INTERNATIONAL STANDARD

IEC 61029-2-10

First edition
1998-06

Safety of transportable motor-operated electric tools –

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

Sécurité des machines-outils électriques semi-fixes –

Partie 2-10: Règles particulières pour les tourets à couper

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* See web site address on title page.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

_____

SAFETY OF TRANSPORTABLE MOTOR-OPERATED ELECTRIC TOOLS –

Part 2: Particular requirements for cutting-off grinders

FOREWORD

1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

This part of International Standard IEC 61029 has been prepared by subcommittee 61F: Safety of hand-held motor-operated electric tools, of IEC technical committee 61: Safety of household and similar electrical appliances.

The text of this standard is based on the following documents:

FDIS	Report on voting
61F/235/FDIS	61F/242/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This part 2 is to be used in conjunction with the IEC 61029-1.

This part 2 supplements or modifies the corresponding clauses in IEC 61029-1, so as to convert it into the IEC standard: Safety requirements for cutting-off grinders.

Where a particular subclause of part 1 is not mentioned in this part 2, that subclause applies as far as is reasonable. Where this standard states “addition”, “modification” or “replacement”, the relevant text in part 1 is to be adapted accordingly.

NOTES

1 The following print types are used:

- requirements: in roman type;
- *test specifications: in italic type;*
- notes: in small roman type.

2 Subclauses, notes and figures which are additional to those in part 1 are numbered starting from 101.

A bilingual version of this standard may be issued at a later date.

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:*

This standard applies to cutting-off grinders intended mainly for cutting metal with a plain abrasive cutting-off wheel whose diameter does not exceed 406 mm and has a rated peripheral speed not exceeding 80 m/s.

2 Definitions

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

2.21 *Replacement:*

normal load
load obtained when the tool is operated continuously, with the torque applied to the spindle such that the input, in watts, is equal to the rated input

NOTE – The normal load is based on the rated voltage or on the upper limit of the rated voltage range.

Addition:

2.101
cutting-off grinders
machine designed to cut metal by means of a plain abrasive cutting-off wheel which is fixed on the tool spindle. The tool spindle is mounted on the outer end of an arm which is pivoted at its inner end on the machine frame. The machine table has a clamping device to secure the workpiece. The table can be traversed towards the cutting-off wheel (see figure 101).

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

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

2.104
flange assembly
means provided to clamp the plain abrasive cutting-off wheel to the machine spindle

2.105
straight recessed flange
flange with central recess suitable for a plain abrasive cutting-off wheel (see figure 106)

2.106
workpiece fixing device
device intended to support or hold the piece to be worked

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:

7.1 *Addition:*

– rated no-load speed in rev/min;
– maximum diameter *D* of the wheel to be used;
– indication of direction of rotation of the abrasive wheel.

7.6 *Addition:*

The direction of rotation of the wheel shall be indicated on the tool by an arrow raised or sunk, or by other means not less visible and indelible.

7.13 *Addition:*

The handbook or information sheet shall include all the necessary information for safe working with cutting-off grinders, such as method of operation, abrasive wheel change, maintenance, assembly, transportation, etc.

In addition, the following instructions shall be given:

– wear protective glasses;
– do not use damaged abrasive wheels;
– do not use the cutting-off grinders without guards in position;
– use only abrasive wheels recommended by the manufacturer which have marked speed equal or greater to that marked on the machine;
– read the operating instructions supplied by the wheel manufacturer.

NOTE – Sketches may be used to illustrate the modes of operation.

In addition, the following information shall be given:

– how to connect the dust collection device, if any;
– for cutting-off grinders equipped with straight-sided flanges, the recommended thickness of plain abrasive cutting-off wheels and the size of the hole in the wheel.

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.

13 Radio and television interference suppression

This clause of part 1 is applicable.

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

This clause of part 1 is applicable.

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, which cannot be removed without the aid of a tool.

The guarding system shall comply with the requirements of 18.1.101.

NOTE – Other means of achieving the necessary degree of mechanical safety are allowed provided these are equally effective and reliable as those specified.

18.1.101 Guards

Guards shall be provided as part of a cutting-off grinder.

The portion of the abrasive wheel which is not performing the cutting action shall be completely enclosed by a fixed guard.

The remaining part of the abrasive wheel shall be protected by a movable guard which covers the abrasive wheel rim on both sides and which shall return automatically to its rest position when the abrasive wheel is withdrawn from the workpiece.

The guards shall comply with the requirements outlined hereafter.

18.1.102 Thickness of the guards

Table 101 – Minimum thickness of the guard

D mm	**Tensile strength** N/mm^2			
	>200 ≤ 390		>390	
	P mm	***J*** mm	***P*** mm	***J*** mm
≤250	3	1,5	1,5	1,5
250 < *D* ≤ 300	4	2	2	1,5
300 ≤ D < 406	4	3	2	1,5
where *D* is the maximum diameter of abrasive wheel; *P* is the thickness of the periphery of guard; *J* is the thickness of the side of the guard.				

The design and construction of guards shall either

– be in accordance with the thickness and material in table 101;

or

– comply with the requirements below.

The grinder shall be fixed in a suitable position.

A non-reinforced abrasive product of maximum size and thickness as specified by the manufacturer or a particular test wheel of the same shape and mass, shall be run at the rated speed of the grinder. The wheel enclosed by the guard shall be subject to the following test:

– *a burst shall be caused by a projectile to be fired at the wheel or by another suitable method. The test shall be carried out by bursting three wheels in succession in the same wheel guard;*
– *the wheel guard shall remain attached to the grinder, remain effective, and shall not show any visible cracks when examined by a recognised method of crack detection, e.g. dye penetration or magnetic crack detection. Minor deformations and superficial damage are acceptable. Any fixing devices, e.g. clamping devices and bolts, shall remain effective and subject to a critical examination for damage.*

NOTE – This test is dangerous and shall be carried out only in a properly constructed and equipped test facility. The test shall be performed inside a fully protected enclosure which can contain all the wheel fragments and other debris.

18.1.103 Fixed guard

The fixed guard shall be designed in such a way that the opening angle alpha (α) shall not exceed 165° (see figure 102).

To prevent ejection of broken parts of the wheel in front of the machine, the lower front part of the guard shall be below the horizontal plane crossing the spindle axis, for all positions of the arm ($x > 0$).

If the movable guard is made of a steel sheet of at least the guard thickness P and if it overlaps the fixed guard, it can be used to ensure guarding against wheel breakage; in this case, the previous requirement $x > 0$ does not apply.

18.1.104 Movable guard

In addition to the fixed guard, the movable guard shall be designed to prevent physical contact with the wheel.

The following minimum requirements shall be met.

The minimum dimensions are defined with the arm in the up position (see figures 103 and 104) so that

– distance “b” is reduced to a minimum for the arm movement to be free;
– dimensions “c” and “d” are larger than the maximum radius of the wheel.

Any gaps between fixed guards and movable guards shall not allow the standard test finger in figure 1 to touch the wheel.

The movable guard can be either plain, wire-netting or perforated. In the last two cases, the openings shall satisfy the test finger requirements of part 1.

In detail:

– if an overlapping “a” is foreseen between the fixed guard and the movable guard (see figure 103), it shall be sufficient to prevent the access to the wheel in the overlapping area;
– if there is no overlapping, the clearance between the fixed guard and the movable guard shall not exceed 4 mm (corresponding to the positions “e1”, “e2” and “e3” of figure 104).

The tool shall be so designed that during the operations of loading-unloading of parts, the movable guard cannot be lifted inadvertently.

The tool shall also be designed so as to avoid any inadvertent dropping of the movable guard, where it is necessary to lift it to replace the wheel.

18.1.105

Tools shall have a rear guard behind the wheel to prevent the ejection of the sparks, broken wheels and other debris. The rear guard shall comply with the requirements of figure 105 as follows:

– its height above the table of the tool shall be such that, the arm being in the up position, the upper part of this guard is above the tangent from the lower rear part of the fixed guard to the wheel ($g > 0$);
– its width, symmetrical from the wheel plane, shall be such that the angle alpha (α) from the centre of the wheel to the side of the rear guard is at least 18°.

18.3 This subclause of part 1 is not applicable.

18.101 Workpiece fixing device

Tools shall have a workpiece fixing device which shall be fixed to the table. It shall be possible to operate the workpiece fixing device without removing the guards. The height of the jaws shall be at least half of the maximum depth of the cut of the cutting-off grinder.

The clamping jaws shall be adjustable so as to clamp all sizes of workpiece up to the maximum capacity.

18.102 Straight recessed flanges

The flanges shall comply with the following:

Where the peripheral speed of the abrasive wheel is ≤ 63 m/s:

$d_f \geq 0{,}2\ D$

$r \geq 0{,}17\ d_f$

$h \geq 0{,}17\ M$

t = 1,0 mm nominal

Where the peripheral speed is > 63 m/s

$d_f \geq 0{,}25\ D$

$r \geq 0{,}17\ d_f$

$h \geq 0{,}17\ M$

$t = 1{,}0$ mm nominal

Where (see figure 106):

D is the diameter of the abrasive wheel in millimetres

d_f is the diameter of the flange in millimetres

h is the annular width of the flange in millimetres

r is the width of the gripping surface of the flange in millimetres

M is the annular width of the abrasive wheel in millimetres

t is the depth of the recess

A flange set shall have the same contact diameter (d_f) and width of gripping surface (*r*) for both flanges. At least one of the flanges shall be keyed, threaded or shrunk on to the tool spindle.

18.103 Tool spindle

18.103.1 Characteristics and dimensions

The spindle shall be made of steel with a tensile strength of at least 650 N/mm^2 and an elongation of at least 10 %.

18.103.2 Spindle end

The cutting-off grinders shall be designed so as to prevent the abrasive from coming loose under working conditions.

Compliance is checked by inspection.

18.104

Cutting-off grinders shall have provisions so the wheel cannot be touched from under the table.

19 Mechanical strength

This clause of part 1 is applicable.

20 Construction

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

20.17 *Addition:*

Cutting-off grinders shall be designed so that when the operating handle (see item 6 in figure 101) is released, the tool automatically returns to its rest position.

20.18 *Addition:*

The actuation of the mains switch or control device shall not be affected, nor access to the switch or control device be restricted, by adjustment of the table or by the workpiece.

20.101 Cutting-off grinders may have either dust extraction and collection facilities or devices for the connection of external dust extraction and collection equipment.

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:*

Non-detachable flexible cables and cords shall not be lighter than ordinary polychloroprene sheathed flexible cable (code designation 60245 IEC 57).

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

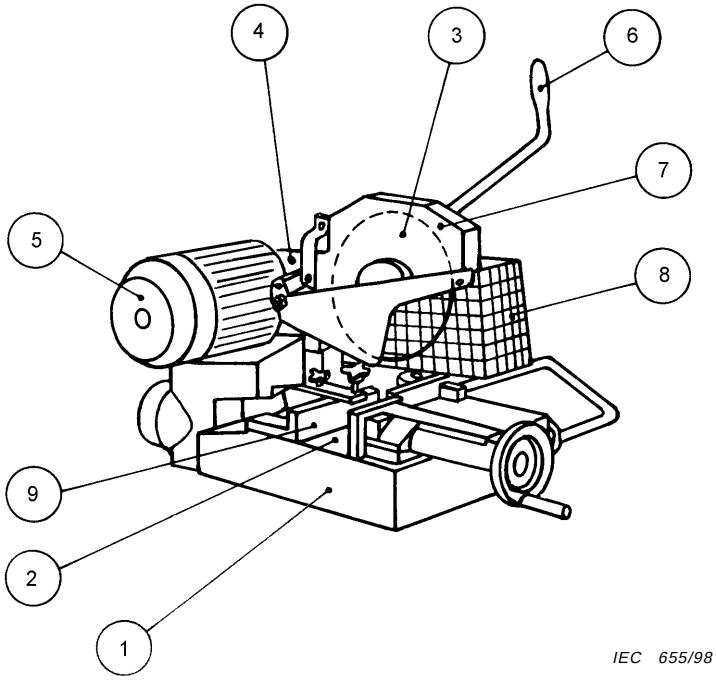
This clause of part 1 is applicable.

29 Resistance to rusting

This clause of part 1 is applicable.

30 Radiation

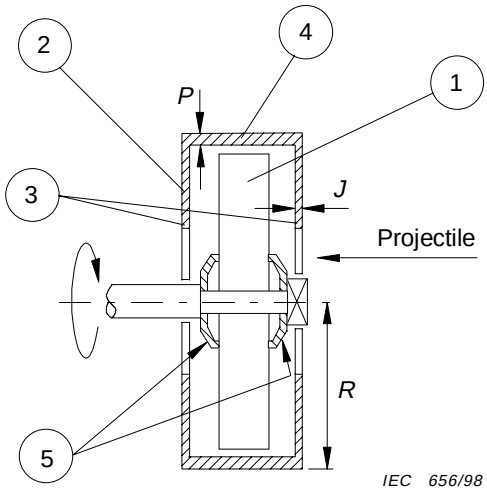
This clause of part 1 is applicable.



1 Bench
2 Table
3 Wheel
4 Arm
5 Motor
6 Operating handle
7 Fixed guard
8 Movable guard
9 Fixing device for workpieces

NOTE – The drawing is given as a guide only.

Figure 101 – Cutting-off grinder



1 Wheel
2 Guard
3 Guard sides
4 Guard periphery
5 Flanges
P Guard thickness of periphery
J Guard thickness of sides
L Guard width
R Guard inside radius

Figure 102a

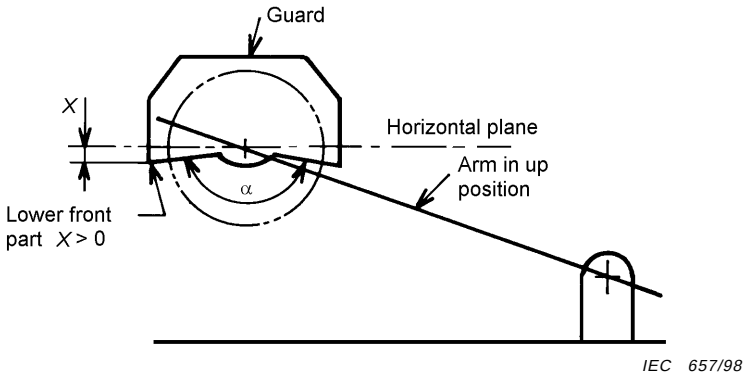


Figure 102b

Figure 102 – Fixed guard

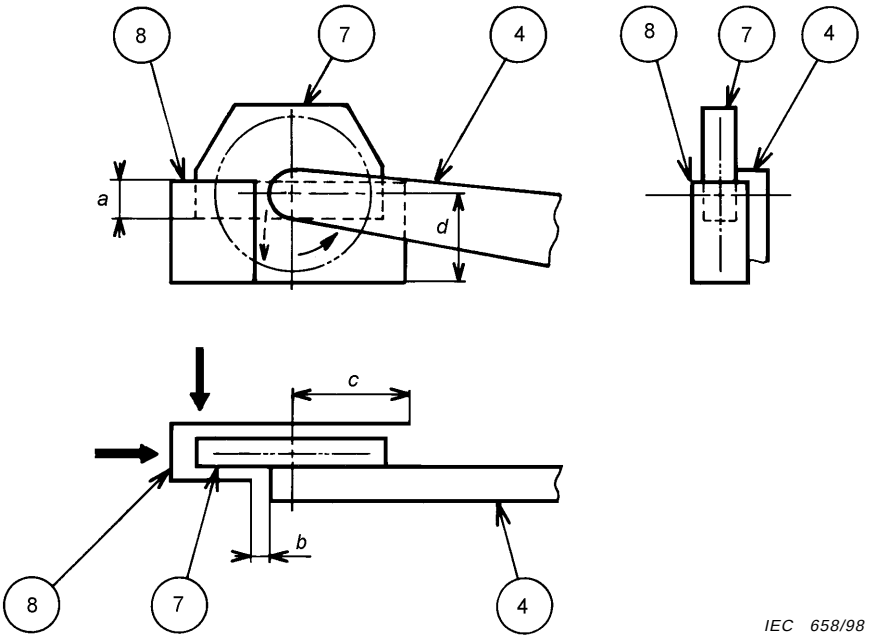
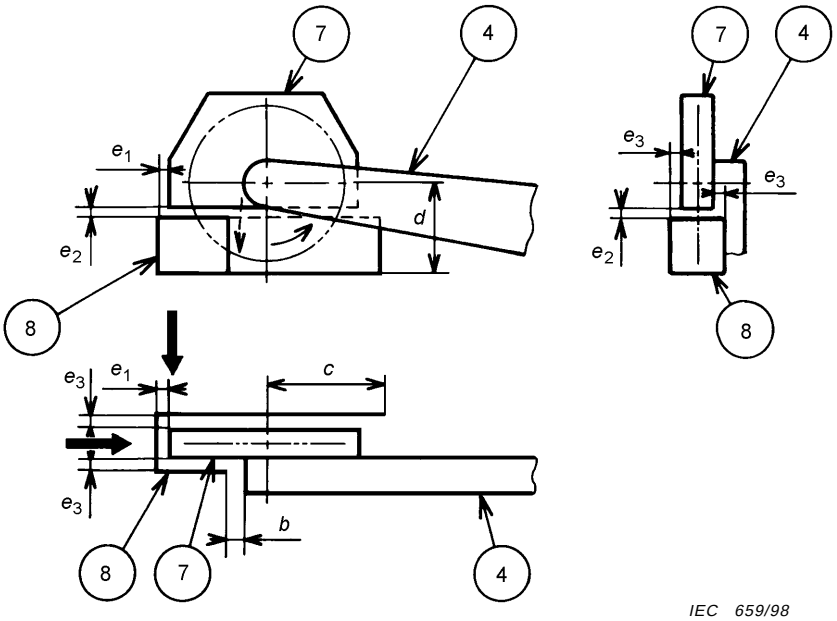


Figure 103 – Movable guard with overlapping



4 Arm

7 Fixed guard

8 Movable guard

Figure 104 – Movable guard without overlapping

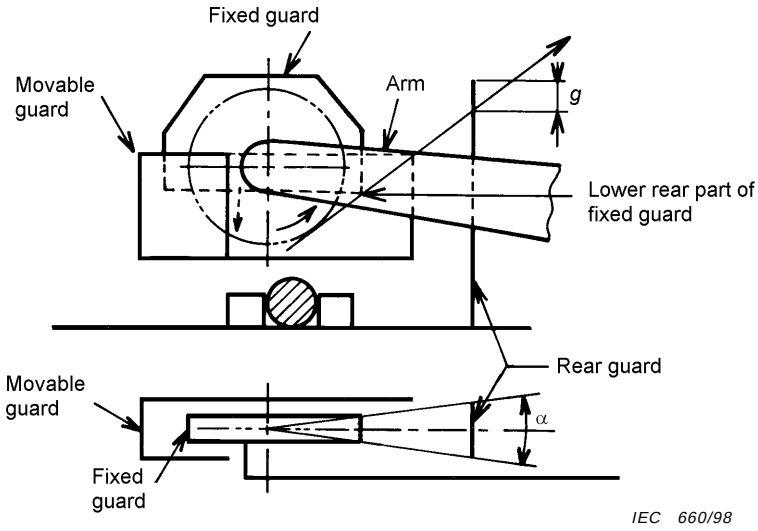


Figure 105 – Rear guard

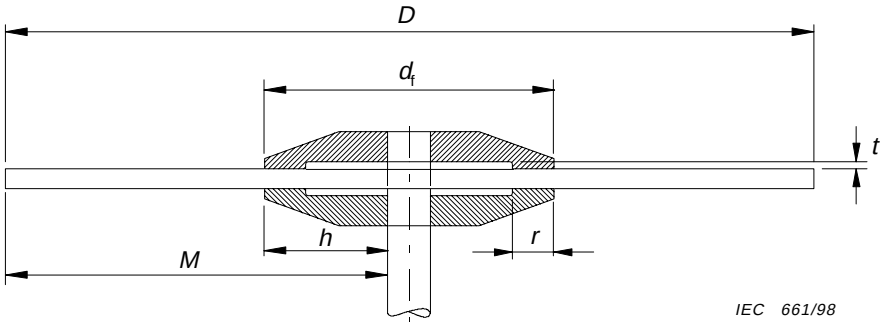


Figure 106 – Straight recessed flanges for plain abrasive cutting-off wheels

Annexes

The annexes of part 1 are applicable.

———————

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- ☐ other.....

3.

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4.

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- ☐ for a lawsuit
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- ☐ for certification
- ☐ for general information
- ☐ for design purposes
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- ☐ IEC
- ☐ ISO
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- ☐ other (published by.....)

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- ☐ illustrations
- ☐ technical information

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- ☐ sales information
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- ☐ other.....

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In what medium of standard does your organization maintain most of its standards (check one):

- ☐ paper
- ☐ microfilm/microfiche
- ☐ mag tapes
- ☐ CD-ROM
- ☐ floppy disk
- ☐ on line

9A.

If your organization currently maintains part or all of its standards collection in electronic media, please indicate the format(s):

- ☐ raster image
- ☐ full text

10.

In what medium does your organization intend to maintain its standards collection in the future (check all that apply):

- ☐ paper
- ☐ microfilm/microfiche
- ☐ mag tape
- ☐ CD-ROM
- ☐ floppy disk
- ☐ on line

10A.

For electronic media which format will be chosen (check one)

- ☐ raster image
- ☐ full text

11.

My organization is in the following sector (e.g. engineering, manufacturing)

.....

12.

Does your organization have a standards library:

- ☐ yes
- ☐ no

13.

If you said yes to 12 then how many volumes:

.....

14.

Which standards organizations published the standards in your library (e.g. ISO, DIN, ANSI, BSI, etc.):

.....

15.

My organization supports the standards-making process (check as many as apply):

- ☐ buying standards
- ☐ using standards
- ☐ membership in standards organization
- ☐ serving on standards development committee
- ☐ other.....

16.

My organization uses (check one)

- ☐ French text only
- ☐ English text only
- ☐ Both English/French text

17.

Other comments:

.....

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