
JUfbcgh`YgbccVXYcj Ub]` gffc^j !' ?fcybYyU Y!'%&"XY. 'B] Ub]` Y]b]_

Safety of woodworking machines - Circular sawing machines - Part 12: Pendulum cross-cut sawing machines

Sicherheit von Holzbearbeitungsmaschinen - Kreissägemaschinen - Teil 12: Pendelkreissägemaschinen

Sécurité des machines pour le travail du bois - Machines à scier circulaires - Partie 12: Tronçonneuses pendulaires

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ICS:

25.080.60	Strojne žage	Sawing machines
79.120.10	Lesnoobdelovalni stroji	Woodworking machines

SIST EN 1870-12:2004

en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1870-12

November 2003

ICS 79.120.10

English version

Safety of woodworking machines - Circular sawing machines - Part 12: Pendulum cross-cut sawing machines

Sécurité des machines pour le travail du bois - Machines à
scies circulaires - Partie 12: Tronçonneuses pendulaires

Sicherheit von Holzbearbeitungsmaschinen -
Kreissägemaschinen - Teil 12: Pendelkreissägemaschinen

This European Standard was approved by CEN on 1 September 2003.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document EN 1870-12:2003 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of an identical text or by endorsement, at the latest by May 2004, and conflicting national standards shall be withdrawn at the latest by May 2004.

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

For relationship with EC Directives see informative annex ZA which is an integral part of this document.

Organisations contributing to the preparation of this European Standard include the European Committee of Woodworking Machinery Manufacturer's Association "EUMABOIS".

The annex B is normative and annexes A and C are informative.

This document includes a Bibliography.

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 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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

EN 1870-12:2003 (E)**0 Introduction**

This European Standard has been prepared to be a harmonised 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 1070:1998.

The machinery concerned and the extent to which hazards, hazardous situations and events 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 C type standard take precedence over the provisions of other standards, for machines that have been designed and built according to the provisions of this type C standard.

The requirements of this European Standard are directed to manufacturers and their authorised representatives of pendulum cross-cut sawing machines. It is also useful for designers.

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

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

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1 Scope

This European Standard specifies the requirements and/or measures to remove the hazards and limit the risk on pendulum cross-cut sawing machines, herein after referred to as 'machines', designed to cut solid wood, chipboard, fibreboard, plywood and also these materials when covered with plastic edging and/or plastic/light alloy laminates.

Any workpiece positioning equipment fitted to the machine is included in this European Standard.

This European Standard covers the hazards relevant to these machines as stated in clause 4.

This European Standard does not apply to :

- a) machines for cross cutting logs;
- b) machines where the saw unit can be rotated about a horizontal axis.

For Computer Numerically Controlled (CNC) machines this European Standard does not cover the hazards related to Electro-Magnetic Compatibility (EMC).

NOTE The requirements of this European Standard apply to all machines whatever their method of control e.g. electromechanical and/or electronic.

This European Standard is primarily directed at machines which are manufactured after the date of publication by CEN.

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 (including amendments).

- EN 292-1:1991, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology.*
- EN 292-2:1991, EN 292-2/A1:1995, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications.*
- EN 294:1992, *Safety of machinery - Safety distance to prevent danger zones being reached by the upper limbs.*
- EN 418:1992, *Safety of machinery - Emergency stop equipment, functional aspects - Principles for design.*
- EN 574:1996, *Safety of machinery – Two-hand control devices - Functional aspects - Principles for design.*
- EN 847-1:1997, *Tools for woodworking - Safety requirements - Part 1: Milling tools and circular saw blades.*
- EN 954-1:1996, *Safety of machinery – Safety-related parts of controls systems - Part 1: General principles for design.*
- EN 982:1996, *Safety of machinery - Safety requirements for fluid power systems and their components – Hydraulics.*
- EN 983:1996, *Safety of machinery - Safety requirements for fluid power systems and their components – Pneumatics.*
- EN 1037:1995, *Safety of machinery - Prevention of unexpected start-up.*
- EN 1070:1998, *Safety of machinery – Terminology.*
- EN 1088:1995, *Safety of machinery - Interlocking devices associated with guards - Principles for design and selection.*
- EN 1760-1:1997, *Safety of machinery - Pressure sensitive protective devices - Part 1: General principles for the design and testing of pressure sensitive mats and pressure sensitive floors.*
- EN 1760-2:2001, *Safety of machinery - Pressure sensitive protection devices - Part 2: General principles for the design and testing of pressure sensitive edges and pressure sensitive bars.*
- EN 60204-1:1992, *Safety of machinery - Electrical equipment of machines - Part 1: General requirements (IEC 60204-1:1992, modified).*
- EN 60529:1991, *Degrees of protection provided by enclosures (IP code) (IEC 60529:1989).*
- EN 60825-1:1994+ A11:1996 + A2:2001, *Safety of laser products – Part 1: Equipment classification, requirements and user's guide (IEC 60825-1:1993).*
- EN 60947-4-1: 1992, *Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor starters; electromechanical contactors and motor starters (IEC 60947-4-1:1990).*
- EN 60947-5-1:1997, *Low voltage switchgear and control gear - Part 5-1: Control circuit devices and switching elements; electromechanical control circuit devices (IEC 60947-5-1:1997).*
- prEN 61496-2:1997, *Safety of machinery - Electrosensitive protective equipment - Part 2: Particular requirements for equipment using active optoelectronic protective devices.*
- EN ISO 3743-1:1995, *Acoustics - Determination of sound power levels of noise sources - 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 using sound pressure - Engineering methods for small, moveable sources in reverberant fields - Part 2: Methods for special reverberation test rooms (ISO 3743-2:1994).*

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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 4871:1996, *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: Measurements 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 the workstation 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).*

EN ISO 11688-1:1998, *Acoustics - Recommended practice for the design of low-noise machinery and equipment - Part 1: Planning (ISO/TR 11688-1:1995).*

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.*

HD 21.1 S3:1997, *Polyvinyl chloride insulated cables of rated voltages up to and including 450/750V - Part 1: General requirements.*

HD 22.1 S3:1997, *Rubber insulated cables of rated voltages up to and including 450/750V - Part 1: General requirements.*

HD 22.4 S3:1995+ A1:1999, *Rubber insulated cables of rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables (IEC 60245-4 : 1994, modified).*

3 Terms and definitions

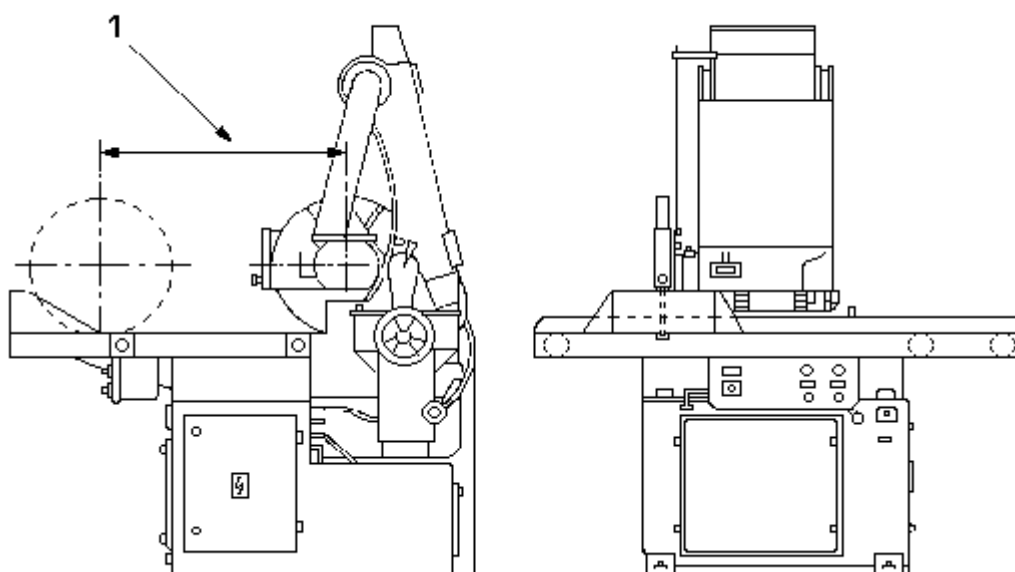
For the purposes of this European Standard the terms and definitions given in EN 1070:1998 and the following apply.

3.1**cross-cutting**

operation of cutting across the grain of a wooden workpiece

3.2**pendulum cross-cut sawing machine**

machine with a single saw blade positioned above the workpiece. The saw blade is moved manually or by integrated feed through the workpiece during cutting and then back to its rest position. The stroke (see Figure 1) is either in a straight line or an arc shaped line.

**Key**

1 Stroke

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Figure 1 — Example of a pendulum cross-cut sawing machine

3.3**manual pendulum cross-cut sawing machine**

machine where the saw unit is fed by hand and the workpiece is manually positioned for cutting to length

3.4**semi-automatic pendulum cross-cut sawing machine**

machine where the saw unit has integrated feed which is initiated manually and the workpiece is positioned manually or by means of a positioning mechanism for cutting to length

3.5**automatic pendulum cross-cut sawing machine**

machine where the saw unit has integrated feed, the workpiece is manually loaded and/or unloaded, automatically positioned for cutting to pre-selected lengths and where the integrated feed of the saw unit is initiated automatically

3.6**stationary machine**

machine designed to be located on or fixed to the floor or other parts of the structure of the premises and to be stationary during use

3.7**transportable machine**

machine which is located on the floor, stationary during use and equipped with a device, normally wheels, which allow it to be moved between locations

3.8**machine actuator**

power mechanism used to effect motion of the machine

3.9**hand fed on pendulum cross-cut sawing machines**

manual holding and/or guiding of the workpiece or the manual guiding of the saw unit with the saw blade

EN 1870-12:2003 (E)**3.10****integrated feed**

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

3.11**cutting area of the saw blade**

area where the saw blade can be involved in the cutting process

3.12**non-cutting area of the saw blade**

area of the saw blade where the saw blade is not involved in the cutting process

3.13**cutting area of a pendulum cross-cut sawing machine**

area defined by all possible positions of the saw blade with the maximum diameter for which the machine is designed in front of the fence

3.14**run-up time**

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

3.15**unbraked run-down time**

time elapsed from the actuation of the stop control, but not the braking device (if fitted) up to spindle standstill

3.16**braked run-down time**

time elapsed from the actuation of the stop control and the brake device up to spindle standstill

3.17**manual loading of power fed machines**

operation where the workpiece is presented by the operator directly to the machine integrated feed, e.g. rotating feed rollers, travelling table or reciprocating carriage; i.e. for which there is no intermediate loading device to receive and transfer the workpiece from the operator to the integrated feed

3.18**manual unloading of power fed machines**

operation where the workpiece is removed by the operator directly from the machine outfeed; i.e. for which there is no intermediate unloading device to receive and transfer the workpiece from the machine outfeed to the operator

3.19**confirmation**

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

4 List of hazards

This European Standard deals with hazards listed and relevant to the machines 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 relevant type A or B standards, especially EN 292-1:1991 and EN 292-2:1991/A1:1995.

These hazards are listed in Table 1 in accordance with clause 4 of EN 292-1:1991.

Table 1 — List of hazards

Number	Hazard	Relevant sub-clauses of this European 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	5.2.7, 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, 5.2.4, 5.2.7
1.4	Entanglement hazard	5.2.7
1.5	Drawing-in or trapping hazard	5.2.7
1.6	Impact hazard	5.2.7.4
1.8	Friction or abrasion hazard	5.2.4
1.9	High pressure fluid ejection hazard	5.2.4, 5.3.6, 5.3.7
1.10	Ejection of parts (of machinery and processed materials/workpieces)	5.1.6, 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
2	Electrical hazards caused for example by :	
2.1	Electrical contact (direct or indirect)	5.3.4, 5.3.12, 5.3.13
2.2	Electrostatic phenomena	5.3.10
2.4	External influences on electrical equipment	5.3.4, 5.3.8
4	Hazards generated by noise resulting in :	
4.1	Interference with speech communication, acoustic signals etc.	5.3.2
4.2	Hearing losses (deafness), or other physiological disorders (e.g. loss of balance, loss of awareness)	5.3.2
6	Hazards generated by radiation, especially by :	
6.2	Lasers	5.3.9
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, mists, fumes and dust	5.3.3, 6.3
7.2	Fire hazard	5.3.1, 5.3.3
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, 5.3.5, 6.3
8.2	Inadequate consideration of human hand-arm or foot-leg anatomy	5.1.2, 5.3.5, 6.3
8.3	Neglect of use of personal protection equipment	6.3
8.4	Inadequate area lighting	6.3
8.6	Human error	6.3
9	Hazard combinations	5.1.6, 5.1.7, 5.1.8, 5.2.7.4, 5.3.3, 5.3.4
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)	5.1.8, 5.1.9, 5.2.4, 5.3.7, 5.3.8
10.2	Unexpected ejection of machine parts or fluids	5.3.7, 5.3.8, 5.3.12
10.3	Failure, malfunction of control systems (unexpected start up, unexpected overrun)	5.1.8, 5.1.9, 5.2.3.1

(continued)

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Table 1 — List of hazards (concluded)

Number	Hazard	Relevant sub-clauses of this European Standard
10.4	Errors of fitting	5.2.3, 5.3.11, 6.1, 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 guard	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, 5.1.5
11.4	Safety signs and signals	6.1, 6.2
11.5	All kinds of information and warning devices	6.2, 6.3
11.6	Energy supply disconnection devices	5.3.6, 5.3.7, 5.3.12
11.7	Emergency devices	5.1.5
11.8	Feeding/removal means of workpieces	5.2.6, 5.2.7.4
11.9	Essential equipment and accessories for safe adjusting and/or maintaining	5.3.13
11.10	Equipment evacuating gases etc	5.3.3, 6.3

5 Safety requirements and/or measures

The machine 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 clauses 5 and 6 of EN 292-1:1991 for hazards relevant but not significant, which are not dealt with by this document (e.g. sharp edges).

For guidance in connection with risk reduction by design, see clause 3 of EN 292-2:1991/A1:1995, and for safeguarding measures, see clause 4 of EN 292-2:1991/A1:1995.

5.1 Controls

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5.1.1 Safety and reliability of control systems

For the purposes of this European Standard a safety related control system is one from and including the initial manual control or position detector 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);
- moveable interlocked guards (see 5.1.3, 5.2.7);
- moveable interlocked guards with guard locking (see 5.2.7);
- on automatic and semi-automatic machines interlocking of the cutting stroke with saw blade rotation and workpiece clamping (see 5.1.3);
- on automatic machines interlocking of the powered workpiece positioning with the cutting stroke (see 5.1.6);
- the mode selection (see 5.1.7);
- the initiation of the braking system (see 5.1.4, 5.1.5, 5.2.4);
- the two-hand control device (see 5.2.7);
- on semi-automatic machines interlocking of self closing power operated guards with the position of the saw unit (see 5.2.7.2);
- the active optoelectronic protective devices (light barriers) (see 5.2.7.4);
- the pressure sensitive mats (see 5.2.7.4);
- the mechanically actuated trip devices (trip bar) (see 5.2.7.4);
- the workpiece clamping (see 5.2.8).

Unless otherwise stated in this European Standard these control systems shall, as a minimum, be designed and constructed in accordance with category 1 as defined in EN 954-1:1996.

For the purposes of this European Standard "well tried components and principles" means :

- a) electrical components if they comply with relevant standards including the following as :
- i) EN 60947-5-1:1997 (section 3) for control switches with positive opening operation used as mechanical actuated position detectors for interlocking guards and for relays used in auxiliary circuits;
 - ii) EN 60947-4-1:1992 for electromechanical contactors and motor-starters used in main circuits;
 - iii) HD 22.1 S3:1997 for rubber-insulated cables;
 - iv) HD 21.1 S3:1997 for polyvinyl chloride cable if this cable is additionally protected against mechanical damage by positioning (e.g. inside frames);
- b) electrical principles if they comply with the first four measures listed in 9.4.2.1 of EN 60204-1:1992. The circuits shall be either "hardwired", or if electronic components are used in safety related control systems "well tried" is fulfilled if they are in accordance with 9.4.2.2 (i.e. redundancy with cross-monitoring) or 9.4.2.3 (i.e. diversity) of EN 60204-1:1992 (also see annex A);
- c) mechanical components if, for example they operate in the positive mode in accordance with the description given in 3.5 of EN 292-2:1991/A1:1995;
- d) mechanically actuated position detectors for guards if they are actuated in the positive mode and their arrangement/fastening and the cam design/mounting comply with 5.2 and 5.3 of EN 1088:1995;
- e) interlocking devices with guard locking if they are :
- i) if the run down time of the saw spindle is less than 10 s an interlocking device with guard locking with manually operated delay device in accordance with the requirements in annex N of EN 1088:1995;
 - ii) in all other cases an interlocking device with spring applied/power released guard locking device in accordance with the requirements in annex M of EN 1088:1995;
- f) pneumatic and hydraulic components and systems if they comply with EN 983:1996 and EN 982:1996 respectively;
- g) two-hand control devices if they are as a minimum of type III B in accordance with the requirements of EN 574:1996;
- h) pressure sensitive mats if they are as minimum in accordance with type 2 of EN 1760-1:1997 and if they are tested together with their associated control circuits at least at each starting of the machine;
- i) active optoelectronic protective devices (light beam) if they comply as minimum of type 2 of prEN 61496-2:1997 and if they are tested together with the associated control circuits at least at each starting of the machine;
- j) mechanically actuated trip devices (trip bars) if they are as minimum in accordance with type 2 of EN 1760-2:2001 and if they are tested together with their associated control circuits at least at each starting of the machine.

Time delay devices used in hardwired safety related control circuits may be of category B in accordance with the requirements of EN 954-1:1996 if the time delay device is designed for at least one million actuations.

Verification: By checking the relevant drawings and/or circuit diagrams and inspection of the machine. For electrical components by requiring a confirmation from the manufacturer of the component which declares conformity with the relevant standards.

5.1.2 Position of controls

5.1.2.1 Manual machines

The start and stop control required by 5.1.3 and 5.1.4 of this European Standard shall be situated either :

- a) incorporated in, or adjacent to the operating handle of the machine; or