SLOVENSKI STANDARD
SIST EN 15895:2011

01-november-2011

Ročna orodja z nabojnim delovanjem - Varnostne zahteve - Pritrjevalniki in označevalniki

Cartridge operated hand-held tools - Safety requirements - Fixing and hard marking tools

Kartuschenbetriebene handgehaltene Werkzeuge - Sicherheit - Befestigungs- und Markierwerkzeuge

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

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ICS:

25.140.99	Druga ročna orodja	Other hand-held tools

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EUROPEAN STANDARD

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English Version

Cartridge operated hand-held tools - Safety requirements - Fixing and hard marking tools

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

Kartuschenbetriebene handgehaltene Werkzeuge - Sicherheit - Befestigungs- und Markierwerkzeuge

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COMITÉ EUROPÉEN DE NORMALISATION
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Contents

Foreword

This document (EN 15895:2011) has been prepared by Technical Committee CEN/TC 213 “Cartridge operated hand-held tools - Safety”, the secretariat of which is held by SNV.

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of an identical text or by endorsement, at the latest by November 2011, and conflicting national standards shall be withdrawn at the latest by November 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] 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.

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.

According to the CEN/CENELEC Internal Regulations, the national standards organizations 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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 European 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 (see Clause 4). It deals with the significant hazards in the different operating modes and intervention procedures as referred to in EN ISO 12100-1:2003, 5.3.

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 designed for use with cartridges with casings made of metal or plastic and with solid propellant 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+A1:2009, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

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

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

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*

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
tool for single cartridges
tool designed for the use of single (loose) cartridges

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

3.1.4
cartridge operated stand-up tool
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

NOTE A universal cartridge operated 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.

3.1.5
cartridge operated pole tool
cartridge operated 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 A universal cartridge operated tool affixed to a pole which is an accessory is not considered a pole tool.

3.2
hard marking tool
tool to mark materials by imprinting

EXAMPLE Imprinting of letters and numerals.

3.3
cartridge
device which contains propellant used to drive the piston

3.3.1
single cartridge (loose cartridge)
cartridge intended to be inserted by hand in the cartridge chamber one by one

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 and loaded with a stronger than usual propellant charge

NOTE See 6.3.2 and Annex A.

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

3.5
fastener
fixing device intended for use in a fixing tool

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

3.6
base material
material into which the fastener is driven

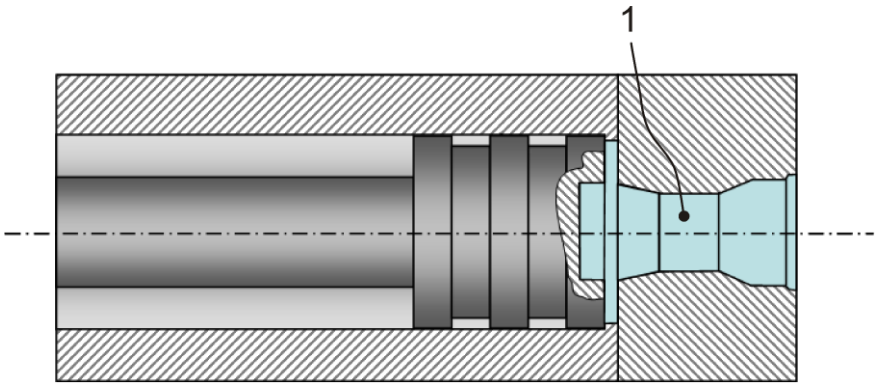
3.7
average muzzle velocity (fixing tools)
$\bar{v}_{10}$
mean arithmetic value of test element/piston velocity evaluated out of 10 single test values

3.8
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

3.9
reference combustion volume
V_{ref}
volume defined for testing of cartridge strength; one single reference value of 0,16 cm^3

3.10
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.

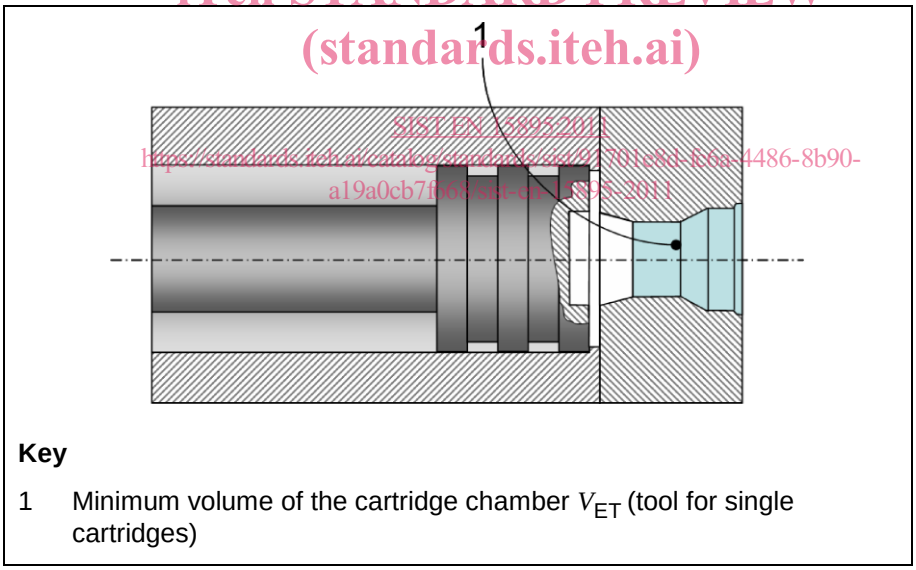


Key

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

3.11
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.



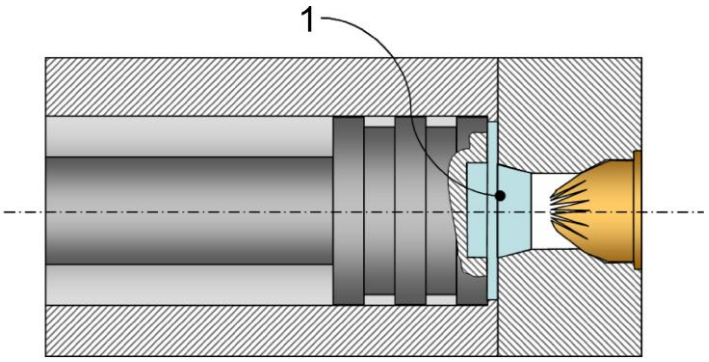
Key

1 Minimum volume of the cartridge chamber V_{ET} (tool for single cartridges)

3.12
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 and is calculated as the difference between the design-specific volume V_{tot} and the calibre-specific volume V_{ET}:

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

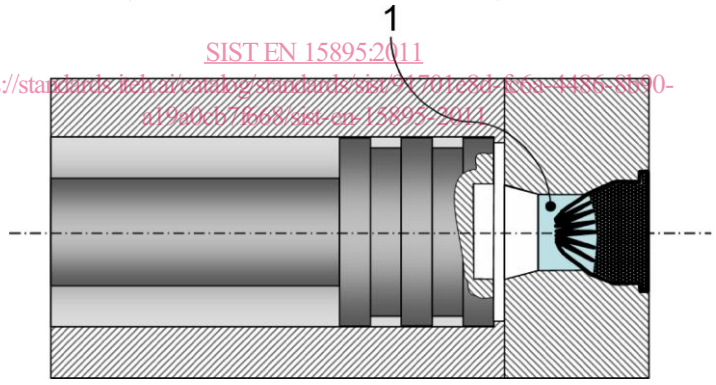


Key

1 Minimum operational volume of the combustion chamber V_a (tool for single cartridges)

3.13
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.

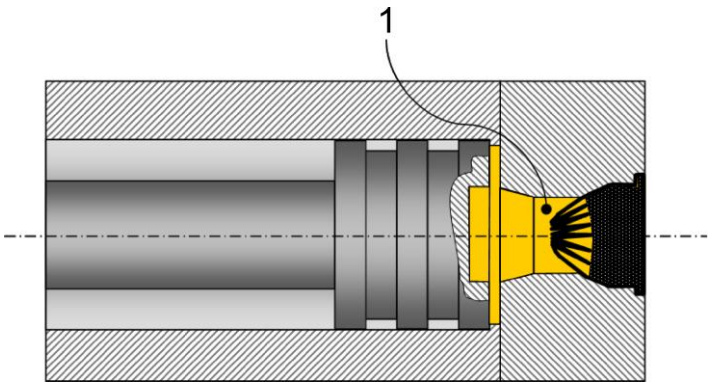


Key

1 Reduced volume of the cartridge chamber V_h^* (tool for single cartridges)

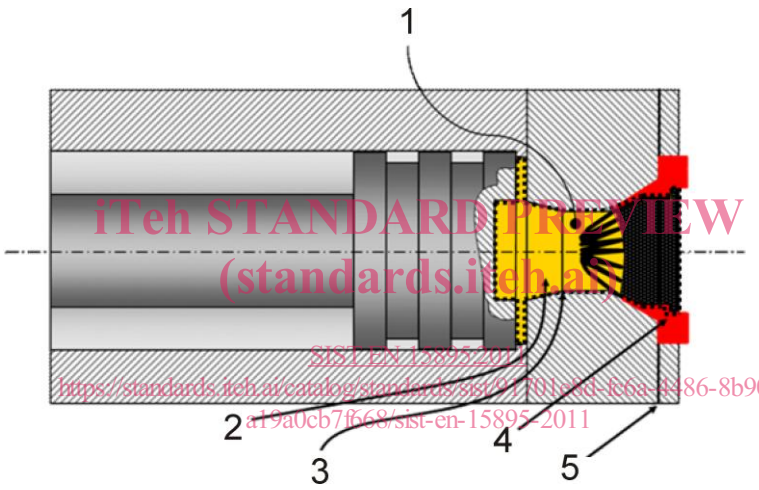
3.14
effective combustion volume
V_{eff}
effective (total) volume of all connecting voids between the cartridge and the piston before the firing of the cartridge; calculated by

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



Key

1 Effective combustion volume V_{eff} (tool for single cartridges)



Key

1 Effective combustion volume V_{eff} (tool for collated cartridges)
2 V_a collated cartridges
3 Boundary line of V_{ET}
4 Collation strip
5 Separation line between cartridge chamber and collation strip

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

NOTE 2 V_{eff} is a design-specific value.

3.15
maximum gas pressure
p_{max}
maximum value of combustion pressure in the cartridge chamber depending on the calibre and the effective volume of the combustion chamber, calculated according to the combustion equation

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

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

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

where a, b are coefficients determined experimentally

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

NOTE 2 The maximum 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.

3.16
real gas pressure
$p_{max, real}$
combustion pressure produced by a factually available cartridge (used for an overpressure test)

NOTE The real gas pressure $p_{max, real}$ is generally lower than p_{max}.

3.17
relative cartridge strength
X
ratio of the combustion pressure of a factually available cartridge and the tabulated maximum combustion pressure

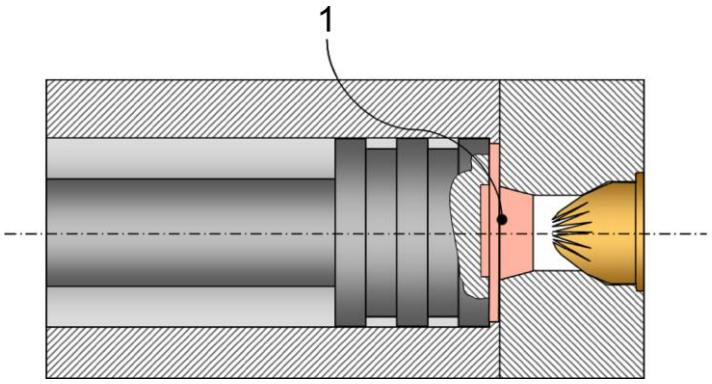
$$X = \frac{p_{max, real}}{p_{max}}$$

NOTE X would be 1,0 for cartridges producing exactly the p_{max} tabulated in Annex A.

3.18
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 times of the maximum gas pressure p_{max}, calculated using the equation

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

This equation is valid for cartridges with a relative strength of X between 1,0 and 0,85.



Key

1 Reduced proof volume of the combustion chamber V_E

3.19
adapted reduced proof volume of the combustion chamber
$V_{E,\ adapted}$
volume of the combustion chamber reduced to an even lower value than the theoretical value V_E to account for a factually available cartridge weaker than $X = 0{,}85$ in overpressure testing.

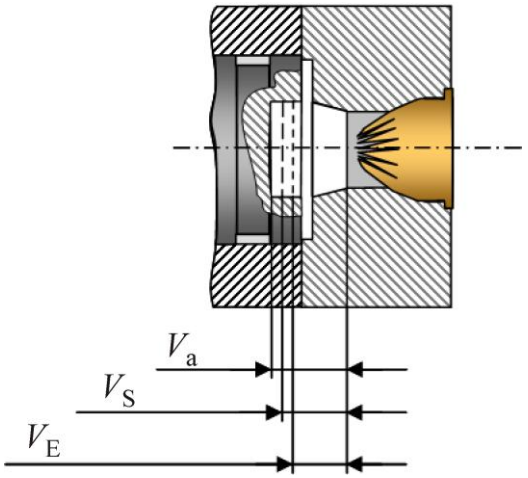
$V_{E,\ adapted}$ is dependent on the relative cartridge strength X and is calculated using the equation

$$V_{E,\ adapted} = \left(\frac{1{,}3 \cdot 0{,}85}{X}\right)^{\frac{1}{b}} \cdot V_a + \left(\left(\frac{1{,}3 \cdot 0{,}85}{X}\right)^{\frac{1}{b}} - 1\right) \cdot V_h^*$$

This equation is valid for cartridges with a relative strength of X below 0,85 as long as $V_{E,\ adapted}$ does not drop below 50 % of V_E calculated according to 3.18.

3.20
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 gas pressure p_{max} of each tested cartridge strength calculated using the equation

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



Key

V_a Minimum operational volume
V_S Reduced system testing volume
V_E Reduced proof volume

3.21
A-weighted emission sound pressure level
L_{pA}
ten times the logarithm to the base 10 of the ratio of the square of the emission sound pressure, p, to the square of a reference value, p_0, expressed in decibels

$$L_{pA} = 10 \lg \frac{p^2}{p_0^2} \text{ dB}$$

where the reference value, p_0, is 20 µPa

3.22
A-weighted single event emission sound pressure level in dB
L_{EA}
A-weighted and time-integrated emission sound pressure level of an isolated single sound event of specified duration T (or specified measurement time interval $T = t_2 - t_1$ covering the single event), normalized to reference time interval $T_0 = 1$ s; given by the following equation:

$$L_{EA} = 10 \lg \left[\frac{1}{T_0} \int_0^T \frac{p^2(t)}{p_0^2} \mathrm{d}t \right] \text{dB}$$

NOTE The reference sound pressure is $p_0 = 20$ µPa.

3.23
A-weighted sound power level
L_{WA}
ten times the logarithm to the base 10 of the ratio of the sound power of a source, P, to a reference value, P_0, expressed in decibels

$$L_{WA} = 10 \lg \frac{P}{P_0} \text{ dB}$$

where the reference value, P_0, is 1 pW