SLOVENSKI STANDARD
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Varnostne zahteve za superabrazivne izdelke

Safety requirements for superabrasive products

Sicherheitsanforderungen für Schleifwerkzeuge mit Diamant oder Bornitrid

Prescriptions de sécurité pour les produits superabrasifs

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Safety requirements for superabrasive products

Prescriptions de sécurité pour les produits superabrasifs

Sicherheitsanforderungen für Schleifwerkzeuge mit Diamant oder Bornitrid

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 143.

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

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European foreword

This document (prEN 13236:2026) by Technical Committee CEN/TC"Machine tools - Safety", the secretariat of which is held by SNV.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13236:2019.

prEN 13236:2026 includes the following significant technical changes with respect to EN 13236:2019:

a) replaced Formula (2) by Table 12 with minimum bending moments in 5.3.6.3;

b) changes to centrifugal force test in 6.2.1;

c) changes to shear strength test in 6.2.3.1;

d) added new Figure 8 in 6.2.3.1;

e) flange diameter for tensioning in 6.5 has been added.

Introduction

This document 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 document 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 document.

1 Scope

This document applies to superabrasive 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)*

3 Terms, definitions and symbols

For the purposes of this document, the following terms and definitions apply/ the terms and definitions given in... and the following apply.

— ISO Online browsing platform: available at http://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

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 [1].

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 [2] , EN ISO 11148-9 [3], EN 60745-2-3 [4] and EN ISO 19432 [5].

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

3.4 Type of application

Table 1 — Type of application

Grinding method	Type of machine	Type of application	Superabrasive product	Workpiece	Examples for application/ machines
grinding	stationary grinding machines	mechanically guided grinding	fixed	mechanically guided	Surface grinding, centreless grinding, creep feed grinding, bevel grinding on glass (glass bevelling machine)
			mechanically guided	fixed	Profile grinding of stone and concrete

Grinding method	Type of machine	Type of application	Superabrasive product	Workpiece	Examples for application/ machines
			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)

3.4.1
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 .

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:	—
*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*br	safety factor against bursting due to centrifugal force	Bursting speed divided by maximum operating speed, all squared:	—
*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 at least reaches 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

σb	bending strength	N/mm^2
τS	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.

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 [6].

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	Safety factor	Burst speed factor
		v_s	S_{br}	f_{br}
		m/s		
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 *vs* 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 shall be 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.

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

5.3.3 Safety factors

Non-precision cutting-off wheels shall have a safety factor against bursting due to centrifugal forces at their maximum operating speed as given in Table 7.

Table 7 — Safety factors for non-precision cutting-off wheels

Type of machine	Type of application	Maximum operating speed v_s m/s	Safety factor S_{br}	Burst speed factor f_{br}
stationary cutting-off machines	mechanically guided cutting-off	≤ 100	2,0	1,41
	mechanically guided cutting-off with totally enclosed working area	≤ 100	1,75	1,32
stationary and mobile cutting-off machines	manually guided cutting-off	≤ 100	3,5	1,87
hand-held cutting-off machines	hand-held cutting-off	≤ 100	3,5	1,87

5.3.4 Maximum operating speeds

Non-precision cutting-off wheels shall comply with the sequence of maximum operating speeds in 5.3.2 up to the maximum values given in Table 8.

Table 8 — Maximum operating speeds as a function of the bond type

Cutting rim (abrasive section)	Type of application	Maximum operating speed v_s m/s	
		Metal M	Single layer: electroplated and vacuum brazed G
continuous	mechanically and manually guided cutting-off	100	100
segmented	mechanically and manually guided cutting-off	100	100
continuous or segmented	hand-held cutting-off	100	100

5.3.5 Requirements for the blank