-weighted peak emission sound pressure level $L_{pC,\,peak}$ in dB

the C-weighted peak emission sound pressure level $L_{pC,\,peak}$ of a test object, determined in accordance with EN ISO 11201 at the work station

4 List of significant hazards

This clause contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this document, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk.