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## Transportable wall saw and wire saw equipment for job site - Safety

Scies murales et scies à fil transportables de chantier -  
Sécurité

Transportable Wand- und Seilsägen für den  
Baustelleneinsatz - Sicherheit

This European Standard was approved by CEN on 7 October 2007.

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## Foreword

This document (EN 15027:2007) has been prepared by Technical Committee CEN/TC 151 “Construction equipment and building material machines — Safety”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2008, and conflicting national standards shall be withdrawn at the latest by May 2008.

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

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, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

## Introduction

This document is a type C standard as stated in EN ISO 12100-1:2003.

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

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

It is intended to revise this standard to align with changes in legislation and the availability of other European Standards in preparation.

## 1 Scope

The global description “wall saw and wire saw equipment” contains two differing types of machines for use in the construction industry, and both used to make cuts on walls, ceilings and floors composed of mineral construction materials and/or composite materials. The many different cutting tasks and choice of operating method determine the type of machine to be used for each application.

The machines may therefore be split into the following two principal classifications:

- Wall saws – exclusively rail guided – transportable.
- Wire saws – transportable.

The machines are intended for the use of diamond tools. The types of cutting tools used in conjunction with the machines as described above fall within the design and use parameters supplied by the manufacturer.

Cutting debris generated by the cutting action is removed from the cutting joint by a medium such as water directed to the cutting tool.

Machines covered by this standard may be powered by: electric motor, IC engine, electro-hydraulic drive and IC engine-hydraulic drive.

This European Standard deals with all significant hazards, hazardous situations and events relevant to wall saws and wire saws machinery, when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Clause 4).

This standard specifies the appropriate technical measures to eliminate or reduce risks arising from the significant hazards generated by the cutting process work cycle.

For special applications, for example, when working in potentially explosive atmospheres, additional safety requirements is necessary which are not covered by this standard.

This European Standard does not apply for wire saws intended for quarrying and stationary machining of natural stone as covered by prEN 15163.

This European Standard applies primarily to machines which are manufactured after the date of approval by CEN of this standard.

## 2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 294:1992, *Safety of machinery — Safety distance to prevent danger zones being reached by the upper limbs*

EN 573-3:2007, *Aluminium and aluminium alloys — Chemical composition and form of wrought products — Part 3: Chemical composition*

EN 953:1997, *Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards*

EN 982:1996, *Safety of machinery — Safety requirements for fluid power systems and their components — Hydraulics*

EN 983:1996, *Safety of machinery — Safety requirements for fluid power systems and their components — Pneumatics*

EN 10111:1998, *Continuously hot-rolled low carbon steel sheet and strip for cold forming — Technical delivery conditions*

EN 60204-1: 2006, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:2005, modified)*

EN 61029-1:2000, *Safety of transportable motor-operated electric tools - Part 1: General requirements (IEC 61029-1:1990, modified)*

EN ISO 3744:1995, *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)*

EN ISO 11201:1995, *Acoustics - Noise emitted by machinery and equipment - Measurement 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 12100-1:2003, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2:2003, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles (ISO 12100-2:2003)*

EN ISO 13732-1:2006, *Ergonomics of the thermal environment - Methods for the assessment of human responses to contact with surfaces - Part 1: Hot surfaces (ISO 13732-1:2006)*

EN ISO 13849-1:2006, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850:2006, *Safety of machinery - Emergency stop - Principles for design (ISO 13850:2006)*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003 and the following apply.

#### 3.1

##### **wall saw**

transportable machine utilising a diamond cutting-off wheel, for sawing primarily on walls, floors and ceilings. A wall saw is powered by an integral or an external power source as described in Clause 1. Feed and depth of cut can be adjusted/operated manually or by remote control

NOTE The components of a wall saw are shown in Figure 1.

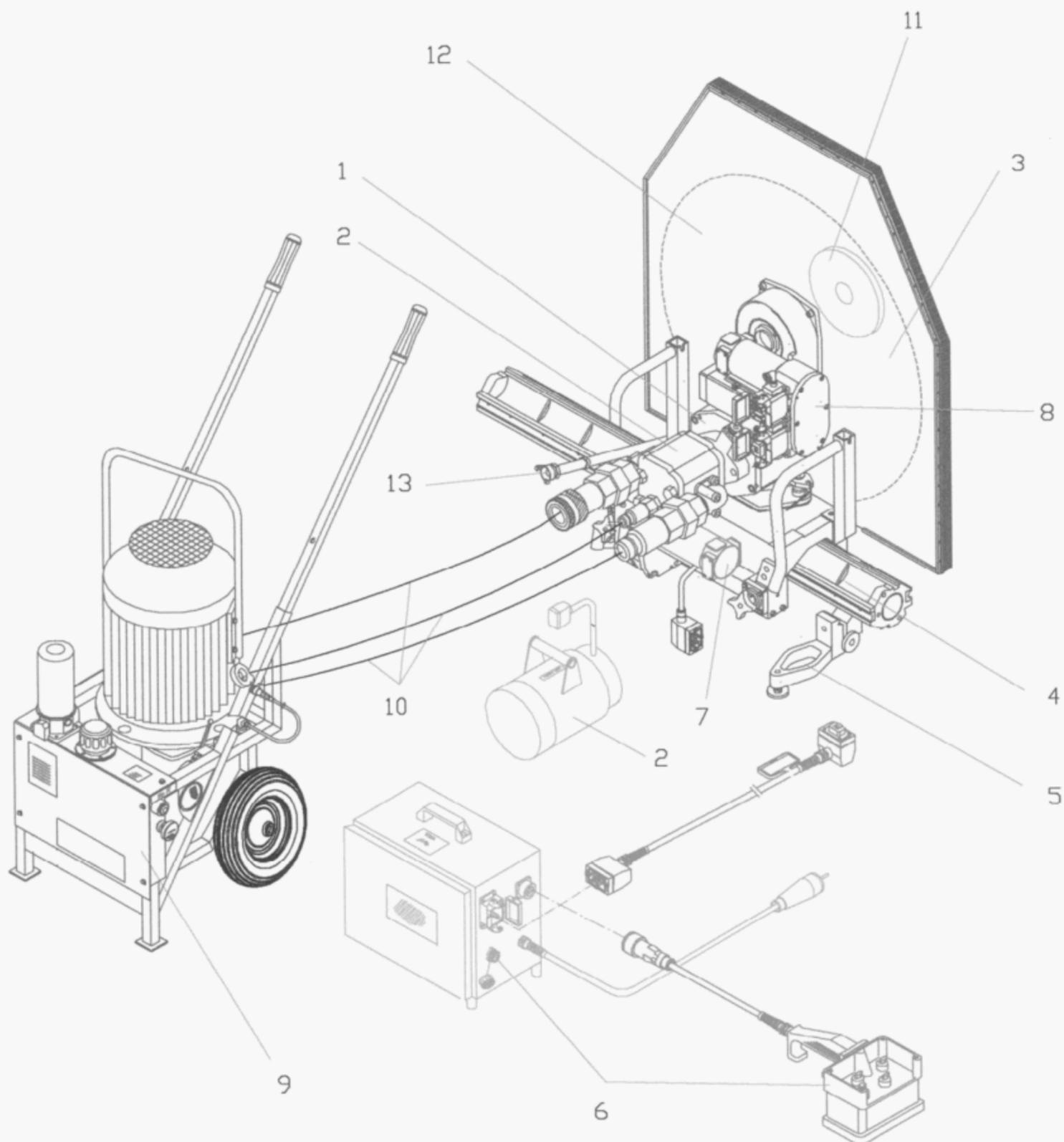
#### 3.2

##### **wire saw**

transportable machine utilising a diamond wire, for sawing primarily on walls, floors and ceilings. A wire saw is powered by an integral or an external power source as described in Clause 1. The machine is operated by remote control

NOTE The components of a wire saw are shown in Figure 2.

3.3  
components of wall saws



Key

- |   |  |    |                      |
|---|--|----|----------------------|
| 1 | cutting head                               | 8  | depth control        |
| 2 | drive motor hydraulic/drive motor electric | 9  | power source         |
| 3 | tool protection/blade guard                | 10 | power transmission   |
| 4 | track guiding system                       | 11 | tool mounting device |
| 5 | mounting devices                           | 12 | diamond tool         |
| 6 | remote control system                      | 13 | coolant supply       |
| 7 | feed system                                |    |                      |

Figure 1 — Components of a wall saw

**3.3.1****cutting head**

cutting head for wall saws powered by an internal or external power source incorporates the mounting device for the diamond cutting tool (e. g. flange, arbour), the cutting tool driving device, feeding and depth control device and the protective/safety devices to afford protection to the operator or site personnel. It incorporates a specific device to be mounted and guided on the track

**3.3.2****track guiding system**

track guiding system for wall saws is mounted in relation to the surface to be cut by means of fixing elements. It guides the cutting head during the working process and is designed to withstand the imparted stresses. It incorporates end stops to retain the cutting head at the track ends

**3.3.3****cutting tool**

rotating diamond tool(s) to perform the cutting operation

**3.3.4****tool mounting device**

device (e. g. flange) for wall saws to securely hold the cutting tool on the cutting head during the cutting operation

**3.3.5****clamping flange system**

clamping flange system for wall saws consists of two plates with concentric tool seat. They are spanned by a locking device

**3.3.6****flush cut flange system**

flush cut flange system for wall saws consists of a single flange with concentric tool seat and a fixing device in order to mount the tool

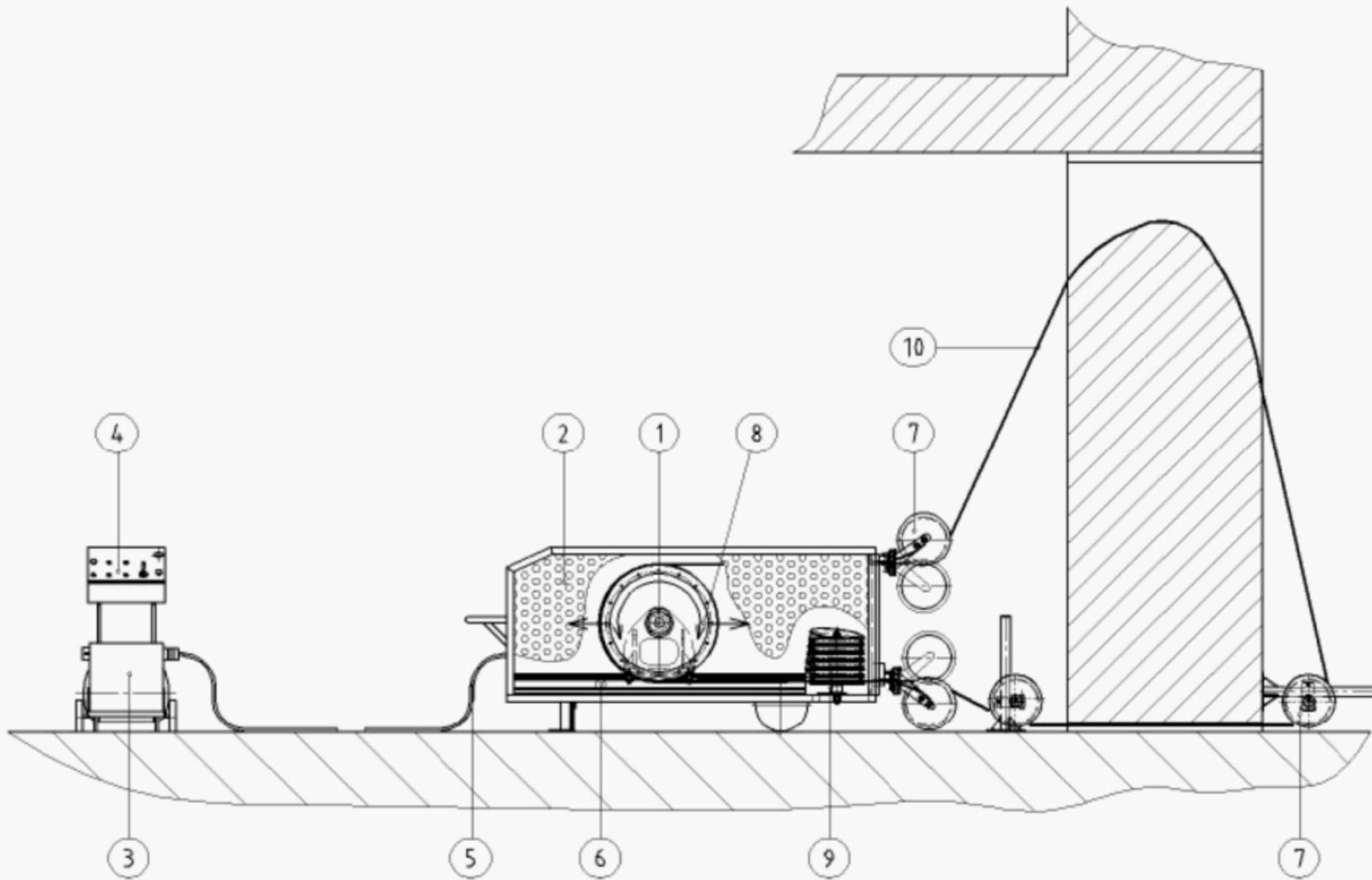
**3.3.7****tool protection guard**

guard which encloses non-working parts of the cutting tool

**3.3.8****power supply unit**

unit supplying electric or hydraulic power required in order to perform the specific cutting operation

3.4  
components of a wire saw



Key

- |   |                                |    |                     |
|---|--------------------------------|----|---------------------|
| 1 | wire drive unit                | 6  | feed system         |
| 2 | tool protection/guards         | 7  | wire guiding device |
| 3 | power source                   | 8  | wire drive wheel    |
| 4 | remote control                 | 9  | wire storage        |
| 5 | power and coolant transmission | 10 | diamond tool (wire) |

Figure 2 — Components of a wire saw

3.4.1

**wire drive unit**

drive unit for wire saws powered by an internal or external power source incorporates the driving wheel(s) for the diamond wire, feeding and tensioning device and the protective/safety devices to afford protection to the operator or site personnel. It may incorporate a wire storage and guiding device

3.4.2

**wire guiding devices**

device(s) which can be mounted in the vicinity of the surface to be cut in order to guide the wire during the cutting operation

3.4.3

**cutting tool**

flexible circulating tool consisting of a core (wire rope) fitted with diamond impregnated beds (cutting rings)

3.4.4

**power supply unit**

unit supplying electric or hydraulic power required in order to perform the specific cutting operation

### 3.5 rated speed

maximum speed of the rotating spindle in revolutions per minute at the rated conditions specified by the manufacturer without cutting tool and under no load

### 3.6 nominal mass

mass of the machine components as defined in the instruction manual but without cutting tool. All tanks empty

## 4 List of significant hazards

This clause contains all hazards and hazardous situations and events, as far as they are dealt with in this European Standard, identified by risk assessment as significant for this type of machinery and which require action to eliminate or reduce the risk.

**Table 1 — List of significant hazards**

	<b>Hazards</b>	<b>Concerned subclauses</b>
4.1	Crushing hazard	5.2.1, 5.2.2, 5.2.4, 5.2.5, 5.2.7
4.2	Shearing hazard	5.2.1, 5.2.2, 5.2.4, 5.2.5, 5.2.7
4.3	Cutting and severing hazard	5.2.1, 5.2.2, 7.3.2
4.4	Entanglement hazard	5.2.1, 5.2.2, 7.3.2
4.5	Drawing in or trapping hazard	5.2.1, 5.2.2, 7.3.2
4.6	Impact hazard	5.2.1, 5.2.2, 5.2.6, 7.3.2
4.7	Fluid injection hazard	5.6
4.8	Hazards caused by ejection of parts, material, lash of bands etc.	5.2.1, 5.2.2, 5.2.5, 5.2.6, 5.9, 7.3.2, 7.3.2.3, Annex B
4.9	Hazards caused by loss of stability	5.2.3, 7.3.2
4.10	Slip, trip and fall hazard in relation with machine	5.7, 7.3.2
4.11	Hazards caused by electrical contact direct/indirect	5.3
4.12	Hazards resulting in burns or scalds, by possible contact of persons by flames, explosion and radiation of heat sources.	5.4, Annex D
4.13	Hearing loss, physiological disorders, interference with speech communication and auditory danger signals	5.10, 7.3.2, Annex A
4.14	Hazards resulting from contact with or inhalation of harmful fluids, gases, mists, fumes and dusts.	5.5, 5.8, 7.3.2
4.15	Hazards caused by fire or explosion.	5.11, 7.3.2
4.16	Hazard combinations	5
4.17	Hazard caused by failure of energy supply or control circuits	5.2.8, 5.2.9
4.18	Hazards caused by failure or malfunction of control system	5.2.8
4.19	Hazards caused by assembly errors	7.3.2, 7.3.3
4.20	Hazards caused by temporary missing or incorrectly positioned safety related measures such as: -	
4.20.1	Guards of all kinds	5.2.2
4.20.2	Safety related protection devices of all kinds	5.2.2
4.20.3	Starting and stopping devices	5.2.8
4.20.4	Safety signs and tags	7.2.3, 7.3.2, Annex C
4.20.5	Information and warning devices of all kinds	7.2.2
4.20.6	Essential equipment and accessories for safe adjusting and maintenance	7.2.2

## 5 Safety requirements and/or measures

### 5.1 General

Machinery shall comply with the safety requirements and/or measures of this clause and in addition with EN ISO 12100-1:2003 and EN ISO 12100-2:2003 for hazards which are relevant but not significant and which are not dealt with in this standard.

The application of the reference standards EN 294:1992, EN 953:1997 used in this standard refers only to the operation of intended elements (see also 7.3.2.3).

### 5.2 Mechanical hazards

#### 5.2.1 General

As components and parts have to be manually handled, all accessible parts, the cutting tool excepted, shall be free of sharp edges and burrs which could generate hazards when setting up, using, handling and maintaining the machine. Burrs from, for example, manufacturing, casting and welding shall be eliminated, sharp edges shall be smoothed.

#### 5.2.2 Protection against moving parts

##### 5.2.2.1 Moving parts not involved in the working process

Rotating transmission parts, for example, couplings and drive shafts shall be provided with fixed guards to prevent contact. Guards shall comply with EN 953:1997 and in particular with Clauses 5, 6 and 7. Fixed guards shall be used and be held in position either by welding or mounting them in such a way that they can only be opened or removed only with the aid of tools or keys.

Guards shall comply with the provisions of EN 294:1992 on safety distances.

When daily access is required for service or maintenance purposes instead of fixed guards, movable guards (see EN ISO 12100-2:2003, 5.3.2.3 a), may be fitted. They shall fulfil the following requirements:

- they shall remain fixed to the machine when open;
- they shall be fitted with a system holding them in the open position.

NOTE The system may be of – for example – a locking, latching, own-weight or spring loaded type.

##### 5.2.2.2 Moving parts involved in the working process

###### 5.2.2.2.1 General

The guards for the protection against contact with the tool and its driving and guiding devices shall be so designed and robust enough to resist strains resulting from an accidental projection of fragments of the cutting tool. Brittleness of the guard material shall be taken into account. Permanent plastic deformation of the guard resulting from stress shall be allowed. Requirements for the strength of cutting-off wheel and wire guards are specified in Annex B. The existence of a device stopping the cutting-off wheel is not necessary, when the absence or the opening of the guard creates a projection of water, which prevents an intended use of the machine.

#### 5.2.2.2.2 Wall saws

The upper part of the cutting tool and its fixing shall be covered with a fixed guard to avoid inadvertent contact and designed with sufficient strength to protect against ejection of fragments of the tool, water, the material to be cut and take into account that the machine may be remotely controlled by the operator.

The mounting and dismounting of the guard system shall need an intentional manual action.

For removable guard systems, keyless fixation of the guard may be applied as an alternative to a key operated system.

The guard opening angle in relation to the centre of the spindle shall not exceed 180°. In the flange area the lateral parts of the guard may have an opening of a size up to 50 % of the lateral parts. The guard shall have a removable section (lateral and peripheral) or a special design exclusively to allow a cut into a frontal surface. In this case 90° of the tool periphery shall remain covered (see operator's instructions in 7.3.2.3).

Only for flush cutting the guard may have an open side (lateral) or a special design in order to allow a cut close to adjacent surface (see operator's instructions in 7.3.2.3).

In that case fixing screws and similar devices shall be designed countersunk in the flange or cutting tool.

#### 5.2.2.2.3 Wire saws

The drive, tensioning (feed) and storage system of the wire saw except of the external wire guiding devices shall be covered with fixed guards to avoid inadvertent contact. This/these guard(s) shall have sufficient strength to protect against ejection of fragments of the tool. When designing the guard system it shall take into account that the machine will be remotely controlled by the operator. The distance from the unprotected moving tool to the remote control shall allow that the operator can operate the machine outside the dangerous area described in the instruction manual (see 7.3.2.3).

The mounting and dismounting of the guard system shall need an intentional manual action.

For removable guard systems, keyless fixation of the guard may be applied as an alternative to a key operated system.

### 5.2.3 Stability

The machines shall be designed and constructed so that they are sufficiently stable under the intended operating conditions.

Machines shall be equipped with fixing devices which shall allow a rigid and safe mounting in relation to the material to be cut. Nuts and screws intended to adjust the mountings in position shall need intentional action to loosen.

### 5.2.4 Transport and handling

The movable parts of the machine shall be either lockable or removable to avoid risk of shearing, crushing, unlocking or falling down e. g. during handling or carrying.

NOTE For technical requirements relating to transport and lifting of machines see 5.5.5 of EN ISO 12100-2:2003, Annex A.

## 5.2.5 Fixing of the cutting tool

### 5.2.5.1 Device for mounting the cutting tool

The device for mounting the cutting tool on the wall saw shall be designed that loosening and untightening shall only be possible by an intentional manual action (e. g. by retaining the cutting tool on the drive spindle by a fixing device preventing loosening of the tool when in use).

### 5.2.5.2 Flanges

Clamping flanges for wall saws used to mount the rotating tools shall secure a safe transmission of moments and forces to the tool during the whole cutting process including foreseeable misuse. Clamping flanges have to be designed in a way that the loads to the rotating tool during the cutting process will not lead to a fatigue or failure in the clamping zone of the rotating tool.

NOTE ISO 21537-2:2004 can be used as a design help, but any other design, if justified is possible.

## 5.2.6 Manual starting

Internal combustion engines using a hand starting system shall be designed to avoid a hazard caused by kick back by of the inclusion, for example of an anti kick-back device.

## 5.2.7 Guiding systems

The track guiding system and/or the wire guiding system shall be designed to take the maximum force generated by the working process. End stops at track guiding system to retain the cutting head/drive unit shall be mounted on both ends.

## 5.2.8 Control devices

### 5.2.8.1 General

For control functions in electric, hydraulic and pneumatic systems the requirements specified in Clauses 7, 9, 11 and 13 of EN 60204-1:2006, EN 982:1996 and EN 983:1996 shall be applied.

Control devices shall be marked without ambiguity. They shall be positioned for safe, quick and comfortable operation.

NOTE For guidance see 3.6.6 of EN ISO 12100-2:2003.

For safety-related parts of control systems EN ISO 13849-1:2006 shall be applied, the required performance level  $PL_r$  shall be c or higher.

### 5.2.8.2 Start and stop control for rotation and feed

Machines shall be fitted with separate control devices to start and stop the motor, or the cutting action of the cutting tool and stop the powered feed. Start and stop devices shall be easily accessible to the operator.

Wall saws shall be equipped with a control which, when stopping the feed, holds the cutting head in a sustained position.

Wire saws shall be equipped with a remote control. The remote control may be an integral part of the power supply unit. The design of the remote control shall allow the operator to control the machine from outside the danger zone as defined by the manufacturer in the operator's instructions (see 7.3.2.3).

NOTE The danger zone for wire saws is considered as twice the maximum length of the free running wire as shown in Annex E.

All machines with a powered feed shall be fitted with an easily accessible emergency stop in the system. This emergency stop shall be in accordance with EN ISO 13850:2006. It shall stop all dangerous movements as quickly as possible without creating an additional hazard.

### 5.2.9 Failure of power supply

An interruption of the power supply and re-establishment after an interruption shall not lead to a dangerous situation in particular:

- it shall only be possible to restart the machine by an intentional action;
- no part of the machine or a cutting tool shall fall or be ejected;
- a power failure or a hydraulic or pneumatic pressure drop shall not cause any dangerous movements or actions.

Such failures shall not obstruct any stop controls from functioning.

### 5.3 Electrical hazards

Machines with an electric motor the power of which is less than or equal to 4 kW shall fulfil the electrical safety requirements of EN 61029-1:2000.

Machines with an electric motor the power of which is more than 4 kW shall fulfil the electrical safety requirements of EN 60204-1:2006 in particular Clauses 4, 5, 6, 14, 15 and 16. In addition to 4.4.2 of EN 60204-1:2006, these machines shall work as intended in an ambient temperature range of 0 °C – 40 °C.

### 5.4 Thermal hazards

**5.4.1** The surface temperature of handles and other surfaces which require a continuous contact shall not exceed 43 °C.

**5.4.2** Controls and other parts of the machine which require occasional contact shall not exceed the temperature as given in EN ISO 13732-1:2006 according to the chosen material for a duration of 5 s lowest curve.

**5.4.3** Hot areas which can be contacted unintentionally shall not exceed the temperature as given in EN ISO 13732-1:2006 according to the chosen material for a contact time equal to 1 s duration. These areas shall be either located at a distance greater than 120 mm from the gripping areas, or they shall be protected by shields.

These shields shall be designed to reduce the heat transfer from the surface to the body of the operator. This may be achieved by a structured surface, ribs or special coating.

**5.4.4** The test method to verify the surface temperature of the machine is prescribed in Annex D.

The machine parts whose temperatures exceed the permissible limits of EN ISO 13732-1:2006 for contact not exceeding 1 s and whose surface is greater than 10 cm<sup>2</sup>, shall not be accessible to the test cone (see Annex D).

### 5.5 Exhaust fumes (internal combustion engines)

Internal combustion engines exhausts shall not be directed towards the operator when in the operating position specified in the instruction manual.

This requirement is considered fulfilled when the angle made by the axis of the outlet of the exhaust device and the lengthways axis of the machine, measured from the position of the operator, is equal to or greater than 90°.

### 5.6 Hydraulic and pneumatic installations

#### 5.6.1 Hydraulic installations

The hydraulic systems shall comply with the requirements of 3.8 of EN ISO 12100-2:2003 and EN 982:1996.

#### 5.6.2 Pneumatic installations

The pneumatic installations (e. g. feed systems for wire saws) shall comply with the requirements of 3.8 of EN ISO 12100-2:2003 and EN 983:1996.

#### 5.6.3 Hoses and pipes under pressure

Hoses and pipes under hydraulic and pneumatic pressure respectively shall conform to the requirements of EN 982:1996 and EN 983:1996 respectively.

Machines with hoses and pipes under pressure shall be so designed that all components withstand the influence of inlet pressure and stored energy.

Pipes, hoses and fittings shall be able to withstand the stresses from the pressure. The hoses shall be marked with the rated working pressure.

Flexible hydraulic hoses intended for pressure higher than 15 MPa shall be fitted with swaged or screwed fittings.

Hydraulic hoses and pipes shall be separated from electric power wiring and be protected from hot surfaces and sharp edges.

Hydraulic pipes and hoses which have to be disconnected shall be fitted with self sealing couplings. These couplings shall be designed or marked to avoid incorrect connection.

### 5.7 Fluid containers

When filled according to manufacturers instructions fluid containers, such as batteries, fuel, oil, water and hydraulic tanks shall be constructed to prevent spillage when working on any gradient for which the machine is designed with a minimum of 10°.

Seeping at vent systems shall not be considered as spillage.

### 5.8 Cutting debris and dust emission

Machines shall be equipped with a device to remove cutting debris and possible dust emission if applicable.

**NOTE** In case of wet-cutting the volume of water supply applied to the cutting tool should be sufficient to provide adequate tool flush and dust suppression.

### 5.9 Rotational speed

Under the rated conditions of power supply specified by the machine manufacturer, the maximum rotational speed of the driving device shall not exceed that specified by the manufacturer in the instruction manual.

## 5.10 Noise reduction at design stage

A reduction in noise shall be obtained at the design stage on machines to be fitted with either a combustion engine or a pneumatic motor at least by the incorporation of an exhaust silencer (muffler).

Appropriate guidance on low-noise design of machinery is given in EN ISO 11688-1:1998.

NOTE Noise generation mechanisms are described in EN ISO 11688-2:2000.

## 5.11 Maintenance

The parts of the machine which necessitate regular maintenance shall be placed to be easily accessible.

In particular for machines with internal combustion engines:

- oil drain shall be designed to allow easy recovery of the used oil;
- sump drain plug shall be designed to be easily recognised.

## 6 Verification of safety requirements and/or measures

The verification methods of the safety requirements are self evident or are prescribed in the pertinent clauses in this standard.

The measurement, declaration and verification of noise emission values shall be made according to the noise test code given in Annex A.

## 7 Information for use

### 7.1 General

Written instructions shall be drawn up in accordance with 6.5 of EN ISO 12100-2:2003.

### 7.2 Marking

#### 7.2.1 Regular marking

The marking plate (e. g. adhesive sticker) shall carry in a legible and indelible way the following information:

- manufacturer's (or authorised representative's) name and address;
- designation of type and serial number if any;
- year of manufacture;
- mandatory marking <sup>1)</sup>.

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<sup>1)</sup> For EU countries, CE marking

## **7.2.2 Other information**

The following shall be also indicated on the machine:

- installed power in kW (or Watts);
- rated speed(s) (see 3.5) in revolutions per minute ( $\text{min}^{-1}$ ); (if for wall saws several rotational speeds are available, the corresponding speed for each diameter of tool shall be marked on each tool guard or control unit);
- direction of rotation of cutting-off wheel (indicated by an arrow on the cutting head/wire drive wheel and/or guard);
- symbol "read the operator's instructions" (see Annex C).

Control devices shall be marked without ambiguity in accordance with relevant standards.

## **7.2.3 Warning about residual risks**

The machine shall be marked with warning signs according to Annex C to inform the machine user about residual risks.

## **7.3 Accompanying documents**

### **7.3.1 General**

A set of instructions specifying the conditions for installation, starting up, use, maintenance, handling and transport (carrying) shall be supplied with the machine.

In general there may be three written instructions:

- operator's instructions;
- maintenance instructions;
- spare parts list.

### **7.3.2 Operator's instructions**

The operator's instructions shall contain at least the following items:

#### **7.3.2.1 Description of the machine**

The description of the machine shall contain the following items:

- type designation of the machine together with information on type, model and serial number;
- name and full address of manufacture or distributor or authorised agent;
- information listed on the machine data plate;
- specification of the intended use of the machine and foreseeable misuse;
- description of the operators controls and an explanation of their safe use;

- all necessary drawings, diagrams and illustrations of sufficient size to clearly show the designation of major components, their functions, locations and relationships with the complete machine;
- explanation of the pictograms and symbols used on the machine and in the documentation;
- listing of specific cutting-off wheels or wires (for guidance see EN 13236:2001) to be used with their nominal characteristics and the advice that the use of all other types of tools (e. g. circular saw blades) which are not indicated in the list is not allowed;
- schedule of material which may be cut;
- information concerning the fixing and guiding system (if relevant);
- information that any modification which could lead to a change in the original characteristic of the machine, for example, rotational speed or maximum diameter of the cutting tool may be carried out only by the manufacturer who shall confirm that the machine is still in conformity with the safety regulations;
- noise emission declaration according to A.7.

### **7.3.2.2 Instructions for transport, handling and storage of the machine and its dismantable parts**

The instructions for transport, handling and storage of the machine and its dismantable parts shall contain at least the following items and be included in the instruction manual:

- nominal mass of the main machine components (see 3.6);
- instructions about the parts to be dismantled, emptied or fixed during transport and the necessary information concerning their mounting and dismanting;
- position of any lifting points and slinging instructions;
- reference concerning requirements of the tool manufacturer for the storage and handling of the tools.

### **7.3.2.3 Instructions for the installation and use of the machine**

The instructions for the installation and use of the machine shall be included in the instruction manual and contain at least the following items:

- user shall keep a minimum safety margin of 1,5 m to all working and moving parts during the operation;
- advice, that the machine have to be used by a trained operator only;
- information about the safe organisation of the working place including intended operator's position;
- advice, that apart from the operator nobody have to be within the working area;
- instructions for setting up the machine including, for example, choosing a flat and stable surface, free of obstacles (except materials to be cut) and adequately lit;
- information regarding connection of water and power supply if relevant;
- information about the choice of the cutting tool, together with its conditions of use according to the type of work to be performed;
- advice that work area is to be secured by e. g. wire guard systems, barriers, curtains or if necessary by deflectors, if the danger of the ejection of parts (wire fragments, bits, cutting debries) exists in the range concerned;

- reference to danger by rope tear and thereby connected rope whips (Annex E);
  - information concerning the correct setting of the mounting and guiding system;
  - information concerning the loads to be considered under normal cutting conditions in order to safe fixing the guiding system on the surface. Instructions in case the fixing devices, like dowels, would get loose during the cutting operation, how the sawing system should remain attached to the surface;
  - information regarding the maximum length of the free running wire and advice how to mount the wire guiding system according to the assembly of the fairlead-system (see Annex E) correspondingly;
  - advice to check the correct rotation of the tool and if relevant how to invert;
  - advice to prevent any contact with the rotating tool;
  - for machines with an internal combustion engine, information about filling with fuel, fire precautions while filling the fuel tank, fuel storage, warning against smoking;
  - advice, that machines with an internal combustion engine should not be used in confined areas;
  - information that machines with an internal combustion engine shall be installed in such a way to avoid inhalation of exhaust emissions;
  - information on control devices (in particular start and stop devices and emergency stop devices if required);
  - precautions to be taken for mounting, clamping and removing the tool in particular
    - setting the control device to the "off" position;
    - separating the machine from its energy source by unplugging the main power supplies for electrical machines, or for other machines by stopping the prime mover;
  - information about handling methods of tightening flanges if applicable;
  - information regarding the maximum allowed spindle speed in relation to maximum allowed peripheral speed of the tools to be used;
  - advice to use no cutting tool with a maximum operating tool speed less than the rated spindle speed of the machine;
  - information regarding the adjustment of the spindle speed (if any);
  - information about the need of wearing adequate clothing and personal protection equipment (e. g. eye and ear protection);
- NOTE The noise emission during the cutting operation varies significantly as a function of, for example:
- type of the tool;
  - depth of cut;
  - speed of feed;
  - type of material being cut.
- advice that the working area shall be cleared of everything which may hamper the working action;
  - advice that the correct mounting of guards shall be verified;

- advice under which operating conditions guards with removable section(s) and flush cutting guards (see 5.2.2.2.2) may be used;
- advice that for safety reasons each damaged (cracked) tool has to be replaced.

### 7.3.3 Maintenance instructions

The maintenance instructions shall contain at least the following items:

- list of operations, for example adjustment, maintenance, lubrication, repair, cleaning and servicing which shall be carried out only while the machine is shut down and the prime mover stopped;
- information regarding fuel, lubricants, coolants and other fluids used;
- type and frequency of inspections and replacement intervals;
- instructions concerning the maintenance procedures which may be carried out by the user;
- list of the maintenance procedures which require particular technical knowledge and which shall be performed only by competent person;
- diagrams and sketches to allow the correct repair of the machine;
- for machines with an electrical power supply, the instructions given in EN 61029-1:2000 concerning electrical safety;
- electrical sketches (if relevant).

### 7.3.4 Spare parts list

The spare parts list shall contain all parts relevant for safety and maintenance with unambiguous identification and information on the location of the part in the machine.

## Annex A (normative)

### Noise test code – Grade 2 of accuracy

#### A.1 General

This noise test code specifies all requirements to carry out efficiently and under standardised conditions the determination of the noise emission values of transportable wall saw and wire saw equipment.

NOTE 1 The machines covered by this standard are not concerned by 2000/14/EC.

NOTE 2 Under load the A-weighted noise emission of the machines covered by this standard can be 5 to 10 dB higher depending on tools and working conditions.

#### A.2 Measurement of the A-weighted emission sound pressure level at the work station

The A-weighted emission sound pressure level at the working station shall be measured in accordance with EN ISO 11201:1995.

The microphone position during measuring shall be related to the size and position of the operator which are determined by 1,75 m ± 0,05 m height and at a distance of 5 m from the centre of the saw blade or driving wheel.

3 series of measurements shall be made and the arithmetic mean value shall be recorded and reported.

#### A.3 Determination of the A-weighted sound power level emitted by the machine

The A-weighted sound power level emitted by the machine shall be measured in accordance with EN ISO 3744:1995.

The measurement method referring to the hemispherical measurement surface (see 7.2 of EN ISO 3744:1995) shall be used.

The radius of the hemisphere shall be of 4 m starting at the centre of the noise source. The number of microphones may be reduced down to 6 (according to the minimum requirements in 7.4.2 of EN ISO 3744:1995), but the microphone positions 2, 4, 6, 8, 10 and 12 shall be used in any case.

#### A.4 Operating conditions

The machine shall run on a horizontal concrete surface under the following conditions:

- wall saw shall be placed in environmental conditions which fulfil the requirements of Clause 6 of EN ISO 11201:1995 equipped with its largest tool, set for a cutting operation, and shall run at no load, at its maximum allowed speed;
- wire saw shall be placed in environmental conditions which fulfil the requirements of Clause 6 of EN ISO 11201:1995 without tool at the maximum allowed speed of the machine. Any additional powered accessories shall run during the measurement procedure;

- measurement shall be made when the motor has reached its normal operating conditions (wait 10 min at least after starting).

In case the wall or wire-saw equipment includes external power source or any other noise emitting accessory those devices should be positioned as close as possible together, perpendicular to the plane of the saw blade or driving wheel, on the same side as the operator's position.

NOTE Standardized noise emission measurement during work is made impossible by the fact that the machine does not work under stationary conditions (feeding movement) and can operate with a variety of tools and materials.

## A.5 Information to be recorded

The information to be recorded shall be in line EN ISO 3744:1995. Any deviations from this noise test code and/or from the basic standards referred to shall be recorded together with the technical justification for such deviations.

## A.6 Information to be reported

The test report shall give at least the following information:

- identification of the manufacturing company, the machine type including unit configuration, serial number (if any) and year of manufacture;
- reference to the basic noise emission standards used;
- description of the mounting and operating conditions of the machine;
- noise emission value(s) obtained and the associated uncertainties;
- location of the workstation where the A-weighted emission sound pressure level has been measured.

It shall be stated that all requirements of the noise test code and/or the standards referred to have been fulfilled, and, if relevant, any unfulfilled requirements shall be identified; the deviations from the requirements shall be stated and technical justification for the deviations shall be given.

## A.7 Noise declaration by the manufacturer

The noise declaration shall explicitly state that the noise emission values have been obtained according to this noise test code. If this statement is not true, the noise declaration shall indicate clearly what the deviations are.

The format of the noise declaration shall be a dual-number format i.e. measured value and associated uncertainty given separately.

The noise emission values to be declared are:

- A-weighted emission sound pressure level at the operator's position if exceeding 70 dB measured as specified in this annex. Should this sound pressure level not exceed 70 dB, this fact shall be indicated;
- A-weighted sound power level emitted by the machine as measured in accordance with this annex, if the A-weighted emission sound pressure level at the operator's position exceeds 85 dB.

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Unless the manufacturer has other figures available, the associated measurement uncertainties are those offered by EN ISO 3744 and EN ISO 11201, i. e.:

- 2,5 dB for the A-weighted sound power level,
- 4 dB for the A-weighted emission sound pressure level.

NOTE 1 Additional noise emission values may be given in the noise declaration, but only in such a way, that they cannot be confused with the declared values.

NOTE 2 EN ISO 4871:1996 gives a method to determine noise emission values to be declared and to verify the declared values. The methodology is based on the use of the measured values and associated uncertainties. The latter are the uncertainty associated to the measurement procedure (which is determined by the grade of accuracy of the measurement method used) and the production uncertainty (variation of noise emission from one machine to another of the same type made by the same manufacturer).

In the case of verification of declared values, this shall be done by using this noise test code (in particular, same mounting, installation and operating conditions of the machine as those used for the initial determination of noise emission values).

## Annex B (normative)

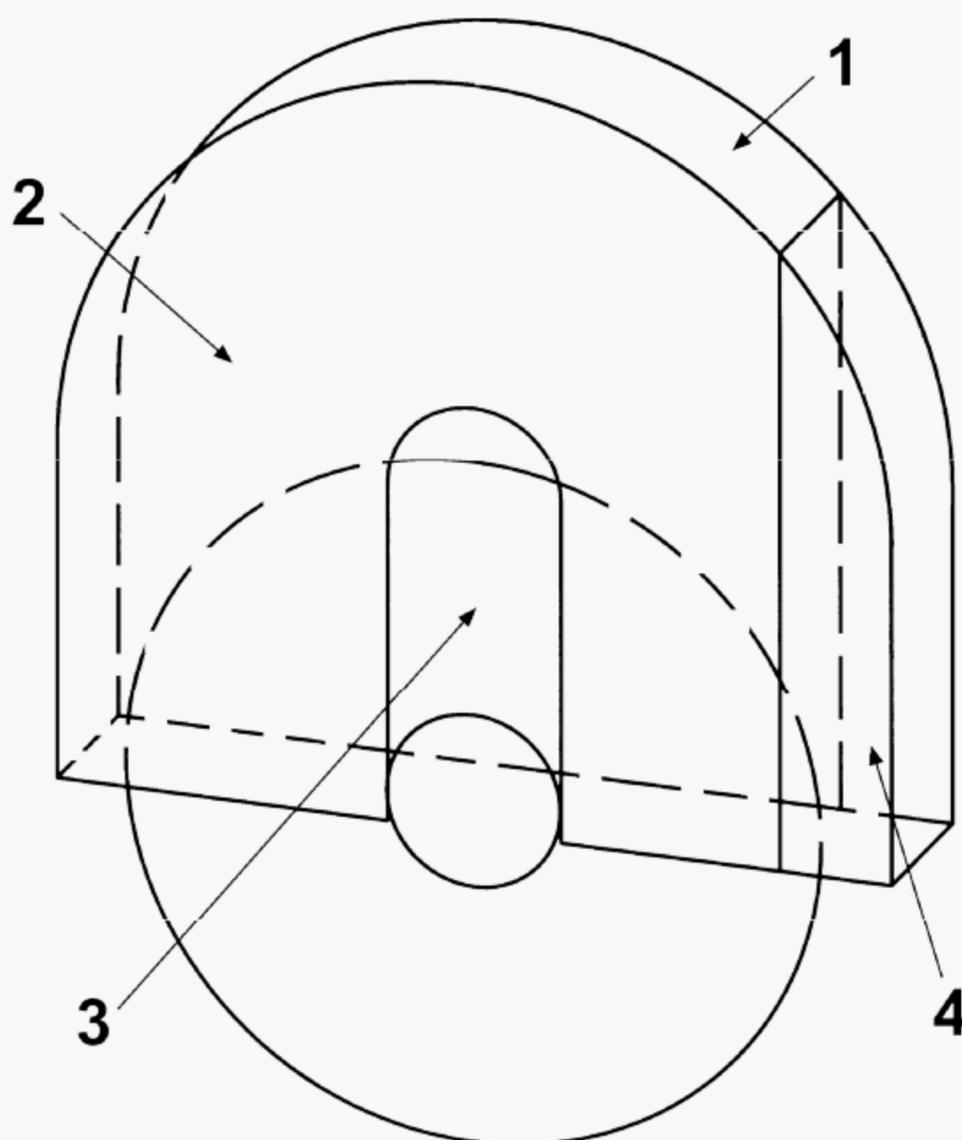
### Requirements for cutting-off wheel and wire guards

#### B.1 General

The strength requirements of the guard are dependent on the material of manufacture and its thickness.

For machines of which the peripheral speed of the cutting tool is  $\leq 63$  m/s for cutting-off wheel and  $\leq 40$  m/s for cutting-off wire, minimum thickness of the guard material shall be as given in the following tables according to the type of the cutting tool.

#### B.2 Tool guards for wall saws



#### Key

- 1 peripheral part (P)
- 2 side part (lateral) (L)
- 3 cutting-off wheel
- 4 allowed open section (see 5.2.2.2.2)

Figure B.1 — Wall saw — Tool guard

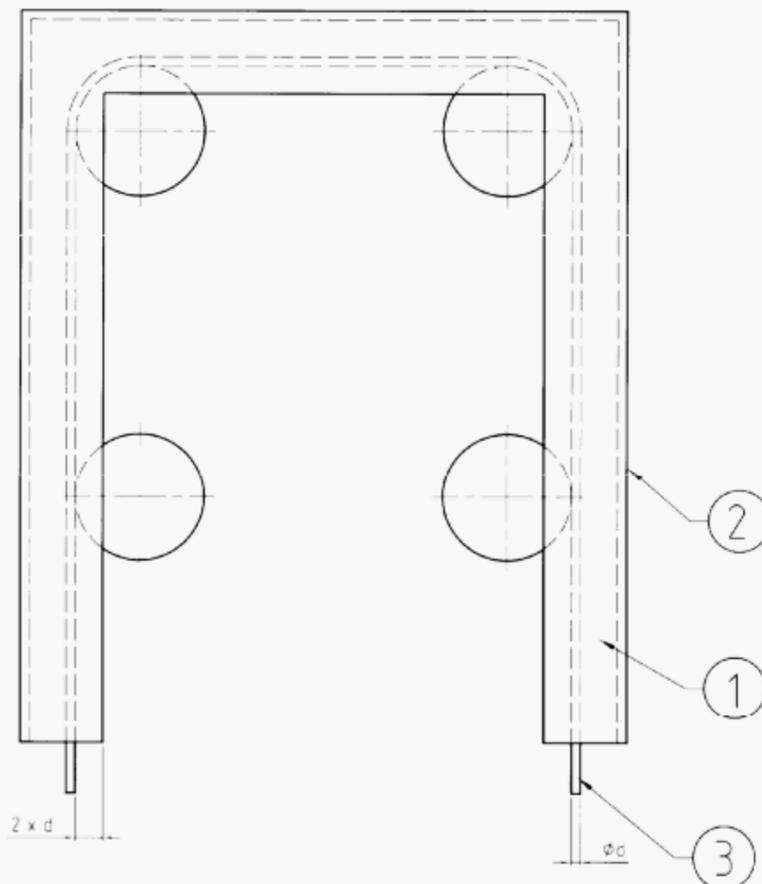
The values in Table B.1 apply to guards made from Aluminium and steel.

**Table B.1 — Minimum thickness of tool guard parts for wall saws**

Material	<i>P</i> (mm)	<i>L</i> (mm)
Aluminium (EN AW 6082) according to EN 573-3	min. 2	min. 1,5
Steel (1.0398) according to EN 10111	min. 1,5	min. 1
<i>P</i> thickness of the peripheral part of the guard.		
<i>L</i> thickness of the lateral part of the guard.		

NOTE The data for minimum wall thicknesses of tool protection from different materials were determined over representative attempts.

**B.3 Tool guard for wire saws**



**Key**

- 1 side part (lateral) (*L*)
- 2 peripheral part (*P*)
- 3 cutting wire

**Figure B.2 — Wire saw – Tool guard**

The values in Table B.2 apply to guards made from Aluminium and steel.

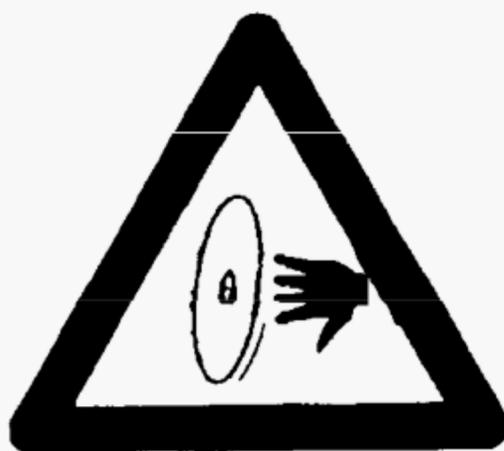
**Table B.2 — Minimum thickness of tool guard parts for wire saws**

<b>Material</b>	<b><i>P</i> (mm)</b>	<b><i>L</i> (mm)</b>
Aluminium (EN AW 6082) according to EN 573-3	min. 2	,min. 1,5
Steel (1.0398) according to EN 10111	min. 1,5	min. 1
<i>P</i> thickness of the peripheral part of the guard.		
<i>L</i> thickness of the lateral part of the guard.		

NOTE The data for minimum wall thicknesses of tool protection from different materials were determined over representative attempts.

**Annex C**  
(normative)

**Pictograms**



**Figure C.1 — “Caution, risk of cutting”**



**Figure C.2 — “Read operator’s instructions” (see ISO 7000:2004)**



**Figure C.3 — “Ear Hearing protection shall be worn”**



**Figure C.4 — “Eye protection shall be worn”**



**Figure C.5 — “Hand protection shall be worn”**

## Annex D (normative)

### Verification of surface temperature

#### D.1 Test equipment

The measuring equipment shall have an accuracy of  $\pm 1$  °C.

#### D.2 Test method

The motor or engine shall be operated at its maximum no load speed until the surface temperature is stable. The test shall be conducted in the shade. Temperatures are to be determined by correcting the observed temperatures by the difference between the specified ambient and the test ambient temperature.

Ambient temperature shall be  $(20 \pm 3)$  °C.

The hot surface area(s) greater than 10 cm<sup>2</sup> shall be identified.

The test cone (see Figure D.1) shall be moved in all positions, the tip of the cone shall be directed towards the hot area.

When moving the cone, it shall be determined whether or not the cone tip or conical surface of the cone gets into contact with the hot surface area(s).

Dimensions in millimetres

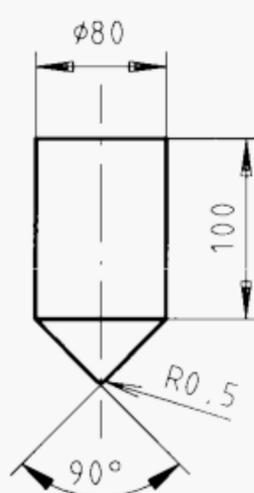


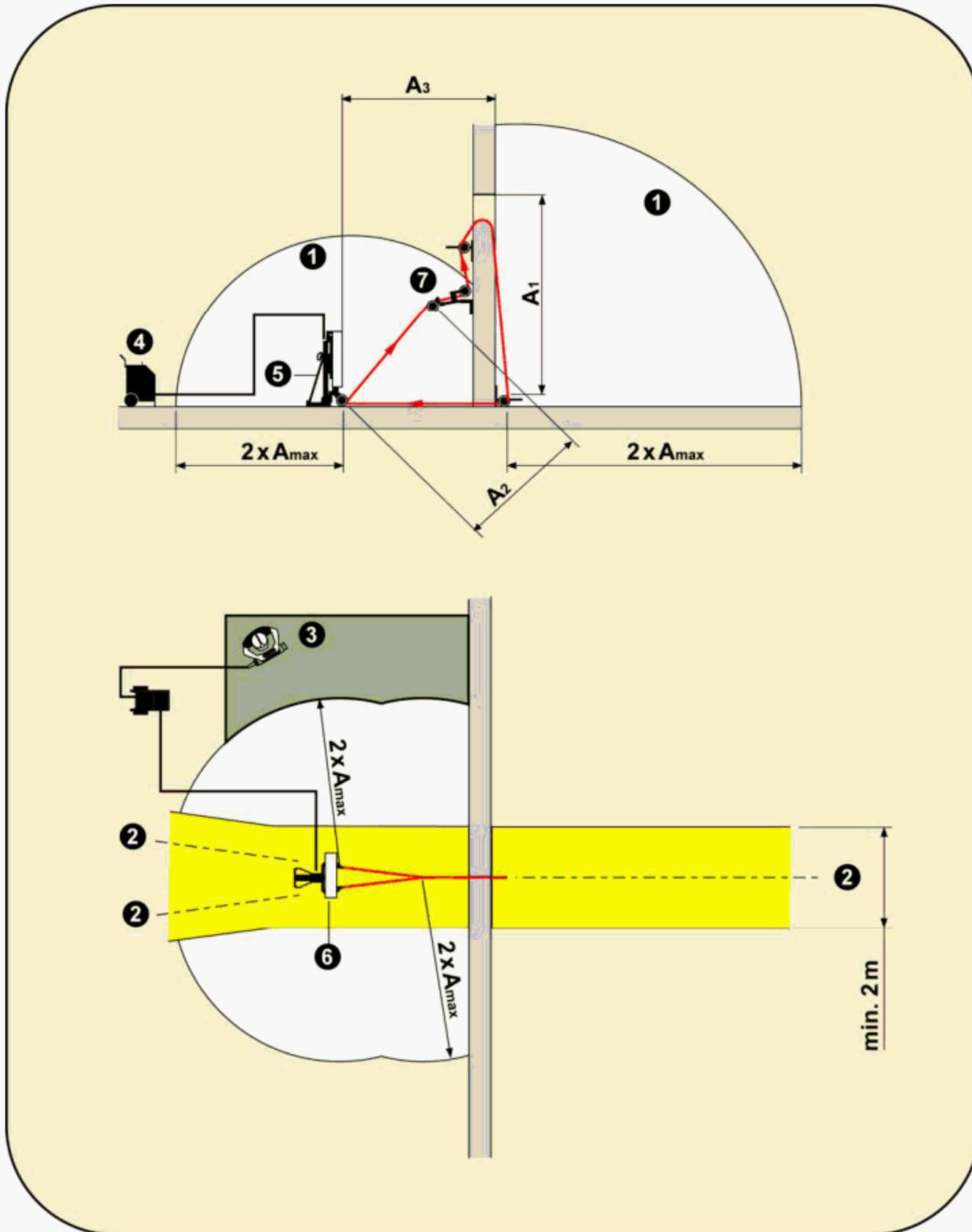
Figure D.1 — Test cone to detect hot surface

#### D.3 Test acceptance

The tip or conical surface of the test cone shall not get into contact with any hot surface.

## Annex E (informative)

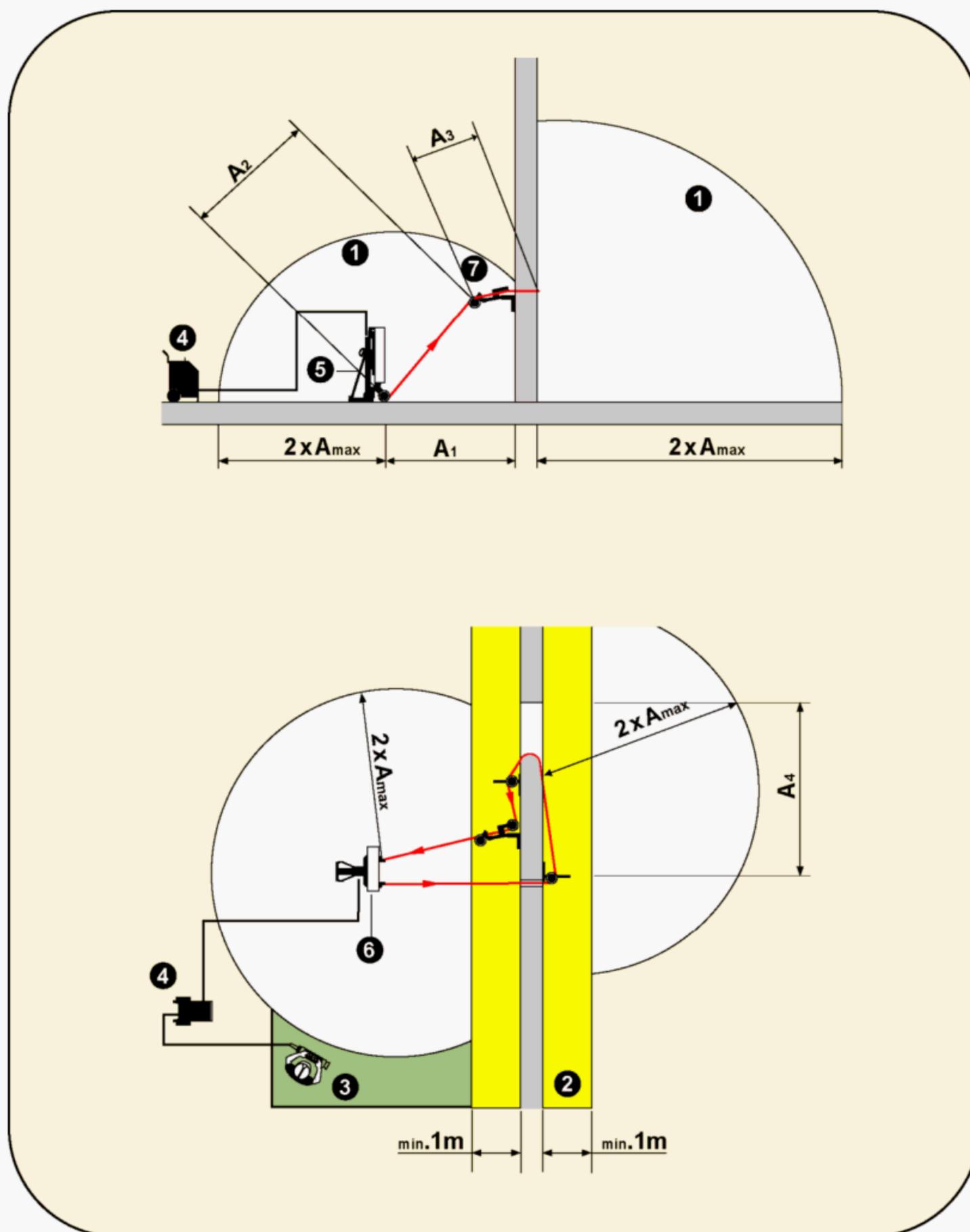
### Examples for working areas and dangerous areas for wire saws



**Key**

- |  |                                     |
|--|-------------------------------------|
| $A_{max}$ largest free running wire section ( $A_1$ to $A_3$ ) | 4 power supply                      |
| 1 danger zone  | 5 wire drive unit                   |
| 2 horizontal projection of the wire towards the operator       | 6 diamond bit/wire protection guard |
| 3 recommended operator position                                | 7 wire guiding device               |

**Figure E.1 — Danger zones for wall cutting with additional wire guiding devices**

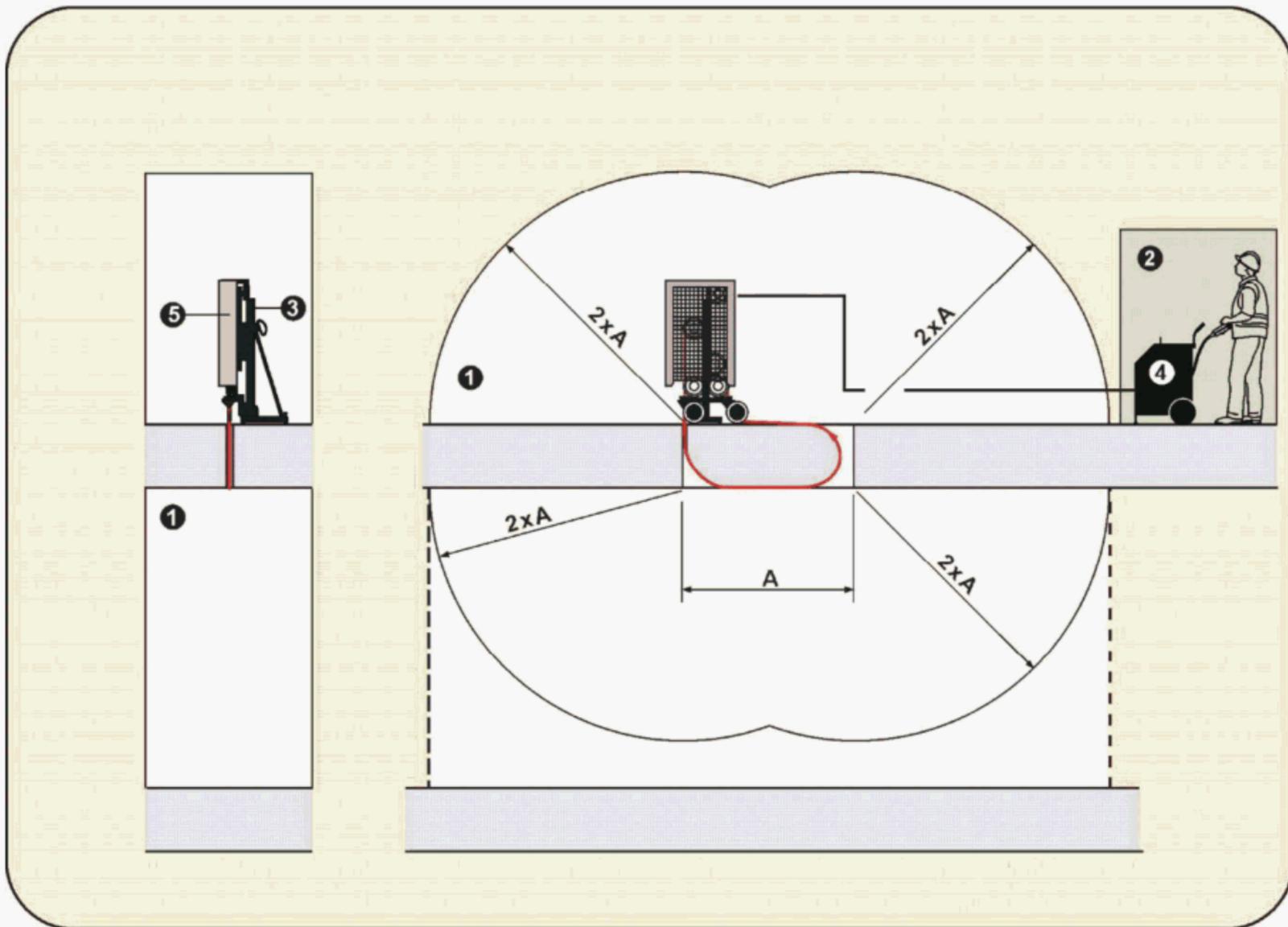


### Key

$A_{max}$  largest free running wire section ( $A_1$  to  $A_4$ )

- 1 danger zone
- 2 danger zone of the horizontal projection of the wire towards the operator
- 3 recommended operator position
- 4 power supply
- 5 wire drive unit
- 6 diamond bit/wire protection/guard
- 7 wire guiding device

Figure E.2 — Danger zones for wall cutting without additional wire guiding devices



**Key**

- A largest free running wire section
- 1 danger zone
- 2 recommended operator position
- 3 wire drive unit
- 4 power supply
- 5 tool protection/guard

**Figure E.3 — Danger zones for floor cutting**

## Annex ZA (informative)

### Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive Machinery 98/37/EC, amended by 98/79/EC.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

**WARNING** — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.

## Bibliography

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prEN 15163, *Machines and installations for the exploitation and processing of natural stone — Safety — Requirements for diamond wire saws*

