



SLOVENSKI STANDARD

SIST EN 1870-11:2004

01-september-2004

Varnost lesnoobdelovalnih strojev - Krožne žage - 11. del: Polavtomatski in avtomatski konzolni čelilnik z enim agregatom

Safety of woodworking machines - Circular sawing machines - Part 11: Semi-automatic and automatic horizontal cross-cut sawing machines with one saw unit (radial arm saws)

Sicherheit von Holzbearbeitungsmaschinen - Kreissägemaschinen - Teil 11: Halbautomatische und automatische waagrecht schneidende Auslegerkreissägemaschinen mit einem Sägeaggregat (Radialsägen)

Sécurité des machines pour le travail du bois - Machines à scier circulaires - Partie 11: Tronçonneuses automatiques et semi-automatiques à coupe horizontale (scies circulaires radiales)

Ta slovenski standard je istoveten z: EN 1870-11:2003

ICS:

25.080.60	Strojne žage	Sawing machines
79.120.10	Lesnoobdelovalni stroji	Woodworking machines

SIST EN 1870-11:2004 en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 1870-11

August 2003

ICS 79.120.10

English version

**Safety of woodworking machines - Circular sawing machines -
Part 11: Semi-automatic and automatic horizontal cross-cut
sawing machines with one saw unit (radial arm saws)**

Sécurité des machines pour le travail du bois - Machines à scier circulaires - Partie 11: Tronçonneuses automatiques et semi-automatiques à coupe horizontale (scies circulaires radiales)

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This European Standard was approved by CEN on 12 June 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 1870-11:2003) has been prepared by Technical Committee CEN/TC 142, "Woodworking machines - Safety", the secretariat of which is held by BSI.

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

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 2004, and conflicting national standards shall be withdrawn at the latest by February 2004.

For relationship with EU Directive(s), 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".

Annex B is normative and Annexes A, C and ZA are informative.

The European Standards produced by CEN/TC142 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).

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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 1870-11:2003 (E)**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 semi-automatic and automatic horizontal cutting cross-cut sawing machines with one saw unit (radial arm saws). It is also useful for designers.

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

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

1 Scope**iTeh STANDARD PREVIEW**

This European Standard specifies the requirements and/or measures to remove the hazards and/or limit the risks on semi-automatic and automatic horizontal cutting cross-cut sawing machines with one saw unit (radial arm saws), hereinafter 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 work-piece 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 machines :

- a) with manual feed of the saw unit; or
- b) for cross cutting logs; or
- c) specifically designed for sawing and/or milling roof timber frames; or
- d) fitted with hydraulic braking systems.

NOTE Radial arm saws with manual feed of the saw unit (the saw unit is moved by hand) are dealt with in prEN 1870-17 and prEN 61029-2-2.

For Computer Numerically Controlled (CNC) machines this European Standard does not cover 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 to machines which are manufactured after the date of issue 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.*

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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 529:1989).*

EN 60825-1:1994+ A11:1996 + A2:2001, *Safety of laser products - Equipment classification, requirements and user's guide (IEC 60825-1:1993).*

EN 60947-4-1: 1992, *Low voltage switchgear and control gear - 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 60947-5-1:1990).*

prEN 61496-2:1997, *Safety of machinery - Electrosensitive protective equipment - Part 2: Particular requirements for equipment using active optoelectronic devices.*

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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).*

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 - Determination 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 (ISO 11202:1995).*

EN ISO 11204:1995, *Acoustics - Noise emitted by machinery and equipment - Measurement of emission sound pressure levels at a work station 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

3.1 General

For the purposes of this European Standard the definitions given in EN 1070:1998 apply. Additional definitions specifically needed for this European Standard are shown in Clause 3.2.

3.2 Definitions

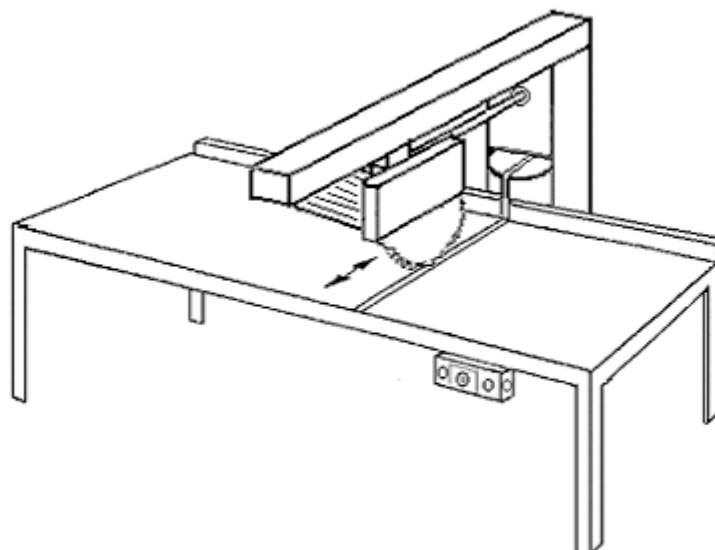
3.2.1

cross-cutting

operation of cutting across the grain of a wooden work-piece.

3.2.2**semi-automatic and automatic horizontal cutting cross-cut sawing machine with one saw unit (radial arm saw)**

machine where the saw unit has integrated feed and moves horizontally forward on an arm in a straight line during the cutting stroke and then back to its rest position. The arm can rotate relative to the centre line of its vertical support (pivoting) and the saw unit can cant relative to a horizontal line in direction of the arm (see Figure 1).



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Figure 1 — Example of a horizontal cutting cross-cut sawing machine with one saw unit (semi-automatic machine)

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3.2.3**semi-automatic cross-cut sawing machine**

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

3.2.4**automatic cross-cut sawing machine**

machine where the saw unit has integrated feed, the work-piece 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.

3.2.5**machine actuator**

power mechanism used to effect motion of the machine.

3.2.6**integrated feed on radial arm saws**

power operated feed mechanism for the saw-blade and work-piece which is integrated with the machine and where the saw unit with incorporated saw-blade and the work-piece are held and controlled mechanically during the machining operation.

3.2.7**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.

3.2.8**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.

EN 1870-11:2003 (E)**3.2.9****cutting area of the saw-blade**

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

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

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

3.2.11**cutting area of a semi-automatic and automatic radial arm saw**

area defined by all possible positions in front of the fence of the saw-blade with the maximum diameter for which the machine is designed, taking into account the saw unit's ability to cant or pivot for angled cutting and the maximum cutting stroke and cutting depth.

3.2.12**run-up time**

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

3.2.13**unbraked run-down time**

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

3.14**braked run-down time**

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

3.2.15**manual loading of power fed machines (standards.iteh.ai)**

operation where the work-piece 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 work-piece from the operator to the integrated feed.

3.2.16**manual unloading of power fed machines**

operation where the work-piece is removed by the operator directly from the machine out feed; i.e. for which there is no intermediate unloading device to receive and transfer the work-piece from the machine out feed to the operator.

3.2.17**confirmation**

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

4 List of significant 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 the requirements of Clause 4 of EN 292-1:1991.

Table 1 — List of significant 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 work-pieces.	
1.1	Crushing hazard	5.3.7, 5.3.8
1.2	Shearing hazard	5.3.7, 5.3.8
1.3	Cutting or severing hazard	5.3.2, 5.3.3, 5.3.4, 5.3.7
1.4	Entanglement hazard	5.3.7
1.5	Drawing-in or trapping hazard	5.3.7
1.6	Impact hazard	5.3.7.3, 5.3.7.4
1.8	Friction or abrasion hazard	5.34
1.9	High pressure fluid ejection hazard	5.3.4, 5.3.8, 5.4.6, 5.4.7, 5.4.13, 6.3
1.10	Ejection of parts (of machinery and processed materials/work-pieces)	5.2.3, 5.2.6, 5.3.2, 5.3.3, 5.3.5, 5.3.6, 5.3.8
1.11	Loss of stability of machinery and machine parts	5.3.1
2	Electrical hazards caused for example by :	
2.1	Electrical contact (direct or indirect)	5.4.4, 5.4.12, 5.4.13
2.2	Electrostatic phenomena	5.4.10
2.4	External influences on electrical equipment	5.4.4, 5.4.8
4	Hazards generated by noise resulting in :	
4.1	Interference with speech communication, acoustic signals etc.	5.4.2
4.2	Hearing losses (deafness), or other physiological disorders (e.g. loss of balance, loss of awareness)	5.4.2
6	Hazards generated by radiation, especially by :	
6.2	Lasers	5.4.9
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	5.4.3, 6.3
7.2	Fire hazard	5.4.1, 5.4.3
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	5.2.2, 5.4.5, 6.3
8.2	Inadequate consideration of human hand-arm or foot-leg anatomy	5.2.2, 5.4.5, 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	5.2.3, 5.2.6, 5.2.7, 5.2.8, 5.3.7.4, 5.4.3, 5.4.4
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)	5.2.8, 5.2.9, 5.3.4, 5.4.6, 5.4.7
10.2	Unexpected ejection of machine parts or fluids	5.2.6, 5.4.6, 5.4.7, 5.4.12
10.3	Failure, malfunction of control systems (unexpected start up, unexpected overrun)	5.2.8, 5.2.9, 5.3.3.1
10.4	Errors of fitting	5.3.3, 5.4.11, 6.1, 6.3
10.5	Overturn, unexpected loss of machine stability	5.3.1

(continued)

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Table 1 — List of significant hazards (concluded)

Number	Hazard	Relevant sub-clauses of this European Standard
11	Hazards caused by (temporary) missing and/or incorrectly positioned safety related measures/means for example :	
11.1	All kinds of guard	5.3.7
11.2	All kinds of safety related (protection) devices	5.2.1, 5.3.7
11.3	Starting and stopping devices	5.2.2, 5.2.3, 5.2.4, 5.2.5
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	5.4.6, 5.4.7, 5.4.12
11.7	Emergency devices	5.2.5
11.8	Feeding/removal means of work-pieces	5.3.6, 5.3.7.3, 5.3.7.4
11.9	Essential equipment and accessories for safe adjusting and/or maintaining	5.4.13
11.10	Equipment evacuating gases etc.	5.4.3, 6.3

5 Safety requirements and/or measures

5.1 General

The machine shall comply with the safety requirements and/or protective measures of this Clause. In addition, the machine shall be designed in accordance with 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.

5.2 Controls

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5.2.1 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 Clause 5.2.3);
- normal stopping (see Clause 5.2.4);
- emergency stop (see Clause 5.2.5);
- moveable interlocked guards (see Clause 5.2.3, 5.3.7);
- moveable interlocked guards with guard locking (see Clauses 5.2.3 and 5.3.7);
- interlocking of the cutting stroke with saw-blade rotation and work-piece clamping (see Clause 5.2.3);
- on automatic machines interlocking of the powered work-piece positioning with the cutting stroke (see Clause 5.2.6);
- mode selection (see Clause 5.2.7);
- the initiation of the braking system (see Clauses 5.2.4, 5.2.5 and 5.3.4);
- the two-hand control device (see Clauses 5.2.3 and 5.3.7);
- on semi-automatic machines interlocking of self closing power operated guards with the position of the saw unit (see Clause 5.3.7.1);
- the active opto-electronic protective devices (light barriers) (see Clause 5.3.7.4);
- the pressure sensitive mats (see Clause 5.3.7.4);
- the mechanically actuated trip devices (trip bar) (see Clause 5.3.7.4);
- the work-piece clamping (see Clause 5.3.8).

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 for :