



SLOVENSKI STANDARD

SIST EN 13218:2003

01-november-2003

Obdelovalni stroji - Varnost – Stacionarni brusni stroji

Machine tools - Safety - Stationary grinding machines

Werkzeugmaschinen - Sicherheit - Ortsfeste Schleifmaschinen

Machines-outils - Sécurité - Machines à meuler fixes

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Ta slovenski standard je istoveten z: ^{SIST EN 13218:2003} EN 13218:2002

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ICS:

25.080.50	Brusilni in polirni stroji	Grinding and polishing machines
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13218

June 2002

ICS 25.080.50

English version

Machine tools - Safety - Stationary grinding machines

Machines-outils - Sécurité - Machines à meuler fixes

Werkzeugmaschinen - Sicherheit - Ortsfeste Schleifmaschinen

This European Standard was approved by CEN on 26 August 2001.

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 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 Management Centre has the same status as the official versions.

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

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Contents

	Page		Page
Foreword	3	Annex A (normative) Abrasive product guards, workzone enclosures and their combinations on stationary grinding machines	38
0 Introduction	4	A.1 Scope	38
1 Scope	4	A.2 Terms and symbols	38
2 Normative references	4	A.3 Safety requirements for abrasive product guards and workzone enclosures	39
3 Terms and definitions	7	A.3.1 Shapes of abrasive product guards and angles of aperture	39
3.1 Grinding machine	7	A.3.2 Wall thicknesses and material	46
3.2 Stationary grinding machine	7	A.3.3 Compound abrasive product guards	56
3.3 Abrasive product	11	A.3.4 Workzone enclosures	57
3.4 Dressing tool	11	A.3.5 Verification of strength, testing	58
3.5 Rotational and peripheral speed	12	A.3.6 Attachment of transparent screens in workzone enclosures	59
3.6 Maximum operating speed	12	A.3.7 Screens for bench and pedestal grinding machines	59
3.7 Maximum rotational speed	12	A.4 Criteria for the design of abrasive product guards and their means of attachment	60
3.8 Type of application	12	A.4.1 General	60
3.9 Manual mode	13	A.4.2 Energy of abrasive product fragments	61
3.10 Setting mode	13	A.4.3 Determination of wall thicknesses of abrasive product guards	61
3.11 Special mode	13	A.4.4 Design of the means of attachment	62
3.12 Automatic mode	13		
3.13 Operational stop	13		
3.14 Safe operational stop	13		
3.15 Safe stop	13		
3.16 Grinding face	13		
3.17 Abrasive product guard	14		
3.18 Work zone enclosure	14		
3.19 Tool holding device	14		
3.20 Extraction system	14		
4 List of significant hazards	14	Annex B (normative) Clamping methods for abrasive products and safety requirements for tool holding devices	64
5 Safety requirements and/or protective measures	21	B.1 Scope	64
5.1 General	21	B.2 Clamping methods	64
5.2 Mechanical hazards	21	B.3 General requirements	64
5.3 Electrical hazards	24	B.4 Design of flanges	64
5.4 Noise	25	B.4.1 Clamping forces and tightening torques	64
5.5 Vibration	25	B.4.2 Outside clamping diameter, radial width and covering	65
5.6 Hazards resulting from dusts, fumes and mists	25	B.4.3 Stiffness	68
5.7 Devices for the use of coolants	26	B.4.4 Marking of flanges	69
5.8 Measures against fire and explosion hazards	27	B.5 Devices for mounting of abrasive products by means of clamping inserts	69
5.9 Lighting	27	B.5.1 Central threaded inserts	69
5.10 Control systems and control devices	27	B.5.2 Method for the determination of the run-out tolerance for collets	70
5.11 Electromagnetic compatibility	31	B.5.3 Inserts for abrasive products type 2, 35, 36, 37 (see EN 12413) and comparable abrasive products	71
6 Verification of the safety requirements and/or measures	32		
7 Information for use	34		
7.1 General	34		
7.2 Instruction handbook	34		
7.3 Marking	37		

	Page		Page
Annex C (informative) Calculation of the clamping force and the tightening torque for the mounting of abrasive products by means of flanges	76	Annex F (normative) Requirements for grinding machines for the machining of materials generating flammable and explosive dusts	85
C.1 Symbols	76	F.1 Devices for wet grinding	85
C.2 Operating forces	77	F.2 Devices for dry grinding with wet precipitation by means of instantaneous moistening	85
C.3 Necessary clamping force	79	F.3 Devices for dry grinding with precipitation by means of a wet-type cyclone	86
C.4 Tightening torque of the screws	81	F.4 Additional requirements, dry grinding	87
C.5 Surface pressure	81	Annex G (informative) Relevant and special clauses for different types of stationary grinding machine	85
Annex D (informative) Noise reduction	83	Annex ZA (informative) Relationship of this European Standard with other EC Directives	88
D.1 Measures for the reduction of noise emission	83	Bibliography	89
Annex E (informative) Noise emission determination, declaration and verification	84		
E.1 Measuring procedure	84		
E.2 Operating conditions	84		
E.3 Declaration and verification of noise emission values	84		

Foreword

This document (EN 13218:2002) has been prepared by Technical Committee CEN/TC 143 "Machine tools - Safety", the secretariat of which is held by SNV. standards.iteh.ai

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 December 2002, and conflicting national standards shall be withdrawn at the latest by December 2002.

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.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

EN 13218:2002 (E)

0 Introduction

This European standard has been prepared to be a harmonised standard to provide one means of conforming with the essential safety requirements of the Machinery Directive and associated EFTA regulations. This standard is a type C standard as stated in EN 292-1:1991.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this standard.

1 Scope

This standard specifies the technical safety requirements and/or protective measures to be adopted by persons undertaking the design, construction and supply (including installation and dismantling, arrangements for transport and maintenance) of stationary grinding machines as defined in 3.1 and 3.2 and intended to be used for the grinding of workpieces of cold metal.

This standard deals with the significant hazards as listed in 4.

This standard does not apply to honing, polishing and belt grinding machines.

This standard applies to machines which are manufactured after the date of issue of this standard.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies (including amendments).

CR 1030-1

Hand-arm vibration – Guidelines for vibration hazards reduction – Part 1: Engineering methods by design of machinery

EN 287-1

Approval testing of welders – Fusion welding – Part 1: Steels

EN 287-2

Approval testing of welders – Fusion welding – Part 2: Aluminium and aluminium alloys

EN 288-1

Specification and qualification of welding procedures for metallic materials – Part 1: General rules for fusion welding

EN 292-1:1991

Safety of machinery – Basic concepts, general principles for design – Part 1: Basic terminology, methodology

EN 292-2:1991

Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles and specifications

EN 292-2:1991/A1:1995

Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles and specifications; Amendment A1

EN 294

Safety of machinery – Safety distances to prevent danger zones being reached by the upper limbs

EN 349

Safety of machinery – Minimum gaps to avoid crushing of parts of the human body

- EN 418
Safety of machinery – Emergency stop equipment, functional aspects – Principles for design
- EN 547-1
Safety of machinery - Human body measurements - Part 1: Principles for determining the dimensions required for openings for whole body access into machinery
- EN 547-2
Safety of machinery - Human body measurements - Part 2: Principles for determining the dimensions required for access openings
- EN 614-1
Safety of machinery - Ergonomic design principles - Part 1: Terminology and general principles
- EN 626-1
Safety of machinery - Reduction of risks to health from hazardous substances emitted by machinery - Part 1: Principles and specifications for machinery manufacturers
- EN 729-1
Quality requirements for welding – Fusion welding of metallic materials – Part 1: Guidelines for selection and use
- EN 953
Safety of machinery – Guards – General requirements for the design and construction of fixed and movable guards
- EN 954-1
Safety of machinery – Safety-related parts of control systems – Part 1: General principles for design
- EN 982
Safety of machinery – Safety requirements for fluid power systems and their components – Hydraulics
- EN 983
Safety of machinery – Safety requirements for fluid power systems and their components – Pneumatics
- EN 1033
Hand arm vibration – Laboratory measurement of vibration at the grip surface of hand guided machinery – General
- EN 1037
Safety of machinery – Prevention of unexpected start-up
- EN 1050:1996
Safety of machinery – Principles for risk assessment
- EN 1070
Safety of machinery – Terminology
- EN 1088:1995
Safety of machinery – Interlocking devices associated with guards – Principles for design and selection
- EN 1127-1:1997
Explosive atmospheres – Explosion prevention and protection – Part 1: Basic concepts and methodology
- EN 1837
Safety of machinery - Integral lighting of machines
- EN 10025
Hot rolled products of non-alloy structured steels - Technical delivery conditions
- EN 10130:1991 + A1
Cold-rolled low carbon steel flat products for cold forming – Technical delivery conditions
- EN 12096
Mechanical vibration – Declaration and verification of vibration emission values

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EN 13218:2002 (E)

EN 12413

Safety requirements for bonded abrasive products

EN 13236

Safety requirements for superabrasives

EN 13478

Safety of machinery – Fire prevention and protection

EN 22553

Welded, brazed and soldered joints – Symbolic representation on drawings (ISO 2553:1992)

EN 25817:1992

Arc-welded joints in steel – Guidance on quality levels for imperfections (ISO 5817:1992)

ENV 26385

Ergonomic principles for the design of work systems (ISO 6385:1981)

EN 50081-2

Electromagnetic compatibility – Generic emission standard – Part 2: Industrial environment

EN 50082-2

Electromagnetic compatibility – Generic immunity standard – Part 2: Industrial environment

EN 60204-1:1997

Safety of machinery – Electrical equipment of machines – Part 1: General requirements (IEC 60204-1:1997)

EN 61310-2

Safety of machinery – Indication, marking and actuation – Part 2: Requirements for marking (IEC 61310-2:1995)

EN ISO 3744

Acoustics – Determination of sound power levels of noise sources using sound pressure – Engineering method in an essentially free field over a reflecting plane (ISO 3744:1994)

SIST EN 13218:2003

EN ISO 3746

Acoustics – Determination of sound power levels of noise sources using sound pressure – Survey method using an enveloping measurement surface over a reflecting plane (ISO 3746:1995)

EN ISO 4871

Acoustics – Declaration and verification of noise emission values of machinery and equipment (ISO 4871:1996)

EN ISO 11201

Acoustics – Noise emitted by machinery and equipment – Measurements of emission sound pressure levels at a work station and at other specified positions – Engineering method in an essentially free field over a reflecting plane (ISO 11201:1995)

EN ISO 11202

Acoustics – Noise emitted by machinery and equipment – Measurements of emission sound pressure levels at a work station and at other specified positions – Survey method in situ (ISO 11202:1995)

EN ISO 11204

Acoustics – Noise emitted by machinery and equipment – Measurements of emission sound pressure levels at a work station and at other specified positions – Method requiring environmental corrections (ISO 11204:1995)

EN ISO 11688-1

Acoustics – Recommended practice for the design of low-noise machinery and equipment – Part 1: Planning (ISO/TR 11688-1:1995)

ISO 230-5

Test code for machine tools – Part 5: Determination of the noise emission

ISO 666

Machine tools – Mounting of plain grinding wheels by means of hub flanges

ISO 1052

Steels for general engineering purposes

ISO 1083

Spheroidal graphite cast iron – Classification

ISO 3522

Cast aluminium alloys – Chemical composition and mechanical properties

ISO 3574

Cold-reduced carbon steel sheet of commercial and drawing qualities

ISO 4997

Cold-reduced steel sheet of structural quality

ISO 6316

Hot-rolled steel strip of structural quality

ISO 6361-2

Wrought aluminium and aluminium alloy sheets, strips and plates – Part 2: Mechanical properties

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 1070 and the following terms and definitions apply.

Additional terms and definitions specifically needed for this standard are added below.

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3.1

grinding machine

machine tool intended to machine workpieces by means of abrasive products

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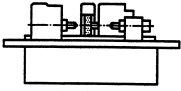
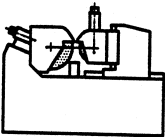
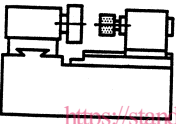
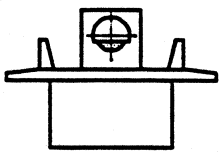
3.2

stationary grinding machine

grinding machine fixed in position during operation and capable of a combination of one or more types of operations, examples see Table 1

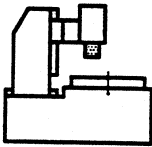
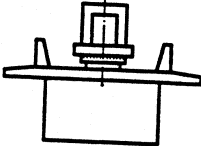
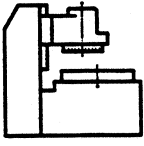
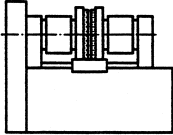
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Table 1: Stationary grinding machines

No.	Machine	Designation	Grinding method
1.1		de: Außenrundscheifmaschine en: External cylindrical grinding machine fr: Rectifieuse cylindrique extérieure	External cylindrical grinding The grinding of the external surface of a rotating workpiece. The workpiece and the grinding wheel are mechanically guided.
1.2		de: Spitzenlose Außenrundscheifmaschine en: Centreless external cylindrical grinding machine fr: Rectifieuse cylindrique sans centre	Centreless grinding The grinding of the external surface of a rotating workpiece. The workpiece is rotated mechanically guided with reference to the grinding wheel by means of a control-wheel and rests on a straight-edge placed between the two wheels.
1.3		de: Innenrundscheifmaschine en: Internal cylindrical grinding machine fr: Rectifieuse cylindrique intérieure	Internal grinding The grinding of the internal surface of a rotating workpiece. The workpiece and the grinding wheel are mechanically guided.
1.4		de: Planscheifmaschine, Rechtecktisch, waagerechte Spindel en: Surface grinding machine, reciprocating table, horizontal spindle fr: Rectifieuse plane à table a déplacement rectiligne – broche horizontale	Surface grinding-peripheral grinding The grinding of plane surfaces of a workpiece. The workpiece is secured to a reciprocating table. The workpiece and the grinding wheel are mechanically guided.


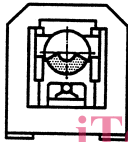
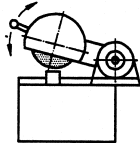
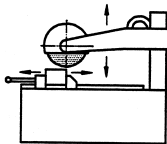
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Table 1 (continued)

No.	Machine	Designation	Grinding method
1.5		de: Planschleifmaschine, Rundtisch, waagerechte Spindel en: Surface grinding machine, rotary table horizontal spindle fr: Rectifieuse plane à table rotative – broche hori- zontale	Surface grinding – peripheral grinding The grinding of plane surfaces of a workpiece. The workpiece is secured to a rotary table. The workpiece and the grinding wheel are mechanically guided.
1.6		de: Planschleifmaschine, Rechtecktisch, senk- rechte Spindel en: Surface grinding machine, reciprocating table, vertical spindle fr: Rectifieuse plane à table a déplacement rectiligne – broche verticale	Surface grinding – face grinding The grinding of plane surfaces of a workpiece. The workpiece is secured to a reciprocating table. The workpiece and the grinding wheel are mechanically guided.
1.7		de: Planschleifmaschine, Rundtisch, senkrechte Spindel en: Surface grinding machine, rotary table vertical spindle fr: Rectifieuse plane à table a déplacement rota- tive – broche verticale	Surface grinding – face grinding The grinding of plane surfaces of a workpiece. The workpiece is secured to a rotary table. The workpiece and the grinding wheel are mechanically guided.
1.8		de: Doppelspindel-Plan- schleifmaschine, waage- rechte oder senkrechte Spindeln en: Surface grinding machine, double spindle horizontal or vertical fr: Rectifieuse plane à deux	Surface grinding – face grinding The grinding of a workpiece by passing it between two disc or cylinder wheels or segments. The workpiece and the grinding wheels are mechanically guided.

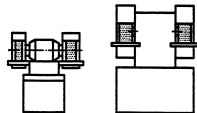
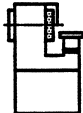

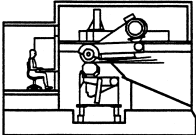
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Table 1 (continued)

No.	Machine	Designation	Grinding method
1.9		de: Werkzeugschleif- maschine en: Tool grinding machine fr: Affûteuse	Peripheral and face grind- ing The grinding or regrinding of cutting faces and edges of tools (workpiece). The workpieces and the grinding wheels are mechanically guided.
1.10		de: Trennschleifmaschine en: Cutting-off machine fr: Tronçonneuse	Cutting-off The grinding of workpieces for slotting or cutting-off. The workpiece is firmly fixed and the cutting-off wheel is mechanically guided.
1.11		de: Trennschleifmaschine en: Cutting-off machine fr: Tronçonneuse	Cutting-off The grinding of workpieces for cutting-off. The workpiece is firmly clamped, the cutting-off wheel is guided by hand.
1.12		de: Trennschleifmaschine en: Cutting-off machine fr: Tronçonneuse	Cutting-off The grinding of workpieces for slotting or cutting-off. The workpiece is guided by hand. The cutting-off wheel is mechanically guided.

(continued)

Table 1 (concluded)

No.	Machine	Designation	Grinding method
1.13		de: Tisch- oder Ständer- schleifmaschine en: Bench or pedestal grinding machine fr: Touret pour établi ou sur	Peripheral grinding The grinding of a surface of a workpiece using the wheel periphery.
1.14		de: Ständerschleifmaschine en: Pedestal grinding machine fr: Lapidaire	Face grinding The grinding of a surface of a workpiece using the wheel face. The workpiece is guided by hand.
1.15		de: Pendelschleifmaschine en: Swing frame grinding machine fr: Meulage et tronçonnage avec machine suspendue	Peripheral grinding/cutting-off The grinding or cutting of a workpiece using the wheel periphery. The workpiece is firmly clamped or stabilized by its own weight. The grinding machine is suspended and guided by hand.
1.16		de: Hochdruckschleif- maschine en: High pressure grinding machine fr: Machine pour meulage à	Surface grinding High pressure grinding where the workpiece is secured to a table. The workpiece and the grinding wheel are mechanically guided.

3.3

abrasive product

cutting tools of varied shapes with geometrically unspecified cutting edges. They are made from abrasive grains and bond. There is a distinction between bonded abrasive products and superabrasives, see EN 12413 and EN 13236

3.4

dressing tool

fixed or rotary tool for the generation or reproduction of the grinding capacity (sharpening) and/or the geometry (truing) of abrasive products

EN 13218:2002 (E)

3.5

rotational and peripheral speed

peripheral speed of a grinding wheel is calculated by the formula:

$$v = \frac{D \times \pi \times n}{60 \times 1\,000}$$

The speed of rotation of a grinding wheel is calculated by the formula:

$$n = \frac{v \times 1\,000 \times 60}{D \times \pi}$$

where

n is the speed of rotation in rotations per minute ;

v is the peripheral speed in metres per second;

D is the outside diameter of the abrasive product in millimetres

3.6

maximum operating speed

maximum permissible peripheral speed of a rotating abrasive product

3.7

maximum rotational speed

maximum rotational speed of a grinding wheel spindle under all operating conditions. Rotational speed of a new abrasive product at maximum operating speed

3.8

type of application

see Table 2

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Grinding method	Type of application	Abrasive product	Workpiece
Grinding	Mechanically guided grinding	Fixed	Guided mechanically
		Guided mechanically	Fixed
		Guided mechanically	Guided mechanically
	Manually guided grinding	Guided by hand	Fixed
		Fixed	Guided by hand
Cutting-off	Mechanically guided cutting-off	Fixed	Guided mechanically
		Guided mechanically	Fixed
		Guided mechanically	Guided mechanically
	Manually guided cutting-off	Guided by hand	Fixed
		Fixed	Guided by hand

The type of feed describes the way in which workpiece and abrasive product are moved to each other. There is a distinction between

a) mechanical feed, see Table 1, e. g. No. 1.1

and

b) manual feed, see Table 1, e. g. No. 1.13.

There is also the possibility of mechanical and manual feed combinations on a single grinding machine, see Table 1, e. g. No. 1.12.

3.9

manual mode

operation mode for the machining under manual control. All process steps for the machining are controlled or started by an operator without support by an NC-machining program

3.10

setting mode

operation mode at which the operator executes the setting for the subsequent machining process

NOTE: The setting mode includes e. g. alignment of the tool and determination of the workpiece position by touching with the rotating abrasive product.

3.11

special mode

operation mode at which the possibility for manual intervention into the machining process as well as for a limited automatic mode (fixed sequence of separate consecutive steps) started by the operator, is given

3.12

automatic mode

Operation mode where only the start-up of a machining process is initiated by the operator, all subsequent process steps being automatically carried out

3.13

operational stop

Stop of the machine movements in the production process. Control functions between control system and machine drives are maintained (torque, speed of rotation, position)

3.14

safe operational stop

operation stop with additional control system measures preventing dangerous machine movements due to control system faults

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3.15

safe stop

removal of the energy supply to the machine actuator, preventing dangerous machine movements due to control system faults

3.16

grinding face

that part of an abrasive product which is used to grind the workpiece (examples, see Figures 1 to 3)

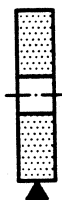


Figure 1
Peripheral grinding

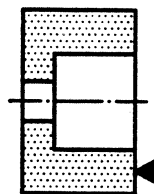


Figure 2
Face grinding

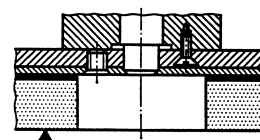


Figure 3
Side grinding