SLOVENSKI STANDARD
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Varnostne zahteve za superabrazive

Safety requirements for superabrasive products

Sicherheitsanforderungen für Schleifwerkzeuge mit Diamant oder Bornitrid

Prescriptions de sécurité pour les produits superabrasifs

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25.100.70 Brusiva Abrasives

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EUROPEAN STANDARD

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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 16 October 2010.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 13236:2010) 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of an identical text or by endorsement, at the latest by May 2011, and conflicting national standards shall be withdrawn at the latest by November 2011.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.

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

This document supersedes EN 13236:2001.

Significant changes against EN 13236:2001 are as follows:

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;

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, 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 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.

1 Scope

This European Standard is applicable to the following superabrasive products: precision superabrasive 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 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

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 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

NOTE See for example EN 13218.

3.2.2
mobile grinding machine
grinding machine not being fixed in position during operation

NOTE 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

NOTE 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

3.4 Type of application

See Table 1.

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
$v_{br\ min}$	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
σ_b	Bending strength	N/mm^2
τ_S	Shear strength	N/mm^2

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
	2. Grinding debris	Clause 7
Vibration	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.