SLOVENSKI STANDARD
SIST EN 68:2000

01-december-2000

Hand-held (portable) power driven grinding machines - Mechanical safety

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Handgeführte, motorgetriebene Schleifmaschinen - Mechanische Sicherheit

Meuleuses tenues a la main (portatives) entraînées par moteur - Sécurité mécanique

Ta slovenski standard je istoveten z: **EN 68:1977**

ICS:

25.140.10 Pnevmatična orodja Pneumatic tools

SIST EN 68:2000 **en**

EUROPEAN STANDARD
NORME EUROPEENNE
EUROPÄISCHE NORM

EN 68

Edition 1

October 1977

UDC 621.924.1-182.4

Key words: Grinding machines, portable electric machine tools, shafts, mouting flanges, grinding wheels, safety devices, adjusting systems, rotational velocity, specifications, dimensions, setting-up conditions, safety requirements, marki[illegible]

English version

HAND HELD (PORTABLE) POWER DRIVEN GRINDING MACHINES - MECHANICAL SAFETY

Meuleuses tenues à la main (portatives) entraînées par moteur - Securité mécanique

Handgeführte, motorgetriebene Schleifmaschinen - Mechanische Sicherheit

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

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EUROPEAN COMMITTEE FOR STANDARDIZATION
Comité Européen de Normalisation
Europäisches Komitee für Normung

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BRIEF HISTORY

The text of this standard, drawn up by CEN Technical Committee TC 65 "Portable grinding machines - Mechanical safety", was submitted to the CEN Members for ballot in February 1977 with a view to its adoption as a European Standard.

This standard was adopted as a European Standard by CEN in October 1977 as a result of its acceptance by the following CEN Member countries :

France, Germany, Ireland, Italy, Netherlands and Sweden.

This standard specifies safety requirements related to the mechanical design of hand held (portable) power driven grinding machines in order to provide for a common basis for inspection of these machines in relation to trade between the countries concerned.

Regarding safety in the use of grinding machines and grinding wheels, other requirements have to be taken into account, for which no European Standards are available as yet. As a provisional measure, some recommendations on the use of portable grinding machines are given in annex to this standard for information only.

CONTENTS

ANNEXES (not an integral part of the standard)

HAND HELD (PORTABLE) POWER DRIVEN GRINDING MACHINES - MECHANICAL SAFETY

1. Scope

This standard specifies safety requirements for the mechanical design of hand held (portable) power driven grinding machines (see annex A for examples).

It does not deal with other safety aspects of these machines such as electrical safety, dust, noise and vibration hazards. 1)

Safety recommendations on the use of portable grinding machines are given in annex F.

2. Field of application

The standard applies to portable grinding machines to be used with:

- straight-sided wheels, taper-sided wheels, cup wheels and reinforced depressed-centre and cutting-off wheels (see annex B for examples)
- cones and plugs with threaded holes (see annex C for examples)
- mounted wheels and points (see annex D for examples).

The standard does not apply to portable grinding machines designed to be used with

- wheels driven with a peripheral speed exceeding 85 m/s
- straight-sided wheels with a diameter exceeding 200 mm.

3. References

Eu 25-1972, Structural steels for general use.
Eu 32-1966, Hot rolled and cold reduced carbon steel sheet of commercial and drawing qualities

Additional references to ISO standards, CEE and FEPA publications are given in annex G for information.

4. Definitions

Hand held (portable) power driven grinding machine: A power driven machine intended for grinding and so designed that the motor and the machine form an assembly which is held by hand or guided by hand while suspended during operation.

NOTE 1: The machine may have provision for mounting on a support.

NOTE 2: Wheel diameters for the machines shall be according to those specified in tables 2, 3, 4 and 5.

Machine spindle: The shaft of the grinding machine which supports and drives the abrasive wheel.

Flange assembly: All means provided to clamp the abrasive wheel to the machine spindle.

Flanges (clamping): A set of flanges between which an unthreaded hole abrasive wheel is clamped to mount it on the machine spindle.

Flange (backing): A flange fixed to the machine spindle having an unrecessed flat surface against which a threaded hole wheel, cone or plug is screwed.

Flange outside diameter: The outside diameter of the bearing surface of a flange.

1) CEE-publication 20 'Specification for hand held electric motor operated tools' deals with electrical safety and related mechanical safety.

Guard (wheel): A device which partially encloses the abrasive wheel in order to protect against accidental contact with the wheel and against ejection of fragments of the wheel in case of breakage.

5. Rotational frequency

The machine shall be so constructed that under the conditions marked on the machine (see clause 11) the rated free rotational frequency shall not be exceeded by more than 10%.

In the case of fluid powered machines the rotational frequency may be dependent on the inlet pressure. Where a pressure regulator is used for controlling the inlet pressure, this shall be fitted with a pressure gauge.

6. Machine spindle

The machine spindle shall be made of steel resistant to impact. It shall be free from cracks and shall not have sharp changes of section.

In designing the spindle the dimensions and the mass of the grinding wheels to be used shall be taken into consideration.

The spindle shall have a suitable means for applying a tachometer.

The direction of the spindle thread shall be such that any clamping device, collet or threaded-hole wheel shall tend to tighten during grinding.

In order to prevent mis-matching with 5/8 in. and 3/4 in. UNC threads, metric threads M16 and M20 shall not be used on spindles intended for mounting threaded-hole grinding wheels.

7. Flanges

7.1 General

The inner (driving) flange shall be keyed, screwed, shrunk or otherwise secured to prevent rotation relative to the spindle. The inner flange bearing surface shall run true with a tolerance giving a total indicator reading not greater than 0,3% of the diameter at the position of the indicator.

Both flanges between which a wheel is mounted shall be of the same outside diameter and shall have equal bearing surfaces, with the exception of the assembly shown in figure 5.

The flanges shall be made of steel Fe 430B according to Euronorm 25 to the dimensions specified below. Or of other material and dimensions to give adequate strength, in which case the test according to 7.2 shall be made.

The clamping nut for retaining depressed-centre and cutting-off wheels shall always be of steel to the above specification.

7.2 Test for flanges

Where thickness, shape or material of flanges are other than those specified the following test shall be made:

- The abrasive wheel shall be replaced on the machine by a steel disc having similar thickness and shape as the wheel.
- The clamping nut shall be tightened with a first test torque according to table 1, and a feeler gauge 0,05 mm thick used to test whether the flanges are

in contact with the disc all round their circumference. The test is complied with if the feeler gauge at no place can be pushed underneath the flanges.

- The clamping nut shall be tightened with a second test torque according to table 1, and a feeler gauge 0,05 mm thick used to test the deflection of the flanges. The test is complied with if the feeler gauge at no place can be pushed underneath the flanges by more than 1 mm.

TABLE 1 : Torques for testing flanges

Thread		First test torque – Nm	Second test torque Nm
mm	inch		
M 8	-	2	8
M 10	3/8"	4	15
M 12	1/2"	7,5	30
M 14	-	11	45
M 16	5/8"	17,5	70
M 20	3/4"	35	140

7.3 Flanges for straight-sided wheels and unthreaded-hole cup wheels

Dimensions of flanges for straight-sided and unthreaded-hole cup wheels of diameters greater than or equal to 50 mm, are given in table 2 in connection with figure 1 (according to FEPA No. 12). Their external diameter shall be not less than 1/3 of the diameter of the wheel.

The outer form of the flange is left to the discretion of the manufacturer.

Flanges of other designs, but having the same outside diameter and radial width of bearing surface as in table 2 and of equivalent strength, may be used.

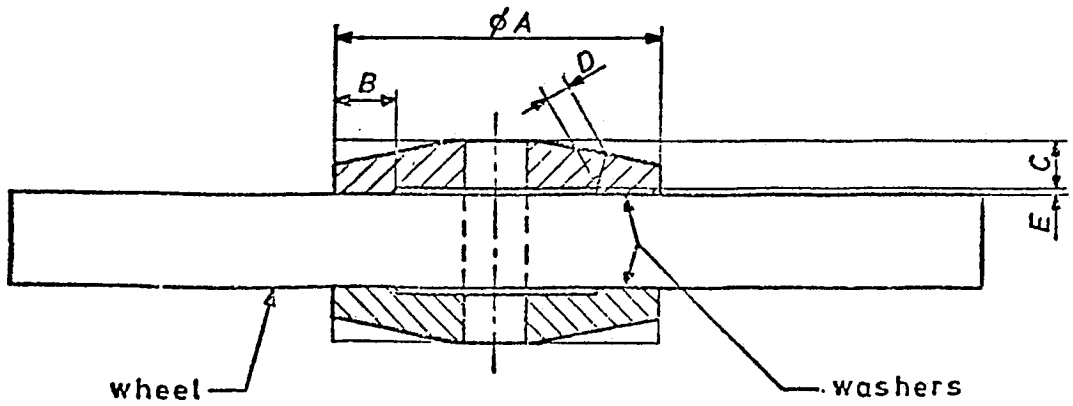

FIGURE 1 Flanges for straight-sided wheels (excluding reinforced cutting-off wheels) and unthreaded-hole cup wheels (for dimensions see table 2)

TABLE 2: Dimensions of flanges for straight-sided wheels (excluding reinforced cutting-off wheels) and unthreaded-hole cup wheels (see figure 1)

Dimensions in millimetres

Diameter of wheel	Minimum outside diameter of flange	Radial width of bearing surface 1)		Minimum thickness of flange at bore	Minimum thickness of flange at edge of recess	Minimum depth of recess
		min	max			
	A	B		C	D	E
50	17	3	5	3	2,5	1
80	27	3	5	5	2,5	1
100	34	3	6	5	3,2	1
125	42	5	8	6	3,2	1
150	50	6	13	8	5,0	1
175	58	6	13	8	5,0	2
200	67	6	13	10	5,0	2

1) NOTE:

Where a wheel is provided with a loose bush, care shall be taken that the radial width of bearing surfaces on the wheel itself is not less than the indicated minimum value.

7.4 Flanges for taper-sided wheels

A taper-sided wheel may be used in place of a straight-sided wheel, where the use of a guard is impracticable. Dimensions of flanges for taper-sided wheels are given in table 3 in connection with figure 2 (according to FEPA No. 12). Their external diameter shall be not less than $\frac{1}{2}$ the diameter of the wheel.

The outer form of the flange is left to the discretion of the manufacturer.

Flanges of other designs, but having the same outside diameter and radial width of bearing surface as in table 3 and of adequate strength, may be used.

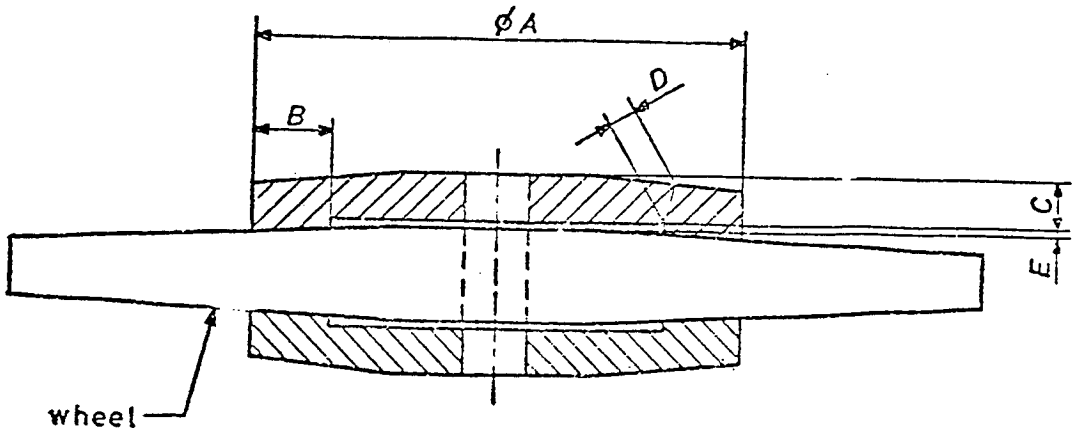

FIGURE 2 Flanges for taper-sided wheels (for dimensions see table 3)

TABLE 3: Dimensions of taper protection flanges for taper-sided wheels (see figure 2)

Dimensions in millimetres

Diameter of wheel	Minimum outside diameter of flange	Minimum radial width of bearing surface 1)	Minimum thickness of flange at bore	Minimum thickness at edge of recess	Minimum depth of recess
	A	B	C	D	E
100	50	8	5	5	1
125	63	10	6	5	1
150	75	13	8	5	1
175	88	14	8	6	1
200	100	16	8	6	2

1) NOTE

Care shall be taken that for wheels with larger holes the radial width of bearing surfaces on the wheel itself is not less than the minimum value given in this column.

7.5 Flanges for threaded-hole cup wheels, cones and plugs

The wheels are mounted by screwing them on to a machine spindle, so that the back of the wheel seats against an unrecessed flange or flat surface, which shall be of sufficient diameter to ensure adequate support to the wheel.

If threaded hole wheels have blind holes, the length of the spindle and depth of the hole shall be such that the end of the spindle does not touch the bottom of the wheel hole.

Dimensions of flanges for threaded wheels are given in table 4 in connection with figure 3 (according to FEPA No. 12).

The outer form of the flange is left to the discretion of the manufacturer.

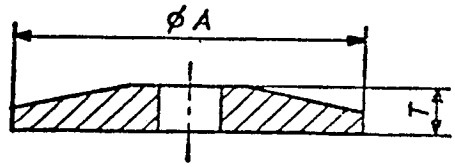

FIGURE 3 Unrecessed flange for threaded wheels (for dimensions see table 4)

TABLE 4: Minimum dimensions of unrecessed flanges for threaded wheels (see figure 3)

Dimensions in millimetres

Diameter of wheel	Minimum outside diameter of flange [1] A	Minimum thickness of flange T
25	16	3
50	25	3
80	25	5
100	35	5
125	45	6
150	50	10

[1] NOTE:

The minimum outside diameter of the flange shall be larger than the outside diameter of the threaded insert.
Where wheels with safety back bush (figure 15) or wheels with integral guard (figure 16) are used, this note does not apply.

7.6 Flange assemblies for reinforced depressed-centre and cutting-off wheels

Flange assemblies shall be made in accordance with figure 4 and table 5. Figure 5 shows a special flange assembly for depressed-centre wheels which also may be used.

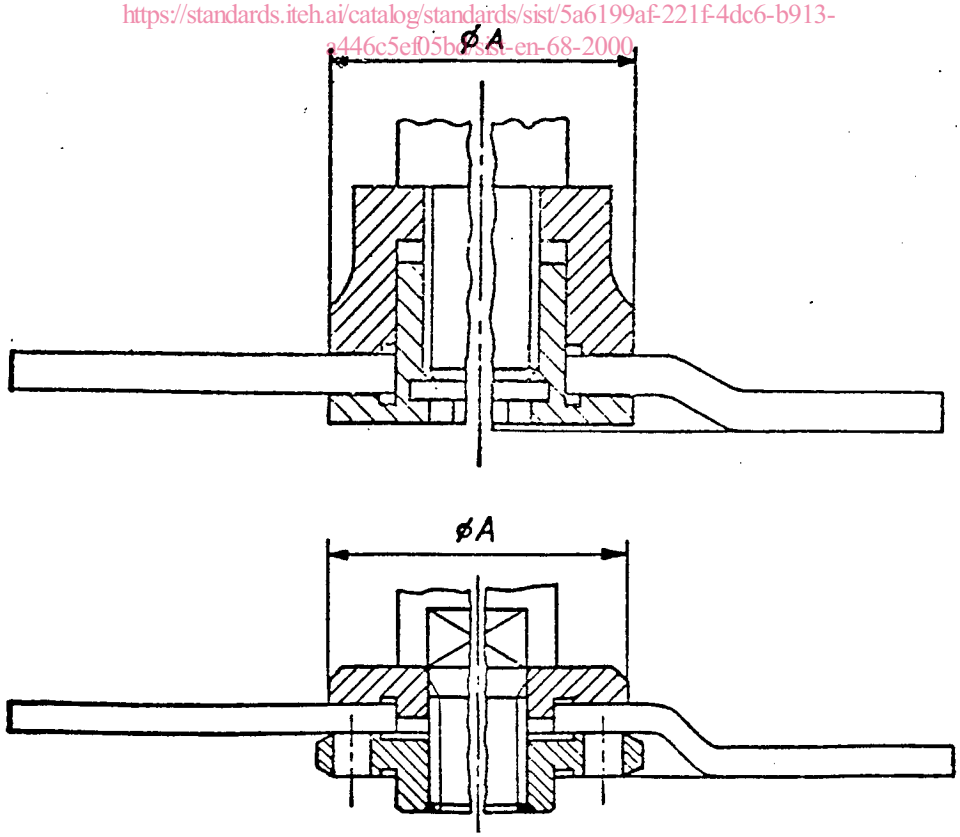

FIGURE 4 Examples of flange assemblies for reinforced depressed-centre and cutting-off wheels (for dimensions see table 5)

TABLE 5: Dimensions for flange assemblies for reinforced depressed-centre and cutting-off wheels (see figure 4)

Dimensions in millimetres

Diameter of wheel	Outside diameter of flange A	
	min	max
⩽ 100 [1]	18	19
> 100 ⩽ 230 [2]	39	41

1) NOTE: For wheels having a hole diameter of 16 mm the outside diameter of the flange shall be minimum 30 mm and maximum 32 mm.

2) NOTE: For cutting-off wheels of diameters greater than 230 mm the flanges shall be not less than 1/3 of the diameter of the wheel.

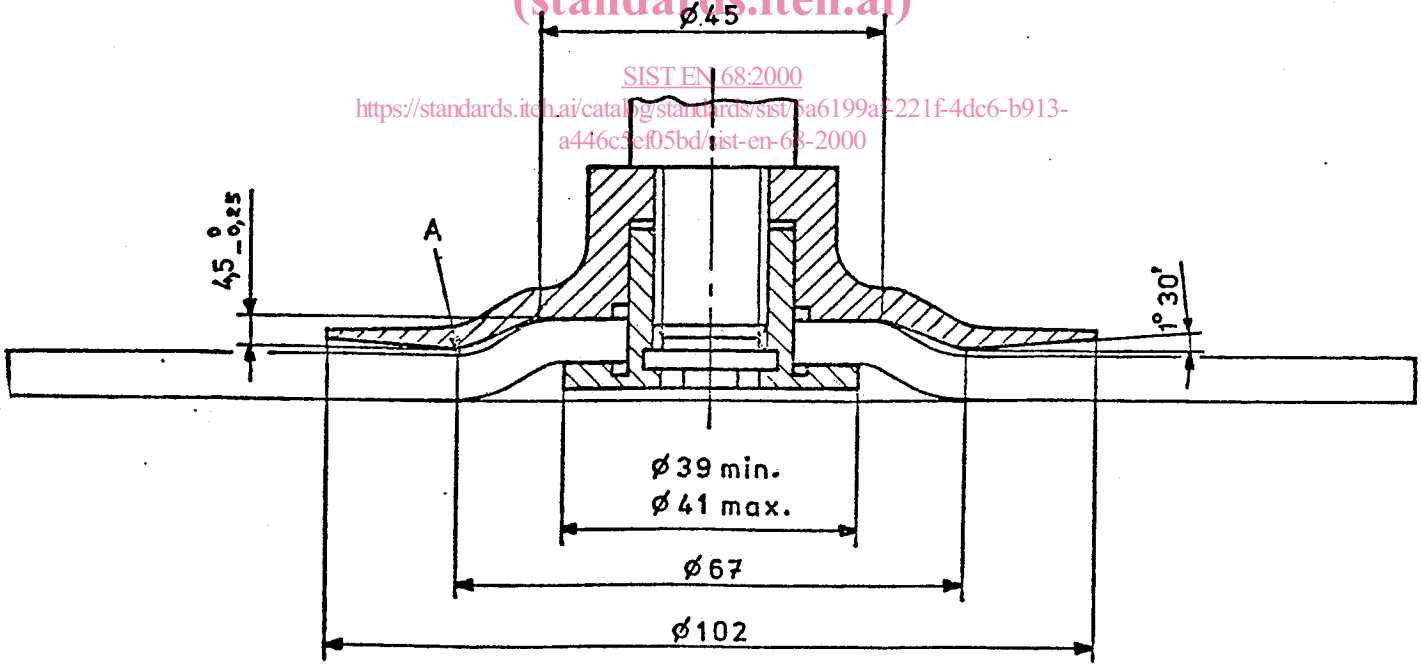

FIGURE 5 Special flange assembly for depressed-centre wheels of 180 mm diameter and larger.

NOTE: When the clamping nut has been tightened there should be a slight clearance between the flange and the wheel at A.