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**SIST EN 13236:2011+A1:2016**  
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**Nadomešča:**  
**SIST EN 13236:2011**

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**Varnostne zahteve za superabrazive (vključno z dopolnilom A1)**

Safety requirements for superabrasive products

Sicherheitsanforderungen für Schleifwerkzeuge mit Diamant oder Bornitrid

Prescriptions de sécurité pour les produits superabrasifs

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**Ta slovenski standard je istoveten z: EN 13236:2010+A1:2015**

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**ICS:**

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EUROPEAN STANDARD

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## Safety requirements for superabrasive products

Prescriptions de sécurité pour les produits  
superabrasifsSicherheitsanforderungen für Schleifwerkzeuge mit  
Diamant oder Bornitrid

This European Standard was approved by CEN on 16 October 2010 and includes Amendment 1 approved by CEN on 17 November 2015.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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## European foreword

This document (EN 13236:2010+A1:2015) 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of an identical text or by endorsement, at the latest by June 2016 and conflicting national standards shall be withdrawn at the latest by June 2016.

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.

The provisions of this European Standard need not be mandatory to superabrasive products manufactured the first 12 months after publication of this European Standard.

This document includes Amendment 1 approved by CEN on 17 November 2015.

This document supersedes A1 EN 13236:2010 A1.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

A1 Significant changes between EN 13236:2001 and EN 13236:2010 were as follows: A1

- a) the standard was technically and editorially revised and partly adapted to EN 12413:2007 about bonded abrasive products and EN 13743:2009 about coated abrasive products;
- b) the term "burst speed factor" was included in Table 2, Table 5, Table 7 and Table 13;
- c) in the requirements it is now distinguished between precision and non-precision cutting-off wheels;
- d) new 5.3.5.3 defines restrictions in design and position of cuts and openings in the metal blank of cutting-off wheels for hand-held applications;
- e) changed 5.3.6.2 on dimensional limitations and bending moment for segmented non-precision cutting-off wheels for hand-held applications, with requirements now depending on segment height and segment length;
- f) requirements for reconditioned non-precision cutting-off wheels were included in new 5.3.6.4 and new normative Annex D;
- g) Clause 6 was shortened to verification of safety requirements. The scope of inspection and testing has been deleted because it is the responsibility of the manufacturer to put in place respective test procedures that give them the confidence that all safety requirements defined in this standard are respected;
- h) the requirements for colour code stripes were deleted in Annex A and are now presented in new Annex B;
- i) Table A.3 and Table A.4 about restrictions for use were combined to one table and thereby adapted to EN 12413 and EN 13743;
- j) Clause A.2 about execution of the marking was simplified;

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- k) Annex B about blotters was deleted and part of its content was included in 5.2.5;
- l) Annex C about mounted points was completely revised and shortened;
- m) Annex D with the speed conversion table (now Annex E) was editorially revised and maximum operating speeds above 320 m/s were deleted;
- n) Annex E about shapes and dimensions of grinding wheels and cutting-off wheels had become obsolete with publication of ISO 6104 and was therefore deleted;
- o) Annex F about grain sizes and concentration for diamond and cubic boron nitride had become obsolete with publication of ISO 6106 and was therefore deleted.

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

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## 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 Safety Requirements of the Machinery Directive.

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

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**EN 13236:2010+A1:2015 (E)****1 Scope**

**[A1]** This European Standard only 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. **[A1]**

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

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

The hazards taken into consideration are listed in Clause 4.

This European Standard does not apply to bonded abrasive products, coated abrasive products, rotating dressing tools, truers nor any non-rotating superabrasive products.

**2 Normative references**

**[A1]** The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies. **[A1]**

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, *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.

**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 machines****3.2.1****stationary grinding machine**

grinding machine being fixed in position during operation

**[A1]** Note 1 to entry: **[A1]** See for example EN 13218.

**3.2.2****mobile grinding machine**

grinding machine not being fixed in position during operation

**[A1]** Note 1 to entry: **[A1]** Mobile grinding machines are manually guided (but not supported) by hand during use, e.g. floor grinding machines.

**3.2.3****hand-held grinding machine**

grinding machine being held in the hand during the grinding process

Ⓐ<sub>1</sub> Note 1 to entry: Ⓐ<sub>1</sub> See for example EN 792-7, EN 792-9, EN 60745-2-3 and EN ISO 19432.

**3.2.4****grinding machine with totally enclosed working area**

stationary grinding machine being protected in such a way by separating guards 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

**3.3 Grinding method****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**

slotting with the periphery of the cutting-off wheel

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**3.4 Type of application**

See Table 1.

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**3.4.1****mechanically guided grinding**

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

**3.4.2****manually guided grinding**

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

**3.4.3****hand-held grinding**

grinding process with grinding machine entirely guided by the operator's hands

Table 1 — Grinding method, type of machine, 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, 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

The symbols used in this European Standard are listed in Table 2.

**Table 2 — Symbols**

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

### 3.6 Other symbols

Other symbols used in this European Standard are listed in Table 3.

Table 3 — Other symbols

Symbol	Designation	Unit
$M_b$	Bending moment	Nm
$F$	Force	N
$F_A$	Shearing force	N
$L_F$	Lever arm	mm
$\sigma_b$	Bending strength	N/mm <sup>2</sup>
$\tau_s$	Shear strength	N/mm <sup>2</sup>

#### 4 List of significant hazards

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 C and Annex D
	— manufacturing defects	5.1
	— wrong selection	Clause 7, Annex A and Annex B
	— improper handling and storage	Clause 7
	— improper use (mounting and grinding process)	Clause 7
Vibration	2. Grinding debris	Clause 7
	3. Hand arm vibration on hand-held machines caused by:	
	— improper use	Clause 7
	— incorrect mounting	Clause 7

#### 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.

### 5.2.2 Sequence of maximum operating speeds

Precision superabrasive grinding and cutting-off wheels shall be manufactured for maximum operating speeds conforming 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.

NOTE For conversion of maximum operating speeds into speeds of rotation for different outside diameters  $D$  of the abrasive product, see Annex E.

### 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 $v_s$ m/s	Safety factor $S_{br}$	Burst speed factor $f_{br}$
Stationary grinding machines	Mechanically guided grinding	$\leq 80$	3,0	1,73
	Mechanically guided grinding with totally enclosed working area	$\leq 320$	1,75	1,32
Stationary and mobile grinding machines	Manually guided grinding	$\leq 63$	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.