



SLOVENSKI STANDARD
SIST EN 13236:2019

01-oktober-2019

Nadomešča:

SIST EN 13236:2011+A1:2016

Varnostne zahteve za superabrazive

Safety requirements for superabrasive products

Sicherheitsanforderungen für Schleifwerkzeuge mit Diamant oder Bornitrid

Prescriptions de sécurité pour les produits superabrasifs

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: EN 13236:2019

<https://standards.iteh.ai/catalog/standards/sist/ca49431c-1ceb-4783-93d0-f2392eb8c39/sist-en-13236-2019>

ICS:

25.100.70 Brusiva

Abrasives

SIST EN 13236:2019

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 13236:2019

<https://standards.iteh.ai/catalog/standards/sist/ca49431c-1ceb-4783-93d0-fe2392eb8e39/sist-en-13236-2019>

EUROPEAN STANDARD

EN 13236

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2019

ICS 25.100.70

Supersedes EN 13236:2010+A1:2015

English Version

Safety requirements for superabrasive products

Prescriptions de sécurité pour les produits
superabrasifs

Sicherheitsanforderungen für Schleifwerkzeuge mit
Diamant oder Bornitrid

This European Standard was approved by CEN on 26 November 2018.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

[SIST EN 13236:2019](https://standards.iteh.ai/catalog/standards/sist/ca49431c-1ceb-4783-93d0-fe2392eb8e39/sist-en-13236-2019)

[https://standards.iteh.ai/catalog/standards/sist/ca49431c-1ceb-4783-93d0-
fe2392eb8e39/sist-en-13236-2019](https://standards.iteh.ai/catalog/standards/sist/ca49431c-1ceb-4783-93d0-fe2392eb8e39/sist-en-13236-2019)



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

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

Contents

Page

European foreword.....	4
Introduction	5
1 Scope	6
2 Normative references.....	6
3 Terms, definitions and symbols.....	6
3.1 General.....	6
3.2 Grinding and cutting-off machines	7
3.3 Grinding and cutting-off methods.....	7
3.4 Type of application.....	8
3.5 Symbols.....	9
4 List of significant hazards	11
5 Safety requirements.....	11
5.1 General requirements.....	11
5.2 Requirements for precision superabrasive grinding and cutting-off wheels	12
5.2.1 Bore tolerances.....	12
5.2.2 Sequence of maximum operating speeds.....	12
5.2.3 Safety factors.....	12
5.2.4 Maximum operating speeds.....	12
5.2.5 Blotters	13
5.3 Requirements for non-precision cutting-off wheels	13
5.3.1 Bore tolerances.....	13
5.3.2 Sequence of maximum operating speeds.....	13
5.3.3 Safety factors.....	14
5.3.4 Maximum operating speeds	14
5.3.5 Requirements for the blank	15
5.3.6 Requirements for the connection of the superabrasive section to the blank.....	19
5.3.7 Tensioning of non-precision cutting-off wheels	21
5.3.8 Limitation of side coating of abrasive grain and/or superabrasive grain	21
5.4 Requirements for diamond wires	21
5.4.1 General.....	21
5.4.2 Requirements.....	22
5.4.3 Maximum operating speeds	22
5.5 Requirements for mounted points	22
5.5.1 Spindle diameter tolerances.....	22
5.5.2 Sequence of maximum operating speeds.....	22
5.5.3 Safety factors.....	23
5.6 Requirements for other superabrasive products for non-precision grinding	23
5.6.1 Bore diameter tolerances	23
5.6.2 Sequence of maximum operating speeds.....	23
5.6.3 Safety factors.....	23
5.6.4 Maximum operating speeds.....	23
5.6.5 Requirements for the connection of the abrasive section to the core	24
5.7 Marking.....	24

6	Verification of the safety requirements	24
6.1	Verification of the general requirements	24
6.1.1	General	24
6.1.2	Visual inspection.....	25
6.1.3	Ring test	25
6.2	Verification of the strength requirements	25
6.2.1	Verification of the safety factor	25
6.2.2	Verification of the bending moment of non-precision cutting-off wheels	25
6.2.3	Verification of the strength requirements for other superabrasive products for non-precision grinding.....	29
6.2.4	Verification methods for diamond wires	30
6.3	Verification of marking	33
6.4	Verification of the requirements for blotters.....	33
6.5	Verification of the tensioning of non-precision cutting-off wheels.....	33
7	Information for use	35
Annex A (normative)	Marking.....	36
A.1	Content of the marking.....	36
A.1.1	Marking requirements.....	36
A.1.2	Additional inscriptions.....	39
A.1.2.1	General	39
A.1.2.2	Multiple or gang mounted wheels	39
A.2	Execution of marking	39
Annex B (informative)	Mounted points	41
B.1	Example of calculation of the maximum permissible speed of rotation	41
B.2	Example for the application of the calculation method.....	45
B.2.1	Types of mounted points	45
B.2.2	Assumptions for the calculation.....	46
B.2.3	Maximum permissible speeds of rotation	47
Annex C (normative)	Reconditioning of cutting-off wheels according to 5.3.6.4	49
C.1	Preconditions for reconditioning	49
C.2	Additional marking requirements	49
Annex D (informative)	Speed conversion table	50
Bibliography	53

EN 13236:2019 (E)**European foreword**

This document (EN 13236:2019) has been prepared by Technical Committee CEN/TC 143 “Machine 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 October 2019, and conflicting national standards shall be withdrawn at the latest by October 2019.

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 supersedes EN 13236:2010+A1:2015.

Significant changes between EN 13236:2010+A1:2015 and EN 13236:2019 are as follows:

- a) added the hazard “kickback” in Table 4;
- b) added vacuum brazed products in Table 6 for maximum operating speeds;
- c) added mobile cutting-off machines in Table 10;
- d) revised the definitions and requirements for openings to achieve a better distinction and to avoid different interpretations;
- e) merged the tables for bending strength and bending moment for cutting-off wheels for the use on hand-held cutting-off machines into one table and updated the values for minimum requirements for destructive testing.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This European Standard has been prepared to provide one means of conforming with essential safety requirements, e.g. of the General Product Safety Directive and associated EFTA regulations.

This European Standard is addressed to designers, manufacturers and suppliers of the superabrasive products described in the scope as well as to those who are reconditioning superabrasive cutting-off wheels. In addition, it helps designers, manufacturers and suppliers of grinding machines in the selection of superabrasive products, in order to reduce the risks and achieve conformity of the respective machinery with the essential health and safety requirements of the Machinery Directive.

The extent to which hazards are covered is indicated in the scope of this European Standard.

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 13236:2019](https://standards.iteh.ai/catalog/standards/sist/ca49431c-1ceb-4783-93d0-fe2392eb8e39/sist-en-13236-2019)

<https://standards.iteh.ai/catalog/standards/sist/ca49431c-1ceb-4783-93d0-fe2392eb8e39/sist-en-13236-2019>

EN 13236:2019 (E)**1 Scope**

This document applies to superabrasives products containing natural or synthetic diamond or cBN (cubic boron nitride). It includes precision grinding and cutting-off wheels, non-precision cutting-off wheels, diamond wires, mounted points and other superabrasive products for non-precision grinding. It also applies to reconditioned superabrasive cutting-off wheels.

This document specifies requirements and/or measures for the removal or reduction of hazards resulting from the design and application of the superabrasive products.

This document contains also procedures and tests for verification of the compliance with the requirements as well as safety information for use, which will be made available to the user by the manufacturer.

This document does not apply to bonded abrasive products, coated abrasive products, rotating dressing tools, truers or any non-rotating superabrasive products.

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 ISO 286-2:2010, *Geometrical product specifications (GPS) - ISO code system for tolerances on linear sizes - Part 2: Tables of standard tolerance classes and limit deviations for holes and shafts (ISO 286-2:2010)*

ISO 22917, *Precision superabrasives — Limit deviations and run-out tolerances for grinding wheels with diamond or cubic boron nitride*

3 Terms, definitions and symbols

For the purposes of this document, the following terms and definitions 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 General**3.1.1****superabrasive product**

abrasive product containing natural or synthetic diamond or cubic boron nitride in a bond

3.2 Grinding and cutting-off machines

3.2.1

stationary machine

machine being fixed in position during operation

Note 1 to entry: See, for example, EN ISO 16089.

Note 2 to entry: Included are fixed swing frame machines and mobile machines clamped firmly in position during use.

Note 3 to entry: Transportable machines are fixed in position during operation and therefore considered to be stationary machines.

3.2.2

stationary machine with totally enclosed working area

stationary machine being protected by separating guards in such a way that machining processes including loading and unloading of workpieces are carried out inside them and persons are protected against hazards generated by bursting of an abrasive product

3.2.3

mobile machine

machine not being fixed in position during operation

Note 1 to entry: Mobile machines are manually guided (but not hand-held) by the operator during use, e.g. floor grinding machines.

3.2.4

hand-held machine

machine being held in the hand during operation

Note 1 to entry: Included are machines with flexible drives.

Note 2 to entry: See for example EN ISO 11148-7, EN ISO 11148-9, EN 60745-2-3 and EN ISO 19432.

3.3 Grinding and cutting-off methods

3.3.1

peripheral grinding

grinding with the periphery of the wheel with no or limited side loads

3.3.2

face grinding

grinding with the face of the wheel

3.3.3

cutting-off

cutting-off or slotting with the periphery of the cutting-off wheel

EN 13236:2019 (E)**3.4 Type of application****3.4.1****mechanically guided grinding and cutting-off**

process with feed movements of the abrasive product and/or workpiece guided by mechanical means

Note 1 to entry: See Table 1.

3.4.2**manually guided grinding and cutting-off**

process with feed movements of the abrasive product and/or the workpiece manually guided by the operator

Note 1 to entry: See Table 1.

3.4.3**hand-held grinding and cutting-off**

process with the machine entirely guided by the operator

Note 1 to entry: See Table 1.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN 13236:2019](https://standards.iteh.ai/catalog/standards/sist/ca49431c-1ceb-4783-93d0-fe2392eb8e39/sist-en-13236-2019)

<https://standards.iteh.ai/catalog/standards/sist/ca49431c-1ceb-4783-93d0-fe2392eb8e39/sist-en-13236-2019>

Table 1 — Type of application

Grinding method	Type of machine	Type of application	Super-abrasive product	Workpiece	Examples for application/machines
grinding	stationary grinding machines	mechanically guided grinding	fixed	mechanically guided	Surface grinding, centerless grinding, creep feed grinding, bevel grinding on glass (glass bevelling machine)
			mechanically guided	fixed	Profile grinding of stone and concrete
			mechanically guided	mechanically guided	Internal grinding, external, plunge and traverse grinding, jig grinding, decorative stone milling and polishing, pencil edging of glass (automotive glass)
	stationary and mobile grinding machines	manually guided grinding	manually guided	fixed	Roughing and polishing of stone floors (carriage/floor grinding machine)
			fixed	manually guided	Tool grinding (bench grinding machine), decorative glass grinding
	hand-held grinding machines	hand-held grinding	manually guided	fixed	Stone and concrete milling and polishing (angle/straight grinder)
cutting-off	stationary cutting-off machines	mechanically guided cutting-off	fixed	mechanically guided	Cutting-off of bricks and tiles (table saw)
			mechanically guided	fixed	Cutting-off of stone and concrete (bridge-type saw, floor and wall saw, wire saw)
			mechanically guided	mechanically guided	Cutting-off of semi-conductors
	stationary and mobile cutting-off machines	manually guided cutting-off	manually guided	fixed	Cutting-off of stone and concrete (table saw, floor saw)
			fixed	manually guided	Cutting-off of bricks (table saw)
	hand-held cutting-off machines	hand-held cutting-off	manually guided	fixed	Cutting-off of stone and concrete (angle grinder, hand-held cutting-off machine)

3.5 Symbols

For the purposes of this document, the symbols listed in Table 2 and Table 3 apply.

Table 2 — Symbols

Symbol	Designation	Definition	Unit
f_{br}	burst speed factor	Bursting speed divided by maximum operating speed: $f_{br} = \frac{v_{br}}{v_s}$	—
n_{ab}	deflection speed of mounted points	Revolutions per minute at which the spindle of mounted points is deflecting under centrifugal force	1/min
n_{max}	maximum permissible speed of rotation	Revolutions per minute of a new abrasive product at maximum operating speed	1/min
S_{ab}	safety factor against spindle deflection for mounted points	Deflection speed divided by maximum permissible speed of rotation: $S_{ab} = \frac{n_{ab}}{n_{max}}$	—
S_{br}	safety factor against bursting due to centrifugal force	Bursting speed divided by maximum operating speed, all squared: $S_{br} = \left(\frac{v_{br}}{v_s} \right)^2$	—
v_s	maximum operating speed	Maximum permissible peripheral speed of a rotating abrasive product	m/s
v_{br}	bursting speed	Peripheral speed at which an abrasive product breaks due to centrifugal force	m/s
$v_{br,min}$	minimum bursting speed	Peripheral speed which an abrasive product shall at least reach without bursting due to centrifugal force	m/s

Table 3 — Other symbols

Symbol	Designation	Unit
F	force	N
F_A	shearing force	N
L_F	lever arm	mm
M_b	bending moment	Nm
σ_b	bending strength	N/mm ²
τ_s	shear strength	N/mm ²

4 List of significant hazards

The significant hazards are listed in Table 4.

Table 4 — List of significant hazards

Hazard designation	Hazardous situations (Examples)	Relevant clauses in this standard
Ejection of parts	1. Abrasive product breakage caused by:	—
	— improper design	5.1, 5.2, 5.3, 5.4, 5.5, 5.6, 5.7, Annex B and Annex C
	— manufacturing defects	5.1
	— wrong selection	Clause 7, Annex A
	— improper handling and storage	Clause 7
	— improper use (mounting and grinding process)	Clause 7
	2. Grinding debris	Clause 7
Vibration	Hand arm vibration on hand-held machines caused by:	
	— improper use	Clause 7
	— incorrect mounting	Clause 7
Kickback	Kickback effect of cutting-off wheels on hand-held machines caused by:	—
	— improper use	Clause 7
	— wobbling of cutting-off wheels due to wrong tensioning	5.3.7
	— side coating of cutting-off wheels	5.3.8

5 Safety requirements

5.1 General requirements

Superabrasive products shall be designed and manufactured in such a way that they resist the forces and loads that are to be expected when used as intended. They shall not present visible defects affecting safety and shall comply with the requirements listed in the following clauses.

EN 13236:2019 (E)

5.2 Requirements for precision superabrasive grinding and cutting-off wheels

5.2.1 Bore tolerances

The tolerance class for bores on precision superabrasive grinding and cutting-off wheels is given in ISO 22917.

5.2.2 Sequence of maximum operating speeds

Precision superabrasive grinding and cutting-off wheels shall be manufactured for maximum operating speeds according to the following sequence:

< 16 — 20 — 25 — 32 — 35 — 40 — 45 — 50 — 63 — 80 — 100 — 125 — 140 — 160 — 180 — 200 — 225 — 250 — 280 — 320 in m/s.

Intermediate maximum operating speeds should only be used where the application requirements demand it.

NOTE For conversion of peripheral speeds into speeds of rotation for different outside diameters D of the abrasive product, see Annex D.

5.2.3 Safety factors

Precision superabrasive grinding and cutting-off wheels shall have a safety factor against bursting due to centrifugal forces at their maximum operating speed as given in Table 5.

Table 5 — Safety factors for precision superabrasive grinding and cutting-off wheels

Type of machine	Type of application	Maximum operating speed m/s	Safety factor S_{br}	Burst speed factor f_{br}
stationary machines	mechanically guided grinding and cutting-off	≤ 80	3,0	1,73
	mechanically guided grinding and cutting-off with totally enclosed working area	≤ 320	1,75	1,32
stationary and mobile machines	manually guided grinding and cutting-off	≤ 63	3,0	1,73
		80	3,5	1,87

5.2.4 Maximum operating speeds

Precision superabrasive grinding and cutting-off wheels shall comply with the classification of the sequence of maximum operating speeds in 5.2.2 up to the maximum values given in Table 6.

In the totally enclosed working area, the maximum operating speeds given in Table 6 may be exceeded, if the safety factor required in Table 5 is complied with.

Table 6 — Maximum operating speeds as a function of the bond type

Core	Abrasive section	Maximum operating speed			
		v_s m/s			
		Vitrified V	Resinoid B	Metal M	Single layer: electroplated and vacuum brazed G
Metal	Manufactured on core, e.g. sintered or electroplated	—	100	100	200
	Connected to core, e.g. cemented, screwed, clamped, brazed or welded	180	80	100	—
Resinoid	Manufactured on core, e.g. pressed	—	100	—	—
	Connected to core, e.g. cemented, screwed, clamped	80	80	80	80
Vitrified	Manufactured on core, e.g. pressed	80	—	—	—
	Connected to core, e.g. cemented, screwed, clamped	80	80	80	—

5.2.5 Blotters

Blotters shall be supplied by the manufacturer, supplier or importer where these are required for a safe mounting and use of the superabrasive product.

Blotters shall be made of suitable compressible material. Shape, dimensions and material shall be adapted to application and intended use. When water-based coolants are used the blotter material shall not be affected in the way that it loses its compressibility and physical function.

Blotters can serve as a label for the marking provided the marking requirements of this standard are met and the blotter is firmly attached to the wheel.

5.3 Requirements for non-precision cutting-off wheels

5.3.1 Bore tolerances

The tolerance class for bores for non-precision cutting-off wheels is H9 as per EN ISO 286-2:2010.

5.3.2 Sequence of maximum operating speeds

Non-precision cutting-off wheels shall be manufactured for maximum operating speeds conforming to the following sequence:

20 — 25 — 32 — 35 — 40 — 45 — 50 — 63 — 80 — 100 in m/s.

Intermediate maximum operating speeds should only be used where the application requirements demand it.