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BSI Standards Publication

Machines and plants for mining and tooling of natural stone — Safety — Requirements for edge finishing machines

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National foreword

This British Standard is the UK implementation of EN 15572:2015.

The UK participation in its preparation was entrusted to Technical Committee MCE/3/15, Machines for natural stone.

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

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

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Machines et installations d'extraction et d'usinage des pierres naturelles - Sécurité - Prescriptions relatives aux machines de finition des bords

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

This European Standard was approved by CEN on 3 July 2015.

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European foreword

This document (EN 15572:2015) 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of an identical text or by endorsement, at the latest by February 2016 and conflicting national standards shall be withdrawn at the latest by February 2016.

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For relationship with EU Directive 2006/42/EC, 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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, 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 defined in EN ISO 12100:2010.

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.

The requirements of this document are directed to manufacturers and their authorized representatives of edge finishing machines. It is also useful for designers.

This also includes examples of information to be provided by the manufacturer to the user.

1 Scope

This European Standard applies to table edge finishing machines (see 3.1) and belt edge finishing machines (see 3.2) which are used to grind, polish, cut and shape the edge or surface of slabs, strips or tiles of natural stone and engineered stone (e.g. agglomerated stone) as defined by EN 14618:2009.

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

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

This European Standard deals all significant hazards that may occur within the expected lifetime of the machinery including the phases of transport, assembly, dismantling, disabling and scrapping.

This European Standard also applies to machines fitted with the following facilities/devices:

— automatic tool change;

— tilting and/or rotating head axis;

— rotating workpiece support(s);

— axes operating according a NC work programme;

— mechanical, pneumatic, hydraulic or vacuum workpiece clamping;

and the following accessory units:

— spindle with grinding and polishing tool;

— spindle with bush-hammering tool;

— spindle with diamond wheel;

— spindle with calibrating tool;

— spindle with dripstone tool;

— spindle with cutting tool;

— spindle with shaping tool.

This European Standard does not deal with:

— hand-held grinding machines;

— machines intended for operation in a potentially explosive atmosphere;

— operation in severe environmental conditions (e.g. extreme temperatures, corrosive environment);

— machines intended for outdoor operation.

This European Standard is not applicable to machinery which is manufactured before the date of publication of this document by CEN.

2 Normative references

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

EN 349:1993+A1:2008, *Safety of machinery - Minimum gaps to avoid crushing of parts of the human body*

EN 953:1997+A1:2009, *Safety of machinery - Guards - General requirements for the design and construction of fixed and movable guards*

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

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

EN 1037:1995+A1:2008, *Safety of machinery - Prevention of unexpected start-up*

EN 1837:1999+A1:2009, *Safety of machinery - Integral lighting of machines*

EN 50370-1:2005, *Electromagnetic compatibility (EMC) - Product family standard for machine tools - Part 1: Emission*

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

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 61439-1:2011, *Low-voltage switchgear and controlgear assemblies - Part 1: General rules (IEC 61439-1:2011)*

EN 61496-1:2013, *Safety of machinery - Electro-sensitive protective equipment - Part 1: General requirements and tests (IEC 61496-1:2012)*

EN ISO 3743-1:2010, *Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Engineering methods for small movable sources in reverberant fields - Part 1: Comparison method for a hard-walled test room (ISO 3743-1:2010)*

EN ISO 3743-2:2009, *Acoustics - Determination of sound power levels of noise sources using sound pressure - Engineering methods for small, movable sources in reverberant fields - Part 2: Methods for special reverberation test rooms (ISO 3743-2:1994)*

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 (ISO 3744:2010)*

EN ISO 3745:2012, *Acoustics - Determination of sound power levels and sound energy levels of noise sources using sound pressure - Precision methods for anechoic rooms and hemi-anechoic rooms (ISO 3745:2012)*

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 (ISO 3746:2010)*

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

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

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

EN ISO 7010:2012, *Graphical symbols - Safety colours and safety signs - Registered safety signs (ISO 7010:2011)*

EN ISO 11200:2014, *Acoustics - Noise emitted by machinery and equipment - Guidelines for the use of basic standards for the determination of emission sound pressure levels at a work station and at other specified positions (ISO 11200:2014)*

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 (ISO 11201:2010)*

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 (ISO 11202:2010)*

EN ISO 11203:2009, *Acoustics - Noise emitted by machinery and equipment - Determination of emission sound pressure levels at a work station and at other specified positions from the sound power level (ISO 11203:1995)*

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 (ISO 11204:2010)*

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

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

EN ISO 13849-1:2008, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design (ISO 13849-1:2006)*

EN ISO 13850:2008, *Safety of machinery - Emergency stop - Principles for design (ISO 13850:2006)*

EN ISO 14119:2013, *Safety of machinery - Interlocking devices associated with guards - Principles for design and selection (ISO 14119:2013)*

3 Terms and definitions

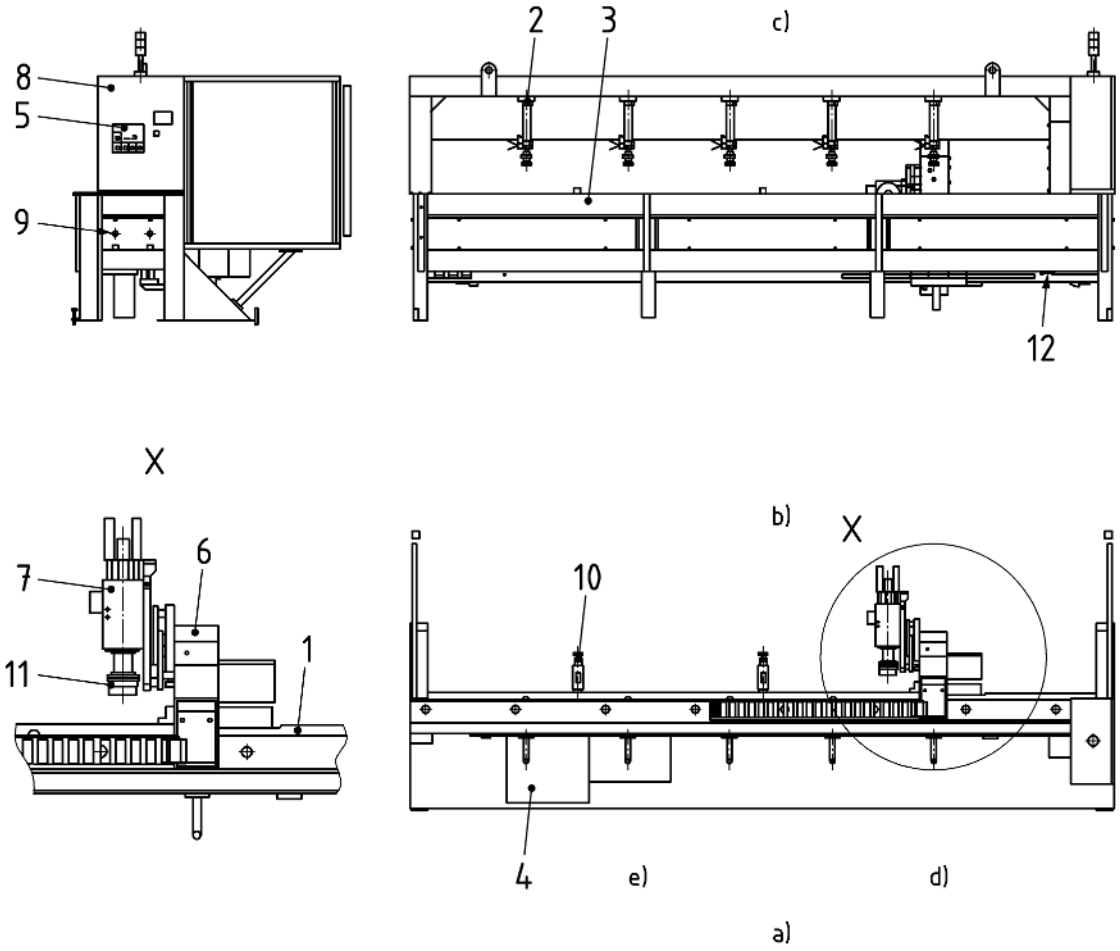
For the purposes of this document, the terms and definitions given in EN ISO 12100:2010 and the following apply.

3.1
table edge finishing machine
integrated fed machine with a workbench on which the workpieces are fixed to be processed and a movable frame, fitted with one work spindle (see Figure 1) or more work spindles (see Figure 2), which is guided along the workpieces on a rail-carriage combination, designed for grinding or polishing and cutting the edge of slabs by the use of grinding or polishing spindles and diamond disk water-cooled during the working process

Note 1 to entry: This machine can be equipped with the following facilities:

a) automatic grinding or polishing tool change system with tools magazine;

b) grinding or polishing tool change system with bayonet locking.

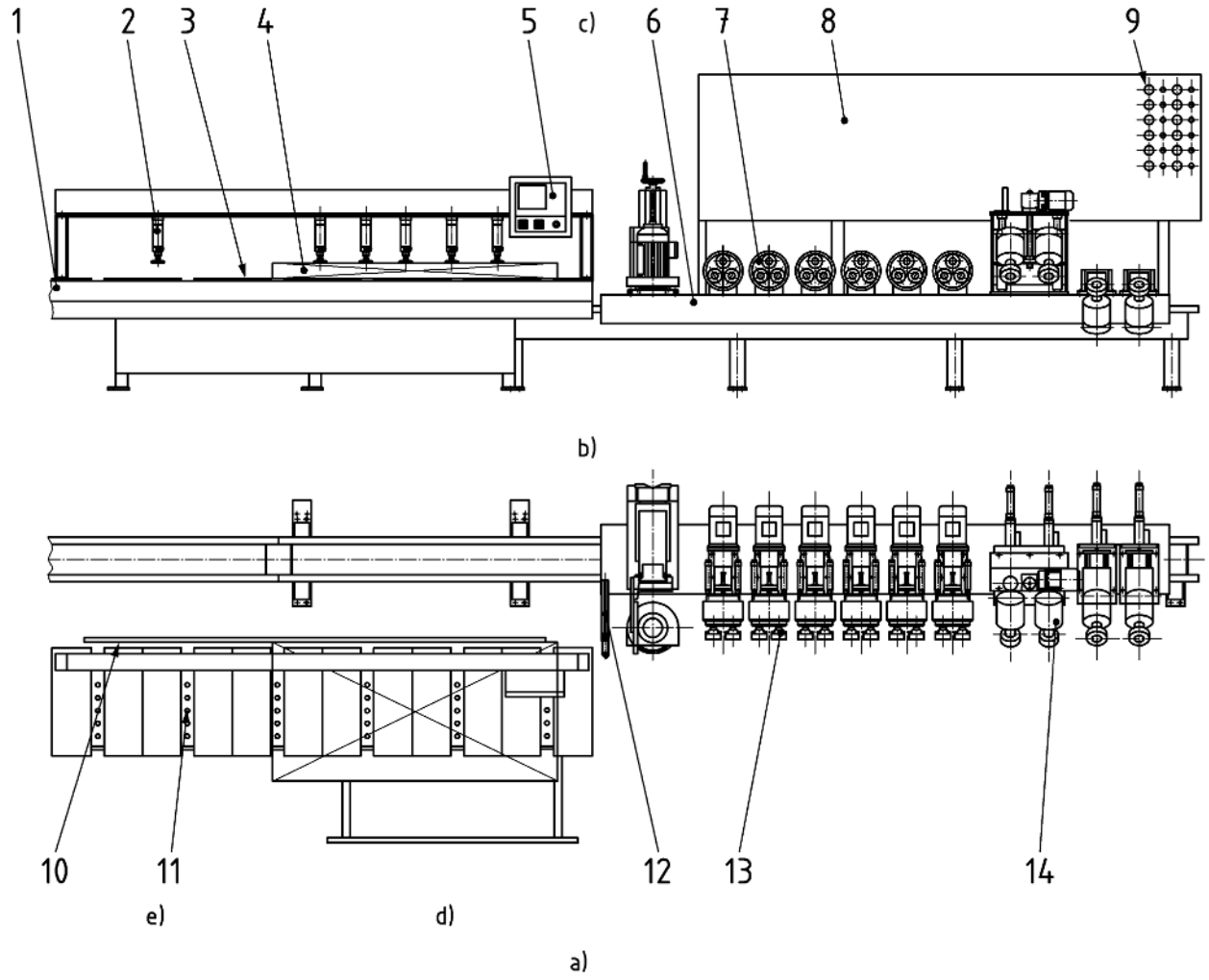


Safeguarding devices are not illustrated.

Key

A	front side	B	rear side	C	upper side
D	loading workpiece area	E	unloading workpiece area		
1	guide rail	2	clamping device	3	workbench
4	workpiece	5	control panel	6	moving machine frame
7	work spindle	8	electrical panel	9	tool control unit
10	table limit stop	11	tool	12	water inlet

Figure 1 — Example of a table edge finishing machine with a single work spindle



Safeguarding devices are not illustrated.

Key

A	front side	B	rear side	C	upper side
D	loading workpiece area	E	unloading workpiece area		
1	guide rail	2	clamping device	3	workbench
4	workpiece	5	control panel	6	moving machine frame
7	finishing carriage	8	control cabinet	9	tool control unit
10	table limit stop	11	movable conveying elements (rolls)	12	edge detection
13	work spindles for face finishing	14	work spindles for chamfering		

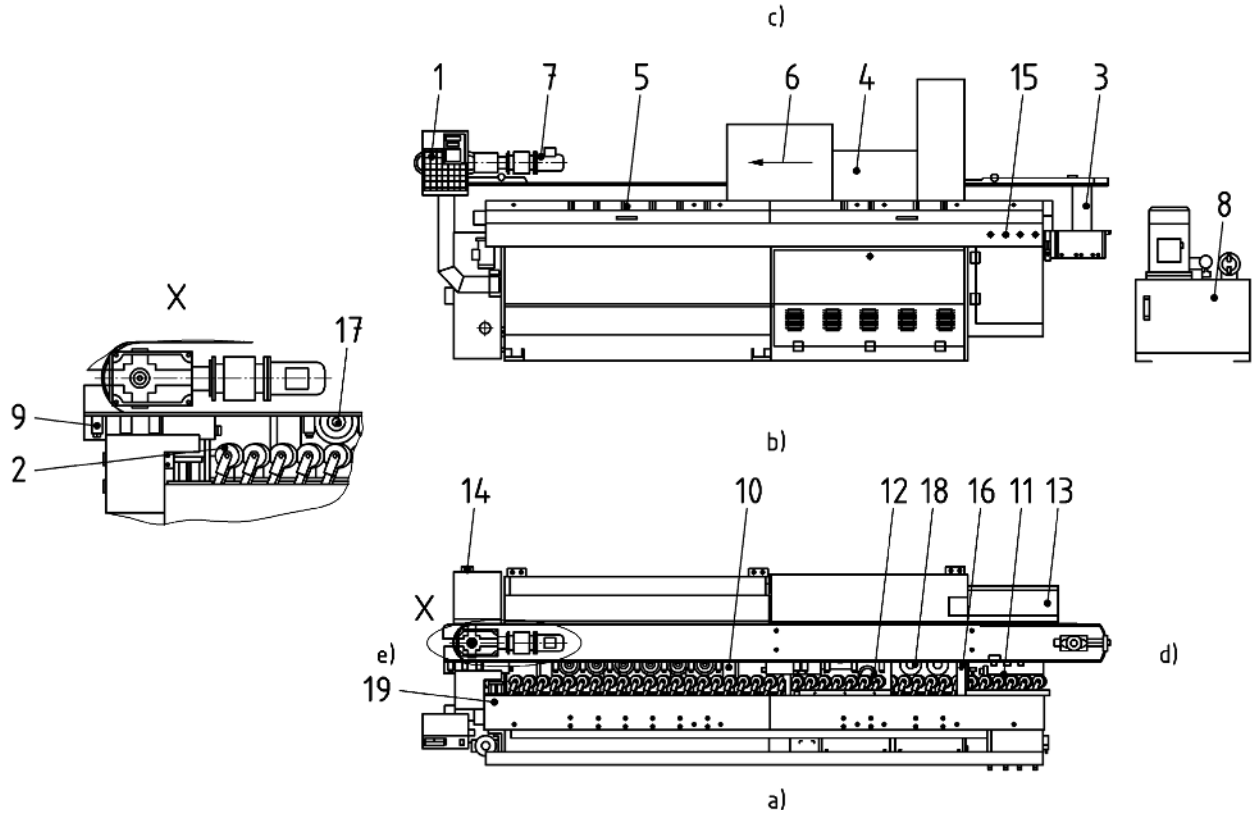
Figure 2 — Example of a table edge finishing machine with more work spindles

3.2
belt edge finishing machine
integrated fed machine with continuous operating conveyor belt on which the workpieces are guided in-line by guide rolls and by means of non-driven top pneumatic or elastic force pressure rolls; the workpieces are processed by fixed and/or oscillating spindles-holding beam and accessory units (e.g. calibrating spindle), designed for grinding or polishing and cutting the edge of slabs by the use of grinding or polishing spindles and diamond disk water cooled during the working process

Note 1 to entry: Belt edge finishing machines may be divided in two groups:

— Vertical belt edge finishing machine (see Figure 3) where the conveyor belt for the workpiece transport is perpendicular to the floor;

— Horizontal belt edge finishing machines (see Figure 4) where the conveyor belt for the workpiece transport is parallel to the floor.

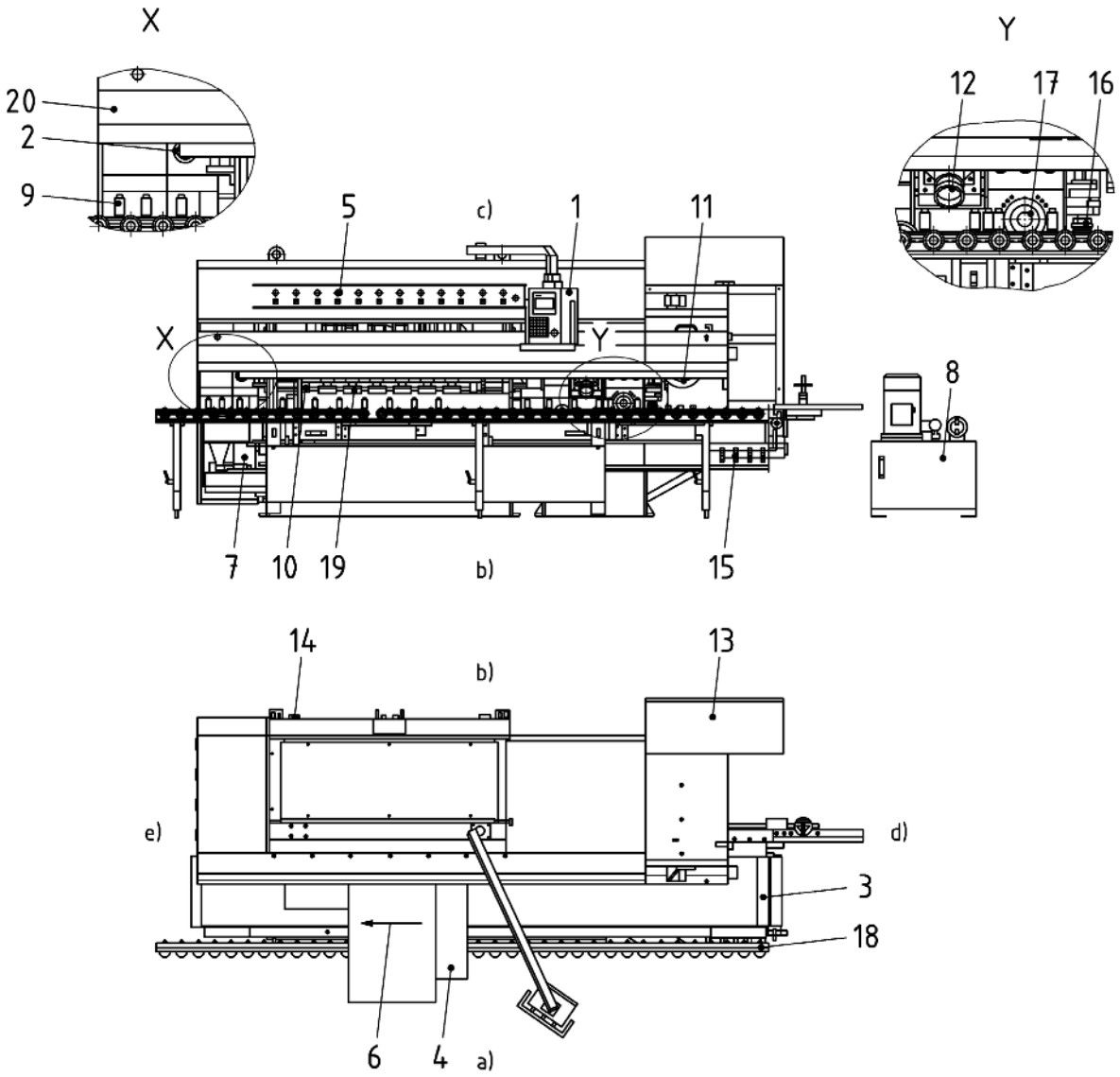


Safeguarding devices are not illustrated.

Key

A	front side	B	rear side	C	upper side
D	loading workpiece area	E	unloading workpiece area		
1	control panel	2	rolls	3	conveyor belt
4	workpiece	5	tools control unit	6	running direction
7	conveying belt drive	8	hydraulic power plant	9	horizontal guide rolls
10	oscillating beam	11	accessory unit	12	chamfer unit
13	electrical panel	14	water outlet	15	water inlet
16	edge detection	17	work spindle	18	tool
19	pressure bar				

Figure 3 — Example of a vertical belt edge finishing machine



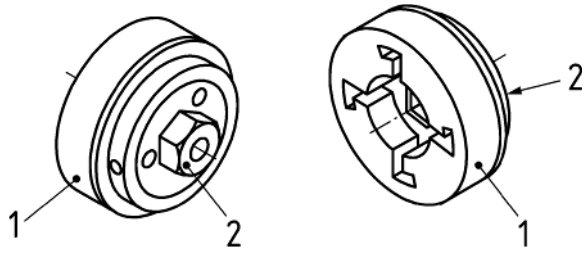
Safeguarding devices are not illustrated.

Key

A	front side	B	rear side	C	upper side
D	loading workpiece area	E	unloading workpiece area		
1	control panel	2	rolls	3	conveyor belt
4	workpiece	5	tools control unit	6	running direction
7	conveying belt drive	8	hydraulic power plant	9	vertical guide rolls
10	oscillating beam	11	accessory unit	12	chamfer unit
13	electrical panel	14	water outlet	15	water inlet
16	edge detection	17	work spindle	18	extractable supporting bar
19	tool	20	pressure bar		

Figure 4 — Example of a horizontal belt edge finishing machine

3.3
grinding and polishing tools
tools that allow to remove the material from the edge of workpiece (slabs) to be processed, getting smoothed and polished surfaces

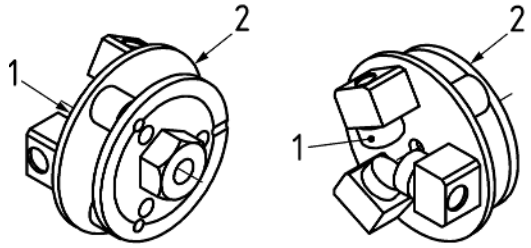


Key

1 abrasive surface 2 grinder holder

Figure 5 — Example of grinding and polishing tools

3.4
bush-hammering tool
tool that allows to remove the material from the surface of the workpiece (e.g. slabs) to be processed, getting smoothed and polished surfaces

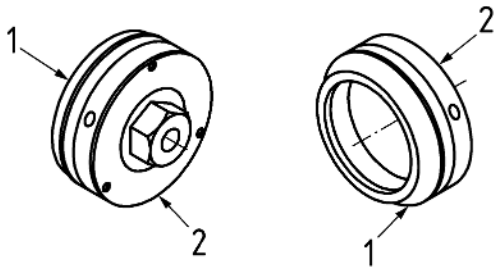


Key

1 bush-hammering wheel 2 grinder holder

Figure 6 — Example of a bush-hammering tool

3.5
diamond wheel
wheel that allows to remove the material from the edge of the workpiece (e.g. slabs) to be processed, getting the rough shape desired

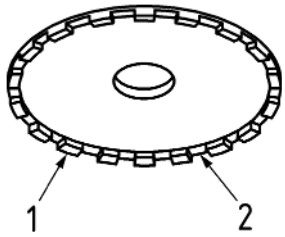


Key

1 diamond surface 2 grinder holder

Figure 7 — Example of a diamond wheel

3.6
calibrating tool
tool that allows to gauge the thickness of the material with an adjustable depth

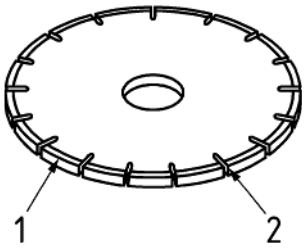


Key

1 diamond tooth 2 steel support

Figure 8 — Example of a calibrating tool

3.7
dripstone tool
tool that allows to carry out slotting for the dripstone

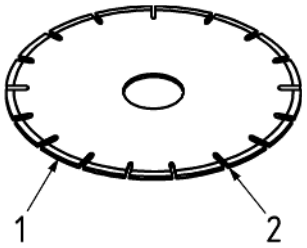


Key

1 diamond tooth 2 steel support

Figure 9 — Example of a dripstone tool

3.8
cutting tool
tool that allows to realize cuts on the surface or edge of workpiece

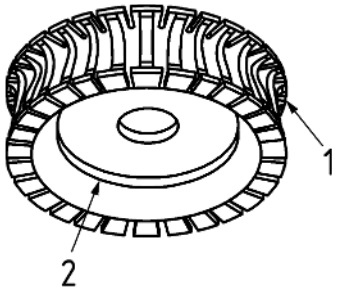


Key

1 diamond tooth 2 steel support

Figure 10 — Example of a cutting tool

3.9
shaping tool
tool that allows to shape edges rectilinearly by proper diamond inserts



Key

1 diamond tooth 2 steel support

Figure 11 — Example of a shaping tool

3.10
machine actuator
power mechanism used to effect motion of the machine and/or generates the tool moving (e.g. electric motor, hydraulic motor, pneumatic cylinder)

3.11
feed drive
devices for adjusting axles position (e.g. handwheels, knobs, hold-to-run control, pneumatic systems, etc.)

3.12
spindle
special shaft, powered by a motor, which holds the tools in rotation

3.13
work bench
for table edge finishing machine, the workbench is the stationary table on which the workpiece is fixed to be processed

for belt edge finishing machine, the workbench is the table on which the conveyor belt drives the workpiece to be processed

3.14
moving machine frame
moveable part of machine fitted with one work spindle (see Figure 1) or more work spindles (see Figure 2), guided along the workpieces on a rail-carriage combination

3.15
pressure bar
device fitted by non-driven top pneumatic or elastic force pressure rolls which press the workpiece on the workbench

3.16
fixed spindles-holding beam
fixed beam that supports the work spindles

3.17
oscillating spindles-holding beam
moveable beam, fitted in belt edge finishing machines, that supports the work spindles and allows the alternative movement of oscillation (see Figure 12 and Figure 13)

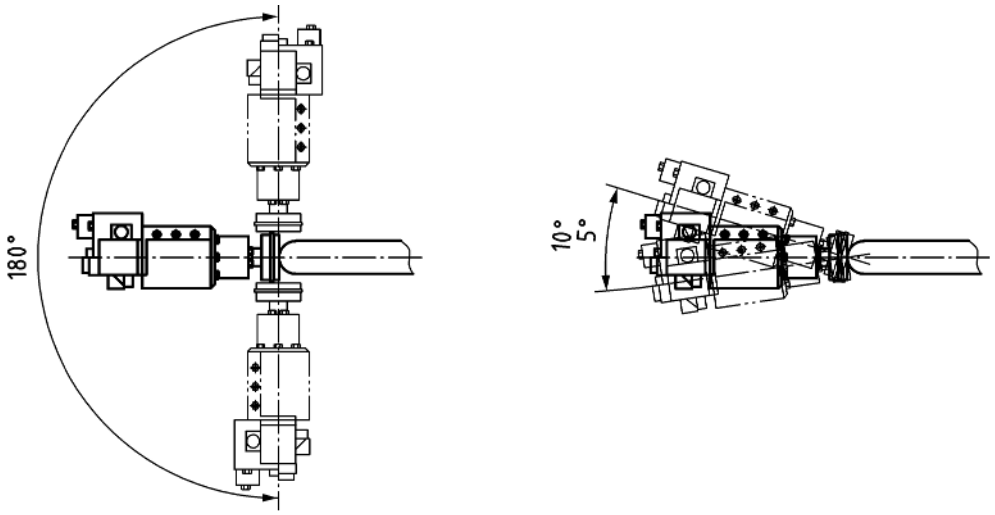


Figure 12 — Example of types of oscillating spindles-holding beam for horizontal belt edge finishing machine with oscillation range of 180° (A) and with maximum oscillation range of 5°-10° (B)

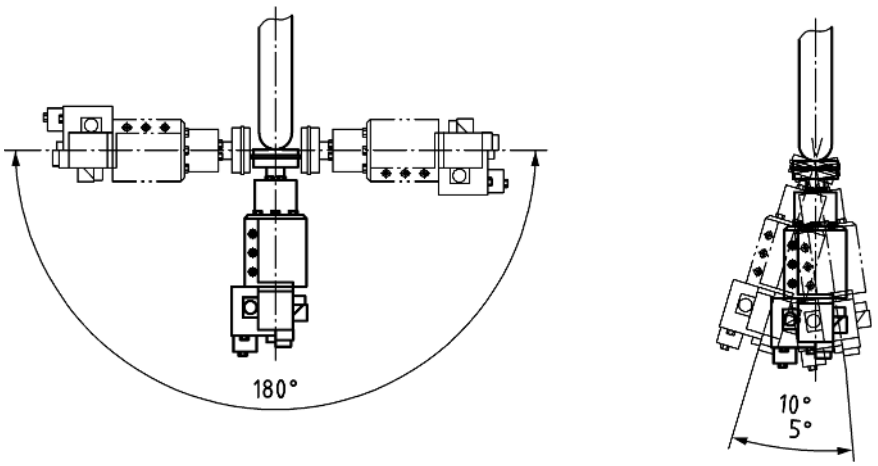


Figure 13 — Example of types of oscillating spindles-holding beam for vertical belt edge finishing machine with oscillation range of 180° (A) and with maximum oscillation range of 5°-10° (B)

3.18
machining mode of operation
automatic, programmed, sequential mode of operation of the machine with the facility for manual or automatic loading/unloading of the workpiece

3.19
machine setting mode of operation
setting, programming, fault finding, programme verification, testing mode of operation of the machine

3.20
operational stop
stop for operational reasons without cutting off the energy supply to the actuator(s) where the stop condition is monitored and maintained

3.21
rotational speed
speed of the drive spindle in rotations per minute with the nominal operation values stated by the manufacturer

3.22
ejection
uncontrolled movement of the workpiece or parts of it or part of the tool from the machine during processing

3.23
monitoring
safety function which ensures that a safety measure is initiated if the ability of a component or an element to perform its function is diminished, or if the process conditions are changed in such a way that hazards are generated

3.24
un-braked run-down time
time elapsed from the actuation of the stop control up to spindle standstill, when the braking device is not provided

3.25
braked run-down time
time elapsed from the actuation of the stop control and the brake device up to spindle standstill, when the brake device is provided

3.26
peripheral enclosure
combination of fixed and moveable interlocking guards with guard locking which encloses the machine danger zone preventing access to it and also forms a means of safeguarding against ejected parts

3.27
safety function
function of the machine whose failure can result in an immediate increase of the risk(s)

[SOURCE: EN ISO 12100:2010, 3.30]

3.28
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 13849-1:2008, 3.1.23, 4.5.1]

3.29
power enabling control device
control device that enables providing power to machines actuators

Note 1 to entry: e.g. powering auxiliary circuit.

4 List of significant hazards

This clause contains all the significant hazards, hazardous situations and events, as indicated in EN ISO 12100:2010, Annex B, 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

Type or group	Origin	Potential consequences	Subclause of this document
Mechanical hazards	Approach of a moving element to a fixed part	Crushing, Impact	**5.3.4, 5.3.5, 5.3.6, 5.3.7**
	Cutting parts	Cutting, shearing	**5.3.4, 5.3.5, 5.3.6, 5.3.7**
	Elastic elements	Crushing, Impact	**5.3.4, 5.3.5, 5.3.6, 5.3.7**
	Gravity, Falling objects	Impact	**5.3.1, 5.3.2, 5.3.3, 5.4.9**
	High pressure	Crushing, Impact, Being thrown	**5.3.5, 5.3.6, 5.4.6, 5.4.8**
	Instability, machinery mobility	Crushing, Impact, Being run over	**5.3.1, 5.3.2, 5.3.3, 5.4.9**
	Moving elements	Drawing-in, Entanglement, Being thrown	**5.3.4, 5.3.5, 5.3.6, 5.3.7**
	Rotating elements	Cutting, abrasion, Entanglement, Being thrown	**5.3.4, 5.3.5, 5.3.6, 5.3.7**

Type or group	Origin	Potential consequences	Subclause of this document
	Rough, slippery surface	Crushing, Impact, Friction or Abrasion, Slipping, tripping and falling	**5.4.10**
	vacuum	Crushing, Impact	**5.3.5**
Electrical hazards	Electromagnetic phenomena	Effects on medical and other electro-mechanical implants	**5.4.7**
	Electrostatic phenomena	Burn, electrocution, shock, falling, being thrown	**5.4.7**
	Live parts	Burn, electrocution, shock, falling, being thrown	**5.4.3**
	Not enough distance to live parts under high voltage	Burn, electrocution, shock,	**5.4.3**
	Parts which have become live under fault conditions	Burn, electrocution, shock, falling, being thrown	**5.4.3**
	Short-circuit	Burn, electrocution, shock, falling, being thrown, fire	**5.4.3**
Thermal hazards	Objects or materials with a high or low temperature	Scald or frostbite	**5.4.1, 5.4.3**
Noise Hazards	Exhausting system, Worn parts	Discomfort, Interference with other acoustic signals, Loss of awareness, Stress, Tinnitus	**5.4.2**
	Manufacturing process	Interference with other acoustic signals, Loss of awareness, Stress, Tinnitus	**5.4.2**
	Moving parts	Discomfort, Interference with other acoustic signals, Loss of awareness, Stress, Tinnitus	**5.4.2**
	Unbalanced rotating parts	Discomfort, Interference with other acoustic signals, Loss of awareness, Stress, Tinnitus	**5.4.2**
Material/substance hazards	Dust	Respiratory diseases	**5.4.10**
Ergonomic hazards	Access, Posture	Discomfort, Fatigue	**5.4.4**
	Design or location of indicators and visual displays units	Discomfort, Fatigue, Stress,	**5.2.2, 5.4.4**
	Design, location or identification of control devices	Discomfort, Fatigue, Stress,	**5.2.2, 5.4.4**
	Effort	Fatigue	**5.4.4**
	Local lighting	Discomfort, Fatigue	**5.4.5**

Type or group	Origin	Potential consequences	Subclause of this document
Hazards associated with the environment in which the machine is used	Electromagnetic disturbance	Unexpected Start/stop, break, Command failure Any consequence of the effect caused by the sources of the hazards on the machine or parts of the machine	**5.4.7**
Combination of hazards	Failure/ disorder of the control system; Uncontrolled restoration of energy supply after an interruption Errors in the software Impossibility of stopping the machine in the best possible conditions Variations in the rotational speed of tools Errors of fitting Break-up during operation Loss of stability/overturning of machinery Slip, trip and fall of persons (related to machinery)	Crushing, Impact, Cutting and shearing, Being run over, Being thrown, Drawing-in, Entanglement, Abrasion Any other as a consequence of the effect caused by the sources of the hazards on the machine or parts of the machine.	**5.2.1, 5.2.2, 5.2.3, 5.2.4, 5.2.5, 5.2.6, 5.2.7, 5.2.8, 5.2.9, 5.2.10, 5.2.11, 5.3.1, 5.3.2, 5.3.3, 5.3.4, 5.3.5, 5.3.6, 5.3.7**

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 12100:2010 for relevant but not significant hazards (e.g. sharp edges of the machine frame) which are not dealt with this document.

5.2 Controls

5.2.1 Safety and reliability of control systems

For the purpose of this document, safety-related part of a control system means the system which implements safety functions from the initial device (e.g. actuator, position detector or sensor) up to include the power control element of the final machine actuator (e.g. motor). Safety-related parts of the control system of this machine comprise parts concerning the following functions and they shall fulfil the requirements of the PL given below in accordance with the requirements of EN ISO 13849-1:2008:

— for power enabling: PL = b (see 5.2.3);

— for normal stop: PL = b (see 5.2.4);

— for emergency stop: PL = c (see 5.2.5);

— for standstill monitoring: PL = c (see 5.2.6);

— for control circuit for interlocking: PL = c or PL = d (see 5.3.5, 5.3.6);

— for mode selection, only for table edge finishing machine: PL = c (see 5.2.9);

— for workpiece-powered clamping: PL = b (see 5.3.5.3, 5.3.6.5);

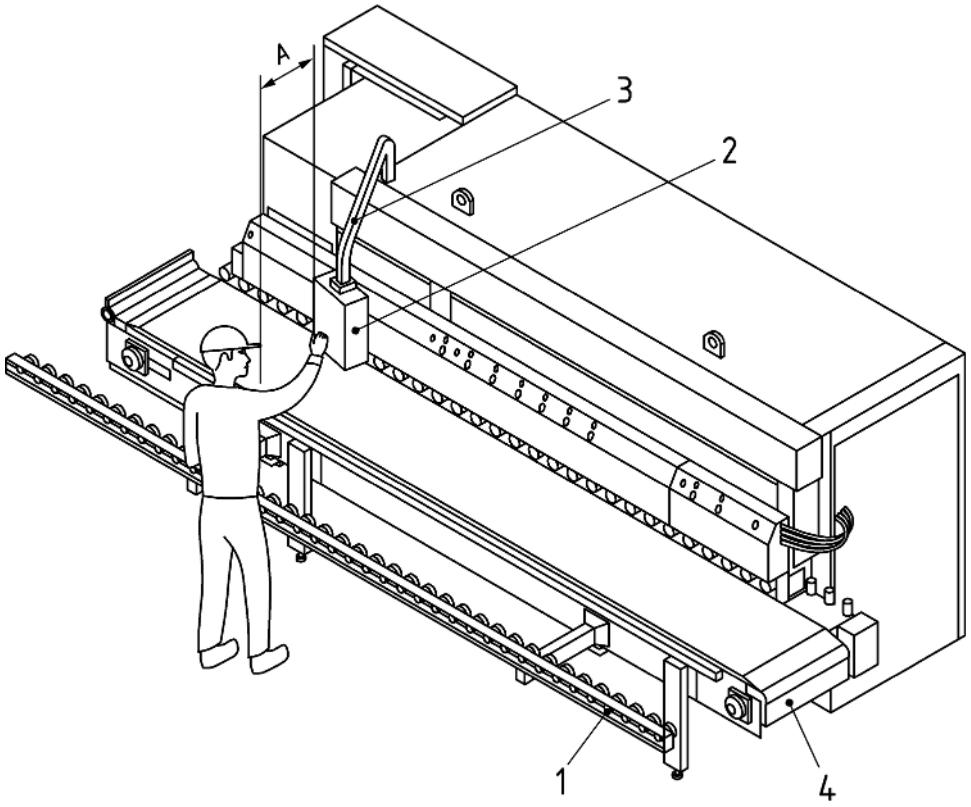
Verification: By checking the relevant drawings and/or circuit diagrams, calculation and inspection of the machine.

5.2.2 Position of controls

5.2.2.1 General

The main electrical control devices, i.e. device for starting, main interrupter, enabling controls, power enabling, operational/normal stop, emergency stop shall be located at the operator's position at the main control panel at a distance of at least 500 mm and not exceeding 1 800 mm from the floor level.

For horizontal belt edge finishing machine, a control panel holder device shall be provided so that to make it reachable by the operator at a minimum distance of 500 mm (“A” in Figure 14) from the edge of the extractable supporting bar.



Key

A distance between the edge of the extractable supporting bar and the control panel

1 extractable supporting bar
2 control panel
3 control panel holder
4 conveyor belt

Figure 14 — Example of a control panel holder device for horizontal belt edge finishing machine

Any other control device shall be located at a distance of at least 300 mm and not exceeding 1 800 mm from the floor level.

Any safeguarding equipment reset control device shall be located outside the protected zone and shall not be effective if actuated from inside the protected zone (see 5.3.5 and 5.3.6).

The emergency stop device shall be provided at each working station and in particular:

a) at the main control panel;

b) at the mobile control panel, connected by cable or wireless system (if provided);

c) at the workpiece loading and unloading area.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and functional testing of the machine.

5.2.2.2 Hand-held control sets

Additional control devices for cycle starting, operational/normal stop may be duplicated/provided on hand-held control sets with or without cable connection taking account of the requirements of 5.2.5 for emergency stop.

No reset function control devices, no power enabling control devices (see 5.2.3) shall be permitted on wireless control sets or control sets with cable connection.

When on a wireless control set the connection between the set and the machine is lost, an emergency stop according to 5.2.5 shall be automatically activated.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and functional testing of the machine.

5.2.3 Starting

Power enabling activation shall be possible only when all safeguards described in 5.3.5 and 5.3.6 are in place and functional.

This is achieved by the interlocking arrangement, including PL required, described in 5.3.5 and 5.3.6.

Cycle start or restart shall only be possible after actuation of a power enabling control device provided for that purpose and protected against unintended actuation e.g. by shrouded control device.

The safety-related part of the control system for the power enabling shall achieve at least PL = b in accordance with the requirements of EN ISO 13849-1:2008, and the requirements of EN 60204-1:2006, 9.2.5.2, apply.

NOTE 1 No minimum PL is required for cycle starting and restarting functions.

Closure of interlocking movable guards shall not lead to an automatic restart of dangerous movements. For each restart, a deliberate action of the operator is required.

NOTE 2 Dangerous movement means movement affecting the safety of the operator or other persons, not the integrity of the machine.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and functional testing of the machine.

5.2.4 Normal stop

A normal stop-control system shall be provided for the machining and setting modes of operation, which, when actuated, shall fulfil the stopping sequences and shall disconnect power from all machine actuators except workpiece clamping (see 5.3.5.3 and 5.3.6.5).

The stop function shall be of a category 1 in accordance with the requirements of EN 60204-1:2006 , 9.2.2 to allow the actuation of the electrical brake if fitted. If the electrical brake is not fitted, the stop function may be of a category 0.

The stopping sequence for normal stop shall be:

a) stop moving machine frame for table edge finishing machine or conveyor belt for belt edge finishing machine;

b) stop spindle rotation;

c) stop axes movements;

d) disconnect the machine actuators from their energy sources, except workpiece clamping until the intended actuation by the operator.

The control circuit for normal stop shall be at least PL = b in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and functional testing of the machine.

5.2.5 Emergency stop

The machine shall be fitted with an emergency stop control device which complies with the requirements of EN ISO 13850:2008 and additionally with the requirements of EN 60204-1:2006, 10.7. The emergency stop control device shall be at any time of self-latching type.

The emergency-stop function shall comply with the requirements of EN 60204-1:2006, 9.2.5.4.2 and the emergency-stop function shall be of a category 0 or 1 in accordance with the requirements of EN 60204-1:2006, 9.2.2.

When initiated the emergency-stop sequence shall:

a) stop moving machine frame for table edge finishing machine or conveyor belt for belt edge finishing machine;

b) stop spindle rotation;

c) stop axes movements;

d) disconnect the machine actuators from electrical energy source except workpiece clamping until the intended actuation by the operator.

The control circuit for emergency stop shall be at least PL = c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection and relevant functional testing of the machine.

5.2.6 Operational stop

If an operational stop function is provided, for intervention in the machine, or any needs of work process or of the operator, while drive systems remain under control, the following requirements shall apply:

The stop function provided (e.g. cycle stop) shall be at least of category 2 in accordance with the requirements of EN 60204-1:2006, 9.2.2 actuated in conjunction with standstill monitoring, and the control system for standstill monitoring shall be at least PL = c in accordance with the requirements of EN ISO 13849-1:2008.

If the intervention in the machine is allowed, for table edge finishing machine, only with a change of mode of operation, the features of the control circuit shall be as described in 5.2.9.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and functional testing of the machine

5.2.7 Machine setting mode of operation

Machine setting mode of operation when the moveable guards are open and/or protective devices disabled shall only be possible when the following requirements are met:

a) tool rotation shall not be possible;

b) for table edge finishing machine, any movement of the machine frame shall not be possible;

c) for belt edge finishing machine, any movement of the oscillating spindles-holding beam, if fitted, shall not be possible;

d) the maximum speed of the adjusting axis shall not exceed 3 m/min. Any single axis movement shall be controlled by a feed drive. Feed drives shall be PL = c in accordance with the requirements of EN ISO 13849-1:2008. No PL is required if the axis movement is actuated by a mechanical or pneumatic feed drive (e.g. mechanical gearbox, pneumatic cylinder);

e) feed drives shall be located outside the protected zone or inside the protected zone if physically separated from the working area of the tool;

f) automatic restart of the machine shall be prevented in accordance with the requirements of 5.2.3.

As an exception, machine setting, during machining mode of operation (see 5.2.8), when fixed and interlocking moveable guards (see EN ISO 14119:2013, 3.2 and 3.5) and/or protective devices are in place and functional, shall only be possible when the following requirements are met:

g) feed drives shall be physically separated by fixed or interlocking moveable guards from the working area of the tool;

h) the maximum speed of the adjusting axis shall not exceed 3 m/min. Any single axis movement shall be controlled by a feed drive. Feed drives shall be PL = c in accordance with the requirements of EN ISO 13849-1:2008. No PL is required if the axis movement is actuated by a mechanical or pneumatic feed drive (e.g. mechanical gearbox, pneumatic cylinder).

Verification: By checking the relevant drawing and/or circuits diagrams, inspection of the machine and functional testing of the machine.

5.2.8 Machining mode of operation

In machining mode, movement shall only be possible when the interlocking moveable guards (see EN ISO 14119:2013, 3.2 and 3.5) and/or protective devices are in place and functional.

Verification: By checking the relevant drawings and/or circuit diagrams and inspection and functional testing of the machine.

5.2.9 Mode selection switch for table edge finishing machine

If the machine is designed to be operated during setting with the interlocking moveable guards and/or protective devices disabled, a mode selection switch shall be provided to select between the machining and setting modes of operation and the following conditions shall be met:

a) the mode selection switch shall be lockable in each position (e.g. by key or password) and shall be located outside the hazards zone e.g. on the main control panel (see 5.2.2 for location of control devices);

b) the control system for mode selection shall be at least PL = c in accordance with the requirements of EN ISO 13849-1:2008;

c) the mode selection switch shall not allow more than one mode to be active at any one time;

d) the safeguarding requirements given in 5.2.7 and 5.2.8 shall be effective in their respective mode of operation;

e) selecting any of the modes shall not initiate any movement of the machine;

f) it shall not be possible to change from one mode to another mode before the machine has been brought to a complete and safe stop in accordance with 5.2.4.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection and functional testing of the machine.

5.2.10 Failure of any power supply

In case of any supply interruption, the following requirements shall be met:

— the automatic restart of the machine after the restoration of the supply shall be prevented;

— for vertical belt edge finishing machine, the clamping device of the workpiece shall be maintained;

— for table edge finishing machine and horizontal belt edge finishing machine, the clamping device of the workpiece shall be maintained, if the slab width exceeds more than the 20 % of the front edge of the work bench, or the front edge of the extractable supporting bar.

Where non-return valves are used to maintain workpiece clamping, they shall be fitted directly at the actuating cylinders.

For electric supply see EN 60204-1:2006, 7.5, paragraphs 1 and 3.

The requirements of EN 1037:1995+A1:2008, Clause 6, apply.

The safety-related part of the control system to prevent automatic restart shall achieve at least PL = b in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking the relevant drawings, circuit diagrams, inspection of the machine.

5.2.11 Failure of the control circuits

See 5.2.1.

Verification: By checking the relevant drawings, circuit diagrams, inspection of the machine.

5.3 Protection against mechanical hazards

5.3.1 Transport of the machine

For the transport of the machine, appropriate provisions for the easy and safe handling shall be made in accordance with EN ISO 12100:2010, 6.3.5.5.

Verification: By checking relevant drawings and inspection of the machine.

5.3.2 Stability and installation of machine

For the stability and installation of the machine, appropriate provisions shall be made in accordance with EN ISO 12100:2010, 6.2.6 and 6.3.2.6.

Verification: By checking relevant drawings and inspection of the machine.

5.3.3 Risk of break-up during the working process

Risk of break-up of tools and workpieces during the working process shall be prevented or minimized as indicated in 5.3.4, 5.3.5. and 5.3.6.

Risk of break-up of moving parts during the working process shall be minimized by mechanical stops at the ends of their strokes.

Verification: By checking relevant drawings and inspection of the machine.

5.3.4 Fixing of tools

5.3.4.1 General

The tool-fixing device shall be such that the tools do not become loose during start up, working, un-braked run-down time.

For belt edge finishing machine and for table edge finishing machine with more work spindles, the tools shall be fixed with central and self-locking screws with flanges having screw threads, or self-locking worm-lock devices to prevent dismantling from the work spindle.

For table edge finishing machine with single work spindle, the tools shall be fixed with a self-locking cone system. The correct locking shall be monitored by a control system with PL = b in accordance with the requirements of EN ISO 13849-1:2008 or by a tool changing test as described in 5.3.4.3.

Verification: By checking the relevant drawings, inspection of the machine and functional testing of the machine.

5.3.4.2 Manual tool changing

Tool release and dismounting shall only be possible if the spindle is stopped and restart is prevented (see 5.2.3 and 5.2.7).

Verification: By checking the relevant drawings, inspection of the machine and functional testing of the machine.

5.3.4.3 Automatic tool changing for table edge finishing machine

For automatic tool changing, the requirements of 5.2.8 apply.

The control system for tool release and locking function shall be of PL = b in accordance with the requirements of EN ISO 13849-1:2008 if there is an additional mechanical system which prevents releasing the tool during rotation (e.g. by centrifugal force).

As an exception, no PL is required if a tool changing test is performed with the following conditions:

a) the test shall be performed after each tool change;

b) the test shall be performed in a safe zone, closed apart by fixed guards, as defined in EN 953:1997+A1:2009;

c) the test shall be performed at the maximum possible speed;

d) the duration of the test shall be at least 10 s.

Verification: By checking the relevant drawings, inspection of the machine and functional testing of the machine.

5.3.5 Table edge finishing machine - Prevention of access to moving parts and devices to minimize the effect of ejected parts of tools or workpieces

5.3.5.1 Guarding of moving and transmission parts

Access to transmission parts like spindles, gear-wheels, shafts, joints, elastic elements, belts and other moving parts (except tools, oscillating spindles-holding beam, conveyor belt, pressure bar and rolls) shall be prevented either by fixed guards or interlocking movable guards in accordance with the requirements of EN ISO 14119:2013.

Guards shall be according to EN 953:1997+A1:2009.

Where frequent access to the moving and transmission parts is provided for maintenance or adjustment purposes, i.e. more than once per day, access shall be via an interlocking movable guard.

The control circuit for interlocking shall be at least PL = c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and functional testing of the machine.

5.3.5.2 Guarding of tools and moving machine frame

Access to the tools and moving machine frame, for setting, tool changing, cleaning, shall be prevented by peripheral enclosure (see 3.26) except for loading and unloading workpiece area. The control circuit for interlocking with guard locking shall be at least PL = c in accordance with the requirements of EN ISO 13849-1:2008.

An adjustable guard restricting access shall prevent hazards due to access to rotating parts or ejection of part of the tool or workpiece to the loading and unloading workpiece area. The control circuit for interlocking shall be at least PL = c in accordance with the requirements of EN ISO 13849-1:2008.

NOTE E.g. an adjustable guard restricting access may be a liftgate above the work table.

For table edge finishing machine with single spindle, the access to tools and the moving machine frame from the rear side shall be prevented by:

a) fixed or moveable interlocking guards. The control circuit for interlocking shall be at least PL = c in accordance with the requirements of EN ISO 13849-1:2008. Guards shall be according EN 953:1997+A1:2009;

b) light beams with the following requirements:

1) any electronic light beams shall be of at least Type 2 in accordance with EN 61496-1:2013 and its associated safety-related control systems shall be at least PL = c in accordance with EN ISO 13849-1:2008;

2) light beams shall consist of at least two opto-electronic elements; the lower elements shall be situated at a height of 400 mm, 900 mm above the floor level;

3) the light barriers shall be positioned at minimum of 500 mm from the rearmost point of moving machine frame;

4) the reset control device shall be outside the protected zone and not reachable from inside this zone. The operator shall have a good view on the protected zone;

5) accessible supporting parts shall be designed and situated in a way that they do not cause injury or create a tripping hazard;

6) the tool shall be protected with a fixed guard to prevent hazard of ejection of part of the tool or workpiece.

Verification: By checking the relevant drawings and/or circuit diagrams, measurements, inspection of the machine and functional testing of the machine.

5.3.5.3 Clamping device

The control circuit for workpiece powered clamping shall be at least PL = b in accordance with the requirements of EN ISO 13849-1:2008.

When the machine is provided of hydraulic or pneumatic clamping device shall be met the requirements of EN ISO 4413:2010 or EN ISO 4414:2010.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and functional testing of the machine.

5.3.6 Belt edge finishing machine - Prevention of access to moving parts and devices to minimize the effect of ejected parts of tools or workpieces

5.3.6.1 Guarding of moving and transmission parts

Access to transmission parts like spindles, gear-wheels, shafts, joints, elastic elements, belts and other moving parts (except tools, oscillating spindles-holding beam, conveyor belt, pressure bar and rolls) shall be prevented either by fixed guards or interlocking movable guards in accordance with the requirements of EN ISO 14119:2013.

Guards shall be according EN 953:1997+A1:2009.

Where frequent access to the moving and transmission parts is provided for maintenance or adjustment purposes i.e. more than once per day, access shall be via an interlocking movable guard. The control circuit for interlocking shall be at least PL = c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and functional testing of the machine.

5.3.6.2 Guarding of tools

Access to the tools for setting, tool changing, cleaning shall be prevented by enclosure consisting of interlocking moveable guards in accordance with the requirements of EN ISO 14119:2013.

Guards shall be according EN 953:1997+A1:2009.

The enclosure shall prevent hazards due to access to rotating parts or ejection of part of the tool or workpiece.

The guards shall be closed apart from the effective working area of the tool to prevent any hazard caused by ejection of material or workpiece; the tool covers shall prevent spurting of the cooling lubricant.

The enclosure shall completely enclose the hazard zone around the tools except for the working area where the hazards are minimized by the workpiece and pressure rolls.

If the distance between the lower part of the pressure rolls and the conveyor belt is more than 110 mm, the rotation of tools shall be stopped to minimize hazards due to access to tools from front side. The control circuit for interlocking shall be at least PL = c in accordance with the requirements of EN ISO 13849-1:2008.

Verification: By checking the relevant drawings and/or circuit diagrams, measurements, inspection of the machine and functional testing of the machine.

5.3.6.3 Guarding of oscillating spindles-holding beam

For horizontal belt edge finishing machine with oscillation range of 180° (see Figure 12 (A)), access to the oscillating spindles-holding beam from the rear side shall be prevented by interlocking moveable guards with guard locking in accordance with the requirements of EN ISO 14119:2013.

Access to the hazard zone shall be possible if the following conditions shall be met:

a) Normal stop of the oscillating spindles-holding beam to the rest position (point “P” in Figure 12 (A));

b) Verification of the achievement of the rest position by the control system;

c) Unlocking of guard locking by intended actuation.

Guard locking shall be spring applied/power released in accordance with EN ISO 14119:2013, Annex F.

A guard locking reset shall be provided outside the enclosure, in a position not reachable from inside the enclosure with a clear view of the inside of it. The control circuit for interlocking with guard locking shall be at least PL = d in accordance with the requirements of EN ISO 13849-1:2008.

For horizontal belt edge finishing machine, with maximum oscillation range of 5° to 10° (see Figure 12 (B)), access to the oscillating spindles-holding beam from the rear side shall be prevented by interlocking moveable guards in accordance with the requirements of EN ISO 14119:2013. The control circuit for interlocking shall be at least PL = c in accordance with the requirements of EN ISO 13849-1:2008.

For vertical belt edge finishing machines with any oscillation range (see Figures 13 (A) and 13 (B)), access to the oscillating spindles-holding beam from the rear side shall be prevented by interlocking moveable guards in accordance with the requirements of EN ISO 14119:2013. The control circuit for interlocking shall be at least PL = c in accordance with the requirements of EN ISO 13849-1:2008.

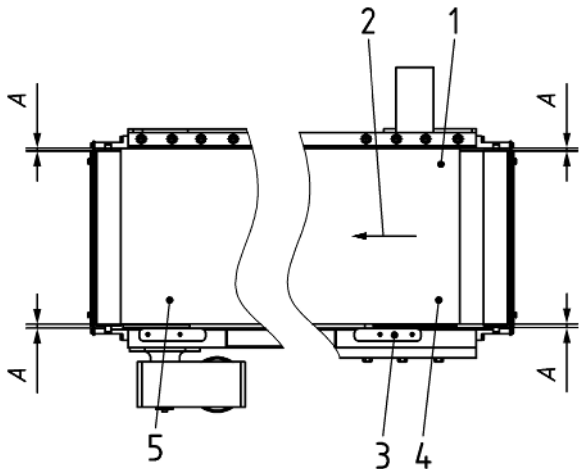
For horizontal belt edge finishing machine, access to the oscillating spindles-holding beam from the upper side of machine shall be prevented by fixed guards.

Guards shall be according EN 953:1997+A1:2009.

Verification: By checking the relevant drawings and/or circuit diagrams, measurements, inspection of the machine, instruction handbook and functional testing of the machine.

5.3.6.4 Conveyor belt

To minimize hazards due to intrusion of hands and entanglement of work clothes, the distance between the conveyor belt and the fixed guards over winding and unwinding points, “A” in Figure 14, shall be no more than 3 mm.



Key

1	conveyor belt	2	running direction	3	fixed guard
4	unwinding point	5	winding point		

Figure 15 — Safety distance between conveyor belt and fixed guards over winding and unwinding points

Verification: By checking the relevant drawings, measures and inspection of the machine.

5.3.6.5 Pressure bar and rolls

The control circuit for workpiece powered clamping, if the actuation system is not manual, shall be at least PL = b in accordance with the requirements of EN ISO 13849-1:2008.

When the machine is provided of hydraulic or pneumatic clamping device shall be met the requirements of standard EN ISO 4413:2010 or EN ISO 4414:2010.

To minimize the risk of crushing of parts of human body, the maximum speed of the pressure bar or rolls shall not be more than 300 mm/min.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and functional testing of the machine

5.3.7 Requirements for guard materials

Guards shall be manufactured from one or a combination of the following materials having at least the properties shown:

a) steel with an ultimate tensile strength of at least 350 N/mm^2 and a wall thickness of at least 1,5 mm;

b) light alloy with characteristics in accordance with the requirements of Table 2;

Table 2 — Light alloy guard thickness and tensile strength

Minimum ultimate tensile strength N/mm^2	Minimum wall thickness mm
180	5
240	4
300	3

c) polycarbonate of at least 3 mm thickness or other plastic material having an impact strength equal to or better than that of polycarbonate of 3 mm thickness.

Verification: By checking the relevant drawings, measurements, inspection of the machine.

5.4 Protections against no mechanical hazards

5.4.1 Fire

To minimize the risk from fire, the requirements of 5.4.3 shall be fulfilled.

Verification: By checking the relevant drawings, inspection of the machine and relevant functional testing of the machine.

5.4.2 Noise

5.4.2.1 Noise reduction at the design stage

When designing machinery, the information and technical measures to control noise at source given in EN ISO 11688-1:2009 shall be taken into account.

The main noise sources are:

a) tools;

b) tool spindles drives;

c) axes drives;

d) pneumatic system (if provided);

e) hydraulic system (if provided);

f) vacuum clamping system.

NOTE Also the information given in EN ISO 11688-2:2000 can be taken into account.

Verification: By checking the relevant drawings.

5.4.2.2 Noise emission measurement

A standardized noise test code is required for the determination, declaration and verification of noise emission values of the machines covered by present standard.

The noise test code specifies the noise measurement methods and operating and mounting conditions for the test, as described in Annex A.

Verification: By checking test reports.

5.4.3 Electrical hazards

With the exception of 6.3, the requirements of EN 60204-1:2006 apply unless stated otherwise in this document.

See EN 60204-1:2006, 6.2, for the requirements regarding prevention of electric shock due to direct contact, and EN 60204-1:2006, Clause 7, for the requirements regarding protection against short circuits (feeder circuit excluded) and overloading.

The protection against electric shock due to indirect contact shall be ensured by the user, e.g. by automatic isolation of the electrical power supply of the machine by the operation of a protective device installed in the line powering the machine (see the information provided by the manufacturer in the instruction handbook, 6.3.2 s)).

The protection against short circuits of the feeder circuit shall be ensured by the user (see the information provided by the manufacturer in the instruction handbook, 6.3.2 t)).

The degree of protection of all electric components outside of enclosure(s) and the enclosure(s) for electrical components itself/themselves shall be at least IP 54 in accordance with the requirements of EN 60529:1991.

Electrical enclosures shall not be exposed to risk from the ejection of tools or workpieces. Live parts shall not be accessible in accordance with EN 60204-1:2006, 6.2.2. Fire risk is not present where power circuits are protected against over current in accordance with EN 60204-1:2006, 7.2.3.

In accordance with EN 60204-1:2006, 18.2, the test 1 for the continuity of the protective bonding circuit and with EN 60204-1:2006, 18.6, the functional test apply.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and relevant tests (EN 60204-1:2006, 18.2, test 1 and functional test according to EN 60204-1:2006, 18.6).

5.4.4 Ergonomics and handling

For the transport of the machine, appropriate provisions for the easy and safe handling shall be made in accordance with EN ISO 12100:2010, 6.3.5.5.

Machine parts which cannot be moved or transported by hand shall be provided or be capable of being provided with suitable attachment devices for transport by means of lifting gear.

Parts of the machine weighing more than 25 kg and that need to be replaced/removed shall be equipped with means for safe handling or enable safe lifting, such as attachments to accommodate the fitting of a lifting device in accordance with EN 1005-2:2003+A1:2008. These attachments shall be positioned such as to avoid machine or components overturn or fall or move in an uncontrolled way during transport, assembly, dismantling, disabling and scrapping.

The machine and its controls shall be designed according to ergonomic principles in accordance with EN 1005-4:2005+A1:2008.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine.

5.4.5 Lighting

Where necessary on the machine, work stations and the zones in which control devices, guards and protective devices are located shall be lit sufficiently to ensure that all work equipment and materials can be properly seen, and that eye strain is also avoided in accordance with EN 1837:1999+A1:2009.

Where lighting is required as determined by reference to EN 1837:1999+A1:2009, it shall be provided in accordance with EN 60204-1:2006, 15.2.

Verification: By checking the relevant drawings and/or circuit diagrams and inspection of the machine.

5.4.6 Hydraulic and pneumatic components

The hydraulic and pneumatic systems shall comply with the requirements EN ISO 4413:2010 and EN ISO 4414:2010.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and functional testing of the machine.

5.4.7 Electromagnetic compatibility

The machine shall have low electromagnetic emission level and sufficient immunity to electromagnetic disturbances to enable it to operate correctly in accordance with EN 61439-1:2011, EN 50370-1:2005 and EN 50370-2:2003.

NOTE Machines which incorporate CE-marked electrical components and where such components and cabling are installed in accordance with their respective manufacturer's instructions are generally considered to be protected against external electromagnetic interference.

If only one of above mentioned requirements is not fulfilled, additional testing in accordance with EN 50370-1:2005 and EN 50370-2:2003 is required.

Verification: By checking the relevant drawings and/or circuit diagrams and inspection of the machine.

5.4.8 Isolation

The principles of EN ISO 12100:2010, 6.2.10 and 6.3.5.4 shall be observed and in addition:

Electrical isolators shall be in accordance with EN 60204-1:2006, 5.3, except that the isolator shall not be type d) in EN 60204-1:2006, 5.3.2.

Pneumatic isolation shall be possible at least through a quick action coupling according EN ISO 4414:2010, 5.4.5.8, which makes it possible to close the air supply.

The machine shall have means to isolate hydraulic power (if provided) according to EN ISO 4413:2010.

Where the machine has a hydraulic system that is powered by an integral electrically operated hydraulic pump, isolation of the hydraulic power is allowed by disconnecting the electrical supply. Where hydraulic energy is stored, e.g. in a reservoir or pipe, safe means for dumping of residual pressure shall be provided. Safe means can include valves but shall not include disconnection of any pipe.

The electric isolator shall have its function, location and operational position clearly identified, e.g. by a label or a pictogram. The label or pictogram shall be fitted in a position clearly visible in close proximity to the isolator on the machine (also see 6.2).

Verification: By checking the relevant drawings and/or circuit diagrams, inspection and functional testing of the machine.

5.4.9 Maintenance

The principles of EN ISO 12100:2010, 6.2.15 shall be observed.

Verification: By checking the relevant drawings, handbook, inspection of the machine and functional testing on the machine.

5.4.10 Materials and substances

The machine shall have means or systems to prevent hazardous situations due to dust emission during the working process.

If water is also used for the suppression of dust emission caused by the process, appropriate harvesting systems shall be provided to capture the water to avoid the risk of slipping on slippery surfaces.

NOTE Water is used as cooling lubricant.

Harvesting systems shall drain the water outside working and maintenance areas.

Verification: By checking the relevant drawings and/or circuit diagrams, inspection of the machine and functional testing of the machine.

6 Information for use

6.1 Signals and warning devices

If the machine is equipped with a pneumatic supply, a permanent warning label shall be placed in proximity to the electrical supply disconnection device, warning that the pneumatic supply is not isolated by isolation of the electrical supply.

A visual warning device to indicate the slab coming out shall be placed on the machine.

Safety signs in accordance with EN ISO 7010:2012 about residual risks due to electrical hazard and crushing hands hazard shall be placed on the machine.

The warnings shall either be in the language of the country in which the machine is to be used or wherever possible by using safety signs.

Verification: By checking the relevant drawings and inspection of the machine.

6.2 Marking

Following minimum markings shall be permanently marked on the machine:

a) the business name and full address of the manufacturer and, where applicable, his authorized representative;

b) designation of the machinery;

c) mandatory required marking;

d) year of manufacturing, that is the year in which the manufacturing process is completed;

e) declaration of the series or type;

f) machine serial number if existing;

g) power designation, e.g. compulsory for electrical products: voltage, frequency, power;

h) the marking of their mass on machine parts that have to be handled frequently with mechanical means.

Verification: By checking the relevant drawings, inspection of the machine.

6.3 Instruction handbook

6.3.1 General

An instruction handbook shall be drawn up in accordance with EN ISO 12100:2010, 6.4.5.

It shall contain the following specific information:

6.3.2 Operator's manual

At least the following user information shall be included:

a) the business name and full address of the manufacturer and of his authorized representative;

b) repetition of the markings, safety signs and other instructions on the machine as described in 6.1 and 6.2;

c) intended use of the machine;

d) foreseeable misuse;

e) the maximum and minimum length, width and thickness of the workpiece;

f) information on the existing residual risks, raised from the risk analysis and application of this document;

g) the principles of machine operation, correct use and adjustment of the jigs and guards;

h) the correct selection of tools for each operation;

i) the correct procedures for manual mounting and fixing of tools;

j) recommendation on care to be taken when handling tools and on use of tool carriers wherever practicable;

k) indication that no tool shall be used whose maximum rotational speed is lower than the selected speed;

l) the instruction for the selection of spindle speed taking into account the tool being used in order that the maximum permissible speed of the tool is not exceeded;

m) the instruction for the selection of conveyor belt or moving machine frame or oscillating spindles-holding beam speed;

n) instruction on those devices which shall be verified, how frequently the verification shall be carried out and by what method. This shall include at least the following:

   1) emergency stop(s) - by functional testing;

   2) interlocking moveable guards - by opening each guard in turn to stop the machine and by proving the inability to start the machine with each guard in the open position;

3) interlocking moveable guards with guard locking - by proving an inability to open the guard as long the tool is rotating;

4) curtains maintenance - by check of absence of damage (at least each month);

5) vacuum clamping - by functional testing;

6) light beams - by functional testing;

o) indication that the given rotating direction of tool shall be checked;

p) indication that every contact with the rotating tool shall be avoided;

q) information on the operator's controls;

r) information about the safety measures for interventions including disconnection of the energy supply or supplies, measures against reconnection, neutralization of residual energies, testing of safe state; if for frequent interventions such complete disconnection is not possible, the manufacturer shall indicate appropriate procedures for carrying out safely the intervention;

s) information on how to provide protection against electric shock due to indirect contact in the machine by a device for automatic disconnection of the power supply to be installed by the user in the line powering the machine (RCD);

t) information on how to provide protection against short circuits of the feeder circuit;

u) indication on suitable clothing and personal protection equipment (e.g. eye and hearing protection);

v) indication that the correct mounting of guards shall be checked;

w) 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;

x) indication that for safety reasons, every damaged (broken) tool shall be replaced;

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

z) indication that for machines equipped with hydrostatic tool fixing facilities, in case of leakage in the hydrostatic system, only tool-fixing devices with additional mechanical device shall be used to protect against loosening of the tool;

aa) information on installation, indicating:

1) machine overall dimensions and weight;

2) work space;

3) the mounting unit on the ground and the vertical force at supporting foot or machine anchoring points;

4) the positioning of the machine for ensuring minimum distances between moving parts of the machine (e.g. moving frame) and fixed or moving parts in the proximity of the machine in accordance with EN 349:1993+A1:2008;

5) the fixing of the machine and/or the rails;

6) that the user shall consider the compatibility with the additional upstream and downstream conveying elements and possible hazards if such elements are not used;

7) indications of the position and the connection of the power supply;

8) indications of the position and the connection of water supply;

9) indications of the position and the connection of pneumatic supply;

bb) the instruction for setting the machine. This includes the precautions during setting as:

1) a warning that before setting the machine, it is necessary to ensure that the tools used are sharpened, selected, maintained and adjusted in accordance with the tool manufacturer's instructions, to use special equipment for setting (e.g. gauges) where practicable and to take care when handling tools;

2) that during setting it shall be verified that no contact exists between non-rotating tools and any workpiece clamping device or machine element;

3) the instructions for clamping device setting and use;

4) information regarding the required clamping pressure (e.g. vacuum and minimum clamping surfaces of the workpiece if the machine is fitted with vacuum clamping);

cc) a declaration regarding airborne noise emissions from the machinery, shall be in accordance with A.6 of Annex A - “Declaration and verification of noise emission values”;

dd) the instructions to minimize noise levels including:

1) the condition of the tools;

2) the guards positioning so as to reduce noise levels;

3) the choice of the tooling speed to reduce the noise levels;

ee) the operating method to be followed in the event of accident or breakdown; if a blockage is likely to occur, the operating method to be followed so as to enable the equipment to be safely unblocked;

ff) information about the personal protective equipment to wear for using the machine.

Verification: By checking the instruction handbook and the relevant drawings.

6.3.3 Maintenance manual

At least the following user information shall be included:

a) information on the existing residual risks raised from the risk analysis and application of this document;

b) indication that every contact with the rotating tool shall be avoided;

c) information about the safety measures for interventions including disconnection of the energy supply or supplies, measures against reconnection, neutralization of residual energies, testing of safe state; if for frequent interventions, such complete disconnection is not possible, the manufacturer shall indicate appropriate procedures for carrying out safely the intervention;

d) list of tasks (e.g. adjustment, maintenance, lubrication, cleaning and service activities) that have to be carried out only, when the machine is down and the machine actuator is off;

e) details and frequency of inspections;

f) instruction of maintenance activities which can be carried out by the operator (including indications on safe appliances and facilities to be used);

g) list of maintenance activities which shall only be carried out by qualified maintenance personnel - as they require special technical knowledge - including indications on safe appliances and facilities to be used;

h) information on how to perform maintenance and that whenever possible maintenance shall be only done if the machine is isolated from all energy sources and involuntary restart is prevented;

i) information about safe cleaning;

j) if fitted with a pneumatic and/or hydraulic system, the method for the safe dissipation of residual energy (see 5.4.8);

k) the identification data of the spare parts to be changed by the user, when these affect the health and safety of operators (parts to be changed only by the manufacturer or personnel charged by the manufacturer are excluded);

l) description of fixed guards which have to be removed by the user for maintenance and cleaning purposes (guards to be dismounted only by the manufacturer or personnel charged by the manufacturer are excluded);

m) information that process water shall be filtered and checked regularly to avoid the presence of pollutants that can be dangerous to the operator;

n) information about the safety equipment to wear for maintenance of machine.

Verification: By checking the maintenance manual and the relevant drawings.

Annex A
(normative)

Noise emission measurement

A.1 Introduction

This noise test code specifies all the information necessary to carry out efficiently and under standardized conditions the determination, declaration and verification of the airborne noise emission values of edge finishing machines.

The determination of these quantities is necessary for:

— manufacturers to declare the noise emitted;

— comparing the noise emitted by machines in the family concerned;

— purposes of noise control at source at the design stage.

This noise test code specifies the noise measurement methods and operating and mounting conditions for the test.

The use of this noise test code ensures the reproducibility of the measurements and the comparability of the airborne noise emission values within specified limits determined by the grade of accuracy of the basic measurement method used.

A.2 Measurement of the A-weighted emission sound pressure level at the operator positions or other specified positions

A.2.1 Basic standards

The determination of the A-weighted emission sound pressure level shall be carried out using a method with an accuracy grade of 2 (engineering) or 3 (survey). One of the following standards shall be applied: EN ISO 11201:2010 or EN ISO 11202:2010 or EN ISO 11203:2009 or EN ISO 11204:2010.

NOTE Grade 2 of accuracy can be reached only with class 1 measuring instruments. Class 2 instruments are allowed when using EN ISO 11202:2010, but grade 3 of accuracy results are obtained with, consequently, a higher uncertainty.

A.2.2 Measurement procedure and positions

If the emission sound pressure level at the workstation shall be measured according to EN ISO 11202:2010, the following modifications shall be applied:

a) the environmental indicator K2A and local environmental factor K3A shall be equal to or less than 4 dB;

b) the difference between the background emission sound pressure level and the workstation sound pressure level shall be equal to or greater than 6 dB according to EN ISO 11202:2010, 6.4.1, accuracy grade 2 (engineering);

c) the correction of the local environmental factor K3A shall be calculated in accordance with EN ISO 11204:2010, A.2, with the reference restricted to EN ISO 3746:2010 instead of the method given

in EN ISO 11202:2010, Annex A, or in accordance with EN ISO 3743-1:2010, EN ISO 3743-2:2009, EN ISO 3744:2010 or EN ISO 3745:2012 where one of these standards has been used as the measuring method.

Alternatively, where the facilities exist and the measurement method applies to the machine type, emission sound pressure levels may also be measured according to a method with higher precision, i.e. EN ISO 11201:2010 or EN ISO 11204:2010 without the preceding modifications.

Depending on which grade of measurement is used for the determination of the sound power level (engineering, survey, etc.), the corresponding grade of measurement shall be used to determine the sound pressure level at the operator's position, i.e. for EN ISO 3746:2010 (survey grade) of sound power, use EN ISO 11202:2010 for sound pressure. For EN ISO 3744:2010 (engineering grade) of sound power, use EN ISO 11201:2010 for sound pressure.

Measurements shall be carried out at each microphone position during at least one test cycle of the machine as defined in A.4.

The microphone shall be located at all operator positions designated by the manufacturer in the instruction handbook. The A-weighted emission sound pressure level at each of these operator positions shall be recorded, reported and declared together with the associated measurement uncertainty.

The microphone used to measure the emitted noise at the position of the operator (see Figure A.1) shall be situated as follows:

— 1,6 m above floor level or platform, and

— 0,5 m from the nearest point of the machine.

A.2.3 Measurement uncertainty

If a grade 2 (engineering) method is used, the standard-deviation of reproducibility for A-weighted emission sound pressure levels at workstations is:

σ_{RA} = 1,5 dB, resulting in a measurement uncertainty of 3 dB if operating conditions of the machine are stable, which is normally the case for the machines covered by this European Standard.

If the emission sound pressure level at the workstation is measured according to EN ISO 11202:2010, uncertainty K, using the dual-number form of declaration in accordance with EN ISO 4871:2009, shall be of 4 dB.

NOTE Detailed information about uncertainty is given in EN ISO 11201:2010, Clause 11, EN ISO 11202:2010, Clause 12, and EN ISO 11204:2010, Clause 11. See also EN ISO 4871:2009.

A.3 Determination of sound power level

A.3.1 Measurement procedure and positions

Emission sound power level shall be measured in accordance with the enveloping surface measuring method ISO 3746:2010 with the following modifications:

a) the environmental indicator K2A shall be equal to or less than 4 dB;

b) the difference between the background sound pressure level and the machine sound pressure level at each measuring point shall be equal to or greater than 6 dB. The correction formula for this difference is given in EN ISO 3746:2010, 8.3.3, Formula (12);

c) only the parallelepiped measurement surface shall be used at 1 m from the reference surface;

d) where the distance from the machine to an auxiliary unit is less than 2 m, the auxiliary unit shall be included in the reference surface;

e) the accuracy of the test method shall be better than 3 dB;

f) the number of microphone positions shall be 9 as described in Figure A.1.

Alternatively, where the facilities exist and the measurement method applies to the machine type, emission sound power levels may also be measured according to a method with higher precision i.e. EN ISO 3743-1:2010, EN ISO 3743-2:2009, EN ISO 3744:2010 and EN ISO 3745:2012 without the preceding modifications.

If the A-weighted emission sound pressure level at any of the measurement positions considered in A.2 exceeds 80 dB, the A-weighted sound power level should normally be determined. However, machines covered by the present standard that have at least a largest dimension (L1 or L2 or L3 in Figure A.2) that exceeds 7 m are considered as very large machines. Therefore, instead of the A-weighted sound power level, the A-weighted emission sound pressure levels at positions located on a path at 1 m from the enveloping surface of the machine and at a height of 1,60 m from the floor shall be detected with reference to EN ISO 11200- series. Microphone positions on the path shall be separated by not more than 2 m (see Figure A.2) and measurements shall be carried out as specified in A.2. Values shall be recorded, reported and declared together with the associated measurement uncertainty. These specified positions are identical to those used for machines with no workstation designated by the manufacturer (see A.2.2).

A.3.2 Measurement uncertainty

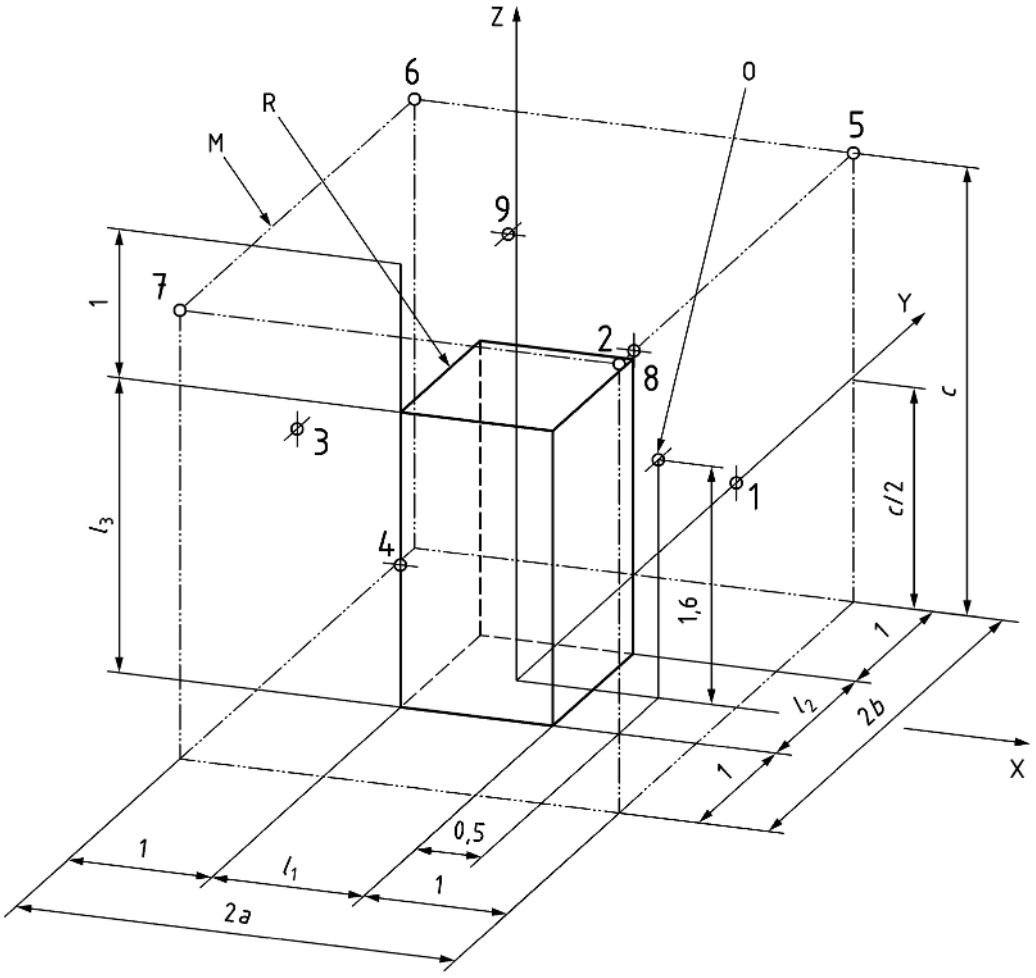
Uncertainty K, using the dual-number form of declaration in accordance with EN ISO 4871:2009, shall be as follows:

— 4dB when using EN ISO 3746:2010;

— 2dB when using EN ISO 3743-1:2010, EN ISO 3743-2:2009 or EN ISO 3744:2010;

— 1dB when using EN ISO 3745:2012.

Dimensions in metres



Key

M measurement surface

R reference box

0 operator position microphone location (sound pressure level measurement)

1–9 measuring microphone positions

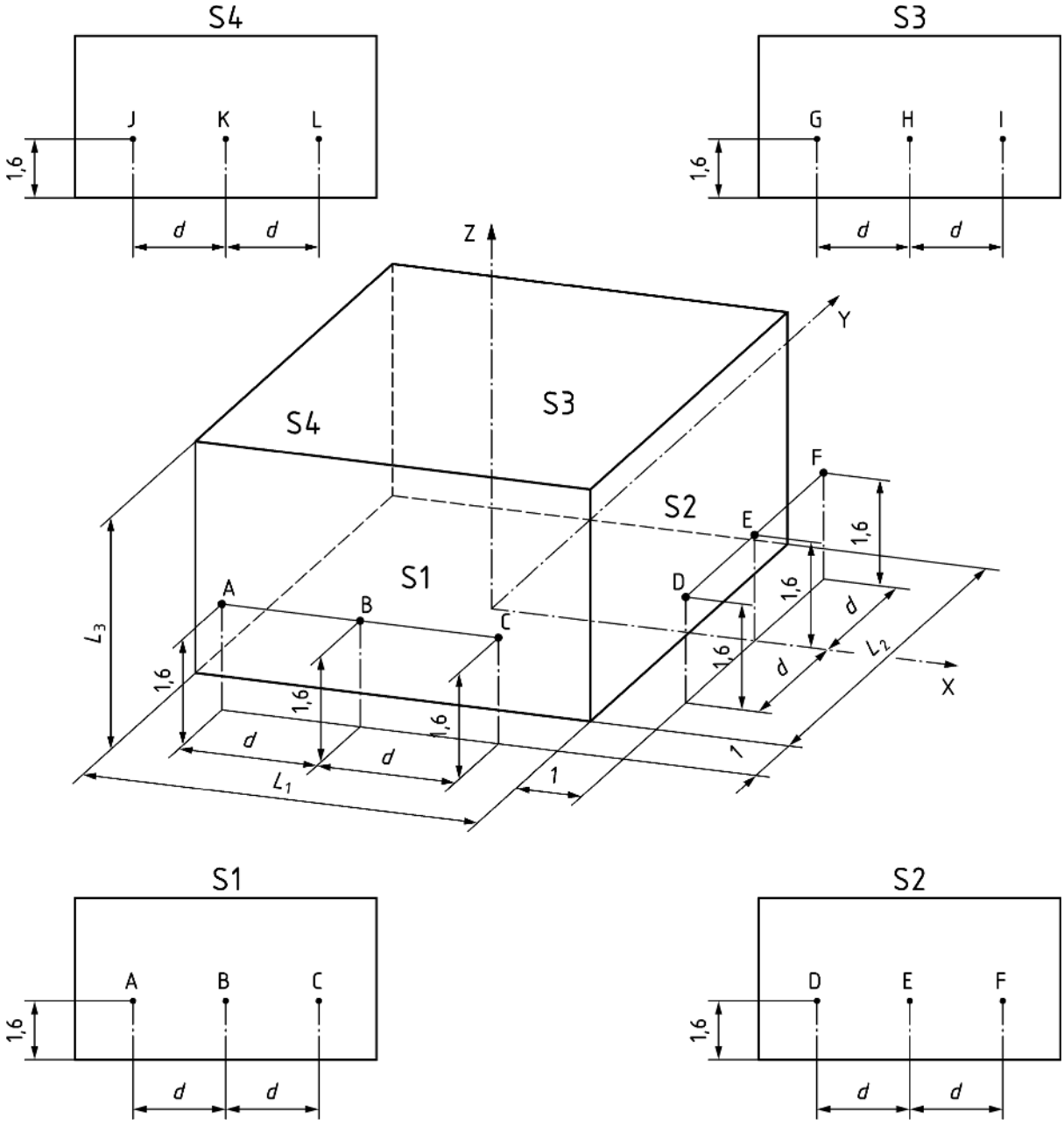
l_1 length of the reference box

l_2 width of the reference box

l_3 height of the reference box

Figure A.1 — Measurement surface and microphone positions

Dimensions in metres



Key

A-L measuring microphone positions

L 1 length of the enveloping surface

L 2 width of the enveloping surface

L 3 height of the enveloping surface

d distance between two adjacent microphones (no more than 2 m)

Figure A.2 — Example of microphone positions when the A-weighted emission sound pressure level at the operator position exceeds 80 dB and at least a dimension (L1 or L2 or L3) exceeds 7 m

A.4 Installation, mounting and operating conditions for noise emission measurement

During the noise test, the machine shall be installed, mounted and operated as specified/recommended by the manufacturer in the instruction handbook.

Installation, mounting and operating conditions of the machine shall be identical for the determination of emission sound pressure levels at the work station and sound power levels.

For the noise tests, the following requirements shall be fulfilled:

a) all integrated auxiliary units, relevant noise sources in the normal cycle and for the measurement, e.g. power feed polishing heads, pneumatic clamping, hydraulic power plant, shall be in function during testing;

b) all relevant guards, safety devices, integral sound enclosures, etc. shall be in position during testing;

c) in accordance with the dimensional requirements of the machine manufacturer, conventional tools normally available on the market shall be used;

d) tools shall be properly installed according to the instructions of their manufacturer;

e) the processed material shall be one of the following types of granite: Porrino pink, Sardinian pink, Sardinian white;

f) slab dimensions, tools characteristics, cutting data and testing operation shall be in accordance with Table A.1.

A.5 Information to be recorded and reported

The information to be recorded and reported shall include all the data required by the basic measurement standard(s) used, i.e. precise identification of the machine under test, acoustic environment, instrumentation, presence and position(s) of the operator(s) if any.

The operating conditions of the machine during measurement and the method that has been used for the measurement shall be indicated by reference to this noise test code with indication of possible deviations with justification of them.

At least the data specified in Table A.1 shall be recorded and reported. If in a specific situation it is necessary to deviate from them, the actual condition applied for the test shall be recorded and reported in the column “Conditions chosen within permitted range or conditions deviating from standard” of Table A.1.

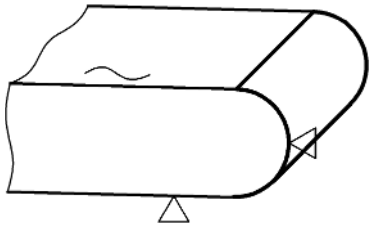
The form in Table A.1 may be copied, modified and distributed free of charge.

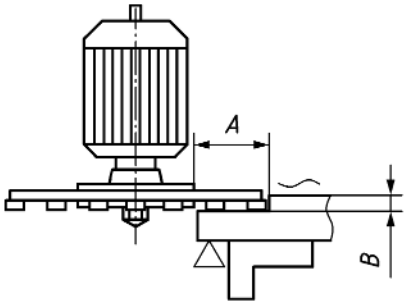
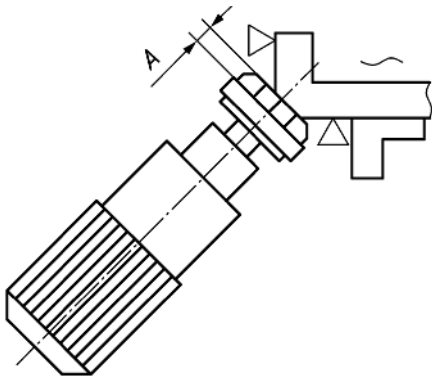
Table A.1 — Noise test code - General Data Sheet

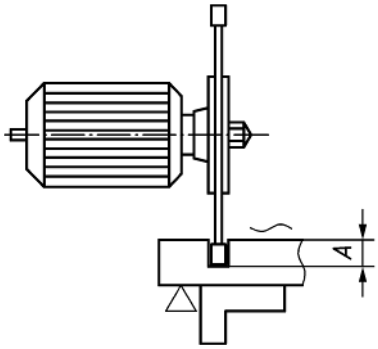
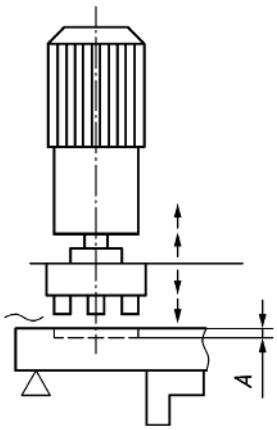
Machine data	Manufacturer: …… Model: …….. Year of manufacture: …… Serial n°:…….. Overall dimensions of machine [a] Length l_1:……mm Width l_2:……mm Height l_3:……mm

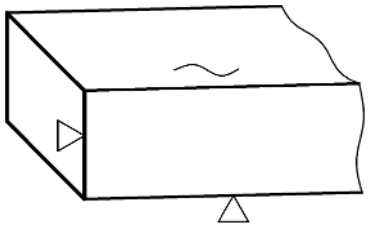
[a] Those elements which protrude from the machine and which are not likely to contribute to the noise emission (e.g. hand-wheels, levers) may be disregarded.

			Remarks/description
Machine installation			
	Machine installed according to manufacturer's recommendations	yes	☐……
		no	☐……
	Machine set up in a separate noise enclosure	yes	☐……..
		no	☐……..
	Machine equipped with peripheral noise enclosure	yes	☐……..
		no	☐……
	Other noise control measures	yes	☐……
		no	☐……..

Testing operating arrangement	Standard conditions	Conditions chosen within permitted range or conditions deviating from standard
☐ **Test 1:** **Machine:** belt edge finishing machine with **oscillating** spindles-holding beam Indicate the type of belt edge finishing machine: ☐ **Horizontal** ☐ **Vertical** **Processing:** Torus edge with: Calibrating tool; Diamond wheel for chamfering; Grinding, polishing and diamond tools for torus edge; Dripstone tool; Bush-hammering tool.  **Figure A.3 — Example of Torus edge** **Testing material:** **Workpiece:** granite slabs **Dimensions of each slab:** Minimum slab length: 1 000 mm Minimum slab thickness: 30 mm **Machine data:** Number of simultaneous machining tools: 100 % Continuous processing, machine under full load Belt conveyor speed rate: 20 m/h Number of oscillations of beam: at least 14/min		

Testing operating arrangement	Standard conditions	Conditions chosen within permitted range or conditions deviating from standard
Tools data Calibrating tool;  **Key** A Calibrating depth B Calibrating height **Figure A.4 — Example of calibrating tool** Spindle speed 1 400 r/min [*] Calibrating tool diameter 250 mm [*] Calibrating height at least 2 mm Calibrating depth at least 30 mm Diamond wheel for chamfering;  **Key** A Chamfering width **Figure A.5 — Example of chamfering tool** Chamfering speed 2 800 r/min [*] Chamfering tool diameter 130 mm [*] Chamfering width at least 10 mm		

Testing operating arrangement	Standard conditions	Conditions chosen within permitted range or conditions deviating from standard
☐ Grinding, polishing and diamond tools for torus edge; chosen value by the manufacturer to obtain the torus edge: Dripstone tool;  **Key** A Dripstone depth **Figure A.6 — Example of dripstone tool** Spindle speed 1 400 r/min [*] Dripstone tool diameter 250 mm [*] Dripstone depth at least 5 mm Bush-hammering tool;  **Key** A Bush-hammering depth **Figure A.7 — Example of bush-hammering tool** Spindle speed 1 400 r/min [*] Bush-hammering tool diameter at least 90 mm [*] Bush-hammering depth at least 1 mm [*] or the chosen value by the manufacturer		

Testing operating arrangement	Standard conditions	Conditions chosen within permitted range or conditions deviating from standard
☐ **Test 2:** **Machine:** belt edge finishing machine with **fixed** spindles-holding beam Indicate the type of belt edge finishing machine: ☐ **Horizontal** ☐ **Vertical** **Processing:** Polishing flat edge with: Dripstone tool; Grinding, polishing and diamond tools for polishing flat edge; Diamond wheel for chamfering.  **Figure A.8 — Example of polishing flat edge** **Testing material:** **Workpiece:** granite slabs **Dimensions of each slab:** Minimum slab length: 1 000 mm Minimum slab thickness: 30 mm **Machine data:** Number of simultaneous machining tools: 100 % Continuous processing, machine under full load Belt conveyor speed rate: 35 m/h		

Testing operating arrangement		Standard conditions	Conditions chosen within permitted range or conditions deviating from standard
Tools data			
Dripstone tool (see Figure A.6);			
Spindle speed	1 400 r/min [*]		
Dripstone tool diameter	250 mm [*]		
Dripstone depth	at least 5 mm		
Grinding, polishing and diamond tools for polishing flat edge;			
chosen value by the manufacturer to obtain the polishing flat edge:			
Diamond wheel for chamfering (see Figure A.5);			
Chamfering speed	1 400 r/min [*]		
Chamfering tool diameter	130 mm [*]		
Chamfering width	at least 3 mm		
[*] or the chosen value by the manufacturer			

Testing operating arrangement	Standard conditions	Conditions chosen within permitted range or conditions deviating from standard
☐ **Test 3:** **Machine:** table edge finishing machine with more work spindles **Processing:** Torus edge (see Figure A.3) with: 1. Calibrating tool; 2. Diamond wheel for chamfering; 3. Grinding, polishing and diamond tools for torus edge; 4. Dripstone tool; 5. Bush-hammering tool. **Testing material:** **Workpiece:** granite slabs **Dimensions of each slab:** Minimum slab length: 1 000 mm Minimum slab thickness: 30 mm **Machine data:** Number of simultaneous machining tools: 100 % Continuous processing, machine under full load Moving machine frame speed rate: 25 r/min Number of oscillations of beam: at least 14/min		

Testing operating arrangement	Standard conditions	Conditions chosen within permitted range or conditions deviating from standard
Tools data 1. Calibrating tool (see Figure A.4); Spindle speed — 1 400 r/min [*] Calibrating tool diameter — 250 mm [*] Calibrating height — at least 2 mm Calibrating depth — at least 30 mm 2. Diamond wheel for chamfering (see Figure A.5); Chamfering speed — 2 800 r/min [*] Chamfering tool diameter — 130 mm [*] Chamfering width — at least 10 mm 3. Grinding, polishing and diamond tools for torus edge; chosen value by the manufacturer to obtain the torus edge: 4. Dripstone tool (see Figure A.6); Spindle speed — 1 400 r/min [*] Dripstone tool diameter — 250 mm [*] Dripstone depth — at least 5 mm 5. Bush-hammering tool (see Figure A.7); Spindle speed — 1 400 r/min [*] Bush-hammering tool diameter — at least 90 mm [*] Bush-hammering depth — at least 1 mm [*] or the chosen value by the manufacturer		

Testing operating arrangement	Standard conditions	Conditions chosen within permitted range or conditions deviating from standard
☐ **Test 4:** **Machine:** table edge finishing machine with more work spindle **Processing:** Polishing flat edge (see Figure A.8) with: 1. Dripstone tool; 2. Grinding, polishing and diamond tools for polishing flat edge; 3. Diamond wheel for chamfering. **Testing material:** **Workpiece:** granite slabs **Dimensions of each slab:** Minimum slab length: 1 000 mm Minimum slab thickness: 30 mm **Machine data:** Number of simultaneous machining tools: 100 % Continuous processing, machine under full load Moving machine frame speed rate: 25 m/h		

Testing operating arrangement	Standard conditions	Conditions chosen within permitted range or conditions deviating from standard
Tools data 1. Dripstone tool (see Figure A.6); Spindle speed — 1 400 r/min [*] Dripstone tool diameter — 250 mm [*] Dripstone depth — at least 5 mm 2. Grinding, polishing and diamond tools for polishing edge; chosen value by the manufacturer to obtain the polishing edge: 3. Diamond wheel for chamfering (see Figure A.5); Chamfering speed — 1 400 r/min [*] Chamfering tool diameter — 130 mm [*] Chamfering width — at least 3 mm [*] or the chosen value by the manufacturer		

Testing operating arrangement	Standard conditions	Conditions chosen within permitted range or conditions deviating from standard
☐ **Test 5:** **Machine:** table edge finishing machine with a single work spindle **Processing:** Polishing flat edge (see Figure A.8) with: 1. Grinding, polishing tool for polishing flat edge; **Testing material:** **Workpiece:** granite slabs **Dimensions of each slab:** Minimum slab length: 2 000 mm Minimum slab thickness: 80 mm **Machine data:** Moving machine frame speed rate: at least 60 % of maximum speed Number of passes: at least 5 passes **Tools data** Grinding, polishing tool for polishing flat edge; Spindle speed 1 400 r/min [*] Tool diameter at least 130 mm [*] [*] or the chosen value by the manufacturer		

Photo or detailed illustration of the machine tested	
Testing results	
Testing laboratory	Firm/Institution: …….. Address:…….. Telephone:……. Date:……. Signature:…….. Test carried out: Place:…… Date:…….

A.6 Declaration and verification of noise emission values

The noise declaration shall be a dual-number declaration as defined in EN ISO 4871:2009, i.e. the measured values and the measurement uncertainty associated to each value shall be indicated separately. Noise emission data to be declared shall be as follows:

a) for machines with workstations or operator positions, designated by the manufacturer, declare the values of the A-weighted emission sound pressure level measured at these workstations (see A.2.2) as follows:

   1) where a value is less than 70 dB, instead of declare the measured value, insert the statement "L_{pA} less than 70 dB";

   2) where the value is more than 70 dB, declare the measured value;

   If at least a value of the A-weighted emission sound pressure level measured at these workstations (see A.2.2) is more than 80 dB, declare the A-weighted sound power level as measured as indicated in A.3.1;

b) for machines without workstations designated by the manufacturer, declare:

   1) the A-weighted sound power level as measured as indicated in A.3.1;

   2) the average value of the A-weighted emission sound pressure level calculated as indicated in EN ISO 11203:2009 using the "Q calculated" method (see EN ISO 11203:2009, 6.2.3);

c) in case of very large machinery (i.e. machines with at least one dimension exceeding 7 m) with workstations designated by the manufacturer, declare the values of the A-weighted emission sound pressure level measured at these workstations as follows:

   1) where a value is less than 70 dB, instead of the value, insert the statement "L_{pA} less than 70 dB";

   2) where the value is more than 70 dB, declare the measured value;

   Where at least a value of the A-weighted emission sound pressure level measured at these workstations (see A.2.2) is more than 80 dB, no value of sound power level shall be declared. In that case declare the values of the A-weighted emission sound pressure level measured at the positions on a path around the machine (see A.3.1). Highlight the position where the highest value is measured;

d) in case of very large machinery (i.e. machines with at least one dimension exceeding 7 m) without workstations designated by the manufacturer, declare the values of the A-weighted emission sound pressure level measured at the positions on a path around the machine (see A.3.1). Highlight the position where the highest value is measured. No value of sound power level shall be declared.

The noise declaration shall mention explicitly that noise emission values have been obtained according to this noise test code. It shall indicate which basic measurement standard has been used and refer to this noise test code for operating conditions including details of the mounting and operating conditions of the machine during the determination of its noise emission. The noise declaration shall clearly indicate deviation(s) from this noise test code and/or from the basic standard used if any.

If the accuracy of the declared emission values is to be checked, measurements shall be made using the same method and the same operating conditions as those declared.

The noise declaration shall be accompanied by the following statement:

“The figures quoted are emission levels and are not necessarily safe working levels. Whilst there is a correlation between the emission and exposure levels, this cannot be used reliably to determine whether or not further precautions are required. Factors that influence the actual level of exposure of the workforce include the characteristics of the work room and the other sources of noise, etc., i.e. the number of machines and other adjacent processes. Also the permissible exposure level can vary from country to country. This information, however, will enable the user of the machine to make a better evaluation of the hazard and risk.”

Information on noise emission shall also be provided in the sales literature when performance data are provided.

Annex ZA
(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 a means of conforming to Essential Requirements of the New Approach Directive Machinery 2006/42/EC.

Once this standard is cited in the Official Journal of the European Union 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.

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