BS EN 61029-2-10:2010+A11:2013

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BSI Standards Publication

Safety of transportable motor-operated electric tools

Part 2-10: Particular requirements for cutting-off grinders

National foreword

This British Standard is the UK implementation of EN 61029-2-10:2010+A11:2013. It was derived from IEC 61029-2-10:1998. It supersedes BS EN 61029-2-10:2010, which will be withdrawn on 22 July 2016.

Where a common modification has been introduced by CENELEC amendment, the tags carry the number of the amendment. For example, the common modifications introduced by CENELEC amendment A11 are indicated by ⟦C11⟩ ⟨C11⟧.

The CENELEC common modifications have been implemented at the appropriate places in the text and are indicated by tags (e.g. ⟦C⟩ ⟨C⟧).

The UK participation in its preparation was entrusted to Technical Committee CPL/116, Safety of motor-operated electric tools.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Date	Text affected
31 October 2013	Implementation of CENELEC amendment A11:2013
30 November 2013	Date of withdrawal corrected in national foreword

EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 61029-2-10:2010+A11

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ICS 25.080.60; 25.140.20

English version

Safety of transportable motor-operated electric tools - Part 2-10: Particular requirements for cutting-off grinders

(IEC 61029-2-10:1998, modified)

Sécurité des machines-outils électriques semi-fixes -
Partie 2-10: Règles particulières pour les tourets à couper
(CEI 61029-2-10:1998, modifiée)

Sicherheit transportabler Elektrowerkzeuge -
Teil 2-10: Besondere Anforderungen für Trennschleifmaschinen
(IEC 61029-2-10:1998, modifiziert)

This European Standard was approved by CENELEC on 2009-12-01. CENELEC 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 Central Secretariat or to any CENELEC 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 CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: Avenue Marnix 17, B - 1000 Brussels

Ref. No. EN 61029-2-10:2010 E

Foreword

The text of the International Standard IEC 61029-2-10:1998, prepared by SC 61F (transformed into IEC TC 116, Safety of hand-held motor-operated electric tools), together with the common modifications prepared by the Technical Committee CENELEC TC 116, former TC 61F, Safety of hand-held motor-operated electric tools, was submitted to the Unique Acceptance Procedure and was approved by CENELEC as EN 61029-2-10 on 2009-12-01.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

– latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2010-12-01
– latest date by which the national standards conflicting with the EN have to be withdrawn	(dow)	2012-12-01

This European Standard is divided into two parts:

Part 1 General requirements that are common to most transportable electric motor operated tools (for the purpose of this European Standard referred to simply as tools) which could come within the scope of this European Standard;

Part 2 Requirements for particular types of tool which either supplement or modify the requirements given in Part 1 to account for the particular hazards and characteristics of these specific tools.

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and covers essential requirements of EC Directive 2006/42/EC. See Annex ZZ.

Compliance with the relevant clauses of Part 1 together with this Part 2 provides one means of conforming with the specified essential health and safety requirements of the Directive.

The standard follows the overall requirements of EN ISO 12100-1 and EN ISO 12100-2.

For noise and vibration this standard covers the requirements for their measurement, the provision of information arising from these measurements and the provision of information about the personal protective equipment required. Specific requirements for the reduction of the risk arising from noise and vibration through the design of the tool are not given as this reflects the current state of the art.

As with any standard, technical progress will be kept under review so that any development can be taken into account.

Warning: Other requirements arising from other EC Directives can be applicable to the products falling within the scope of this standard.

This Part 2-10 is to be used in conjunction with EN 61029-1:2009. This Part 2-10 supplements or modifies the corresponding clauses of EN 61029-1, so as to convert it into the European Standard: “Safety requirements for transportable cutting-off grinders”.

Where a particular subclause of Part 1 is not mentioned in this Part 2-10, that subclause applies as far as reasonable. Where this Part 2-10 states "addition", "modification" or "replacement", the relevant text of Part 1 is to be adapted accordingly.

Clauses, subclauses, notes, tables and figures which are additional to those in Part 1 are numbered starting from 101.

Clauses, subclauses, notes, tables and figures which are additional to those in IEC 61029-2-10 are prefixed “Z”.

NOTE In this European Standard the following print types are used:
- requirements proper: in roman type;
- *test specifications: in italic type;*
- explanatory matter: in smaller roman type.

Foreword to amendment A11

This document (EN 61029-2-10:2010/A11:2013) has been prepared by CLC/TC 116 "Safety of motor-operated electric tools".

The following dates are fixed:

–	latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2014-07-22
–	latest date by which the national standards conflicting with this document have to be withdrawn	(dow)	2016-07-22

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

This amendment was developed to streamline Table Z102 and to bring EN 61029-2-10:2010 in line with current practice and machines in production.

This document has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

NOTE In this European Standard the following print types are used:
- requirements proper: in roman type;
- *test specifications: in italic type;*
- explanatory matter: in smaller roman type.

Annex ZZ
(informative)

Coverage of Essential Requirements of Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CENELEC by the European Commission and the European Free Trade Association and within its scope the standard covers all relevant essential requirements as given in Annex I of the EC Directive 2006/42/EC (Machinery Directive).

Compliance with this standard provides one means of conformity with the specified essential requirements of the Directives concerned.

WARNING: Other requirements and other EC Directives may be applicable to the products falling within the scope of this standard.

CONTENTS

SAFETY OF TRANSPORTABLE MOTOR-OPERATED ELECTRIC TOOLS –

Part 2: Particular requirements for cutting-off grinders

1 Scope

This clause of part 1 is applicable, except as follows:

1.1 *Addition:*

〈C〉 This European Standard applies to cutting-off grinders intended to cut metal by means of a rotating abrasive cutting-off wheel:

- with an abrasive cutting-off wheel diameter not exceeding 406 mm;
- with a peripheral speed not exceeding 80 m/s. 〈C〉

2 Definitions

This clause of part 1 is applicable, except as follows:

2.21 *Replacement:*

〈C〉 **2.21**
normal load
normal load is the load to obtain rated input. The normal load is based on the rated voltage or on the upper limit of the rated voltage range

2.101
cutting-off grinder
tool having a rotating abrasive cutting-off wheel fitted on an arm suspended over a table. The table supports and positions the workpiece, which is fixed in a vice. The arm is pivoted on the support frame or attached directly to the table. See Figure Z101

2.102
spindle
spindle of the cutting-off grinder which supports and transmits the rotation to the abrasive cutting-off wheel

2.103
wheel guard
device which partially encloses the abrasive cutting-off wheel in order to protect the user against contact with the wheel in normal use and against ejection of fragments of the wheel in the protected area in case of a breakage of the wheel

2.104
rear guard
device behind the abrasive cutting-off wheel that prevents the ejection of sparks 〈C〉

〖C11〗 **2.105**
workpiece vice
device intended to support and maintain the workpiece in position 〈C11〉

〖A1〗 ***Texts deleted*** 〈A1〉

3 General requirements

This clause of part 1 is applicable.

4 General notes on tests

This clause of part 1 is applicable.

5 Rating

This clause of part 1 is applicable.

6 Classification

This clause of part 1 is applicable.

7 Marking

This clause of part 1 is applicable, except as follows:

〖C〗 **7.1** *Addition:*

– the rated no-load speed in 1/min or min^{-1};

– the maximum diameter *D* of abrasive cutting-off wheel to be used;

– the direction of rotation of the abrasive cutting-off wheel shall be indicated on the tool by an arrow raised or sunk or by any other means no less visible and indelible;

– “Read the instructions” or the relevant symbol;

– “Wear safety glasses” or the relevant symbol;

– thread size of the spindle, if applicable;

7.6 *Modification:*

The symbol n_0 shall be used for rated no-load speed.

7.13 *Addition:*

The substance of the following information and/or warnings shall also be given: 〈C〗

〈C〉 c) Safety precautions

– warning to always use eye and ear protection when cutting;

– instruction to use personal protective equipment such as dust mask, gloves, helmet and apron;

– warning not to use cutting wheels that are chipped, cracked or otherwise defective;

– instruction to visually inspect the cutting wheel before every use;

– instruction about the correct abrasive wheels to use;

– instruction how to connect the dust collection device, if any;

– information about the maximum cutting depth;

– information how abrasive cutting-off wheels shall be stored and handled;

– information how to correctly fit abrasive cutting-off wheels;

– warning never to use the machine without the guard in place;

– warning not to use saw blades.

e) Safe operation

– warning to ensure that the abrasive cutting-off wheel is correctly fitted and tightened before use including an instruction to run the machine at no-load for 30 s in a safe position, and to stop immediately and replace the cutting-off wheel if there is considerable vibration;

– warning to ensure that ventilation openings are kept clear when working in dusty conditions, including an instruction to first disconnect the machine from the mains supply and to clean the openings by using a soft brush, if it should become necessary to clear dust;

– warning not to use the machine in explosive atmospheres and environments where sparks could cause fire, explosion etc.;

– warning that the wheel continues to rotate after the machine is switched off;

– instruction how and when to secure the machine, such as fixing to a bench;

– information about the minimum size of the workpiece;

– instruction how to support long workpieces; 〈C〉

8 Protection against electric shock

This clause of part 1 is applicable.

9 Starting

This clause of part 1 is applicable.

10 Input and current

This clause of part 1 is applicable.

11 Heating

This clause of part 1 is applicable.

12 Leakage current

This clause of part 1 is applicable.

〈C〉 13 Environmental requirements

This clause of Part 1 is applicable except as follows:

13.1 This subclause is not applicable.

13.2.1 *Addition:*

The most important sources of noise are:

– the abrasive cutting-off wheel and workpiece;

– the gear;

– the motor / fan.

NOTE For general information concerning reduction of noise, see EN ISO 11688-1.

〈C11〉 **13.2.4** *Replacement of paragraphs 1, 2 and 3:*

Cutting-off machines are tested under load in accordance with Table Z101.

Table Z101 – Operating conditions for noise and vibration tests

Material	40 mm x 40 mm square steel bar to ISO 630
Feed-speed	As necessary to achieve steady cutting
Depth of cut	Through the 40 mm square material
Length of cut-off	15 mm
Abrasive cutting-off wheel	New wheel at the start of the test, recommended by the manufacturer
Test cycle	5 cuts, each directly following each other. The average value of these 5 cuts is to be used

〈C11〉

13.3.6.3 *Replacement*

Cutting-off machines are tested under load under the conditions shown in Table Z101. 〈C〉

14 Protection against ingress of foreign bodies and moisture resistance

This clause of part 1 is applicable.

15 Insulation resistance and electric strength

This clause of part 1 is applicable.

16 Endurance

This clause of part 1 is applicable.

17 Abnormal operation

〈C〉 This clause of Part 1 is applicable except as follows:

17.2 *Modification of fourth paragraph:*

During these tests, the machine shall show no defects within the meaning of this European Standard and the no-load speed of the spindle shall not exceed 120 % of the speed marked on the nameplate of the machine.

18 Stability and mechanical hazards

This clause of Part 1 is applicable except as follows:

18.1 *Addition:*

Cutting-off grinders shall be equipped with an adequate guarding system to prevent inadvertent contact with the abrasive cutting-off wheel in normal use. It shall not be possible to remove the guard without the aid of a tool.

The guarding system shall comply with the requirements of 18.1.101 to 18.1.103.

18.1.101 Wheel guards

The areas 1 and 2 of the machine are shown in Figure Z102.

The area 1 shall have a fixed guard that as a minimum covers 180° of the periphery of the abrasive cutting-off wheel and both sides of the wheel down at least to the outer diameter of the flange.

In rest position the area 2 shall be guarded by a movable guard which protects the periphery and both sides of the outer 20 % of the radius of the wheel between the horizontal line through the centre of the wheel and an angle α of at least 15°.

In rest position the unprotected part of the wheel shall be less than or equal to the angle β =150°.

The movable guard shall be opened by contact with the table or workpiece.

The cutting unit and movable guard shall return automatically to their rest positions when the handle is released.

Compliance is checked by inspection and measurement.

When for technical reasons an overlapping occurs between the fixed and movable guard, care shall be taken to prevent access to the wheel in the overlapping area.

Compliance is checked by applying the test probe of Figure Z103 between fixed and movable guard in all positions. It shall not be possible to contact the wheel with the test probe. 〈C〉

18.1.102 Rear guard

Cutting-off grinders shall have a rear guard behind the wheel of sufficient height and width to prevent the ejection of the sparks in all cutting depths. The rear guard shall comply with the following requirements (see Figure Z104 showing the cutting unit in the most unfavourable position).

With a new wheel having the maximum diameter in accordance with 7.1 at any possible cutting position, the rear guard as shown in Figure Z104 shall comply as follows:

– the height of the guard shall extend vertically up not less than 5 mm above the tangent from the periphery of the wheel that intersects with the lower edge of the wheel guard;

– the width of the rear guard, symmetrical with respect to both sides of the plane of the abrasive cutting-off wheel, shall be such that the angle α in Figure Z104 is not less than 18°.

Compliance is checked by inspection and measurement.

18.1.103 Guarding of wheel below the table

Cutting-off grinders shall be guarded so that access to the cutting wheel below the table is prevented.

Compliance is checked by applying the test probe of Figure Z103 below the table for any depth of cut. It shall not be possible to contact the wheel with the test probe.

18.1.104 The change of the wheel shall be possible without removing the guard from the machine.

Compliance is checked by inspection.

18.3 Stability

Replacement of the first two paragraphs:

In any working position, the machine shall have sufficient stability.

Compliance is checked by the following test, without the tool being fixed to the bench.

Without any workpiece, the cutting unit is moved down to its lowest position, and then the handle is released. The machine shall not turn over and shall not be displaced over a distance of more than 100 mm.

Tools shall be provided with the facility to fix the machine to a bench, e.g. by providing holes in the machine frame.

Compliance is checked by inspection.

18.101 Workpiece vice

Tools shall be equipped with a vice for holding the workpiece securely during the cutting operation. This shall be achieved by horizontal or vertical clamping, e.g. by jaws or clamps.

It shall be possible to operate the holding vice without removing the guards.

〈C〉 The holding vice shall

– be fixed to the table while cutting,

– hold workpiece even if heavy or if the machine vibrates,

– hold the workpiece during the complete cycle of cutting,

– resist the cutting force and have a positive stop in direction of cutting force.

The height of the jaws shall be at least 0,6 times the maximum cutting depth.

Compliance is checked by inspection and measurement. 〈C〉

〈C11〉 18.102 Flanges

Flanges shall comply with the dimensions shown in Table Z102 and Figures Z105 and Z106.

One of the flanges shall be keyed to the output spindle.

Table Z102 – Flange dimensions

Abrasive cutting-off wheel		Minimum flange dimensions		
D	***H***	d_f	***r***	***t***
mm	mm	mm	mm	mm
50	6	13	2	0,5
63	8	16	2	0,5
80	10	20	2	0,5
100	10	25	4	1,0
125	13	32	5	1,0
150	16	38	6	1,0
200 - 244	20	50	8	1,0
245 - 250	25,4	63	10	1,5
300	25,4	75	13	1,5
350 - 356	25,4	88	16	1,5
400	25,4	100	17	1,5
> 400	25,4 / 32	102	18	1,5

Key

D	diameter of the abrasive cutting-off wheel
H	diameter of the wheel bore
d_f	diameter of the flange
r	width of the clamping surface
t	depth of the recess

Compliance is checked by measurement. 〈C11〉

〈C〉 **18.102.1** Flanges shall be so designed that they are of adequate strength.

Compliance is checked by the following test.

The cutting-off grinder shall be fitted with a steel disc having an equal thickness and shape as the abrasive cutting wheel.

The clamping nut shall be tightened with a first test torque according to Table Z103. A feeler gauge of a thickness of 0,05 mm shall be used to test whether the flanges are in contact with the disc all around the circumference. The test is satisfactory if at no place the feeler gauge can be pushed underneath the flanges.

The clamping nut shall be further tightened to the second test torque according to Table Z103. A feeler gauge of a thickness of 0,05 mm shall be used to test the deflection of the flanges. The result is satisfactory if at no place the feeler gauge can be pushed underneath the flanges by more than 1 mm.

Table Z103 – Torques for testing flanges

Thread		First test torque	Second test torque
Metric	UNC	Nm	Nm
8	2	2	8
10	3/8	4	15
12	1/2	7,5	30
14		11	45
16	5/8	17,5	70
	3/4	35	140

〈C11〉 **18.103 Tool spindle**

The diameter of the spindle shall correspond to the wheel bore diameter (*H)*, as indicated in Table Z102. The required spindle diameter may be achieved by the use of a bush or ring.

If a thread is used on the spindle, it shall be such that it is self tightening during the cutting operation.

Cutting-off grinders equipped with a brake shall be designed to prevent loose flanges during braking operation.

Compliance is checked by inspection and measurement. 〈C11〉

19 Mechanical strength

This clause of Part 1 is applicable except as follows:

19.1.101 Strength of guards

Guards shall either

a) be made to comply at least with the specifications given in Table Z104 and Table Z105; or

b) have adequate strength to retain fragments of a broken cutting-off wheel. 〈C〉

〚C〛 *Compliance is checked by:*

– *in case of a) by inspection and measurement;*

– *in case of b) by the test of 19.1.102.*

Table Z104 – Guard thicknesses

Dimensions in mm

D	*P*	*J*
≤ 150	1,5	1,5
150 < *D* ≤ 250	2,5	2
250 < *D* ≤ 406	3,5	2,5

Key
D Maximum wheel diameter
P Thickness of periphery of guard
J Thickness of side of guard

Table Z105 – Material specifications

Reference No.	Material	ISO or EN	Ultimate tensile strength N/mm²	Elastic strength N/mm²	Elongation %
1	Steel	ISO 4997 ISO 6316	300	220	18
2	Steel	ISO 1052 EN 10025	340	215	17

19.1.102 Strength test

The set-up of the following test is shown in Figure Z109.

The tool shall be assembled as for normal use, the guard shall be equipped with any accessories for which it is designed.

An impactor shall be made to impact the wheel as close as possible to the flange so as to cause a complete breakage of the wheel, care being taken that the impactor does not itself affect the outcome of the test as follows:

– *make hole in guard to line up with impacting tool of test fixture as per Figure Z107 (in any other position wheel fragments are not held within guard and may fly out so guard strength is not tested);*

– 〚C11〛 *mount the machine in a test box fixed securely to the bottom;*

– *make four slits in a non-reinforced abrasive cutting-off wheel of the maximum dimensions specified by the manufacturer, equidistant apart and with a maximum width of 3 mm. The slits shall be as long as possible so that the wheel remains intact during running but breaks up when impacted as below. See Figure Z108;* 〈C11〉

– *affix prepared abrasive cutting-off wheel to machine mounted to test box;*

– *secure the cover of the test box and operate the tool at no-load until speed has stabilized;* 〈C〉

〈C〉 – *hit impactor sharply with one quick blow using a hammer of at least 2 kg weight;*

– *switch off the machine.*

After the test the wheel guard shall remain attached to the tool, remain effective and shall show no visible cracks. Minor deformations and superficial damage are acceptable. Any fixing devices such as guard clamps, bolts etc. shall remain effective.

20 Construction

This clause of Part 1 is applicable except as follows:

20.18 *Addition:*

The actuation of the mains switch or control device shall not be affected or restricted by adjustment of the table or by the workpiece.

Compliance is checked by manual test.

20.20 *Addition:*

Cutting-off grinders shall be equipped with a mains switch which interrupts the supply automatically when the operating means is released and there shall be no means for locking the switch in the “on” position, except as follows:

Cutting-off grinders may be provided with a lock-on switch if the cutting-off grinder is provided with a movable guard which covers the wheel completely and which returns automatically to its rest position when the wheel is withdrawn from the workpiece.

In this case the machine shall not start automatically after voltage recovery following a voltage failure.

Compliance is checked by inspection and manual test. 〈C〉

21 Internal wiring

This clause of part 1 is applicable.

22 Components

This clause of part 1 is applicable.

23 Supply connection and external flexible cables and cords

This clause of part 1 is applicable, except as follows:

23.2 *Replacement:*

〈C〉 Power supply cords for cutting-off grinders shall not be lighter than heavy polychloroprene sheathed flexible cable (code designation H07RN-F) or equivalent. 〈C〉

24 Terminals for external conductors

This clause of part 1 is applicable.

25 Provision for earthing

This clause of part 1 is applicable.

26 Screws and connections

This clause of part 1 is applicable.

27 Creepage distances, clearances and distance through insulation

This clause of part 1 is applicable.

28 Resistance to heat, fire and tracking

This clause of part 1 is applicable.

29 Resistance to rusting

This clause of part 1 is applicable.

30 Radiation

This clause of part 1 is applicable.

〈C〉

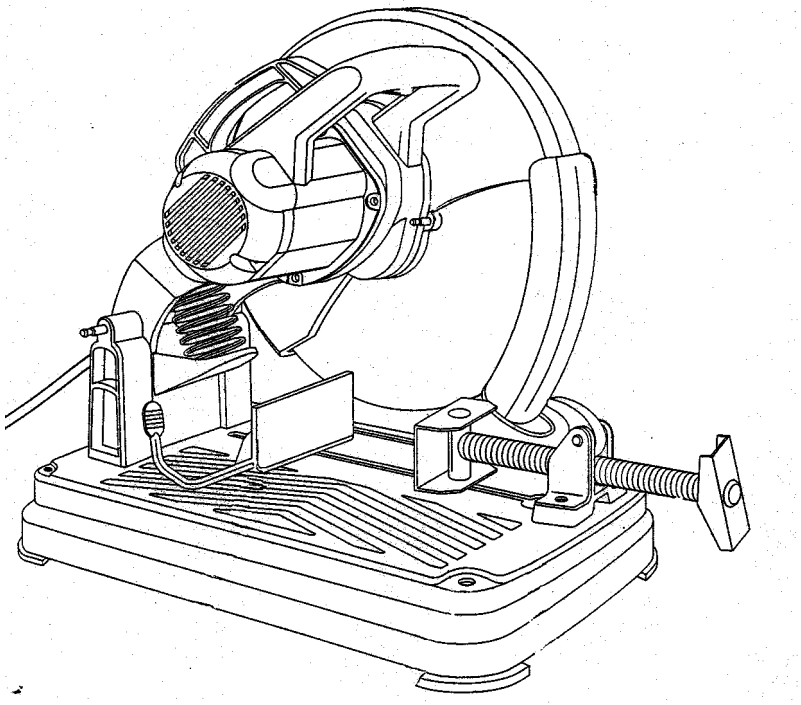
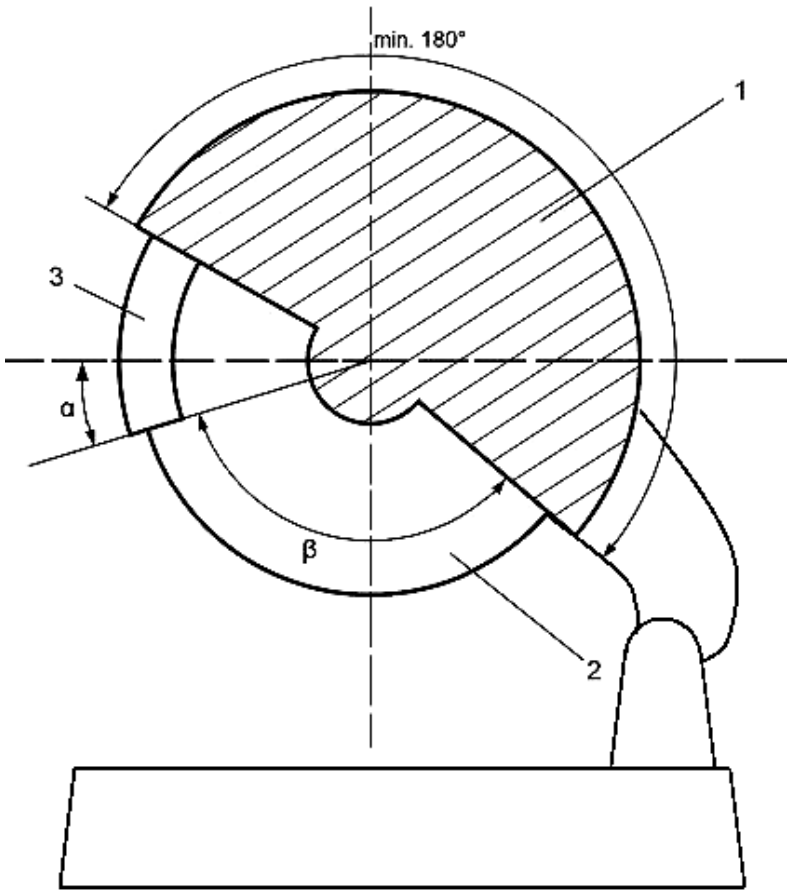


Figure Z101 – Example of a cutting-off grinder 〈C〉

〈C〉



Key

1 Fixed guard (Area 1)

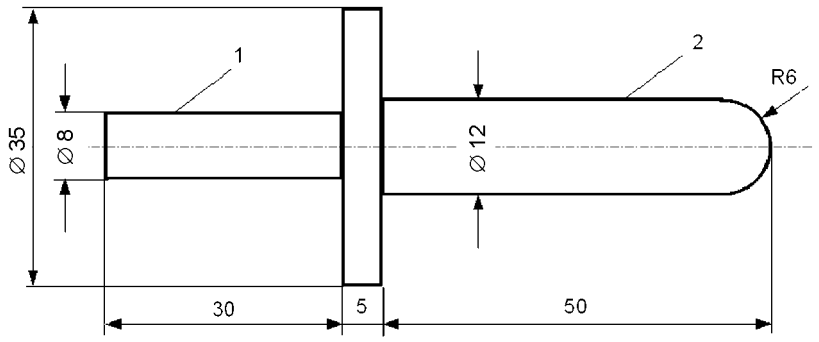
2 Abrasive cutting-off wheel

3 Movable guard (Area 2)

α At least an angle of 15° covered by movable guard in rest position

β Maximum opening angle of 150° in rest position

Figure Z102 – Guard arrangement with cutting unit in rest position

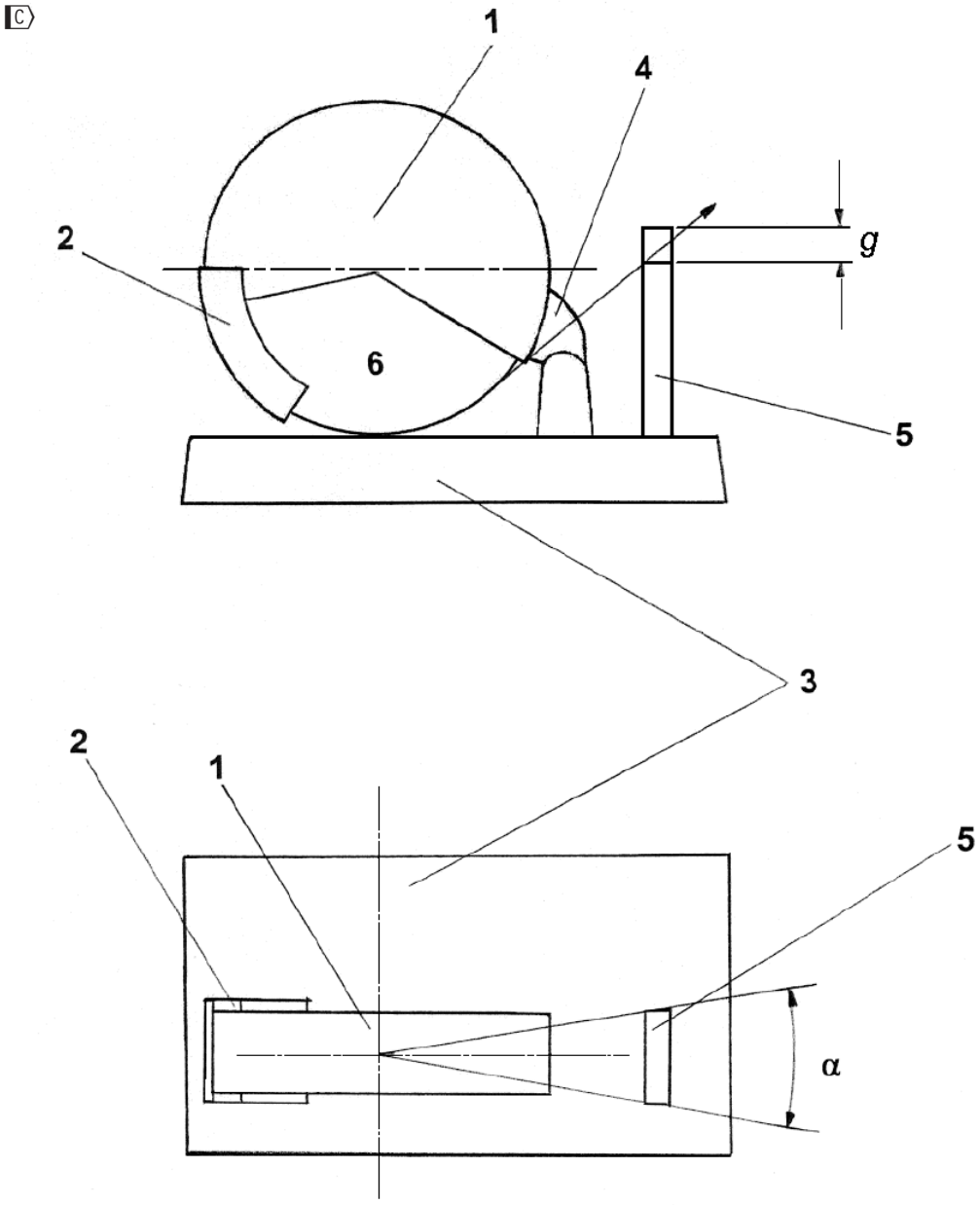


Key

1 Handle section

2 Test section

Figure Z103 – Test probe 〈C〉



Key

1 Fixed guard
2 Movable guard
3 Table
4 Machine arm
5 Rear guard
6 Abrasive cutting-off wheel
g Distance ≥ 5 mm
α Guard width

Figure Z104 – Rear guard

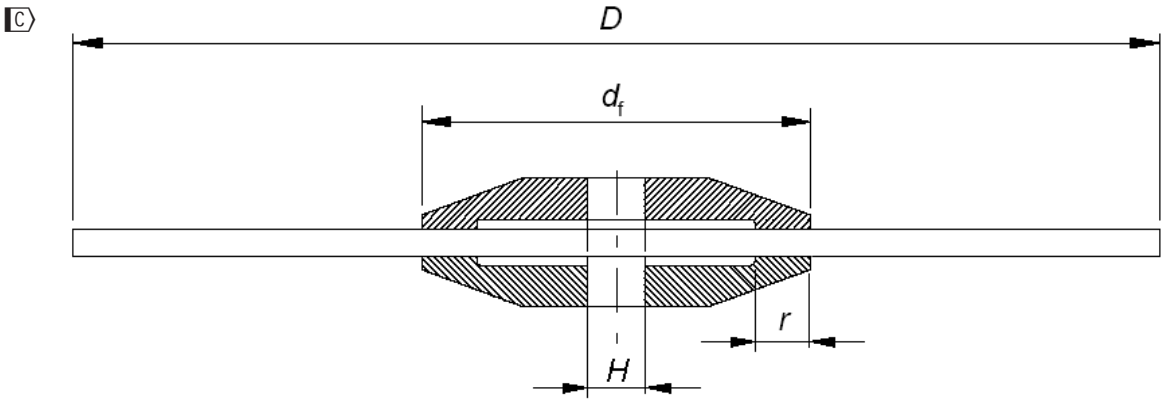


Figure Z105 – Straight recessed flange for plain abrasive cutting-off wheels

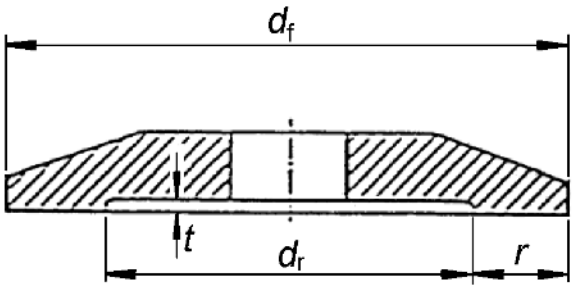
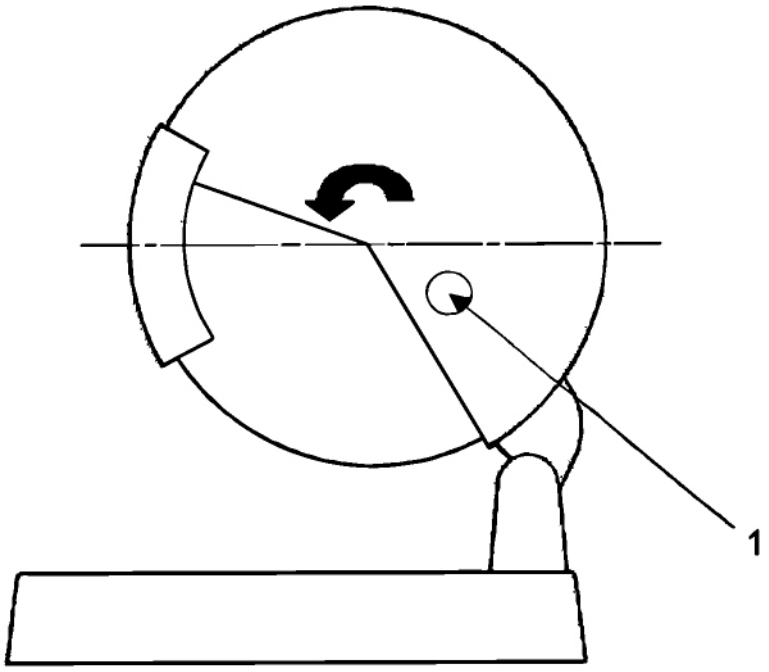


Figure Z106 – Straight recessed flange 〈C〉

〈C〉



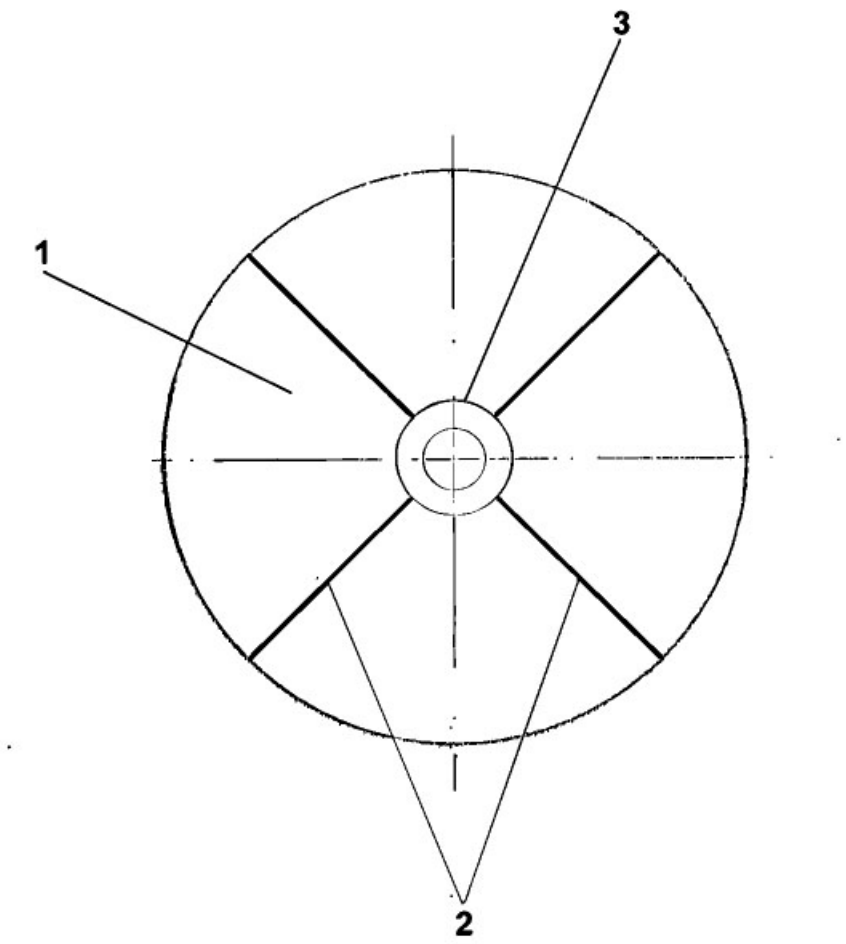
Key

1 Position of the hole in the guard

↶ Direction of rotation

Figure Z107 – Position of test hole for impact test 〈C〉

〈C〉



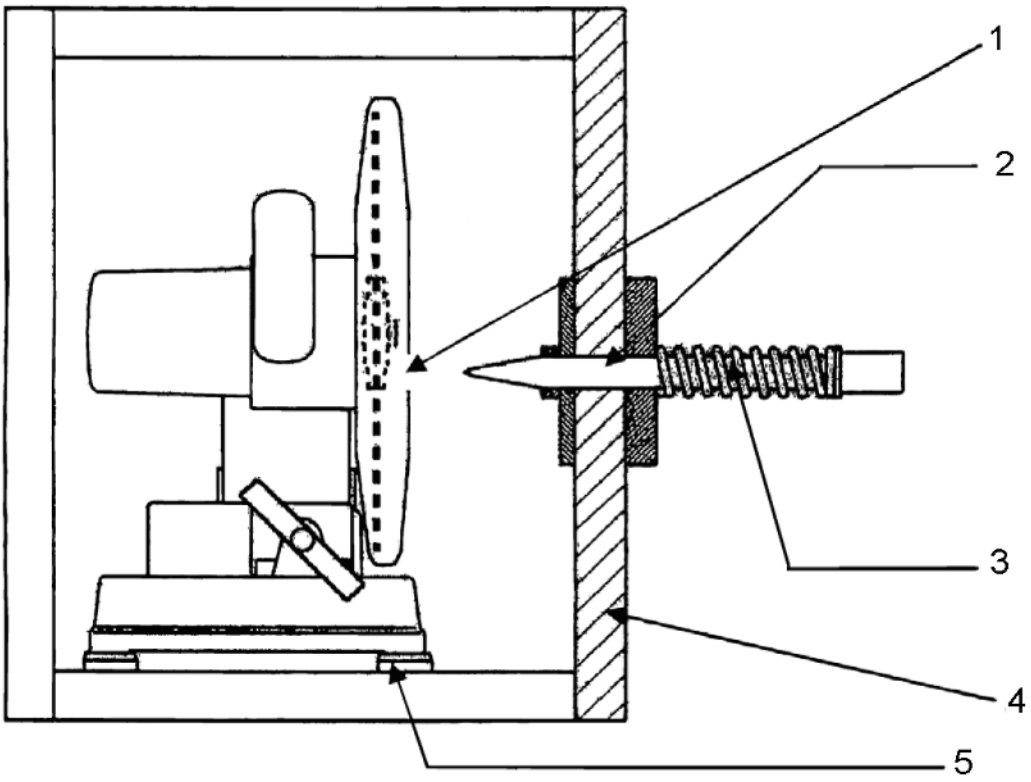
Key

1 Abrasive cutting-off wheel

2 Slits

3 Periphery of the flange

Figure Z108 – Preparation of an abrasive cutting-off wheel for the impact test 〈C〉



Key

1 hole for the steel impactor to go through the wheel guard

2 steel impactor, 26 mm diameter, 420 mm long

3 coil spring for returning the steel impactor

4 test box made of 20 mm - 30 mm thick SPF wood

5 mounting points for fixing the machine to the bottom of the test box

Figure Z109 – Guard material strength test

Annexes

〈C〉 The annexes of Part 1 are applicable except as follows:

Annex A
(normative)

Normative references

Addition:

Publication	Date	Title
EN 10025	Series	Hot rolled products of structural steels
ISO 4997	2007	Cold-reduced carbon steel sheet of structural quality
ISO 6316	2000	Hot-rolled steel strip of structural quality
ISO 1052	1982	Steel for general engineering purposes

Informative references

Addition:

EN ISO 11688-1 + AC	1998 1998	Acoustics - Recommended practice for the design of low noise machinery and equipment - Part 1: Planning (ISO/TR 11688-1:1995) 〈C〉

〈C11〉 Annex ZD
(informative)

Dust measurement

This annex of Part 1 is not applicable. 〈C11〉

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