BRITISH STANDARD

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

ICS 73.120

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 15163:2008.

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

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Maschinen und Anlagen zur Gewinnung und Bearbeitung von Naturstein - Sicherheit - Anforderungen für Diamantseilsägen

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Foreword

This document (EN 15163:2008) 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of an identical text or by endorsement, at the latest by November 2008, and conflicting national standards shall be withdrawn at the latest by November 2008.

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 Annexes ZA and ZB, which are integral parts of this document.

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Introduction

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

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.

1 Scope

This European Standard applies to diamond wire saws being used in quarries as well as in processing plants for cutting marble, granite and other stones out of a mass of rocks in a quarry or of blocks having been already extracted. The machines can be either stationary or travelling on rails during operation.

Diamond wire saws in the scope have an electric main motor. This standard deals with machines working in one main axis as well as in several axes. Furthermore, this standard does not deal with problems caused by an irregular structure of the stones to be cut.

Diamond wire saws are intended to be used with diamond cutting wires also referred to as tools in this standard.

For transportable machines, this standard deals only with machines using coated wire tools.

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

This standard does not deal with noise as a significant hazard.

This European Standard does not deal with:

— operation under extreme ambient conditions (outside the limits defined in EN 60204-1);

— upstream and downstream conveying elements for transporting the work-pieces.

This document is not applicable to machines which are manufactured before the date of its publication as EN.

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 distances to prevent danger zones being reached by the upper limbs*

EN 547-1:1996, *Safety of machinery — Human body measurements — Part 1: Principles for determining the dimensions required for openings for whole body access into machinery*

EN 547-2:1996, *Safety of machinery — Human body measurements — Part 2: Principles for determining the dimensions required for access openings*

EN 547-3:1996, *Safety of machinery — Human body measurements — Part 3: Anthropometric data*

EN 614-1:2006, *Safety of machinery — Ergonomic design principles — Part 1: Terminology and general principles*

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 1088:1995, *Safety of machinery — Interlocking devices associated with guards — Principles for design and selection*

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

EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989)*

EN 60825-1:1994, *Safety of laser products — Part 1: Equipment classification, requirements and user's guide (IEC 60825-1:1993)*

EN 60825-4:2006, *Safety of laser products — Part 4: Laser guards (IEC 60825-4:2006)*

EN 61310-1:1995, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, auditory and tactile signals (IEC 61310-1:1995)*

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 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 and the following apply.

3.1
diamond wire saw
machinery for cutting marble, granite and other natural stones from stone deposits or already extracted stone into blocks and slabs using a suitable diamond wire as tool. During the cutting operation, the tool can be cooled by water. In that case, the water also serves for the suppression of dust emission during the cutting operation.

The diamond wire saws in the scope have an electric motor as main drive.

Different types of diamond wire saws:

— transportable diamond wire saws (mining of natural stone) (see Figure 1);

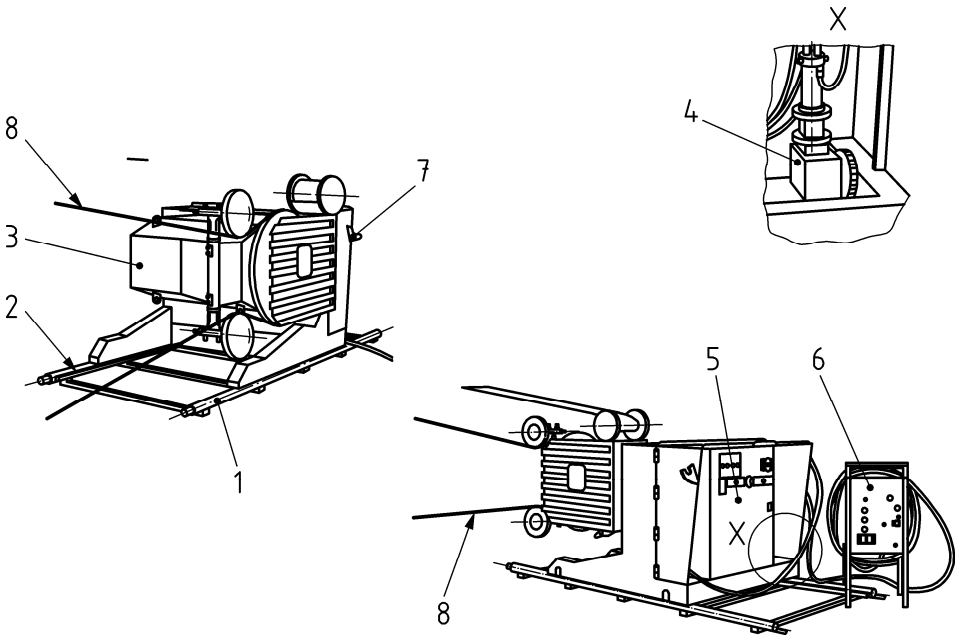
— travelling diamond wire saws (see Figure 2);

— stationary diamond wire saws with block trolley (see Figure 3);

— stationary diamond wire saws without block trolley (Figure 4);

— diamond wire saws for contour (two and more axes) (see Figure 5);

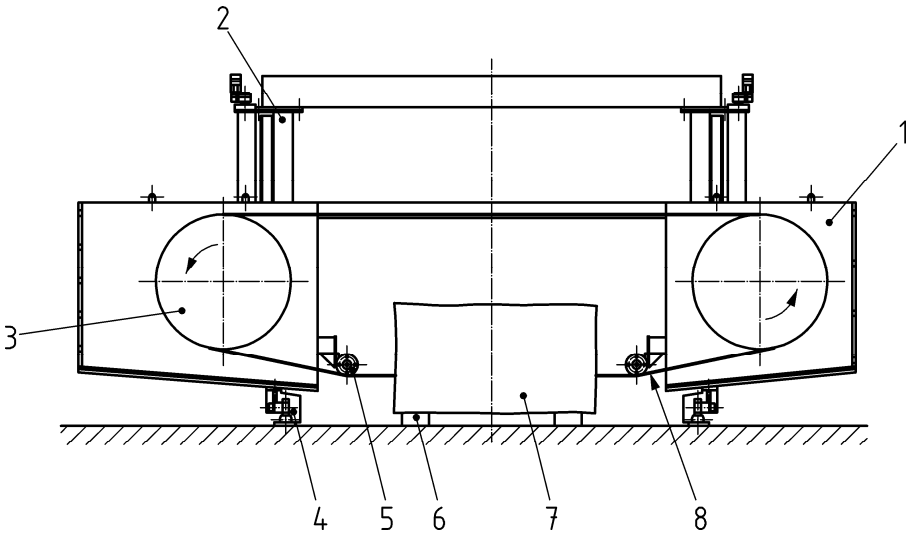
— multi-wire saws (see Figure 6).



Key

1	rails	4	unit to shift the machine on rails	7	supports for electrical cables
2	rack	5	control unit	8	diamond wire
3	drive unit for the tool	6	control unit (remote control)		

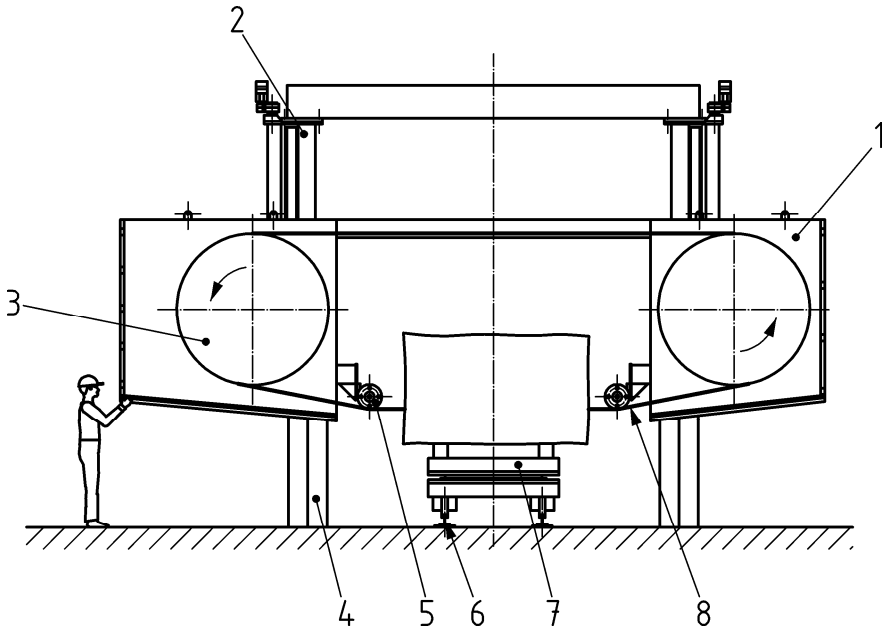
Figure 1 — Transportable diamond wire saw



Key

1	guard	3	wire wheel	5	guide wheel	7	block
2	machine frame	4	carriage	6	sill	8	diamond wire

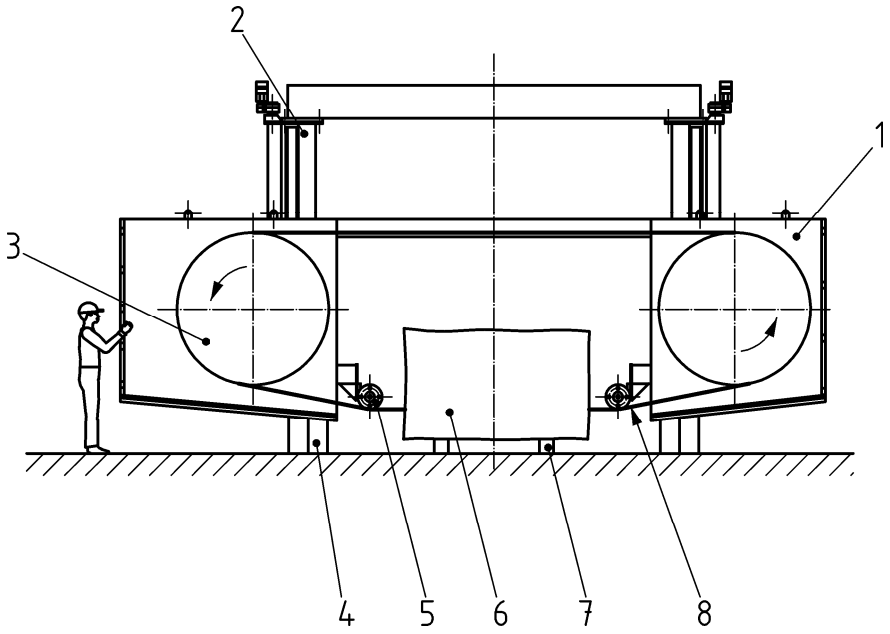
Figure 2 — Travelling diamond wire saw



Key

1 guard
2 machine frame
3 wire wheel
4 foundations
5 guide wheel
6 rails for block trolley
7 block
8 diamond wire

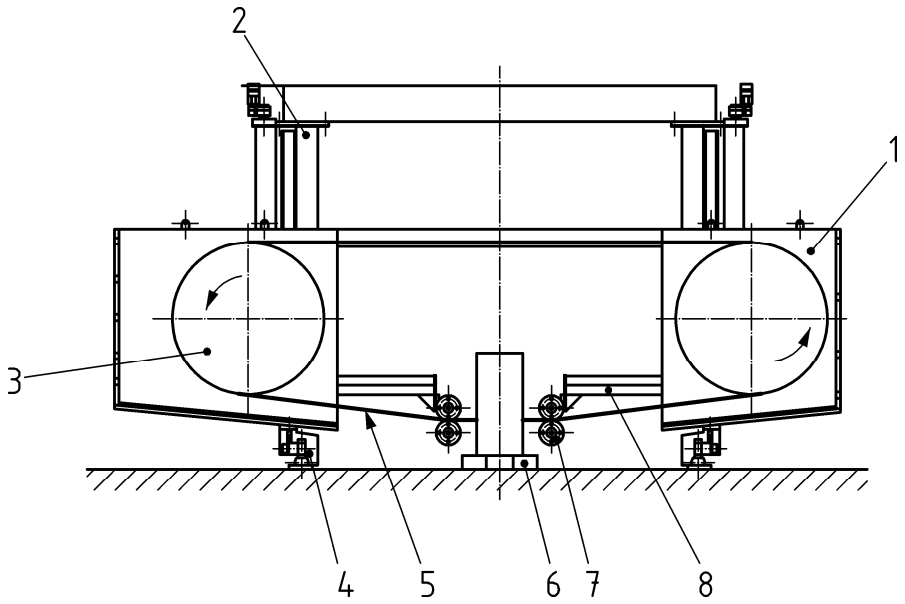
Figure 3 — Stationary block wire saw with block trolley



Key

1 guard
2 machine frame
3 wire wheel
4 foundations
5 guide wheel
6 block
7 sill
8 diamond wire

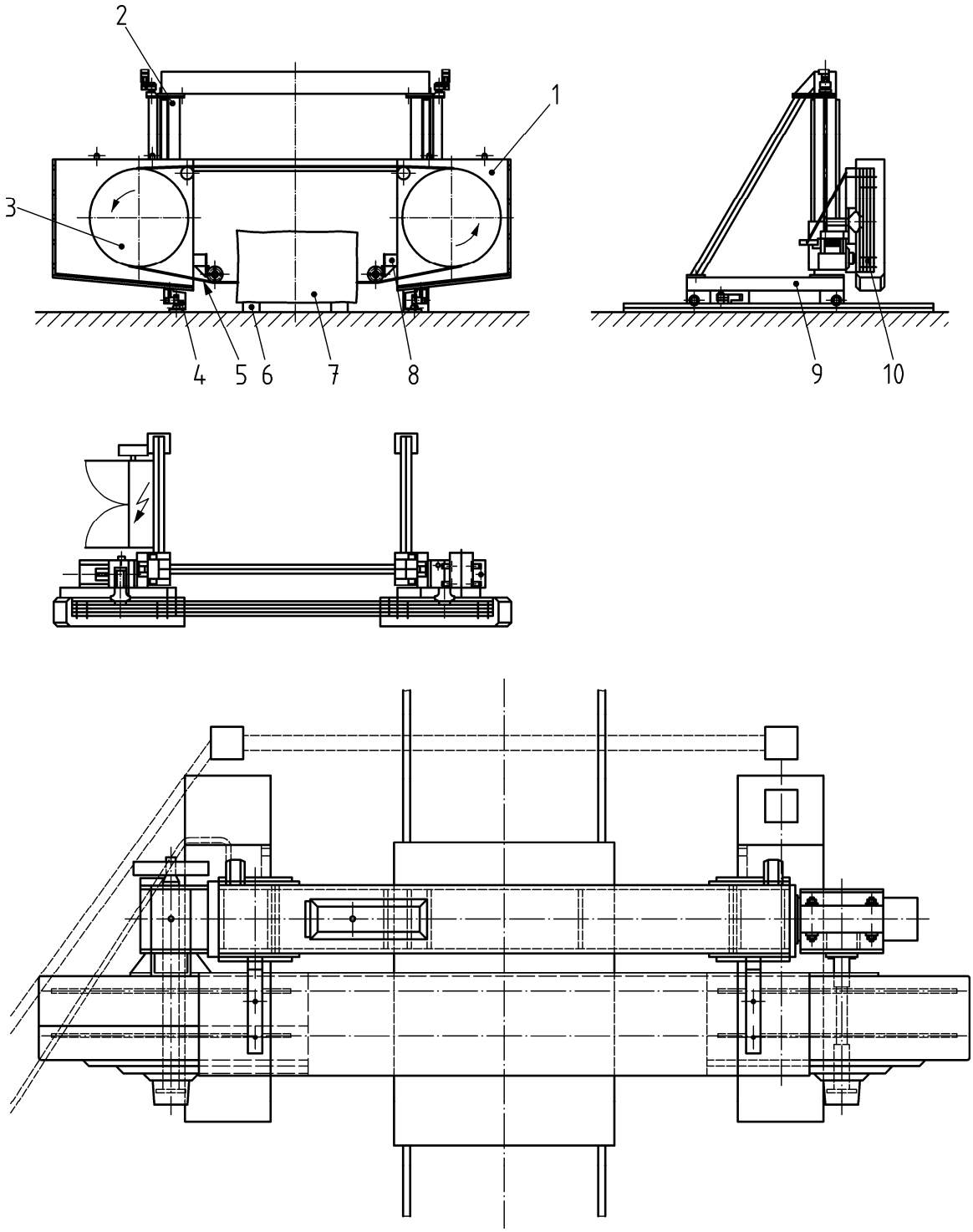
Figure 4 — Stationary block wire saw without block trolley



Key

1 guard
2 machine frame
3 wire wheel
4 carriage
5 diamond wire
6 sill
7 guide wheels
8 guide-wheel carrier

Figure 5 — Contour wire saw



Key

1 guard
2 machine frame
3 wire wheel
4 carriage
5 diamond wire
6 sill
7 block
8 guide-wheel carrier
9 carriage
10 multi-wire wheel

Figure 6 — Examples of multi-wire saw

3.2
block
square natural stone being processed to a half-finished product in natural stone extraction

3.3
block trolley
travelling work-piece table on which blocks are placed to be processed by the wire saw

3.4
wire wheel
rotating wheel on which the diamond wire is guided

3.5
guide wheel
guide wheels are mostly smaller wire wheels guiding precisely and stabilizing the rotating diamond wire

3.6
drive wheel
wire wheel for transmitting the drive power to the diamond wire

3.7
tension wheel
adjustably arranged wire pulley which creates the required wire tension

3.8
diamond wire
tool of a wire saw. It is a steel wire equipped with diamond-tipped cutting rings (pearls)

3.9
wheel guard
casing of the wire wheels to protect persons against hazards that might be caused by the rotating wire wheels

3.10
machine frame
is bearing the machine parts. Within the machine frame, the height adjustment is integrated

3.11
main drive
creates the motion of the tool. Power transmission is done by the drive wheel

3.12
feed drive
serve as drive for the adjustable axes (height adjustment, vertical feed, etc.)

4 List of significant hazards

This clause contains all significant hazards, hazardous situations and events, as far as they are dealt with in this 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

Hazards	Relevant subclauses
4.1 Mechanical hazards	
4.1.1 Crushing	5.2.1; 5.2.2.1 to 5.2.2.3; 5.2.2.5; 5.2.2.6
4.1.2 Shearing	5.2.2.1 to 5.2.2.3; 5.2.2.5
4.1.3 Cutting or severing	5.2.2.1 to 5.2.2.3; 5.2.2.7; 5.2.2.8
4.1.4 Entanglement	5.2.2.1 to 5.2.2.3; 5.2.2.8
4.1.5 Drawing-in or trapping	5.2.2.1 to 5.2.2.3; 5.2.2.5
4.1.6 Impact	5.2.1; 5.2.2.3 to 5.2.2.6; 5.2.2.8
4.2 High-pressure fluid injection or ejection	5.5
4.3 Direct or indirect electrical contact	5.3.1 to 5.3.5
4.4 Laser radiation hazard	5.4.2
4.5 Hazards from dust particles	5.6
4.6 Neglecting ergonomic principles (including measures against human error)	5.2.2.3; 5.7; 5.8; 7
4.7 Failure of the power supply –- failure of the control circuit	5.3.3; 5.3.4; 5.3.6
4.8 Failure or disorder of the control system	5.3.3; 5.3.4; 5.4.1
4.9 Falling or ejected objects (material/work pieces)	5.2.2.7; 5.2.2.8
4.10 Loss of stability (machines and machine parts)	5.2.1; 5.2.2.5; 5.2.2.6; 5.2.3; 5.2.4
4.11 Slip, trip and fall of persons (related to machinery)	5.7; 7.3

5 Safety requirements and/or protective measures

5.1 General

Machinery shall comply with the safety requirements and/or protective measures of this clause.

In addition, the machine shall be designed according to the principles of EN ISO 12100-2 for hazards relevant but not significant which are not dealt with by this document (e.g. sharp edges).

For application of type B standards, such as EN 294, EN 547-1, EN 953, EN 982, EN 983, EN 1088, EN 60204-1, EN 60529, EN ISO 13849-1, EN ISO 13850, the manufacturer shall carry out an adequate risk assessment for the requirements thereof where choice is necessary (as far as the choice is not made in the requirements of this clause).

5.2 Mechanical hazards

5.2.1 Transport

For the transport of the machine, appropriate provisions for the easy and safe handling shall be made in accordance with EN ISO 12100-2:2003, 5.5.5.

5.2.2 Protection against moving parts

5.2.2.1 Transmission parts

Moving parts, e.g. couplings and drive shafts, shall be provided with fixed guards or interlocking moveable guards to prevent contact. Guards shall comply with EN 953:1997 and in particular with Clauses 5 to 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 with the aid of tools or keys. The fixed guards shall not remain in place without their fixings.

Guards shall comply with the provisions of EN 294 on safety distances. Distance guards shall be in accordance with EN 294:1992, Table 1. Opening in guards shall be in accordance with EN 294:1992, Table 4.

When frequent access (once a day or more) is required for service or maintenance purposes, instead of fixed guards, moveable interlocking guards as defined in EN 953:1997, 3.5, shall be used. They shall comply with the relevant requirements of EN 953.

The moveable guards and doors shall be equipped with an interlocking device in compliance with EN 1088:1995, 4.2.1, with a position detector or alternative solutions in accordance with EN 1088:1995, 6.3. The related parts of the control system shall have a Performance Level not less than EN ISO 13849-1:2006, Performance Level c.

If, within the limits of the intended use, in particular for outdoor use, unexpected closing of the moveable guard or door is considered to be a significant hazard, provisions shall be made for holding the guard when open.

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

No guard is necessary if the transmission parts are beyond the safety distances due to their location and are therefore out of reach (see EN 294:1992, 4.2.1).

5.2.2.2 Wire-drive wheel

Drive and idle wire wheels in motion shall be manufactured in accordance with EN ISO 12100-2:2003, 4.3 a) and b). Access to the moving parts of the wire wheels shall be prevented with fixed or interlocking moveable guards according to EN 953, so that a safety distance will be provided for the operator according to EN 294:1992, Table 4, and in case of distance guards, EN 294:1992, Table 2.

In case of interlocking moveable guards, the moveable guards and doors shall be equipped with an interlocking device with guard locking in compliance with EN 1088:1995, 4.2.2, with a position detector or alternative solutions in accordance with EN 1088:1995, 6.3.

If, within the limits of the intended use, in particular for outdoor use, unexpected closing of the moveable guard is considered to be a significant hazard, provisions shall be made for holding the guard when open.

NOTE For stationary diamond wire saws, Annex B contains an example for guarding the wire wheels and the tool not included in the working process.

5.2.2.3 Wire-tension system

The wire-tension system shall have a device capable of compensating sudden changes in the tension of the wire. For stationary diamond wire saws, moveable parts of such a tension system shall be provided with fixed or interlocking moveable guards according to EN 953 as protection against sudden movements (e.g. wire breaking) so that a safety distance to parts in motion according to EN 294:1992, Table 1 and/or 4, will be provided for the operator.

The moveable guards and doors shall be equipped with an interlocking device in compliance with EN 1088:1995, 4.2.1, with a position detector or alternative solutions in accordance with EN 1088:1995, 6.3.

The related parts of the control system shall have a Performance Level of not less than Performance Level c according to EN ISO 13849-1:2006.

The tension system shall be designed to prevent additional stress in the wire generated by non-continuous movement.

For stationary diamond wire saws, the design of the tensioning system shall prevent dangerous movements of the wire-wheel units in case the wire breaks (3 cm/s is considered to be a safe limit for the movement). This system shall have at least mechanical stops preventing the translational motion of the wire-wheel units beyond the limits determined by the manufacturer.

For transportable wire saws and with exception of the starting and the end of the cutting, the wire-tension system shall be regulated during the cutting operation by an automatic control system acting in accordance with the power supplied of the drive motor for the wire-drive wheel. In addition, a device shall be provided limiting the stress of the diamond wire under normal working conditions to a maximum of $^1/_6$ of the breaking load of the steel wire. This can be achieved by a current limiting device or similar device to limit the torque of the drive wheel according to this maximum stress on the diamond wire.

For stability reasons, no counterweight systems shall be used to tension the diamond wire.

5.2.2.4 Height-adjustment head

The height-adjustment system shall be designed in a way to prevent the fall in case of wear of the adjustment system.

5.2.2.5 Movement of machines on rails

In case of rails with defined length, the rails shall be provided with a system to avoid the machine overrunning the end of rails. Those provisions shall consist of limit switch with positive opening of the contacts and mechanical restraint device. The related parts of the control system shall have a Performance Level of not less than EN ISO 13849-1:2006, Performance Level c.

Transportable diamond wire saws (see Figure 1) shall be equipped with a system preventing the return of the movement on the rails during the cutting operation as well as any uncontrolled movement of more than 10 mm in case of interruption or restoration of energy supply.

5.2.2.6 Block trolley

Powered block trolleys on rails with an integrated control system shall have a provision (e.g. limit stops) to prevent the trolleys overrunning the end of rails. They shall have a system avoiding any non-intended movement during the cutting operation.

At the sides of the trolleys, provisions shall be made for mounting of stakes with sufficient mechanical resistance to prevent the falling of work pieces. The design of those provisions shall allow to prevent contact of the stakes with the wire.

5.2.2.7 Protection of the tool of machinery for the processing of natural stone (see Figures 2 to 6)

For stationary machines (see Figures 2 to 6), where technically possible, the access to the non-working parts of the tool shall be prevented by adjustable guards or by fence according to EN 953 and EN 294:1992, Table 1 and/or Table 4.

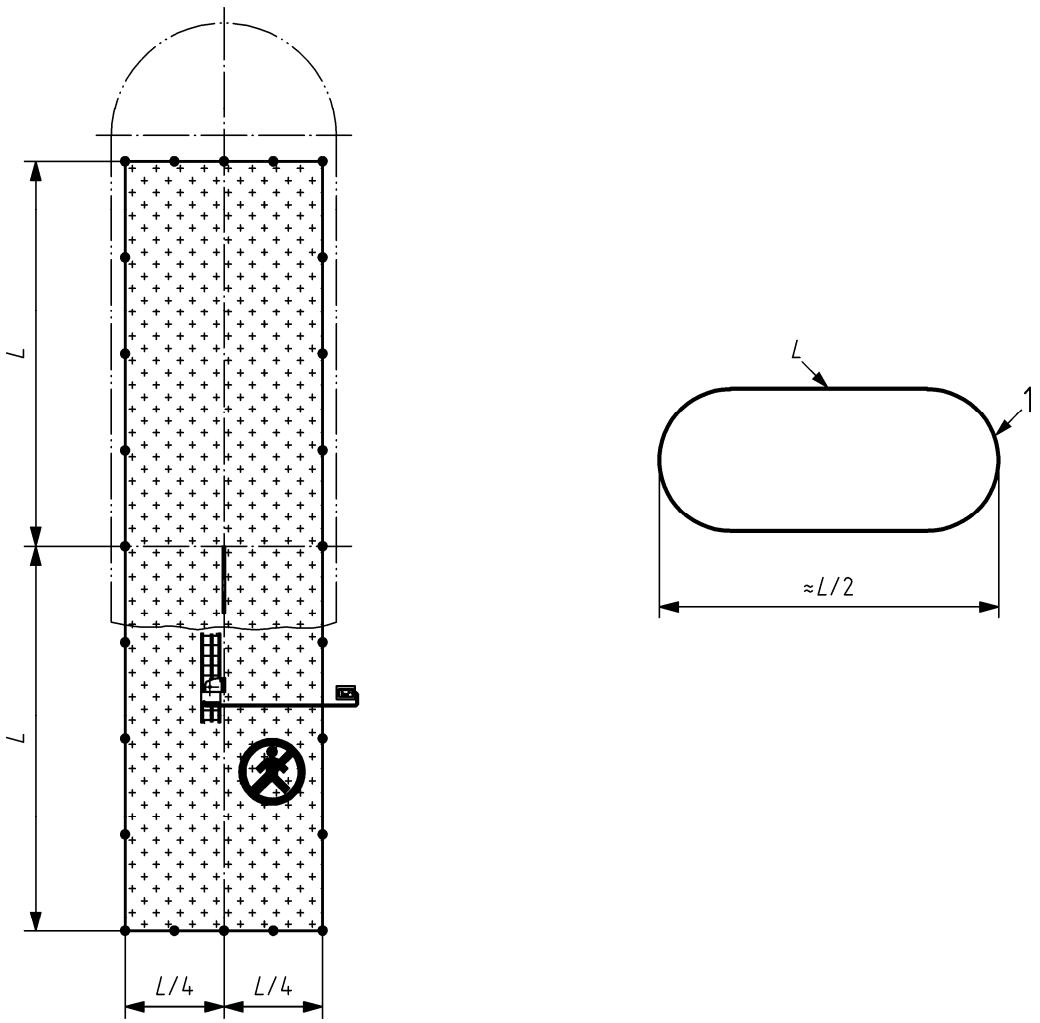
NOTE For stationary diamond wire saws, Annex B contains an example for guarding the wire wheels and the parts of the tool not involved in the working process.

5.2.2.8 Protection of the tool of transportable machines (see Figure 7)

For transportable machines, measures shall be taken in order to prevent persons being hit by the wire end in case of wire breakage ("whiplash") by efficient material marking of the limits of the hazardous area (e.g. with marking poles) and appropriate safety signs (see Annex A, Figure A.2).

The hazardous area is the complete ground surface around the machine that can be reached by the whipping wire end in the most unfavourable conditions (e.g. wire breaking where it leaves the machine frame).

For vertical cutting, the hazardous area shall be defined in accordance with the principles illustrated in Figure 7.



Key

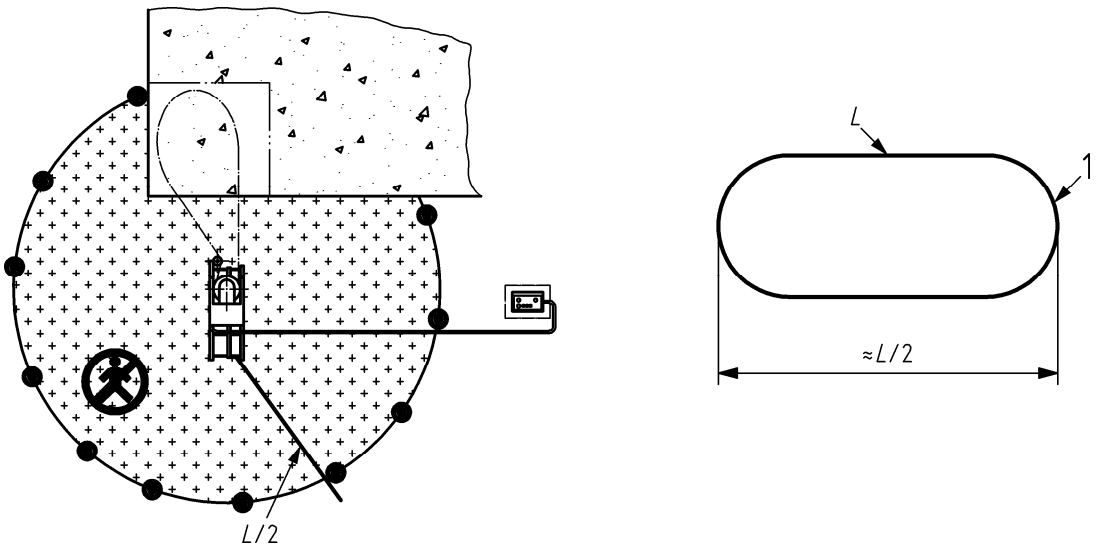
L complete wire length

L/2 loop length

1 diamond wire

Figure 7 — Examples of marking in vertical cut

For horizontal cutting, the hazard is lower than for vertical cutting. The hazardous area is approximately a circle with the machine as the centre and half the wire length (i.e. L/2) as the radius.



Key

L complete wire length

L/2 loop length

1 diamond wire

Figure 8 — Examples of marking in horizontal cut

The hazardous zone can be reduced for areas safeguarded by a protective structure against the effect of the whiplash.

The manufacturer shall include in the information for use instructions concerning the definition of the hazardous area, the location of the operator's position (if not fixed) and the material marking of the zone.

5.2.3 Stability

Stationary machines shall have provisions to be fixed to the ground or to the foundations, and the manufacturer shall give instructions for the correct installation.

Transportable machines (see Figure 1) shall be stable in order to prevent overturning during operation. Transportable machines shall be equipped with a fixing device to avoid uncontrolled movements of the machine on inclined grounds.

5.2.4 Rotation of the machine head of transportable machines

Transportable machines shall be equipped with a hold to run control device for the rotation of the machine head whilst being positioned at the beginning of the working cycle.

5.3 Electrical hazards and hazards related to control

5.3.1 Electric equipment

Electric equipment shall be in accordance with EN 60204-1 and the following.

5.3.2 Conductors, cables and lines

Conductors and cables shall be selected in accordance with EN 60204-1:2006, Clause 12, and wiring shall comply with EN 60204-1:2006, Clause 13.

5.3.3 Mains supplies and separators

Incoming supply connection and supply disconnection devices shall be in accordance with EN 60204-1:2006, Clause 5.

If the supply connection is by plug/socket combination, the protection category of the plug and socket shall be at least IP 54 as specified in EN 60529:1991 if the connection is machine- or switchboard-mounted and IP 65 if cable-mounted and can touch the ground. The plug and socket shall be in accordance with EN 60204-1:2006, Clause 5.

5.3.4 Controls

5.3.4.1 Operating elements

Electrical operator console, operator panels, etc. shall have at least protection category IP 54 as specified in EN 60529:1991.

5.3.4.2 Normal stop

The machine shall be fitted with normal stop control of category 0 or 1 in accordance with EN 60204-1:2006, 9.2.2.

5.3.4.3 Operation mode selector switch for transportable machines

If the actuation of the drive unit of the machine can be controlled by both a control device mounted on the machine or a remote control, the selection of the control device shall be made by an operation mode selector switch which can be locked in each position.

If the machine has operating mode(s) with neutralization of safety features, the mode selector shall be able to be locked for allowing the user to reserve the selection of this (these) mode(s) to designated (qualified) persons.

5.3.4.4 Safety-related parts of control systems

Safety-related parts of controls shall have a Performance Level not less than c in accordance with EN ISO 13849-1:2006. Delay-timing devices used in control circuits may be of Performance Level b in conformity with EN ISO 13849-1:2006 if the timer is designed for at least one million operations.

5.3.4.5 Emergency-stop equipment

The machine shall have an emergency-stop equipment as specified in EN ISO 13850:2006, 4.1.4 (stop category 0 or 1). Emergency-stop devices shall be located at each control position. They shall be easily accessible and permanently operational.

The parts of control systems regarding emergency-stop controls shall be not less than Performance Level d of EN ISO 13849-1:2006.

5.3.5 Electric drives

Electric motors shall provide a protection category of at least IP 54 according to EN 60529:1991.

5.3.6 Failure of electrical power supply

If a machine stops in any working position as result of a failure of power supply, no further dangerous movements shall be made. The manufacturer shall make a note in the operation manual what measures shall be taken before a restart of the machine.

5.4 Radiation

5.4.1 Safety requirements related to electromagnetic phenomena

The machines shall have sufficient immunity to electromagnetic disturbances to enable them to operate safely as intended and not fail to danger when exposed to the levels and types of disturbances intended by the manufacturer.

The manufacturer of the machine shall design, install and wire the equipment and sub-assemblies taking into account the recommendations of the suppliers of these sub-assemblies.

5.4.2 Laser radiation

Positioning lasers typically used on contour diamond wire saws (see Figure 5) shall be in compliance with the requirements of EN 60825-1 and EN 60825-4.

5.5 Hydraulic and pneumatic components

The hydraulic and pneumatic systems shall comply with the requirements EN 982 and EN 983.

If machines have certain motions (e.g. tensioning of wire) being hydraulically or pneumatically activated, the supply line shall be equipped with a shut-off valve that will automatically close in case of sudden pressure drop.

5.6 Protection from dust and dust particles

The machine (except transportable machinery) shall be provided with a water supply and sprinkler system for the suppression of dust emission during the cutting operation.

For machines where the intended operator's position can be exposed to dust emission, appropriate devices shall be adopted (e.g. screens).

5.7 Ergonomic aspects

The ergonomic design of the machine shall comply with EN 614-1 and with EN ISO 12100-2:2003, 4.8.

5.8 Maintenance

Access openings for maintenance and service shall comply with EN 547-1 to 3.

6 Verification of safety requirements and/or protective measures

The conformity with the requirements of Clauses 5 and 7 shall be verified with one or more of the following methods as relevant:

— visual check;

— measurement;

— functional test;

— design check.

In principle, the criteria for acceptance are included in the requirements.

7 Information for use

7.1 General

Information for use shall be provided in accordance with EN ISO 12100-2:2003, Clause 6.

The following specific information shall be given:

7.2 Signal and warning devices

The residual risks of the machine shall be marked permanently and clearly, preferably with use of pictograms that shall be in accordance with the principles of EN 61310-1.

The pictogram illustrated in Figure A.1 shall be used at the operating position(s) of all machines. The pictogram illustrated in Figure A.2 shall be used for the marking of the hazardous areas of the machines (see e.g. 5.2.2.8 on the protection of the tool of transportable machines).

7.3 Instruction handbook

7.3.1 General

The operator's manual shall be drawn up according to EN ISO 12100-2:2003, 6.5, and shall contain the following items:

7.3.2 Description of the machine

The description of the machine shall contain at least the following items:

a) a general description of the machine with drawings;

b) an explanation of pictograms and symbols used on the machine and in the documentation;

c) a list of tools to be used with their nominal characteristics;

d) a list of materials which can be cut off by the machine.

7.3.3 Instructions for transport, handling and storage of the machine and its dismountable parts

The instructions for transport, handling and storage of the machine and its dismountable parts shall contain at least the following items:

a) the nominal mass of the machine and the mass of heavy parts requiring mechanical handling;

b) the sliding and lifting conditions (including lifting points);

c) reference concerning requirements of the tool manufacturer for storage and handling of the tools.

7.3.4 Instructions for the installation and the use of the machine

At least the following user information shall be included:

— instruction for setting up of transportable machines (e.g. maximum allowed working inclination);

— for transportable machines, the information concerning the definition of dangerous area;

— advice that apart from the operator, nobody shall be within the working area;

- indications on the connection to the power supply and water supply;
- information on the existing residual risks;
- indication of the rotating direction;
- indication that every contact with the rotating tool shall be avoided;
- indication about disconnection from the supply (supplies), measures against reconnection, neutralisation of residual energies, testing of safe state;
- information on the operator's controls, especially on the on/off and on the emergency-stop installation (if existing);
- information regarding the protective earthing system for transportable machines;
- information on the choice of the appropriate tools and their application regarding the task to be performed;
- indication that no tools shall be used whose maximum rotational speed is lower than the nominal speed of the machine;
- precautions to be taken at mounting, tightening and removing the tools, especially:
  - switching to the “off” position of the operating element;
  - cut the machine from the power supply by un-plugging electrical machines and by shutting down the main power supply of other machines;
  - indication on appliances for the tool change;
- information on the handling method of the tool holder;
- information on foreseeable incorrect use;
- instructions on the detection of defects, the trouble-shooting and the restart after contact;
- indication on suitable clothing and personal protection equipment (e.g. eye and hearing protection);
- indication that the correct mounting of guards shall be checked;
- information on the handling of the material which is processed by the specific machine;
- indication for avoiding the risk of stumbling in the working area of the machine, e.g. prevention of risk of slipping due to moisture and mud, covering open parts of guide rails at the floor;
- indication that – for safety reasons – every damaged tool shall be exchanged;
- the instruction handbook and the technical documentation describing the equipment shall provide the following information on noise emission:
  - the A-weighted emission sound pressure level at workstations where this exceeds 70 dB. Should this level not exceed 70 dB, this fact shall be indicated;
  - the peak C-weighted emission sound pressure level at workstations where this exceeds 63 Pa (130 dB in relation to 20 µPa);

— the A-weighted sound-power level emitted by the equipment where the A-weighted emission sound pressure level at any workstation exceeds 80 dB, the operating conditions of the equipment during noise-emission measurement, the workstation position(s) where the emission sound pressure level(s) have been determined.

NOTE 1 Information on noise emission should also be provided in the sales literature.

NOTE 2 A specific noise-test code is not yet available; it is in preparation.

7.3.5 Maintenance instructions

At least the following user information shall be included:

— the list of operations (e.g. adjustment, maintenance, lubrication, repair, cleaning and servicing) which shall be carried out only while the machine is shut down and the prime mover stopped; when drawing up procedures for the safe intervention for maintenance, attention shall be paid to the following aspects: supply disconnection, measures against reconnection, neutralising residual energy and verification of zero-energy state;

— type and frequency of inspections and replacement intervals;

— instructions concerning the maintenance procedures which may be carried out by the user and the list of the maintenance procedures which require particular technical knowledge and which shall be performed only by a competent person;

— diagrams and drawings to allow the correct repair of the machine;

— electrical diagrams (if relevant).

7.3.6 Spare parts list

The spare parts list shall contain all relevant safety-related spare parts with an unambiguous identification and information of the location of the part to be replaced.

7.4 Marking

The following minimum markings shall be displayed on the machine:

— business name and full address of the manufacturer and, where applicable, his authorised representative;

— mandatory marking[1)];

— year of construction;

— designation of the machinery;

— designation of series or type, if any;

— serial or identification number, if any;

— rating information (mandatory for electrotechnical products: voltage, frequency, power, etc.).

---

1) For machines and their related products intended to be put on the market in the EEA, CE marking as defined in the applicable European directive(s), e.g. Machinery.

Other markings which shall be specified, if appropriate, include power designation (compulsory for electrical products: voltage, frequency, power, etc.).

Transportable machines require in addition mass in kilogramme of the machine and of the part of it to be handled separately.

Annex A
(normative)

Pictograms

Figure A.1 — Mandatory signal “Read the manual”

Figure A.2 — Prohibitory sign “No access for unauthorised persons”

Annex B
(informative)

Example of a solution for guarding the wire wheels and the parts of the tool that shall not be accessible during the process (stationary machines)

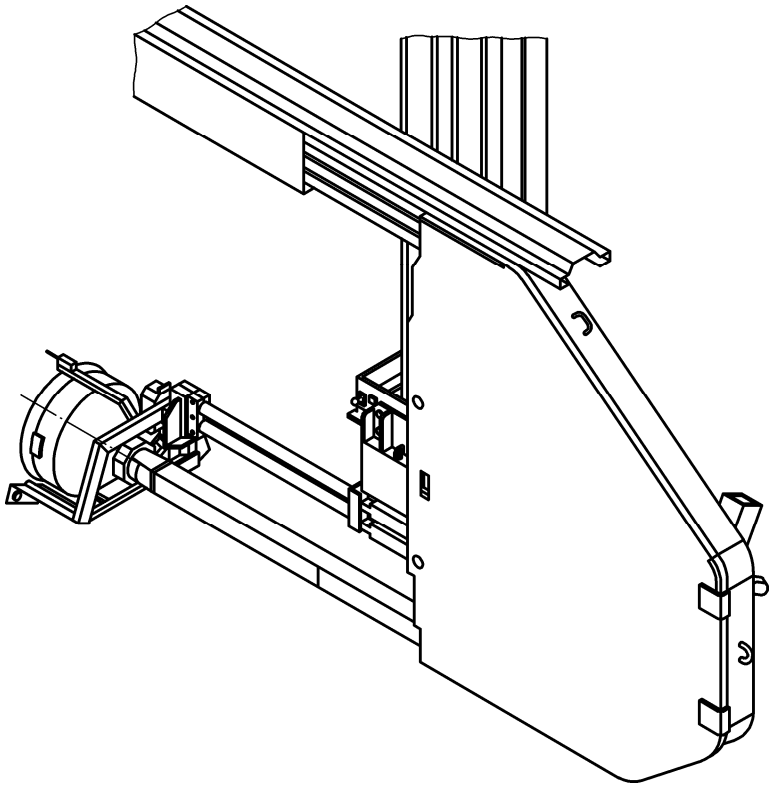


Figure B.1 — Wire-wheel guard

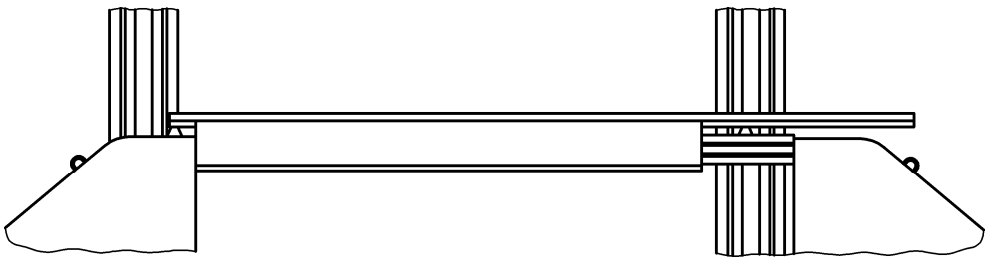


Figure B.2 — Guard for the upper part of the tool

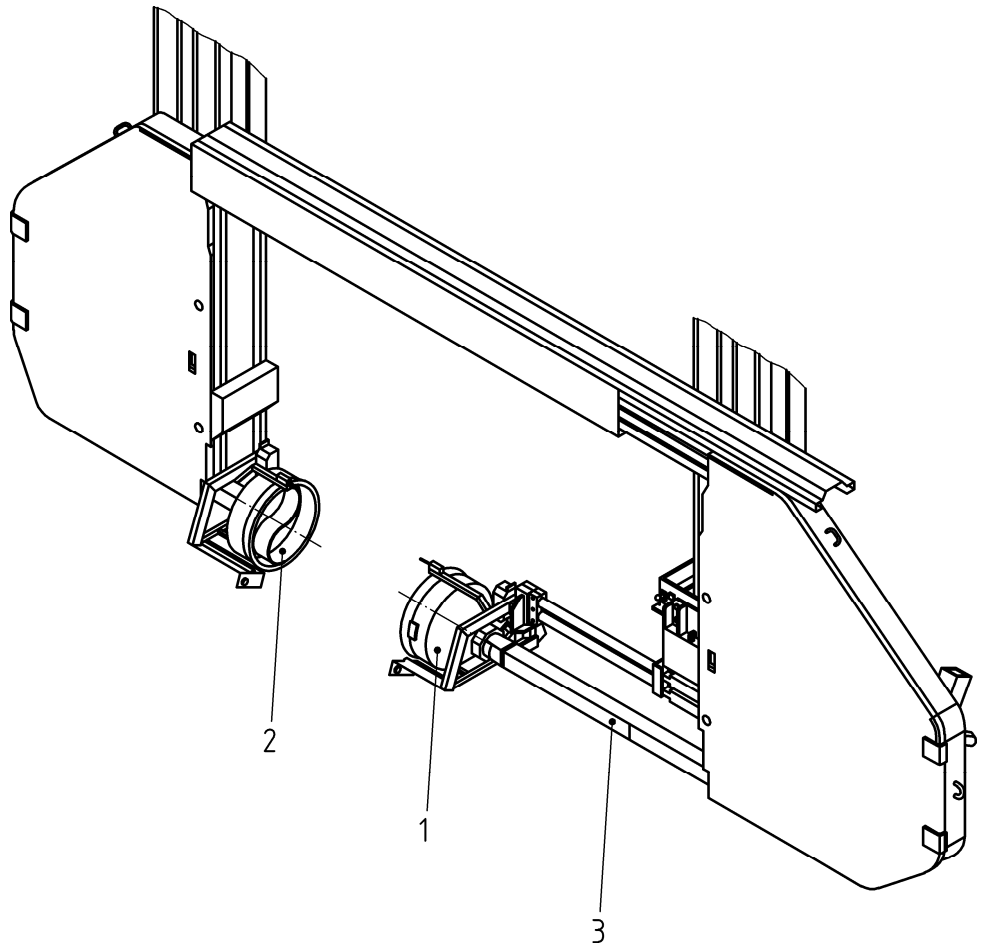


Figure B.3 — Guarding system for the lower part of the tool near the working area

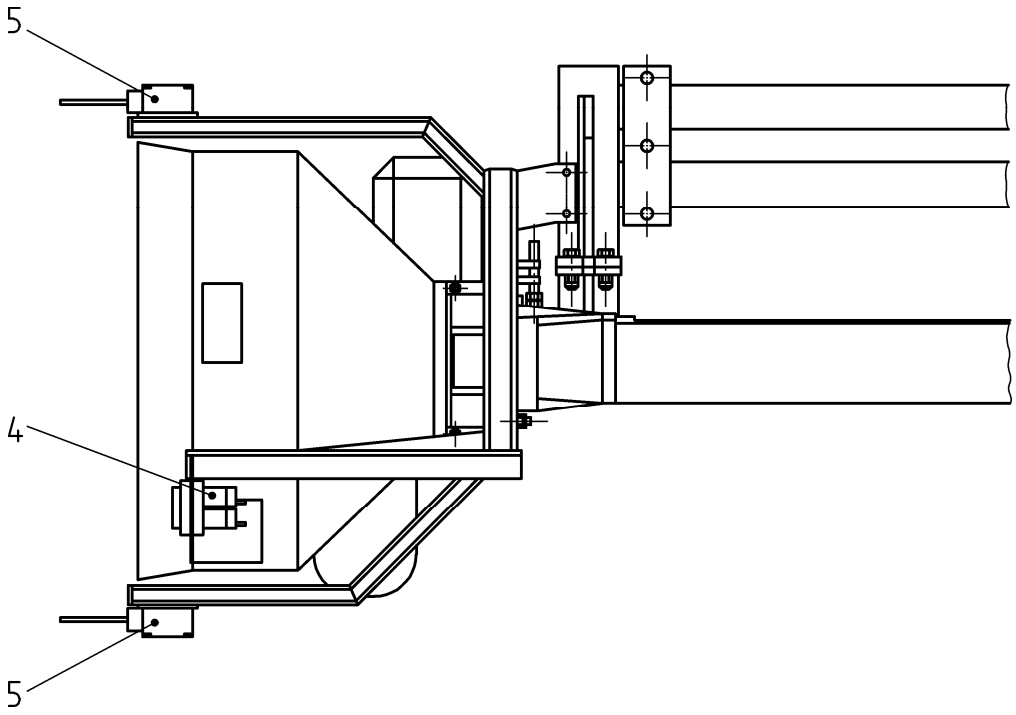


Figure B.4 — Detail of the guarding system shown in Figure B.3

The guarding system consists of two conical guards (1 and 2) mounted on telescopic carriers (3) to protect the parts of the tool that shall not be accessible during the working process.

The telescopic guard is motorised and the position of the guarding system is controlled automatically by sensors on the conical guards (1 and 2) in order to remain near the block, minimising as far as possible the distance between the conical guards and the part of the material being cut.

The sensors (4) can be of types with or without mechanical contact in accordance with EN 1088:1995, 6.2 and 6.3, and the related parts of the control system have a Performance Level c in accordance with EN ISO 13849-1:2006.

The conical guards are fitted with limit switches (5).

A control system does not allow the start of the main drive before the guard is in position.

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, except essential requirement 1.5.8 and 1.7.4 f), 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.

Annex ZB
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/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 one means of conforming to Essential Requirements of the New Approach Directive 2006/42/EC on machinery.

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, except Essential Requirements 1.5.8 and 1.7.4.2 u), 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.

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