BRITISH STANDARD

BS EN
1218-1:1999

Safety of woodworking machines — Tenoning machines

Part 1: Single end tenoning machines with sliding table

The European Standard EN 1218-1:1999 has the status of a British Standard

ICS 79.120.10

National foreword

This British Standard is the English language version of EN 1218-1:1999.

The UK participation in its preparation was entrusted to Technical Committee MTE/23, Woodworking machines, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 23 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

This British Standard, having been prepared under the direction of the Engineering Sector Committee, was published under the authority of the Standards Committee and comes into effect on 15 November 1999

ISBN 0 580 35072 X

Amendments issued since publication

Amd. No.	Date	Comments

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1218-1

August 1999

ICS 79.120.10

English version

Safety of woodworking machines — Tenoning machines — Part 1: Single end tenoning machines with sliding table

Sécurité des machines pour le travail du bois — Tenonneuses —
Partie 1: Tenonneuses simples à table roulante

Sicherheit von Holzbearbeitungsmaschinen — Zapfenschneid- und Schlitzmaschinen —
Teil 1: Einseitige Zapfenschneid- und Schlitzmaschinen mit Schiebetisch

This European Standard was approved by CEN on 8 July 1999.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 1218-1:1999 E

Foreword

This European Standard has been prepared by Technical Committee CEN/TC 142, Woodworking machines — Safety, the Secretariat of which is held by BSI.

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 2000, and conflicting national standards shall be withdrawn at the latest by February 2000.

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

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this standard.

Organizations contributing to the preparation of this European Standard include the European Committee of Woodworking Machinery Manufacturers Association "EUMABOIS".

Normative and informative annexes to this standard are listed in the contents list.

The European Standards produced by CEN/TC 142 are particular to woodworking machines and complement the relevant A and B standards on the subject of general safety (see the introduction of EN 292-1:1991 for a description of A, B and C standards).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Contents

Introduction

This European Standard has been prepared to be a harmonized standard to provide one means of conforming to the essential safety requirements of the Machinery Directive, and associated EFTA regulations. This European Standard is a type "C" standard as defined in EN 292:1991.

The extent to which hazards are covered is indicated in the Scope of this standard.

The requirements of this standard concern designers, manufacturers, suppliers and importers of single end tenoning machines with sliding table.

This European Standard also includes information to be provided by the manufacturer to the user.

Common requirements for tooling are given in EN 847-1:1997.

1 Scope

This European Standard specifies the requirements and/or measures to remove the hazards and limit the risks on single end tenoning machines with sliding table, hereinafter referred to as "machines", designed to cut solid wood, chipboard, fibreboard, plywood and also these materials where they are covered with plastic laminate or edgings.

This European Standard covers all the hazards relevant to this machine. These hazards are listed in clause **4**.

This European Standard does not cover the hazards related to electromagnetic compatibility (EMC) as stated in the EMC directive 89/336 EEC dated 03.05.89.

This standard does not apply to:

a) machines where the tenon is produced only by means of saw blades;

b) machines where the design speed of any tool spindle exceeds 6 000 min^{-1};

c) machines where the average sliding table feed speed in either direction exceeds 25 $m \cdot min^{-1}$ +5 %;

d) combined machines used for tenoning (see EN 940:1997);

e) tenoning attachments on a vertical spindle moulding machine (see EN 848-1:1997).

NOTE Single and double end tenoning machines fed by chain or chains are dealt with in prEN 1218-2. Single end tenoning machines where the tenon is produced only by means of saw blades are dealt with in prEN 1218-3.

This European Standard is primarily applicable to machines which are manufactured after the date of issue of this standard.

2 Normative references

This European Standard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 292-1:1991, *Safety of machinery — Basic concepts — General principles for design — Part 1: Basic terminology, methodology.*

EN 292-2:1991 + A1:1995, *Safety of machinery — Basic concepts — General principles for design — Part 2: Technical principles and specifications.*

EN 294:1992, *Safety of machines — Safety distances to prevent danger zones being reached by the upper limbs.*

EN 349:1993, *Safety of machinery — Minimum distances to avoid crushing of parts of the human body.*

EN 418:1992, *Safety of machinery — Emergency stop equipment — Functional aspects — Principles for design.*

EN 847-1:1997, *Tools for woodworking — Safety requirements — Part 1: Milling tools and circular saw blades.*

EN 848-1:1997, *Safety of woodworking machines — One side moulding machines with rotating tool — Part 1: Single spindle vertical moulding machines.*

EN 940:1997, *Safety of woodworking machines — Combined woodworking machines.*

EN 953:1997, *Safety of machinery — General requirements for the design and construction of guards (fixed, movable).*

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

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

EN 1088:1995, *Safety of machinery — Interlocking devices with and without guard locking — General principles and specifications for design.*

EN 60204-1:1992, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements.*
(IEC 204-1:1992, modified)

EN 60529:1991, *Degrees of protection provided by enclosures (IP Code).*
(IEC 529:1989)

EN 60947-4-1:1992, *Low voltage switchgear and control gear — Part 4: Contactors and motor starters — Section 1: Electromechanical contactors and motor starters.*
(IEC 947-4-1:1990)

EN 60947-5-1:1991, *Low voltage switchgear and control gear — Part 5: Control circuit devices and switching elements — Section 1: Electromechanical control circuit devices.*
(IEC 947-5-1:1990)

EN ISO 3743-1:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering methods for small, moveable sources in reverberant fields — Part 1: Comparison method for hard walled test rooms.*
(ISO 3743-1:1994)

EN ISO 3743-2:1996, *Acoustics — Determination of sound power levels of noise sources — Engineering methods for small, moveable sources in reverberant fields — Part 2: Method for special reverberation test rooms.*
(ISO 3743-2:1994)

EN ISO 3744:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Engineering method in an essentially free field over a reflecting plane.*
(ISO 3744:1994)

EN ISO 3746:1995, *Acoustics — Determination of sound power levels of noise sources using sound pressure — Survey method using an enveloping measurement surface over a reflecting plane.*
(ISO 3746:1995)

EN ISO 4871:1997, *Acoustics — Declaration and verification of noise emission values of machinery and equipment.*
(ISO 4871:1996)

EN ISO 9614-1:1995, *Acoustics — Determination of sound power levels of noise sources using sound intensity — Part 1: Measurement at discrete points.*
(ISO 9614-1:1993)

EN ISO 11202:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Survey method (in situ).*
(ISO 11202:1995)

EN ISO 11204:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at the workstation and at other specified positions — Method requiring environmental corrections.*
(ISO 11204:1995)

ISO 230:1996, *Test code for machine tools.*

ISO 3745:1977, *Acoustics — Determination of sound power levels of noise sources — Precision methods for anechoic and semi-anechoic rooms.*

ISO 7960:1995, *Airborne noise emitted by machine tools — Operating conditions for woodworking machines.*

ISO 7988:1988, *Woodworking machines — Double-end tenoning machines — Nomenclature and acceptance conditions.*

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

HD 21.1 S3:1997, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/75O V — Part 1: General requirements.*

HD 22.2 S3:1997, *Rubber insulated cables of rated voltages up to and including 450/75O V — Part 1: General requirements.*

3 Definitions

For the purposes of this European Standard the following definitions apply.

3.1

single end tenoning machine with sliding table

a machine designed for the production of a tenon on one end of a workpiece during one cycle. The tenon is cut by means of milling tools and saw blade(s) mounted on one or more spindles

3.2

tenon

the machined projections and slots on the end of a workpiece to facilitate the joining of workpieces. This includes profiled tenons

3.3

hand feed

the manual holding and/or guiding of the workpiece or of a machine element incorporating a tool. Hand feed includes the use of a hand operated carriage on which the workpiece is placed manually or clamped and the use of a demountable power feed unit

3.4

integrated feed

a feed mechanism for the workpiece or tool which is integrated with the machine and where the workpiece or machine element with incorporated tool are held and controlled mechanically during the machining operation

3.5

ejection

the unexpected movement of the workpiece, parts of it or part of the machine from the machine during processing

3.6

run-up time

the elapsed time from the actuation of the start control device until the spindle reaches the intended speed

3.7

confirmation

statements, sales literature, leaflets or other documents, where a manufacturer (or supplier) declares either the characteristics or the compliance of the material or product with a relevant standard

3.8

machine actuator

a power mechanism used to effect the motion of the machine

3.9

run-down time

the elapsed time from the actuation of the stop control device to spindle stand still

4 List of hazards

This standard deals with all hazards relevant to the machine as defined in the Scope:

— for significant hazards, by defining safety requirements and/or measures or by reference to relevant type B standards;

— for hazards which are not significant e.g. general, minor or secondary hazards, by reference to the relevant type A standards, especially to EN 292-1:1991 and EN 292-2:1991.

These hazards are listed in Table 1 in accordance with EN 292-2:1991/A1:1995, annex A.

Table 1 — List of hazards

Number	Hazard	Relevant clause of this standard
1	Mechanical hazards caused for example by: — shape; — relative location; — mass and stability (potential energy of elements); — mass and velocity (kinetic energy of elements); — inadequacy of the mechanical strength; — accumulation of potential energy by: — elastic elements (springs); or — liquids or gases under pressure; or — vacuum of the machine parts or workpieces.	
1.1	Crushing hazard	**5.2.1**, **5.2.7**, **5.2.8**
1.2	Shearing hazard	**5.2.7**, **5.2.8**
1.3	Cutting or severing hazard	**5.2.2**, **5.2.3**, **5.2.7**, **5.2.8**
1.4	Entanglement hazard	**5.2.3**, **5.2.4**, **5.2.6**, **5.2.7**
1.5	Drawing in or trapping hazard	**5.2.7**, **5.2.8**
1.6	Impact hazard	**5.2.7**
1.7	Stabbing or puncture hazard	Not relevant
1.8	Friction or abrasion hazard	Not relevant
1.9	High pressure fluid injection hazard	**5.3.7**, **5.3.8**
1.10	Ejection of parts (of machinery and processed materials/workpieces)	**5.2.2**, **5.2.3**, **5.2.5**, **5.2.6**, **5.2.8**
1.11	Loss of stability (of machinery and machine parts)	**5.2.1**
1.12	Slip, trip and fall hazards in relationship with machinery (because of their mechanical nature)	Not relevant
2	Electrical hazards (caused for example by):	
2.1	Electrical contact (direct or indirect)	**5.3.4**, **5.3.15**
2.2	Electrostatic phenomena	Not relevant
2.3	Thermal radiation or other phenomena such as ejection of molten particles, and chemical effects from short circuits, overloads, etc.	Not relevant
2.4	External influences on electrical equipment	**5.1.1**, **5.3.4**, **5.3.12**
3	Thermal hazards resulting in:	
3.1	Burns and scalds, by a possible contact of persons, by flames or explosions and also by the radiation of heat sources	Not relevant
3.2	Health damaging effects by hot or cold work environment	Not relevant

Table 1 — List of hazards *(continued)*

Number	Hazard	Relevant clause of this standard
4	Hazards generated by noise, resulting in:	
4.1	Hearing losses (deafness), other physiological disorders (e.g. loss of balance, loss of awareness)	**5.3.2**
4.2	Interference with speech communication, acoustic signals, etc.	**5.3.2**
5	Hazards generated by vibration (resulting in a variety of neurological and vascular disorders)	Not relevant
6	Hazards generated by radiation, especially by:	
6.1	Electrical arcs	Not relevant
6.2	Lasers	Not relevant
6.3	Ionizing radiation sources	Not relevant
6.4	Machines making use of high frequency electromagnetic fields	Not relevant
7	Hazards generated by materials and substances processed, used or exhausted by machinery for example:	
7.1	Hazards resulting from contact with or inhalation of harmful fluids, gases, mists, fumes and dusts	**5.3.3**
7.2	Fire and explosion hazard	**5.3.1**
7.3	Biological and microbiological (viral or bacterial) hazards	Not relevant
8	Hazards generated by neglecting ergonomic principles in machine design (mismatch of machinery with human characteristics and abilities) caused for example by:	
8.1	Unhealthy postures or excessive efforts	**5.1.2**
8.2	Inadequate consideration of human hand/arm or foot/leg anatomy	Not significant
8.3	Neglected use of personal protection equipment	**6.3**
8.4	Inadequate area lighting	Not significant
8.5	Mental overload or underload, stress, etc.	Not relevant
8.6	Human error	**6.3**
9	Hazard combinations	**5.1.7**
10	Hazards caused by failure of energy supply, breaking down of machinery parts and other functional disorders, for example:	
10.1	Failure of energy supply (of energy and/or control circuits)	**5.1.10**
10.2	Unexpected ejection of machine parts or fluids	**5.2.5**, **5.3.15**
10.3	Failure, malfunction of control system (unexpected start-up, unexpected overrun)	**5.1.11**
10.4	Errors of fitting	**6.3**
10.5	Overturn, unexpected loss of machine stability	**5.2.1**
11	Hazards caused by (temporary) missing and/or incorrectly positioned safety related measures/means, for example:	
11.1	All kinds of guards	**5.2.7**
11.2	All kinds of safety related (protection) devices	**5.1.1**, **5.2.7**
11.3	Starting and stopping devices	**5.1.2**, **5.1.3**, **5.1.4**
11.4	Safety signs and signals	**6.1**, **6.2**
11.5	All kinds of information or warning devices	**6.1**, **6.2**, **6.3**
11.6	Energy supply disconnecting devices	**5.3.15**
11.7	Emergency devices	**5.1.5**
11.8	Feeding/removal means for workpieces	**5.2.5**
11.9	Essential equipment and accessories for safe adjusting and/or maintaining	**5.3.16**
11.10	Equipment evacuating gases, etc.	**5.3.3**

5 Safety requirements and/or measures

For guidance in connection with risk reduction by design, see EN 292-2:1991/Al:1995, clause **3**, and in addition:

5.1 Controls

5.1.1 *Safety and reliability of control systems*

For the purposes of this standard safety related parts of control systems means the system from and including the initial manual control or position detector or other sensor to the point of input to the final actuator or element e.g. motor. The safety related control systems of this machine are those for:

— starting (see **5.1.3**);

— normal stopping (see **5.1.4**);

— emergency stop (see **5.1.5**);

— interlocking (see **5.2.7**);

— interlocking with guard locking (see **5.2.7**);

— trip devices (see **5.2.7**);

— opening or closing the guard during sliding table movement (see **5.2.7**) which:

a) ensures that the workpiece remains clamped in the event of power failure (see **5.2.8**); and

b) on integrated fed machines, prevents movement of the table if the workpiece is not clamped (see **5.2.8**);

— spindle positioning (see **5.2.3**);

— the dumping of residual pressure (see **5.3.15**);

— preventing unexpected start up in the event of power supply failure (see EN 292-2:1991/Al:1995, **A.1.2.6**);

— mode selection (see **5.1.7**);

— stopping the feed (see **5.1.6**);

— initiating the braking system (see **5.2.4**).

These control systems shall, as a minimum, be designed and constructed using "well tried" components and principles.

For the purposes of this standard "well tried" means for:

a) electrical components, if they comply with relevant standards including the following:

— EN 60947-5-1:1991 (section 3) for control switches with positive opening operation used as mechanically actuated position detectors for interlocking of guards and for relays used in auxiliary circuits;

— EN 60947-4-1:1992 for electromechanical contactors and motor starters used in mains circuits;

— HD 22.2 S3:1997 for rubber insulated cables;

— HD 21.1 S3:1997 for polyvinyl chloride cable if these cables are additionally protected against mechanical damage by positioning (e.g. inside frames);

b) electrical principles, if they comply with the first four measures listed in EN 60204-1:1992, **9.4.2.1**. The circuits shall be "hardwired". Electronic components alone do not fulfil "well tried" principles. If electronic components are used in safety related control systems, "well tried" is fulfilled if they are in accordance with EN 60204-1:1992 **9.4.2.2** and **9.4.2.3** (examples see informative annex C);

c) mechanical components, if they comply with EN 292-2:1991/A1:1995, **3.5**;

d) mechanically actuated position detectors for guards, if they are actuated in the positive mode and their arrangement/fastening and cam design/mounting comply with EN 1088:1995, **5.2.2** and **5.3**;

e) interlocking devices with guard locking, if they satisfy the requirements of **5.2.7.1**;

f) pneumatic and hydraulic components and systems, if they comply with EN 983:1996 and EN 982:1996 respectively.

Verification: by checking the relevant drawings and/or circuit diagrams and inspection of the machine. For electrical components, by requiring confirmation from the manufacturer of any component which conforms to the relevant standard.

5.1.2 *Position of controls*

The main controls of the machine for starting the tool spindles, for starting the feed on integrated fed machines, normal stopping and mode selection shall be located at the loading position.

For the position of the emergency stop controls see **5.1.5**.

When power is supplied to a tool spindle motor this shall be indicated e.g. by a light signal. The means of indication shall be positioned near to the start control, integrated in the start button or be provided by using a two position switch.

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

5.1.3 *Starting*

See EN 60204-1:1992, **9.2.5.2**.

For the purposes of this standard, "safeguards in place and functional" is achieved by the interlocking arrangement described in **5.2.7.1** and "operation" means rotation and/or powered adjustment of any tool spindle and/or powered movement of the sliding table (if provided).

For integrated fed machines with manual loading the start of the operating cycle shall not be initiated by the workpiece or automatically.

It shall be possible to start each tool motor separately.

For spindles designed to be used only with outboard bearings it shall only be possible to start the spindles if the outboard bearing is mounted.

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

5.1.4 ***Normal stopping***

A stop control shall be fitted (see EN 292-2:1991/Al:1995, **A.1.2.4**) which stops all machine actuators.

For integrated fed machines the stop control shall bring the machine to a complete stop when the sliding table is at the loading position.

It shall be possible to stop each tool motor separately.

Where the machine is fitted with an integrated feed and/or electric brake(s) and/or powered clamping, the normal stopping sequence shall be:

a) stop the feed (if power driven);

b) cut power to the tool spindle motors;

c) actuate the brake(s);

d) return the saw to the rest position (if relevant);

e) cut power to the brake(s), if electrical, after the spindle has come to rest e.g. by using a time delay;

f) cut power to the power operated clamping if provided.

The stopping sequence shall be satisfied at the level of control circuits. If a time delay device is used the time delay shall be at least equal to the minimum braking time. Either the time delay shall be fixed or the time delay adjustment device shall be sealed.

The normal stopping sequence does not apply to a tool spindle in a non-cutting position. However braking shall be applied (see **5.1.6**).

If the machine is fitted with a mechanical brake, the normal stop control shall conform to category 0 in accordance with EN 60204-1:1992, **9.2.2**.

If the machine is fitted with an electrical brake and/or power operated clamping device the normal stopping control system shall conform to category 1 in accordance with EN 60204-1:1992, **9.2.2**.

For machines with electronic pre-set control the normal stop control system shall conform to category 2 in accordance with EN 60204-1:1992, **9.2.2**. Power may remain only for the electronic equipment.

On hand fed machines, if the emergency stop at least meets the above requirements then it can be regarded as fulfilling the requirements of the normal stop control.

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

5.1.5 ***Emergency stop***

For integrated fed machines an emergency stop shall be fitted at the loading (and unloading) position(s) of the machine and placed such that it is reachable and visible by the operator from that position (or positions).

If the machine is fitted with a mechanical brake the emergency stop control system shall conform to category 0 in accordance with EN 60204-1:1992, **9.2.5.4** and category 0 in accordance with EN 418:1992, **4.1.5**.

If the machine is fitted with an electrical brake and/or power operated clamping the emergency stop control system shall conform to category 1 in accordance with EN 60204-1:1992, **9.2.5.4** and category 1 in accordance with EN 418:1992, **4.1.5**.

On hand fed machines an emergency stop or emergency stops shall be fitted and shall be located so that the operator can reach an emergency stop with the sliding table in any position.

The stopping sequence described in **5.1.4** shall apply.

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

5.1.6 ***Integrated feed***

The feed shall not operate unless the spindles are all rotating or the non-rotating spindles are retracted into a non-cutting position and the requirements of **5.2.8** are met.

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

5.1.7 ***Mode selection***

A mode selection switch shall be provided if a power operated guard has to be released for maintenance, including tool changing. The following requirements for mode selection shall apply:

a) the guard cannot be released until power to the tool spindle drive motor is removed;

b) power to the tool spindle drive shall not be available until the guard is closed;

c) power shall be removed from the feed;

d) it shall be possible to release the brakes;

e) power to the spindle positioning facilities shall be removed.

If the mode selection switch also allows powered spindle positioning, it shall comply with a) to d) but power shall remain available for spindle positioning.

Use of the mode selection switch alone shall not initiate any movement.

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

5.1.8 ***Speed changing***

For machines fitted with a device for infinitely variable (stepless) tool speed changing (e.g. a frequency inverter) the device shall be such that the actual speed does not exceed the selected speed by more than 10 %. The actual speed, or exit frequency, can be converted in a comparator e.g. by the electronic system and shall there be compared, either by the inverter itself or by an external comparator, with the selected value (see EN 60204-1:1992, **9.4.2**).

Verification: by checking the relevant drawings and/or circuit diagrams, inspection and confirmation from the component manufacturer.

5.1.9 ***Control duplication***

Where the machine is fitted with control duplication for starting, these controls shall be in accordance with EN 292-2:1991/A1:1995, **3.7.8**e).

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

5.1.10 ***Failure of the power supply***

In the case of supply interruption for electrically driven machines, automatic restart after the restoration of the supply voltage shall be prevented in accordance with EN 60204-1:1992, **7.5**, paragraphs 1 and 3.

In case of machines incorporating pneumatic clamping of the workpiece, provision shall be made to maintain the pneumatic pressure in the event of failure in the pneumatic power supply e.g. by the use of a non-return valve.

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

5.1.11 ***Failure of control circuits***

See **5.1.1**.

5.2 Protection against mechanical hazards

5.2.1 ***Stability***

Machines and auxiliary equipment shall be provided with a facility for fixing them to the floor or other stable structure e.g. by providing holes in the base of the machine.

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

5.2.2 ***Risk of break-up during operation***

The tool guards shall be manufactured from one of the following materials with at least the properties shown:

a) steel with an ultimate tensile strength of at least 350 $N \cdot mm^{-2}$ and a wall thickness of at least 2 mm;

b) light alloy with the following characteristics:

Ultimate tensile strength $N \cdot mm^{-2}$	**Minimum thickness** mm
180	5
240	4
300	3

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

d) cast iron with an ultimate tensile strength of 200 $N \cdot mm^{-2}$ and minimum thickness of 5 mm.

For integrated fed machines, powered adjustment of any tool spindle in the working position shall only be possible when the sliding table is at the loading position. Contact between tools and parts of the machine during powered adjustment of the spindles shall be avoided, e.g. by a manually adjustable mechanical restraint device [see EN 292-1:1991, **3.2.3**b)].

Powered adjustment does not include controlled movement during cutting.
(See also **5.1.6**, **5.2.3.2**, **5.2.3.4**, **5.2.3.7** and **6.3**.)

Verification: by checking the relevant drawings, measurement, inspection of the machine and for tensile strength, a confirmation from the manufacturer of the material.

5.2.3 ***Tool holder and tool design***

See EN 847-1:1997, **6.3** and annex A.

5.2.3.1 *Geometric performance*

All tool spindles shall, as a minimum, be manufactured in accordance with the requirements of annex B.

That part of the spindle upon which the tools are located shall have a tolerance of g6.

Verification: by checking the relevant drawings, inspection and measurement.

5.2.3.2 *Strength*

The tool spindles shall be manufactured from steel with an ultimate tensile strength of at least 580 $N \cdot mm^{-2}$.

Verification: by checking the relevant drawings and steel manufacturer's confirmation.

5.2.3.3 *Dimensions for spindles and tools*

Having particular regard to the balancing requirements shown in EN 847-1:1997 in determining, for a given spindle diameter, the maximum length of the spindle, its maximum speed and the maximum mass and dimensions of the tool that can be used, the manufacturer shall be able to prove the adequacy of the design.

Verification: by calculation or other method, e.g. test, etc.

5.2.3.4 *Spindle unit locking*

Spindle units which are capable of adjustment shall be held in the adjusted position during machining e.g. by means of:

a) a securing device where the setting adjustment is manual;

b) the brake or a self-locking transmission (e.g. a rack and pinion) where the setting adjustment is by an electric motor;

c) a non-return valve directly connected to the air cylinder where the setting adjustment is by pneumatic power;

d) the control circuit where the setting adjustment is under numeric control (NC).

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

5.2.3.5 *Spindle locking*

If it is necessary to hold the spindle stationary for tool changing, a spindle holding device shall be provided either by a double spanner arrangement or an integral locking bar inserted in the spindle.

When a bar is used its minimum diameter shall be 8 mm and it shall be made from steel with an ultimate tensile strength of at least 350 $N \cdot mm^{-2}$.

Locking bars shall prevent the spindle from rotating if the spindle motor is inadvertently switched on with the bar in situ.

Verification: by checking the relevant drawings, measurement, inspection, confirmation from the steel bar manufacturer and functional testing of the machine. Otherwise by the following test: after starting the spindle drive motor, with the integral or non-integral locking device in function, the spindle shall remain stationary.

5.2.3.6 *Spindle rings*

Where spindle rings are provided they shall have a tolerance of H8 on the internal diameter.

The parallelism of the clamping surfaces and the run-out of the bore shall be within 0.02 mm.

Spindle rings shall be manufactured from steel with an ultimate tensile strength of at least 580 $N \cdot mm^{-2}$ and have a minimum wall thickness of 9.5 mm.

Verification: by checking the relevant drawings, inspection, measurement and steel manufacturer's confirmation.

5.2.3.7 *Tool fixing device*

5.2.3.7.1 *Saw blade fixing*

Two saw flanges (or in the case of flush mounted saw blades, one flange) shall be provided for the cross-cut saw spindle.

The diameter of both flanges (or flange for flush mounted saw blades) shall be at least $\frac{D}{6}$ (where D = the diameter of the largest saw blade for which the machine is designed).

For flanges other than those for flush mounted saw blades the clamping surface at the outside part of the flange shall be flat over at least a width of 5 mm and recessed to the centre. Both outside diameters shall be within a tolerance of $\pm$1 mm.

There shall be a positive connection either between the saw blade and the rear flange fixed to the saw spindle or between the front flange and the saw spindle e.g. a key.

Verification: by checking the relevant drawings, inspection and measurement.

5.2.3.7.2 *Milling tool fixing*

All milling spindles shall be fitted with a tool fixing device which shall be either:

a) a lock nut or a spindle screw and separate/integral spindle ring (locking collar) which ensures a positive connection between the ring and the spindle; or

b) a lock nut or a spindle screw and a spindle which ensures positive connection between the tool and the spindle.

Where the machine is fitted with an hydraulic tool fixing system a device shall be installed which prevents axial movement of the tool in the case of a failure in the hydraulic system.

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

5.2.4 ***Braking***

5.2.4.1 *General*

An automatic brake shall be provided for each tool spindle.

The braked run-down time shall be:

a) less than 10 s; or

b) where the run-up time exceeds l0 s, less than the run-up time but shall in no case exceed 30 s.

Verification: for the determination of run-up time and braked run-down time see the appropriate test below.

5.2.4.2 *Conditions for all tests*

The spindle unit shall be set in accordance with the manufacturer's instructions (e.g. belt tension).

When selecting the speed and the tools, conditions shall be chosen which create the greatest kinetic energy for which the spindle is designed.

Warm up the spindle unit for at least 15 min by running the machine at the intended speed under no load before beginning the test.

Verify that the actual spindle speed is within 10 % of the intended speed.

The manufacturer's instructions for starting shall be observed when testing a unit provided with manual star delta starting.

The speed measuring equipment shall have an accuracy of $\pm$1 % of full scale.

The time measuring equipment shall have an accuracy of $\pm$0,1 s.

5.2.4.3 *Tests*

5.2.4.3.1 *Run-up time*

The run-up time shall be measured as follows:

a) start the machine and measure the run-up time (see **3.6**);

b) cut power to the spindle drive motor and allow the spindle to come to a complete stop;

c) repeat steps a) to b) twice more.

The run-up time is the average of the three measurements taken.

5.2.4.3.2 *Braked run-down time*

The braked run-down time shall be measured as follows:

a) start the machine and run at the intended speed (no load) for 1 min;

b) cut power to the spindle drive motor and measure the braked run-down time;

c) follow the spindle to remain stationary for 1 min;

d) re-start the spindle drive motor and run at no load for 1 min;

e) repeat steps b) to d) nine times.

The braked run-down time is the average of the ten measurements taken.

5.2.4.3.3 *Brake release*

Where a control is provided to release the spindle brake in order to enable rotation by hand and adjustment of the tool, release of the brake shall only be possible when the spindle has stopped turning. (e.g. by a time delay between control actuation and brake release).

5.2.5 ***Devices to minimize the possibility or the effect of ejection***

See **5.2.8** and in addition:

Means, e.g. deflectors, pushers etc., shall be fitted to move off-cuts away from the saw blade in order to prevent them from coming into contact with the (following) tools and being ejected from the machine.

Hand fed machines shall be designed so that climb cutting is not possible.

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

5.2.6 ***Workpiece supports and guides***

Machines shall be provided with a fence on the sliding table against which the workpiece is located during machining. If the part of the fence guiding the workpiece is adjustable and if there is a possibility of contact between the fence and the tools this part of the fence shall be made of light alloy, plastic, wood or wood-based material.

For integrated fed machines a chip breaker (anti-splinter device) shall be provided. For hand fed machines a means for fixing a chip breaker e.g. holes in the fence shall be provided. Any chip breaker that is provided shall be such that the part of the device which comes into contact with the tools shall be made of solid wood, chipboard, fibreboard, plywood or plastic (see **6.3**).

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

5.2.7 ***Prevention of access to moving parts***

For definitions and requirements of the various types of guard and safety device, see EN 292-1:1991, EN 292-2:1992/A1:1995, EN 294:1992, EN 953:1997 and EN 1088:1995. Reference to EN 294:1992 shall be relevant to persons aged 14 years and above.

No crushing/shearing risks shall be created between the sliding table or any other moving element and any fixed part of the machine.

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

5.2.7.1 *Guarding of tools on hand fed machines*

Access to the tools on hand fed machines shall be prevented as follows:

a) by means of a combination of fixed and interlocked moveable guards which, together with the workpiece and associated adjustable guards, totally enclose and prevent access to the tools e.g. see Figure 1; or

b) as in a) but where the guards only partially enclose the tools e.g. see Figure 2 and access is prevented by additional design features which comply with the requirements of EN 294:1992 and EN 349:1993; or

c) by means of power operated or self closing guards such that the tools are inaccessible at all times except during the working and return stroke of the sliding table e.g. see Figure 3. Opening and closing of these guards shall be initiated and controlled by the sliding mechanism. In addition a deterring/impeding device shall be attached to the sliding table. This device shall prevent horizontal access, in a direction perpendicular to the device, to any exposed tool or part of the tool over the full length of the travel of the table. Any deterring/impeding device fixed to the sliding table shall not be removable without the aid of a tool; or

d) a combination of a) to c).

In addition, where it is necessary that parts of the safeguarding provided are designed to be opened or removed, e.g. for tool changing, setting, adjustment, cleaning, off-cut removal etc., these parts shall be interlocked moveable guards with guard locking.

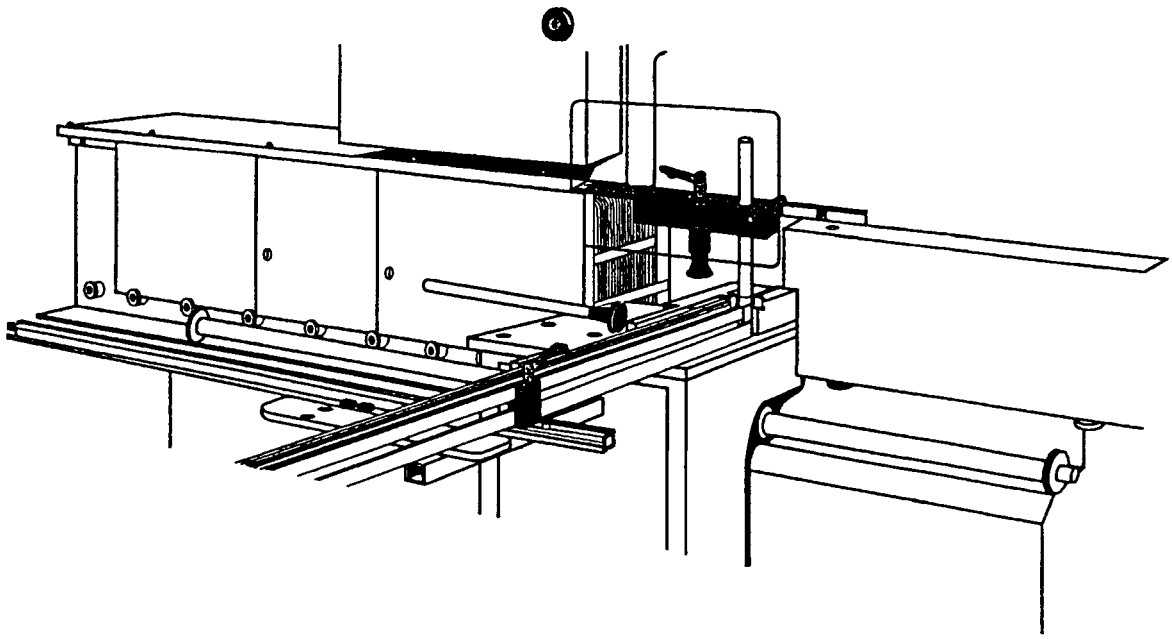


Figure 1 — Example of guarding — Complete enclosure

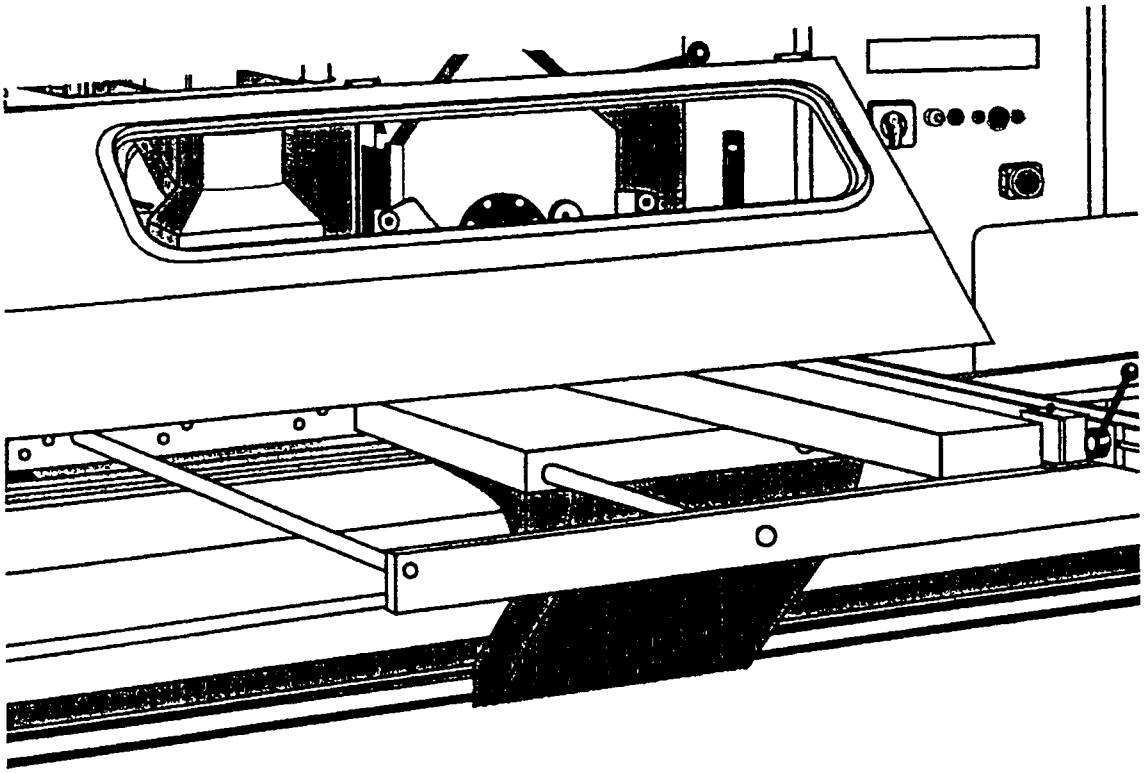
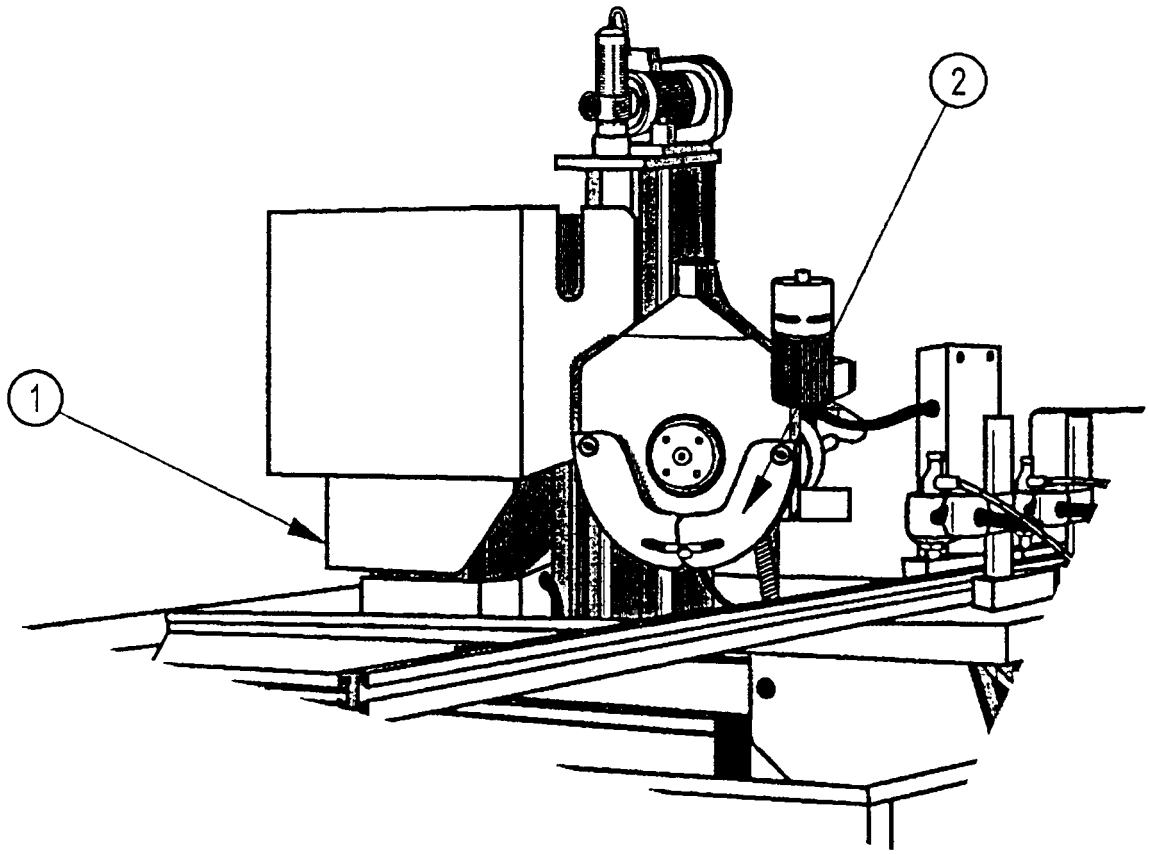


Figure 2 — Example of guarding — Partial enclosure



1 Power operated guard for milling tools
2 Power operated guard for saw blade

Figure 3 — Example of guarding — Power operated guards

The interlocking devices with and without guard locking shall comply with the requirements of EN 1088:1995. In particular for machines where the maximum run-down time is 10 s or less, guard locking shall be achieved by at least an interlocking device with manually operated delay device as shown in, EN 1088:1995, Table 1.

For machines where the run-down time exceeds 10 s, an interlocking device with at least a position monitored shot bolt and time delayed unlocking shall be used. (See EN 1088:1995, Table 1.)

See **5.1.7**.

Verification: by checking the relevant drawings, circuit diagrams, inspection, measurement and relevant functional testing of the machine.

5.2.7.2 *Safeguarding on integrated fed machines*

The tools shall be guarded in accordance with the requirements of **5.2.7.1**.

Where the average speed of the sliding table in either direction is between 20 $m \cdot min^{-1}$ and 25 $m \cdot min^{-1}$ ±5 % a trip device shall be fitted. This device shall have a sensor extending across the full width of the table (excluding the fence), be positioned between 800 mm to 1 000 mm above the floor level, be capable of being operated by any person standing in the path of the sliding table in the direction of travel and, when operated, will stop the table within 50 mm of travel.

Verification: by checking the relevant drawings, circuit diagrams, inspection, measurement and functional testing of the machine.

5.2.7.3 *Guarding of drives*

The tool drive mechanism and integrated feed drive mechanism etc. shall be guarded with a fixed guard. Where access to the drives is provided for maintenance or adjustment purposes, access shall be via an interlocked movable guard. Where access to the tools is also possible, the movable guard shall be interlocked with guard locking.

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

5.2.8 ***Clamping devices***

All machines shall be provided with workpiece clamping.

The sliding table shall have a facility for fitting one or more side clamps to prevent the workpiece turning during cutting.

On integrated-fed machines clamping shall be powered clamping and designed such that the workpiece remains clamped until the tool spindles have stopped rotating if there is a failure of the power supply.

Movement of the sliding table shall only be possible if the following requirements for the clamping system are met:

a) pneumatic or hydraulic pressure shall be applied; and

b) the piston of the pneumatic or hydraulic cylinder is not fully extended.

Where powered clamping is provided crushing hazards shall be prevented e.g. by:

c) two stage clamping with a clamping pressure not exceeding 50×10^3 Pa for 1 s followed by full clamping pressure; or

d) reduction of the clamp/workpiece gap to 6 mm or less by a manually adjustable device and stroke limitation to a maximum of 10 mm or less; or

e) limitation of the clamp closing speed to $10\ \text{mm}\cdot\text{s}^{-1}$ or less; or

f) guarding of the clamp by a guard fixed to the clamping device to reduce the gap between the workpiece and the guard to 6 mm or less. The maximum extension of the clamp outside the guard shall not be more than 6 mm.

Powered clamping systems shall have a facility for releasing the clamp(s).

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

5.3 Protection against non-mechanical hazards

5.3.1 *Fire and explosion*

To avoid or minimize fire and explosion hazards, the requirements of **5.3.3** and **5.3.4** shall be met.

5.3.2 *Noise*

5.3.2.1 *Noise reduction at the design stage*

When designing machinery, the information and technical measures to control noise at source given in ISO/TR 11688-1:1995 shall be taken into account.

5.3.2.2 *Noise emission measurement*

Operating conditions for noise measurement shall comply with the requirements of ISO 7960:1995, annex K.

For machines where ISO 7960:1995, annex K, is not applicable e.g. for different spindle speeds and tool diameter the detailed operating conditions used shall be given in the test report.

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.

Sound power levels shall be measured in accordance with the enveloping surface measuring method shown in EN ISO 3746:1995 with the following modifications:

— the environmental indicator K_{2A} shall be equal to or less than 4 dB;

— 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 (see EN ISO 3746:1995, **8.2**) shall apply up to a difference of 10 dB;

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

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

— the measuring time requirement in EN ISO 3746:1995, **7.5.3**, referring to 30 s shall be excluded;

— the accuracy of the test shall be better than 3 dB;

— the number of microphone positions shall be nine in accordance with ISO 7960:1995, annex K.

Alternatively, where the facilities exist and the measurement method applies to the machine type sound power levels may also be measured according to a method with higher precision i.e. EN ISO 3743-1:1995, EN ISO 3743-2:1996, EN ISO 3744:1995 and ISO 3745:1977 without the preceding modifications.

For determination of sound power level by the sound intensity method, use EN ISO 9614-1:1995, (subject to agreement between the supplier and the purchaser).

Emission sound pressure level at the workstation shall be measured in accordance with EN ISO 11202:1995 with the following modifications:

— the environmental indicator K_{2A} or the local environmental factor K_{3A} shall be equal to or less than 4 dB;

— the difference between the background emission sound pressure level and the workstation sound pressure level shall be equal to or greater than 6 dB;

— the correction of the local environmental factor K_{3A} shall be calculated in accordance with EN ISO 11204:1995, **A.2** with the reference restricted to EN ISO 3746:1995 instead of the method given in EN ISO 11202:1995, annex A, or in accordance with EN ISO 3743-1:1995, EN ISO 3743-2:1996, EN ISO 3744:1995 or ISO 3745:1977 where one of these standards has been used as the measuring method.

5.3.2.3 *Declaration*

See **6.3**.

5.3.3 ***Emission of chips, dust and gases***

Provision shall be made for the extraction of chips and dust from the machine by providing outlets to enable the machine to be connected to the user's dust extraction system.

NOTE To ensure that the chips and dust extracted from the point of origin are conveyed to the collection system, the design of the hoods, ducts and baffles should be based on a conveying velocity of extracted air of 20 $m \cdot s^{-1}$ for dry chips and 28 $m \cdot s^{-1}$ for wet chips (18 % or above, moisture content).

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

See **6.3**.

5.3.4 ***Electricity***

The requirements of EN 60204-1:1992 apply unless stated otherwise in this standard.

In particular see EN 60204-1:1992, clause **6**, for the requirements regarding prevention of electric shock and EN 60204-1:1992, clause **7**, for requirements regarding protection against the short circuit and overloading.

The minimum degree of protection for all electrical components shall be IP54 in accordance with EN 60529:1991.

Verification: by checking the relevant drawings, circuit diagrams, inspection, manufacturer's confirmation and relevant tests (specified in EN 60204-1:1992).

5.3.5 ***Ergonomics and handling***

See **5.1.2**.

5.3.6 ***Lighting***

Not relevant.

5.3.7 ***Pneumatic***

See EN 292-2:1991/Al:1995, **3.8**, and EN 983:1996.

5.3.8 ***Hydraulic***

See EN 292-2:1991/A1:1995, **3.8**, and EN 982:1996.

5.3.9 ***Heat***

Not relevant.

5.3.10 ***Substances***

Not relevant.

5.3.11 ***Vibration***

Not relevant.

5.3.12 ***Laser***

Not relevant.

5.3.13 ***Static electricity***

Not relevant.

5.3.14 ***Errors of fitting***

Not relevant.

5.3.15 ***Isolation***

See EN 292-2:1991/Al:1995, **3.8** and **6.2.2**.

The electrical isolator shall be in accordance with EN 60204-1:1992, **5.3**, except that it shall not be of type d).

If the machine is fitted with an electrical brake the isolator shall be equipped with a blocking device. It shall only be possible to switch off the isolator after manually overriding the blocking device.

It shall be possible to isolate the pneumatic supply by fitting a suitable device. e.g. a valve. The device used shall include a means of permitting it to be locked in the off position e.g. by a padlock.

However, on machines where pneumatic power is only used for clamping the workpiece, a quick action coupling without the means for permitting it to be locked is an acceptable method of isolation.

Where the machine has a hydraulic system it shall be isolated by the electrical isolator. Where residual energy is stored e.g. in a reservoir or pipe, means for dumping residual pressure shall be provided, for example by using a valve. Dumping of residual pressure shall not be achieved by the disconnection of a pipe or union.

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

5.3.16 ***Maintenance***

See EN 292-2:1991/Al:1995, **3.12** and **A.1.6.1**.

The information for maintenance listed as examples in EN 292-2:1991/Al:1995, **5.5.1**e), shall be provided.

Verification: by checking the relevant drawings, instruction handbook, inspection and relevant functional testing of the machine.

6 Information for use

See EN 292-2:1991/Al:1995, clause **5** and **A.1.7**.

6.1 Warning devices

Not relevant.

6.2 Marking

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

A notice shall be affixed adjacent to any speed changing device or door giving access to the belt drive mechanism indicating the operating speed of each spindle. This notice shall, where relevant, indicate the speed at each position of the control device or pulley diameter.

Verification: by checking the relevant drawings and inspection.

6.3 Instruction handbook

See EN 292-2:1991/Al:1995, **5.5**, and in addition the instruction handbook shall include at least:

a) a warning regarding residual risk;

b) recommendations for safe working practice (annex A);

c) information for maintenance listed as examples in EN 292-2:1991/Al:1995, **5.5.1**e);

d) the information described in **5.3.16**;

e) a description of the range, type and dimensions of tools which are suitable for the machine;

f) the maximum length, width and thickness of the workpiece that can be accommodated;

g) a warning that only saw blades and milling tools manufactured in accordance with EN 847-1:1997 shall be used;

h) the method to be used to ensure the safe dissipation of residual energy;

i) that saw blades made of HSS material shall not be used;

j) the requirements to be met in order to safely fix the machine to the floor;

k) information concerning how to avoid contact between the tools and other parts of the machine;

l) installation and maintenance requirements including a list of those devices which should be verified, how frequently the verification shall be carried out and by what method, in particular:

emergency stop	— every two weeks by functional test;
interlocked guards	— every two weeks by opening each guard in turn to stop the machine and by proving inability to start up the machine with each guard in the open position;
any trip device	— every two weeks by functional test;
the brake	— every two weeks by functional test to check braking within the specified braking time.

m) installation instructions which describe any earthing precautions to be taken and in particular those related to the connection of dust extraction equipment;

n) information concerning the dust extraction equipment fitted to the machine as follows:

— the air flow in $m^3 \cdot h^{-1}$;

— the pressure drop at each connection outlet;

— the recommended conveying air velocity in the duct in $m \cdot s^{-1}$;

— the cross-section dimensions and details of each connection outlet;

p) information regarding the airborne noise emission as required by EN 292-2:1991/A1:1995, **A.1.7.4**f) determined in accordance with the methods given in **5.3.2.2**.

The declaration shall be accompanied by a statement of the measuring method used and the operating conditions applied during the test and values for uncertainty K as follows:

4 dB when using EN ISO 3746:1995

2 db when using EN ISO 3743-1:1995, EN ISO 3743-2:1996 or EN ISO 3744:1995

1 db when using ISO 3745:1977

For example, for a sound power level	L_{WA} = 93 dB (measured value) Uncertainty K = 4 dB Measured in accordance with EN ISO 3746:1995

NOTE 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 work-force include the characteristics of the work room, 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."

Verification: by checking the instruction handbook and relevant drawings.

Annex A (informative)
Safe working practice

A.1 General

Guidance given in this annex should be included in the instruction handbook. The manufacturer should also include any other information specific to the machine which concerns its safe use.

It is essential that all operators are adequately trained in the use, adjustment and operation of the machine.

Ensure that the floor area around the machine is level, well maintained and free from loose material e.g. chips and off-cuts.

Provide adequate general or localized lighting.

Locate the stock and finished workpieces close to the operator's normal working position.

Wear suitable personal protective equipment when necessary; this could include:

a) hearing protection to reduce the risk of induced hearing loss;

b) respiratory protection to reduce the risk of inhalation of harmful dust;

c) gloves for handling tools (tools should be carried in a tool holder wherever practicable).

Stop the machine running whilst unattended.

Report faults in the machine, including guards or tools, as soon as they are discovered.

Adopt safe procedures for cleaning and maintenance and remove chips and dust regularly to avoid the risk of fire.

A.2 Tools

Follow the manufacturer's instructions for use, adjustment and repair of tools.

Observe the speed range marked on the tools.

Use correctly sharpened tools.

It is important to ensure that any spindle rings and saw flanges used are suitable for the purpose as stated by the manufacturer.

A.3 Workpiece

The workpiece should be properly supported using additional support if necessary.

Ensure workpieces are effectively clamped e.g. by maintaining a common batch stock size.

Effectiveness of clamping is dependent on the correct manual positioning of the clamps.

Depending on the configuration of the workpiece, additional clamps should be used, particularly where there is a risk of the workpiece moving during cutting. If more than one workpiece is to be machined at one time then special care should be taken to ensure that each workpiece is clamped.

Divert off-cuts away from the cutting area into a suitable receptacle, empty this as and when necessary.

Do not remove off-cuts or other parts of the workpiece from the cutting area whilst the machine is running.

A.4 Sliding table

Maintain the sliding table so that it is free running throughout the extent of its travel. Take the necessary care to prevent a person being crushed/sheared between the moving table and any fixed structure e.g. by providing a perimeter barrier around the machine.

Do not create any obstruction in the table traverse area or within 1 m of it. Mark the area on the floor to help achieve this.

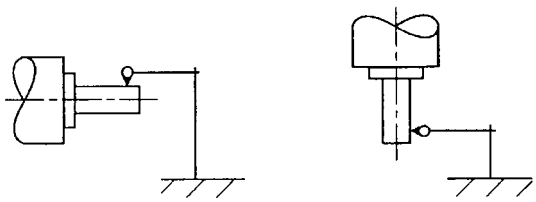
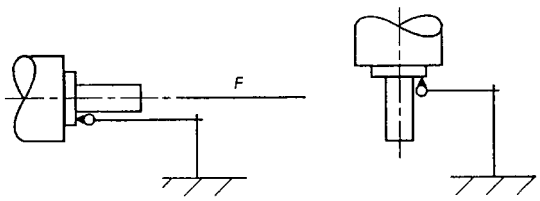
A.5 Guards

Do not use the machine unless all of the guards and other safety devices necessary for machining are in position, in good working order and properly maintained.

It is essential that operators are trained and instructed in the correct use of the guards, and in addition, instructed to carry out regular examination of guards and safety devices.

Connect dust extraction to the machine and switch on before machining commences.

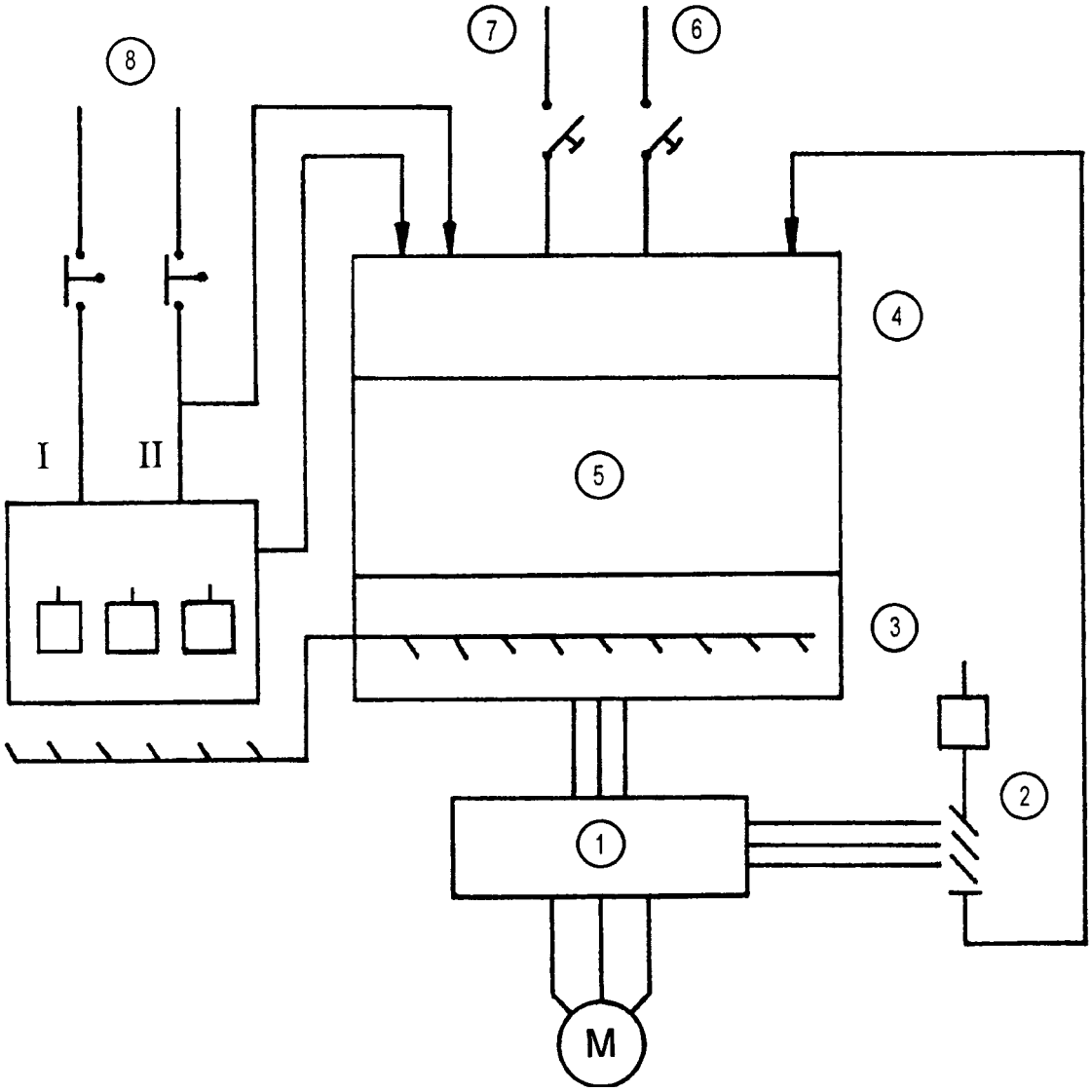
Annex B (normative)
Geometrical performance for the tool holder (spindle) (taken from ISO 7988:1988)

Number	Diagram	Object	Permissible deviation mm	Measuring instrument	Observations and references in ISO 230:1996 test code
G11		To measure spindle run-out	0,02 for a spindle length of 100	Dial gauge	See **5.611.4**
G12		To measure spindle shoulder camming	0,01	Dial gauge	See **5.632** Apply an axial force *F* as recommended by the manufacturer

Annex C (informative)

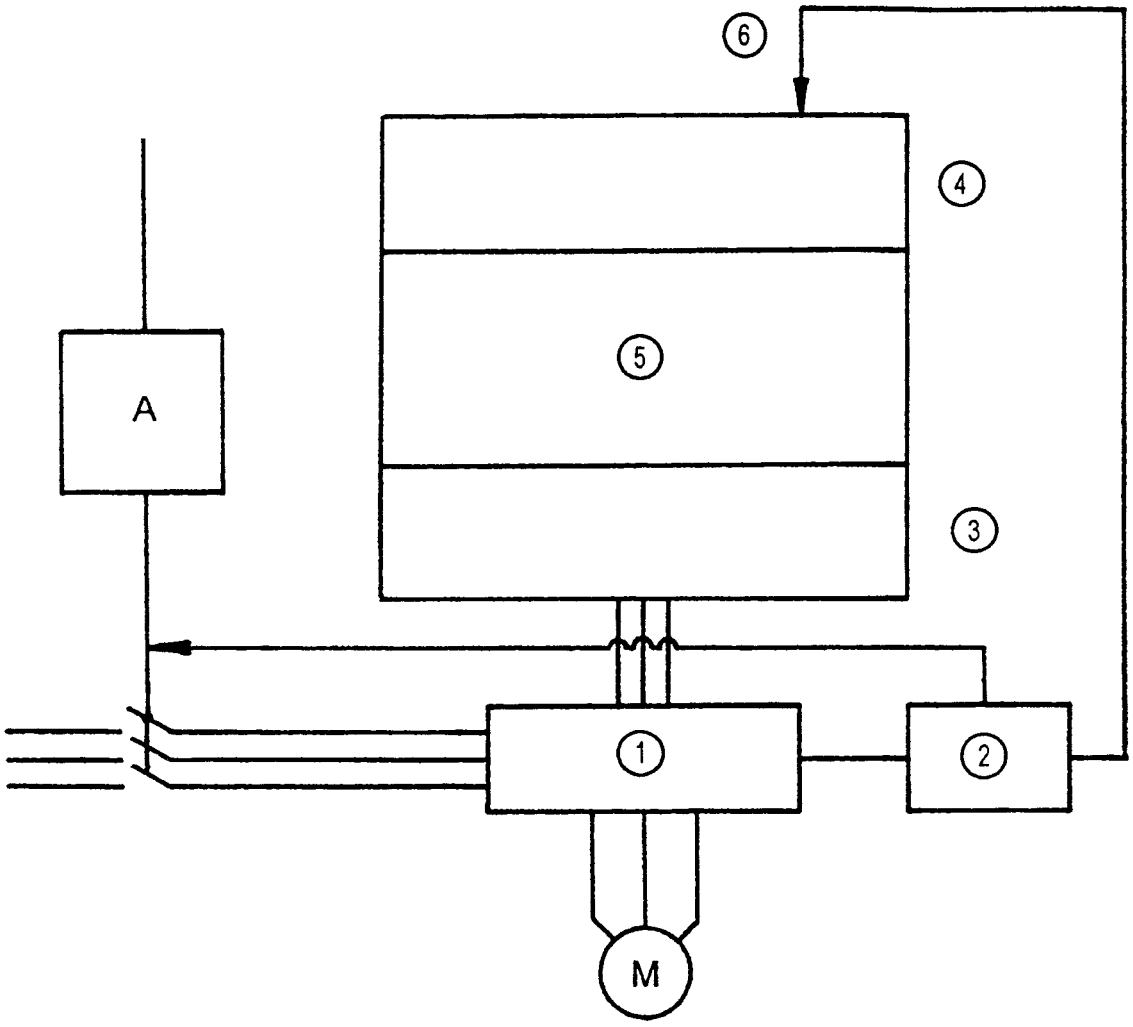
Examples of safety related control systems

Figures C.1 to C.4 show different safety related control systems which fulfil the requirements of this standard.



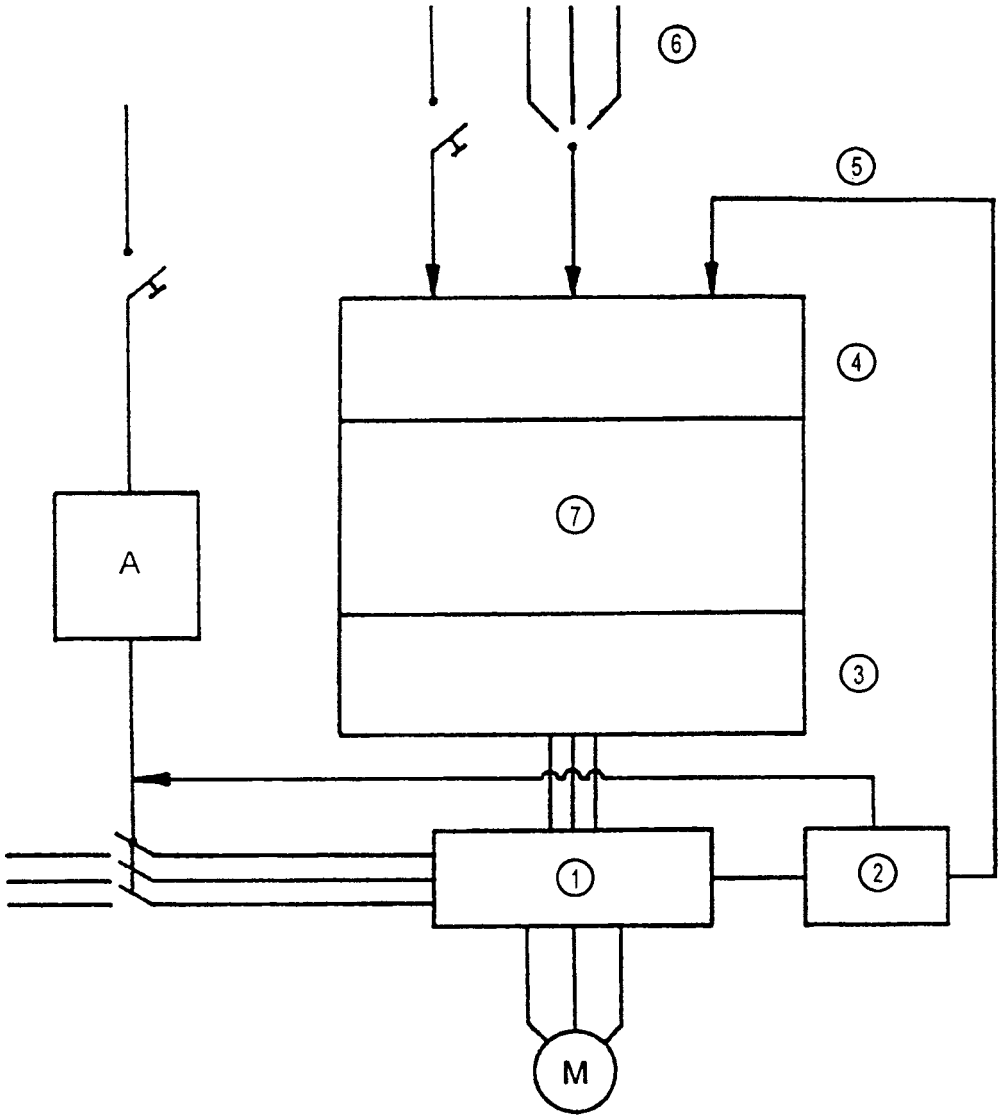
1 Drive controller
2 Contactor
3 Output
4 Input
5 Programmable Electronic System (PES)
6 Stop
7 Start
8 Door

Figure C.1 — Safety related control system for interlocking



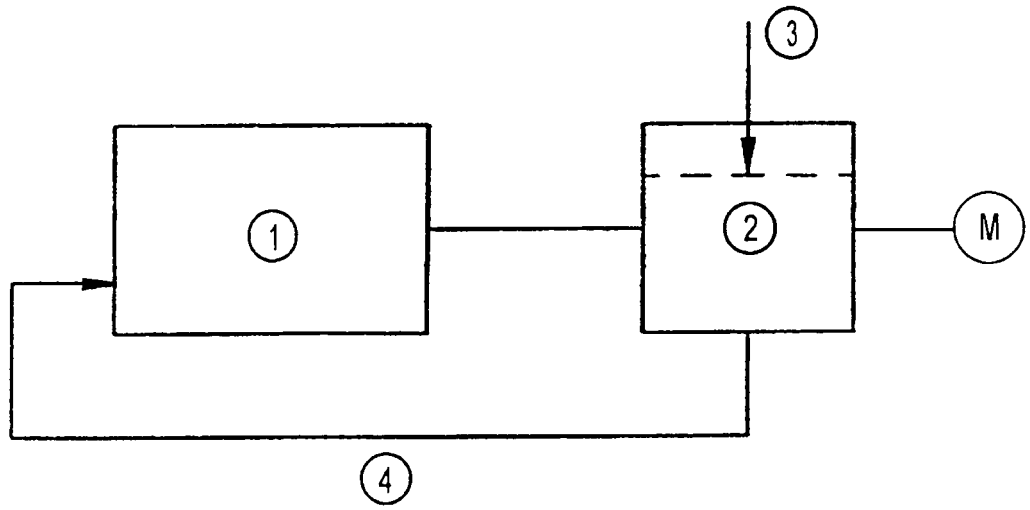
1 Drive controller
2 Supervisor
3 Output
4 Input
5 Programmable Electronic System (PES)
6 Testing loop

Figure C.2 — Safety related control system, category 2 in accordance with EN 60204-1 for normal stopping



1 Drive controller
2 Supervisor (Double level for standstill. Low speed monitoring)
3 Output
4 Input
5 Testing loop
6 Mode selector
7 Programmable Electronic System (PES)

Figure C.3 — Safety related control system for axes



1 Invertor
2 Programmable Electronic System (PES)
3 1st Internal loop
4 2nd External loop

Figure C.4 — Safety related control system for speed monitoring

Annex D (informative)

Bibliography

prEN 1218-2, *Safety of woodworking machines — Tenoning machines — Part 2: Double end tenoning machines fed by chain or chains.*

prEN 1218-3, *Safety of woodworking machines — Tenoning machines — Part 3: Tenoning machines where the tenon is cut by means of saw blades.*

Annex ZA (informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports the essential requirements of EU Directives “Machinery” 89/392/EEC, dated 14-6-89, as amended by 91/386/EEC, dated 20-6-91, and 93/44/EEC, dated 14-6-93.

WARNING: Other requirements and other EU Directives may be applicable to the products falling within the scope of this standard.

The clauses of this standard are likely to support the requirements of the Machinery Directive.

Compliance with the clauses of this standard provide one means of conforming with the specific essential requirements of the Directives concerned and associated EFTA regulations.

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001.

Copyright

BSI
389 Chiswick High Road
London
W4 4AL