



BSI Standards Publication

Machines and installations for the exploitation and processing of natural stone — Safety

Part 2: Requirements for transportable diamond wire saws

National foreword

This British Standard is the UK implementation of EN 15163-2:2022. Together with BS EN 15163-1:2022, it supersedes BS EN 15163:2017, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MCE/3, Safeguarding of machinery.

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

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Maschinen und Anlagen zur Gewinnung und Bearbeitung von Naturstein - Sicherheit - Teil 2: Anforderungen für mobile Diamantseilsägen

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European foreword

This document (EN 15163-2:2022) 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of an identical text or by endorsement, at the latest by December 2022, and conflicting national standards shall be withdrawn at the latest by December 2022.

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

This document supersedes EN 15163:2017.

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

For relationship with EU Directive(s) / Regulation(s), see informative Annex ZA, which is an integral part of this document.

This document deals with safety requirements of transportable diamond wire saws previously treated in EN 15163:2017 with safety requirements of stationary diamond wire saws, now treated in EN 15163-1:2022. As safety requirements related two types of machines have been separated, this standard edition is completely different from the previous one.

Safety requirements treated in Clause 4, information for use treated in Clause 5 and related annexes have been deeply modified, in addition, the following changes have been introduced:

- list of the significant hazards has been moved from Clause 4 to Annex A, according to 6.10.3.1 of CEN Guide 414;
- normative references have been modified and updated to Clause 2;
- new terms and definitions have been introduced and improved to Clause 3 (e.g. transportable diamond wire saw; coated diamond wire, cutting operations);
- Annex ZA has been modified according to the last edition of CEN Guide 414.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This document has been prepared to be a harmonized standard to provide one means of conforming to the essential health and safety requirements of the Machinery Directive and associated EFTA Regulations.

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

This document is of relevance, in particular, for the following stakeholder groups representing the market players with regard to machinery safety:

- machine manufacturers (small, medium and large enterprises);
- health and safety bodies (regulators, accident prevention organizations, market surveillance, etc.).

Others can be affected by the level of machinery safety achieved with the means of the document by the above-mentioned stakeholder groups:

- machine users/employers (small, medium and large enterprises);
- machine users/employees (e.g. trade unions, organizations for people with special needs);
- service providers, e.g. for maintenance (small, medium and large enterprises);
- consumers (in case of machinery intended for use by consumers).

The above-mentioned stakeholder groups have been given the possibility to participate at the drafting process of this document.

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

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

1 Scope

This document deals with all significant hazards, hazardous situations and events which are relevant to transportable diamond wire saws, used in quarries for cutting natural stones (e.g. marble, granite), when they are used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer (see Annex A).

For this document, the intended use of machine is limited by the following cutting operations, defined in Clause 3:

- 1) vertical cut (see 3.16);
 - a) mountain vertical cut (see 3.16.1);
 - b) mountain side vertical cut (see 3.16.2);
 - c) block vertical cut (see 3.16.3);
 - d) overhead underslung vertical cut (see 3.16.4);
- 2) horizontal cut (see 3.17);
 - a) horizontal cut with one side open (see 3.17.1);
 - b) horizontal cut with two sides open (see 3.17.2);
- 3) block inclined cut (see 3.18).

Cutting operations listed above are performed without any path variation (see 3.11).

This document does not deal with any other cutting operation not listed above or defined in Clause 3.

This document deals only with transportable diamond wire saws using coated diamond wire as tool.

This document specifies the appropriate technical measures to eliminate or reduce risks arising from the significant hazards.

This document deals with all significant hazards that could occur within the expected lifetime of the machinery including the phases of transport, assembly, dismantling, disabling and scrapping.

This document does not deal with the significant hazards arising by the use of other facilities/devices not described in this document, that could be fitted on the machines or that could be used during the work cycle.

This document does not apply to:

- i) machines intended for operation in a potentially explosive atmosphere;
- ii) machines which are manufactured before the date of publication of this document.

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 1005-2:2003+A1:2008, *Safety of machinery — Human physical performance — Part2: Manual handling of machinery and component parts of machinery*

EN 1005-4:2005+A1:2008, *Safety of machinery — Human physical performance — Part4: Evaluation of working postures and movements in relation to machinery*

EN 50370-2:2003, *Electromagnetic compatibility (EMC) — Product family standard for machine tools — Part2: Immunity*

EN 60204-1:2018, *Safety of machinery — Electrical equipment of machines — Part1: General requirements (IEC 60204-1:2016)*

EN 60529:1991,¹ *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*

EN 61310-1:2008, *Safety of machinery — Indication, marking and actuation — Part 1: Requirements for visual, acoustic and tactile signals (IEC 61310-1:2007)*

EN ISO 3744:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Engineering methods for an essentially free field over a reflecting plane (ISO3744:2010)*

EN ISO 3746:2010, *Acoustics — Determination of sound power levels and sound energy levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane (ISO3746:2010)*

EN ISO 4413:2010, *Hydraulic fluid power — General rules and safety requirements for systems and their components (ISO4413:2010)*

EN ISO 4414:2010, *Pneumatic fluid power — General rules and safety requirements for systems and their components (ISO4414:2010)*

EN ISO 4871:2009, *Acoustics — Declaration and verification of noise emission values of machinery and equipment (ISO4871:1996)*

EN ISO 11201:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions in an essentially free field over a reflecting plane with negligible environmental corrections (ISO11201:2010)*

EN ISO 11202:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying approximate environmental corrections (ISO11202:2010)*

¹ As impacted by EN 60529:1991/AC:2006-12, EN 60529:1991/A1:2000, EN 60529:1991/A2:2013 and EN 60529:1991/A2:2013/AC:2019-02.

EN ISO 11204:2010, *Acoustics — Noise emitted by machinery and equipment — Determination of emission sound pressure levels at a work station and at other specified positions applying accurate environmental corrections (ISO11204:2010)*

EN ISO 11688-1:2009, *Acoustics — Recommended practice for the design of low-noise machinery and equipment — Part1: Planning (ISO/TR11688-1:1995)*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO12100:2010)*

EN 13236:2019, *Safety requirements for superabrasive products*

EN ISO 13849-1:2015, *Safety of machinery — Safety-related parts of control systems — Part1: General principles for design (ISO13849-1:2015)*

EN ISO 13850:2015, *Safety of machinery — Emergency stop function — Principles for design (ISO13850:2015)*

EN ISO 14118:2018, *Safety of machinery — Prevention of unexpected start-up (ISO14118:2017)*

EN ISO 14120:2015, *Safety of machinery — Guards — General requirements for the design and construction of fixed and movable guards (ISO14120:2015)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

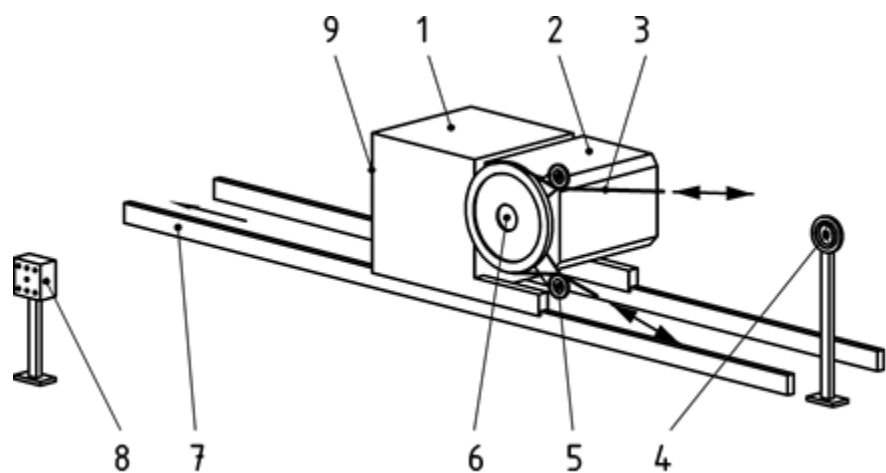
- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

3.1
transportable diamond wire saw
integrated fed machine, generally used in quarries or similar sites, designed for cutting natural stones (e.g. marble, granite) by the use of a coated diamond wire as tool and intended to be easily transported to several points of the quarry by the use of appropriate provisions and other machines; transportable diamond wire saw is powered by an electric motor as main drive, for cutting natural stones into benches, blocks using an only coated diamond wire as tool and where the cutting is performed by the movement of the wire joined to moving back of the machine on its rail

Note 1 to entry: See Figures 1 to 3.

Note 2 to entry: Transportable diamond wire saws are generally intended for outdoor use, usually in quarries.

Note 3 to entry: During the cutting operation, the coated diamond wire can be cooled by water.

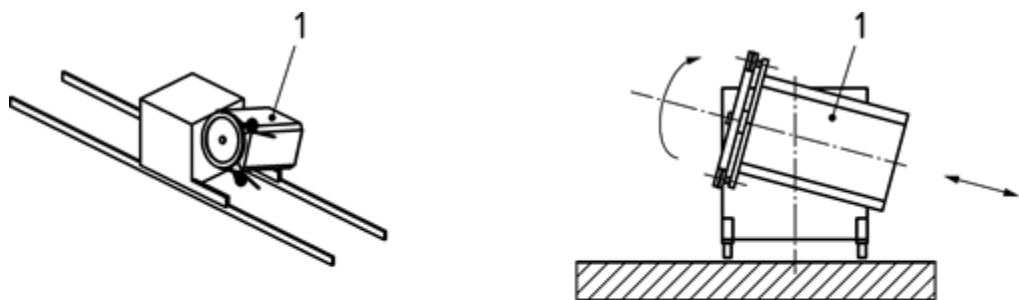


Safeguarding devices are not illustrated

Key

- | | | | | | |
|---|---------------------|---|--------------|---|--------------------------|
| 1 | machine frame | 4 | idle wheels | 7 | rail |
| 2 | machine head | 5 | guide wheels | 8 | main control panel |
| 3 | coated diamond wire | 6 | drive wheel | 9 | additional control panel |

Figure 1 — Example of a transportable diamond wire saw

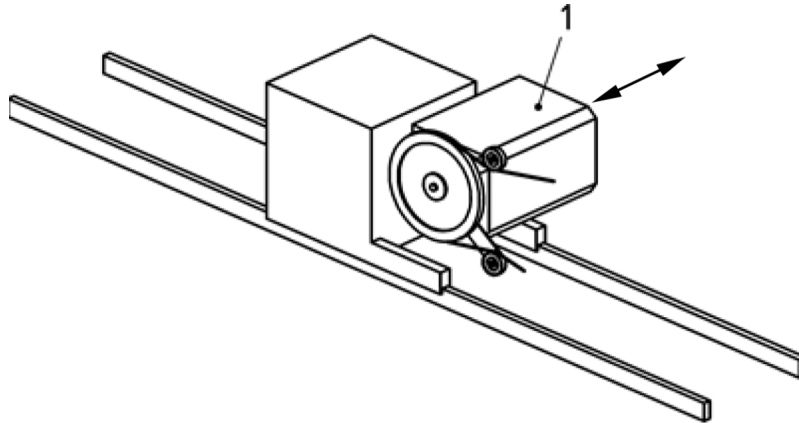


Safeguarding devices are not illustrated

Key

- | | |
|---|--------------|
| 1 | machine head |
|---|--------------|

Figure 2 — Example of machine head rotation



Safeguarding devices are not illustrated

Key

1 machine head

Figure 3 — Example of transversal movement of machine head

**3.2
drive wheel**

power transmission wheel which allows the rotation of the tool

Note 1 to entry: See Figure 1.

**3.3
guide wheel**

not driven wheel mounted on the machine frame which guides the tool entering and exiting the main drive wheel

Note 1 to entry: See Figure 1.

**3.4
main control panel**

panel including the principal controls of the machine

Note 1 to entry: See Figure 1.

**3.5
additional control panel**

panel including only machine setting operation controls

Note 1 to entry: See Figure 1.

**3.6
safety function**

function of the machine the failure of which can result in an immediate increase of the risk(s)

[SOURCE: EN ISO 12100:2010, 3.30]

3.7**safety-related part of a control system****SRP/CS**

part of a control system that responds to safety-related input signals and generates safety-related output signals

Note 1 to entry: The combined safety-related parts of a control system start at the point where the safety-related input signals are initiated (including for example the actuating cam and the roller of the position switch) and end at the output of the power control elements (including for example the main contacts of the contactor).

Note 2 to entry: If monitoring systems are used for diagnostics, they are also considered as SRP/CS.

[SOURCE: EN ISO 13849-1:2015, 3.1.1]

3.8**performance level PL**

discrete level used to specify the ability of safety-related parts of control systems to perform a safety function under foreseeable conditions

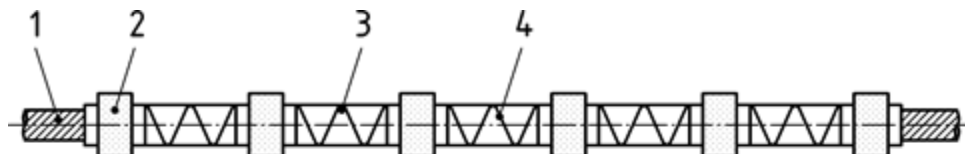
[SOURCE: EN ISO 13849-1:2015, 3.1.23]

3.9**coated diamond wire**

plastic or rubber assembled diamond wire injected with polymer with no modification of the supporting steel cable section and used as a tool during the cutting

Note 1 to entry: See Figure 4.

Note 2 to entry: The polymer, penetrating inside the strands under the threaded diamond beads creates a biting effect between the steel wire and the beads, reducing the probability of ejection of them in case of whiplash (3.18).

**Key**

- | | | | |
|---|---------------|---|--|
| 1 | steel wire | 3 | thermoplastic polymer or vulcanized rubber |
| 2 | diamond beads | 4 | spring |

Figure 4 — Example of a coated diamond wire

3.10

cutting plane

physical or virtual surface bounded by the coated diamond wire

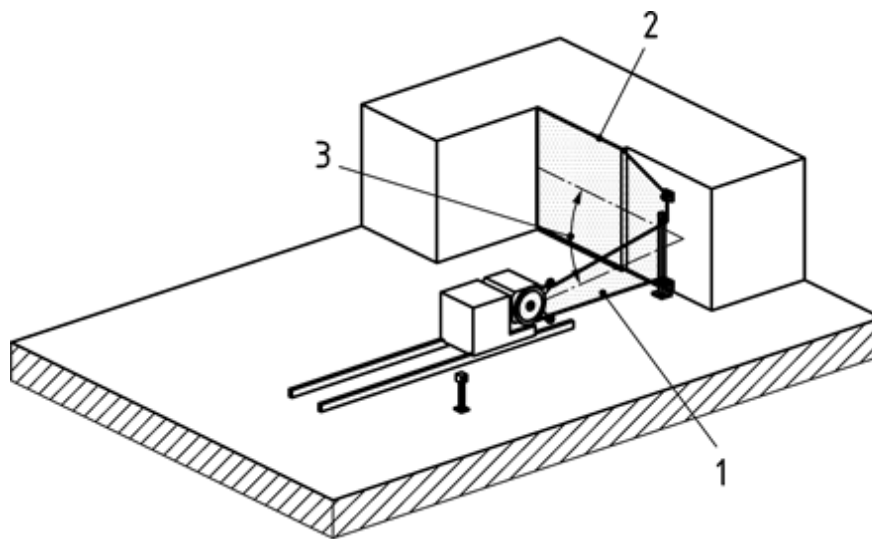
Note 1 to entry: See Figures 5 to 12.

3.11

path variation

changing of coated diamond wire path such as to create more than one cutting plane

Note 1 to entry: See Figure 5.



Key

- | | | | |
|---|----------------------|---|----------------|
| 1 | first cutting plane | 3 | path variation |
| 2 | second cutting plane | | |

Figure 5 — Example of path variation

3.12

whiplash

dangerous movement of the diamond wire that can generate risk of impact and/or ejection of parts of the diamond wire in case of coated diamond wire breakage

3.13

hazardous area

ground surface around the machine that can be reached by the whipping diamond wire ends in the most unfavourable conditions (e.g. wire breaking where it leaves the machine frame)

3.14

block

mass of natural stone extracted from a quarry to be processed to a half-finished product

3.15

cutting operations

excavation of a block from a quarry or the squaring process of the blocks to obtain half-finished product

Note 1 to entry: Transportable diamond wire saws are provided to work in different configurations depending on the morphology of the quarry and the type of cutting to be realized.

3.16

vertical cut

cutting operation where the cutting plane is orthogonal to the rail support surface and the coated diamond wire has no path variation

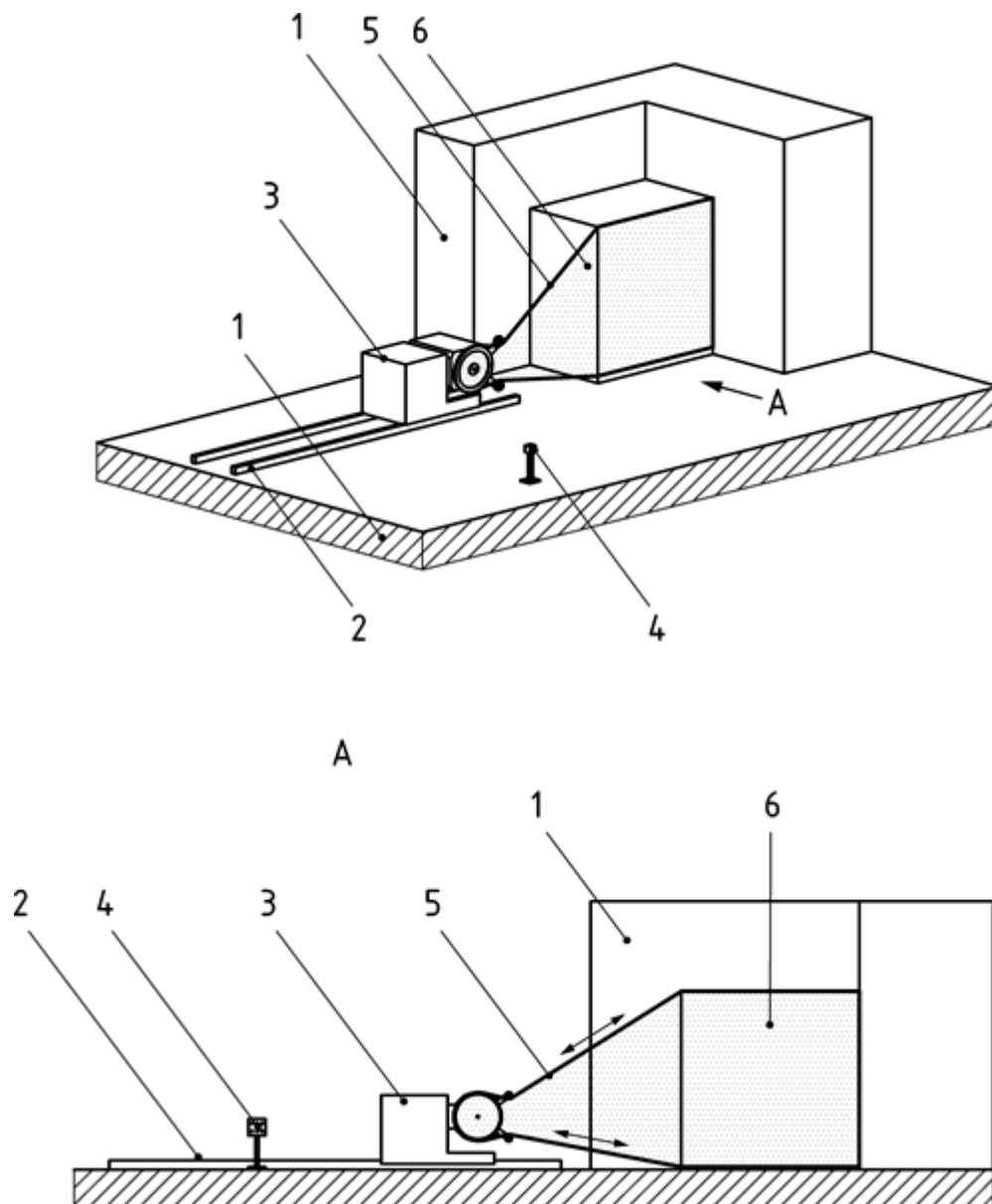
Note 1 to entry: Different types of vertical cutting are defined from 3.16.1 to 3.16.4.

3.16.1

mountain vertical cut

typical vertical cut of extraction of a bench of natural stone from the mountain

Note 1 to entry: See Figure 6.



Safeguarding devices are not illustrated

Key

- | | |
|----------------------------------|-----------------------|
| 1 mountain | 4 main control panel |
| 2 rail | 5 coated diamond wire |
| 3 transportable diamond wire saw | 6 cutting plane |

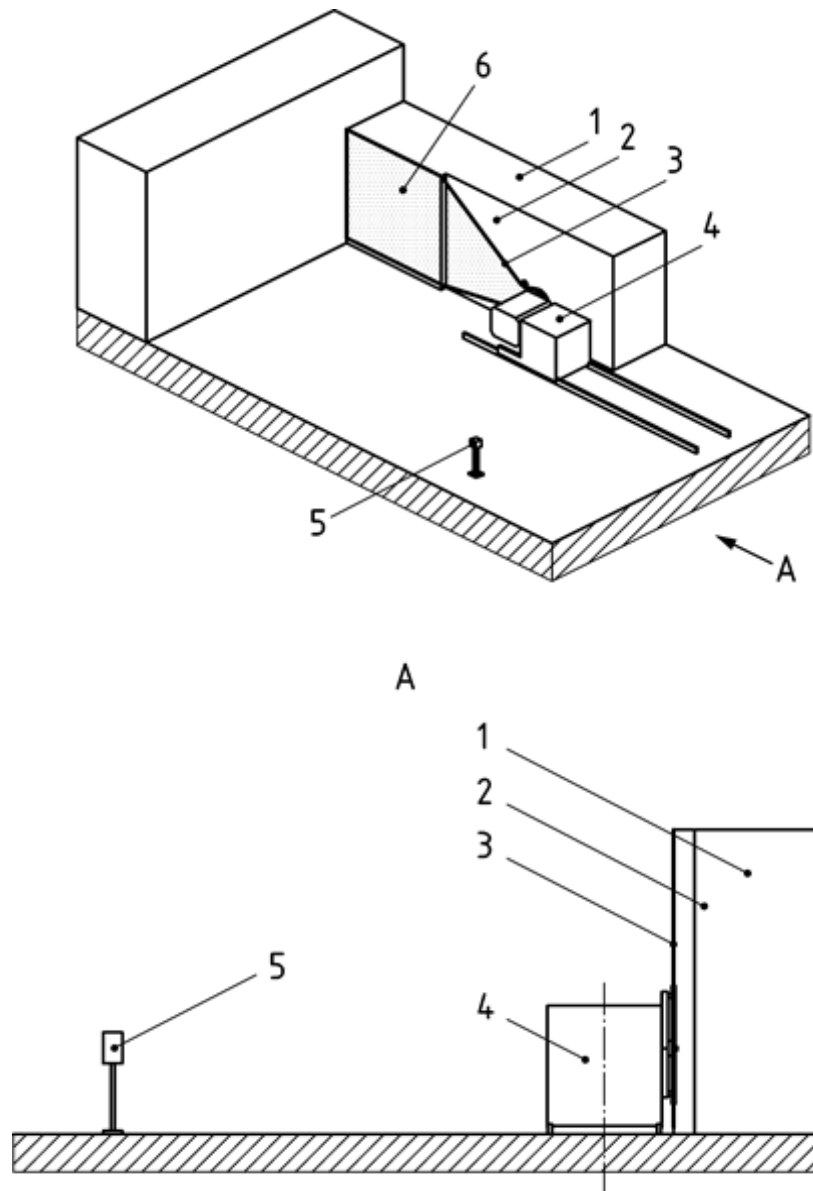
Figure 6 — Example of mountain vertical cut

3.16.2

mountain side vertical cut

vertical cut where the transportable diamond wire saw is very close to the vertical side of the quarry

Note 1 to entry: See Figure 7.



Safeguarding devices are not illustrated

Key

- | | | | |
|---|---------------------|---|--------------------------------|
| 1 | mountain | 4 | transportable diamond wire saw |
| 2 | mountain-side | 5 | main control panel |
| 3 | coated diamond wire | 6 | cutting plane |

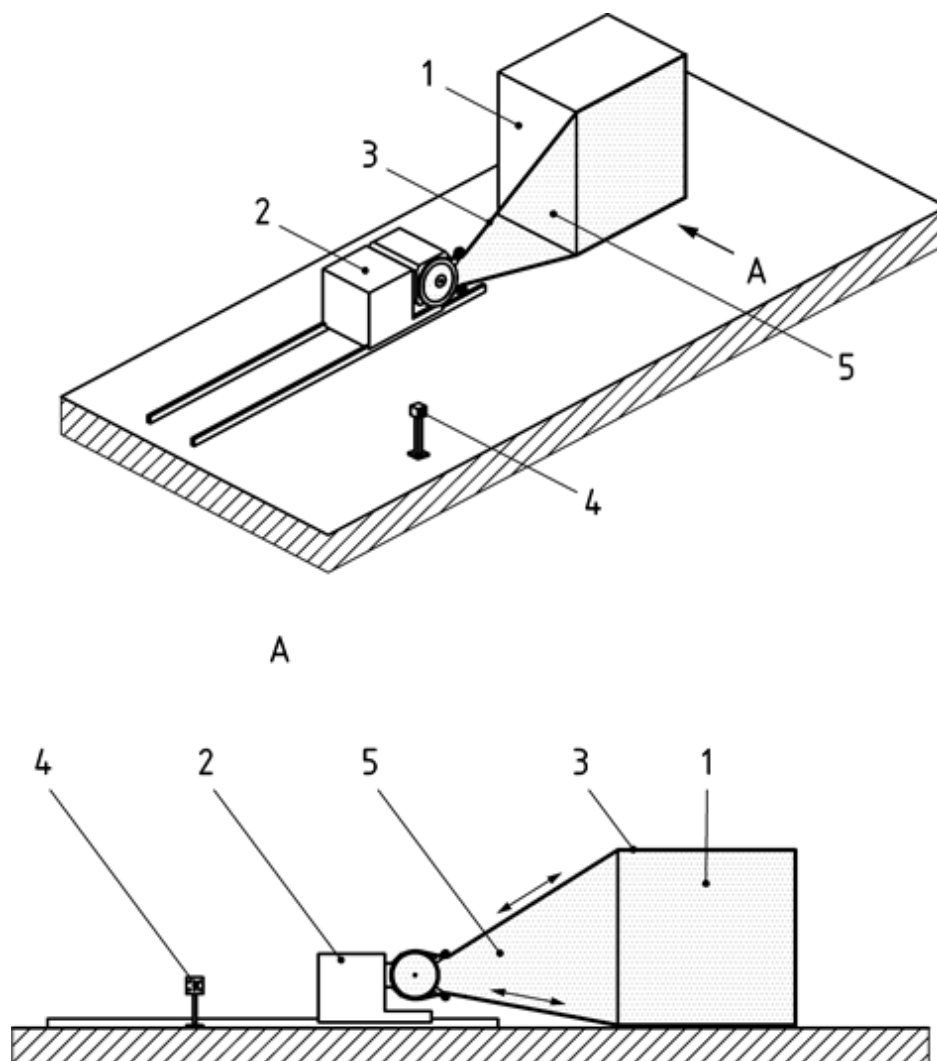
Figure 7 — Example of mountain-side vertical cut

3.16.3

block vertical cut

vertical cut used to square a block

Note 1 to entry: See Figure 8.



Safeguarding devices are not illustrated

Key

- | | | | |
|---|--------------------------------|---|--------------------|
| 1 | block | 4 | main control panel |
| 2 | transportable diamond wire saw | 5 | cutting plane |
| 3 | coated diamond wire | | |

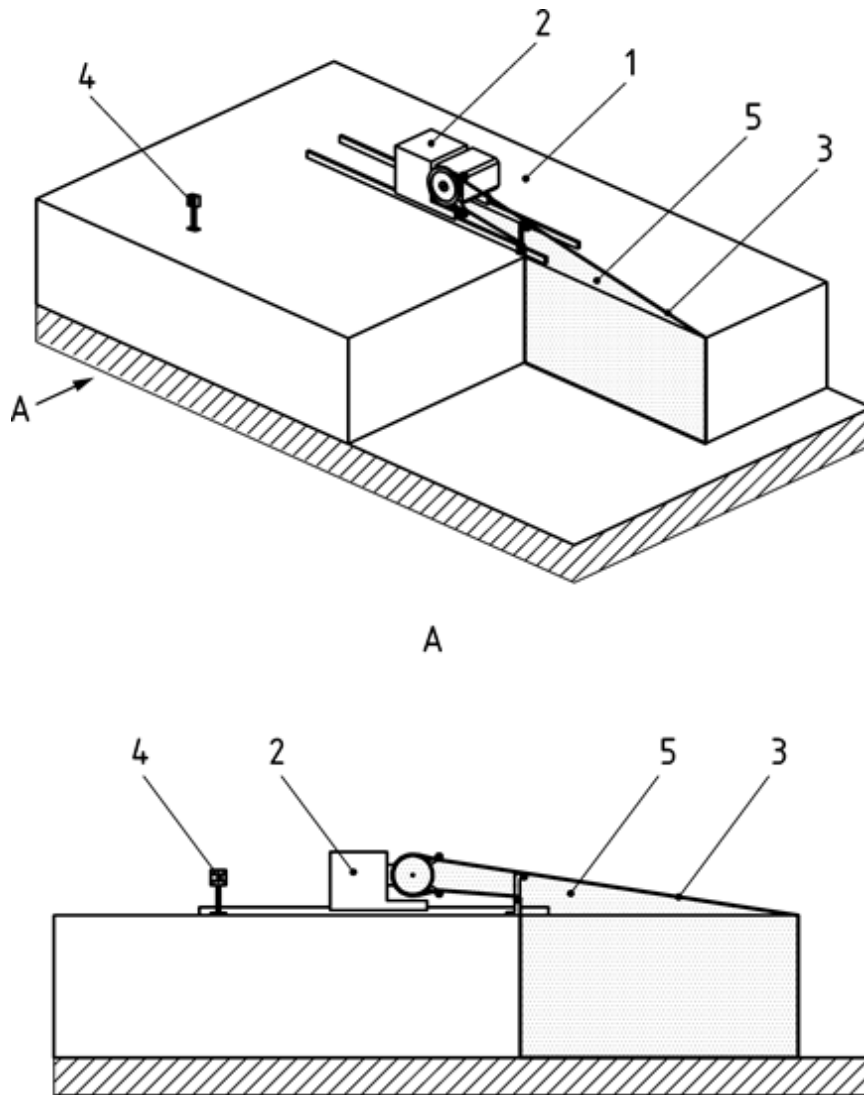
Figure 8 — Example of block vertical cut

3.16.4

overhead underslung vertical cut

vertical cut where the transportable diamond wire saw is on the bench to cut and cutting area is under and in front of the machine

Note 1 to entry: See Figure 9.



Safeguarding devices are not illustrated

Key

- | | | | |
|---|--------------------------------|---|--------------------|
| 1 | bench | 4 | main control panel |
| 2 | transportable diamond wire saw | 5 | cutting plane |
| 3 | coated diamond wire | | |

Figure 9 — Example of overhead underslung vertical cut

3.17

horizontal cut

cutting operation where the cutting plane is parallel to the rail support surface and the coated diamond wire has no path variation

Note 1 to entry: According to the position of the morphology of the quarry two types of horizontal cutting are defined in 3.17.1 and 3.17.2.