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Agricultural and forestry machinery - Safety of log splitters - Part 2: Screw splitters

Land- und Forstmaschinen - Sicherheit von Holzspaltmaschinen - Teil 2: Schraubenspaltmaschinen

Matériel agricole et forestier - Sécurité des fendeuses de bûches - Partie 2 : Fendeuses à vis

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

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Contents

Foreword

This document (EN 609-2:1999+A1:2009) has been prepared by Technical Committee CEN/TC 144 "Tractors and machinery for agriculture and forestry", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by March 2010, and conflicting national standards shall be withdrawn at the latest by March 2010.

This document includes Amendment 1, approved by CEN on 2009-07-27.

This document supersedes EN 609-2:1999.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟨A1⟩ ⟨A1⟩.

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⟨A1⟩ For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. ⟨A1⟩

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Introduction

The extent to which hazards are covered is indicated in the scope of this standard. In addition, machinery shall comply as appropriate with EN 292–1 and EN 292–2 for hazards which are not covered by this standard.

1 Scope

This European Standard specifies safety requirements, and their verification, for the design and construction of screw splitters with horizontal screws, designed to be used by one operator for splitting wood, irrespective of the nature of the power source used.

On a dual purpose circular saw for firewood/log splitting machine only the log splitter part of the machine is covered by this standard, for circular saws. For firewood saws see prEN 1870-6:1997.

This standard describes methods for the elimination or reduction of risks arising from their use. In addition, it specifies the type of information on safe working practices to be provided by the manufacturer.

The list of significant hazards dealt with is given in annex A. Annex A also indicates the hazards which have not been dealt with.

This European Standard applies primarily to machines which are manufactured after the date of issue of the 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, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications (including EN 292-2/A1:1995)*

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

EN 954-1:1996, *Safety of machinery - Safety-related parts of control systems - Part 1: General principles for design*

EN 982:1996, *Safety of machinery - Safety requirements for fluid power systems and their components - Hydraulics*

EN 1088:1995, *Safety of machinery - Interlocking devices associated with guards - Principles for design and selection*

EN 60204-1:1997, *Safety of machinery - Electrical equipment of machines; Part 1: General requirements (IEC 60204-1: 1997)*

EN 60529:1991, *Degree of protection provided by enclosure (IP code) (IEC 529: 1989)*

EN 60947-4-1:1992, *Low-voltage switchgear and controlgear; Part 4: Contactors and motor-starters; Section 1: Electromechanical contactors and motor-starters (IEC 60947-4-1: 1990)*

EN 60947-5-1:1997, *Low-voltage switchgear and controlgear; Part 5-1: Control circuit devices and switching elements; Electromechanical control circuit devices (IEC 60947-5-1 : 1997)*

prEN 1553:1999, *Agricultural machinery - Agricultural self propelled, mounted, semi-mounted or trailed machines - Common safety requirements*

prEN 1870-6:1997, *Safety of woodworking machines - Circular sawing machines - Part 6: Firewood sawing machine/circular saw bench with manual loading and/or unloading*

HD 21.1 S1:1997, *Polyvinyl chloride insulated cables - Polyvinyl of rated voltages up to and including 450/750 V - Part 1: General requirements*

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

3 Definitions

For the purposes of this European Standard, the definitions given in EN 292-1 shall apply together with the following definition:

3.1
Screw splitter
A log splitting machine where the log is split by the action of a rotating, conical screw. To achieve splitting the log is pressed against the point of the screw (see figures 1a and 1b for an example).

4 Safety requirements

4.1 Electrical equipment

The electrical equipment of electrically driven machines shall comply with EN 60204-1.

The degree of protection of all electrical components shall be a minimum of IP 54 in accordance with EN 60529.

See also 6.3 s) of this standard for the use of a portable residual current device (PRCD).

4.2 Safety and reliability of control systems

Control systems shall be at least category 1 according to 6.2.2 of EN 954-1:1996.

For the purpose of this standard, "safety related control systems" means the system from and including the initial manual control or position detector to the point of input to the final actuator or element, e.g. motor. Safety related control systems of this machine include the following:

— starting;

— normal stopping;

— interlocking devices;

— interlocking with guard locking;

— initiation of the braking system.

For the purpose of this standard "well tried" according to EN 954-1 means:

a) for electrical components that they comply with the relevant standards such as:

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

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

— HD 22.1 S3 for rubber insulated cables;

— HD 21.1 S1 for polyvinyl chloride insulated cables if these cables are additionally protected against mechanical damage by positioning (e.g. inside frames);

b) for electrical principles that they comply with the first four measures listed in 9.4.2.1 of EN 60204-1:1997. The circuits shall be "hardwired". Electronic components alone do not fulfil category 1;

c) for mechanical components that they comply with 3.5 of EN 292-2:1991;

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

e) for interlocking devices with guard locking that they are a minimum of type 3 according to table 1 of EN 1088:1995;

f) for hydraulic components and systems that they comply with EN 982.

4.3 Starting and stopping

4.3.1 Electrically driven machines

A control device for starting and stopping the machine shall be provided within the reach of the operator when he is in the operating position.

If the machine is equipped with a mechanical brake (see 4.6.4), the control device used for stopping shall comply at least with Category 0, in accordance with 9.2.2 of EN 60204-1:1992.

If the machine is equipped with an electrical brake (see 4.6.4), the control device used for stopping shall comply at least with Category 1, in accordance with 9.2.2 of EN 60204-1:1992.

If a Category 1 control device is provided for normal stopping, then the following disconnection sequence shall be executed :

a) disconnection of the power supply to all drive mechanisms and subsequent activation of the brake ;

b) disconnection of the power supply to the brake, after the braking process has been completed.

NOTE: The control device meets also the requirements for emergency stop.

4.3.2 Machines not powered by electricity

The machine shall be fitted with a device at the operating position capable to either stop the machine or, e.g. for PTO-driven machines, to disconnect the drive of the machine.

NOTE 1: This control device meets also the requirements for emergency stop.

NOTE 2: The providing of a rope to disengage the power take–off of the tractor does not fulfil this requirement.

4.4 Hydraulic equipment

Hydraulic equipment (if provided) shall comply with EN 982.

Pressurised hoses, lines and components shall be located or shielded so that in the event of rupture, the fluid can not be discharged directly onto the operator when in the operating position.

4.5 Log support

A support or holding device shall be provided for the log. This device shall be designed to allow the log to be split without the need for it to be held in position by the hands or feet. The device shall also prevent the log, or parts of it, falling onto the operator, when he is at the operating position before, during or after splitting.

The feeding device (see 4.6.3) can perform the log supporting function. See figures 1a and 1b for an example.

4.6 Protective measures against contact with the rotating tool

4.6.1 Guarding from above

A guard shall be provided to protect the operator from touching the screw from above. The guard shall extend at least 25 mm beyond the point of the screw and shall be so positioned that its distance from the screw axis does not exceed the maximum diameter of the screw. Its width shall be at least equal to twice its distance from the screw axis.

Where the guard is movable, it shall return automatically to its starting position after the splitting process, e.g. by means of a spring.

4.6.2 Lateral screw guarding

If it is possible to come into contact with the screw from the side, a lateral guard (see figures 1a and 1b) shall be provided on both sides of the machine which shall meet the following requirements:

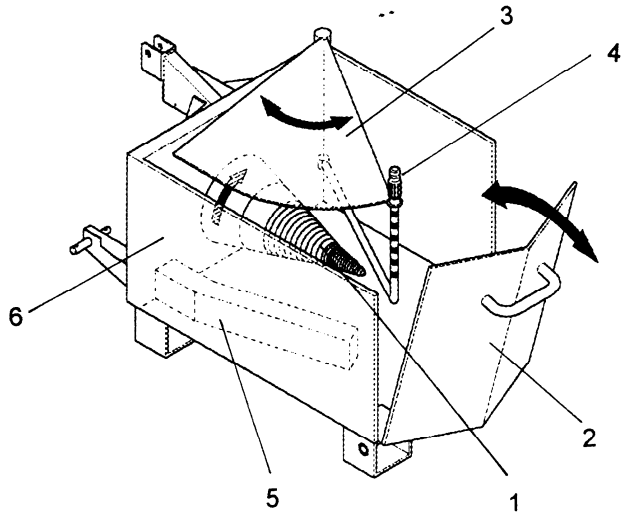
— the horizontal distance of the lateral guard from the screw axis shall be at least 550 mm;

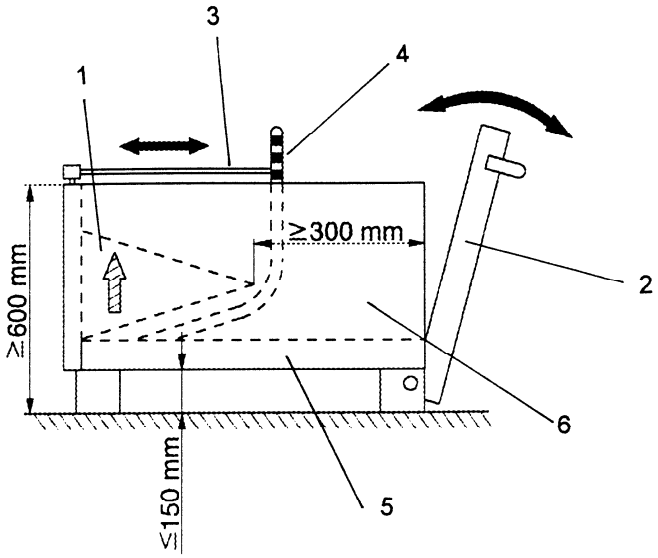
— the guard shall cover at least a height of 150 mm to 600 mm above the surface on which the operator stands ;

— when the feeding device (see 4.6.3) is in the position furthest from the screw, the horizontal distance between the feeding device and the lateral guard shall not exceed 100 mm at any point ;

— if it is necessary to introduce the log into the feed zone from one side of the machine, the guard on this side shall extend at least to the tip of the screw (see figure 1a).

Dimensions in mm



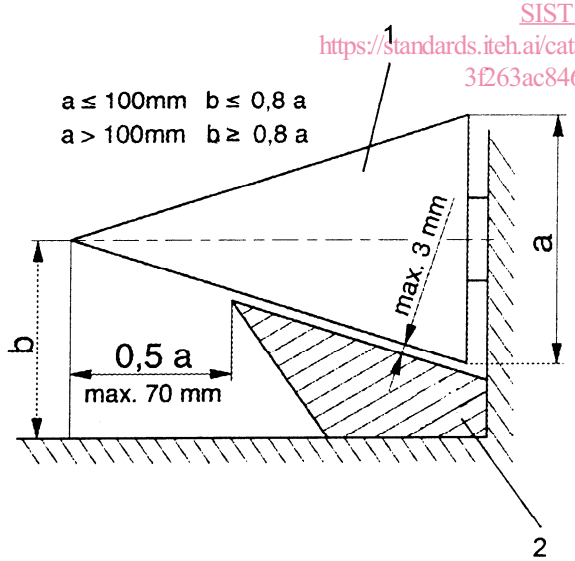


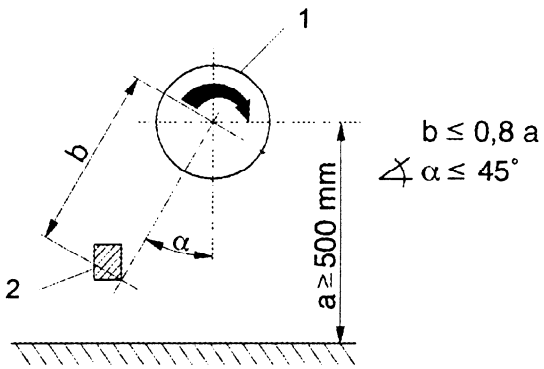
1 screw
2 feeding device
3 guarding from above
4 device for removing jammed wood
5 limit stop
6 lateral guard

Figure 1a : Screw splitter, starting position

Figure 1b : Screw splitter, side view, starting position

Dimensions in mm





1 screw
2 fixed wedge

Figure 2 : Screw splitter with wedge to prevent workpiece rotating

1 screw
2 lateral stop

Figure 3 : Screw splitter with limit stop to prevent workpiece rotating

4.6.3 Measures to prevent entanglement by the screw

Protection against contact with the screw shall be ensured by the provision of a feeding device. The feeding device shall be constructed in such a way that the operator is protected against contact with the screw during the feed process and shall meet the following requirements:

- the surface of the feeding device shall not contain any openings near to the tip of the screw. This surface shall be at least big enough to enable a 200 mm diameter circle to be included within it;
- the feeding device shall be provided with a handle;
- the minimum distance between the feeding device and the tip of the screw shall be 25 mm.

4.6.4 Screw run-down time

The run-down time of the screw shall not exceed 10 s. If the screw is mounted on a saw spindle, the run-down time requirements specified in the standard which applies to the saw, e.g. 5.2.4 of prEN 1870-6:1997, shall be met.

4.7 Safety measures to prevent rotation of the log

A fixed wedge shall be provided near the screw and it shall begin at a distance which corresponds to at least half the diameter of the screw, but does not exceed 70 mm, however, from the tip of the screw (see figure 2). The distance between the edge of the wedge and the contour of the screw shall not exceed 3 mm.

Alternatively, if the vertical distance from the log standing surface of the log to the screw axis is at least 500 mm (dimension *a* in figure 3), then a lateral stop shall be provided. This stop shall satisfy the following requirements:

— the distance between the screw axis and the stopping edge of the lateral stop (dimension *b* in figure 3) shall not exceed 0,8 x *a*; and

— the angle to the vertical formed by the line drawn through the screw axis and the stopping edge (α in figure 3) shall not exceed 45°; and

— the stop shall extend at least 300 mm beyond the tip of the screw.

The above conditions shall be satisfied for any values of dimension *a* and for all positions of adjustable stops.

4.8 Device for removing jammed logs

A device shall be provided for the removal of logs which have not been completely split from the rotating screw. This device shall be an integral part of the machine (see figures 1a and 1b).

4.9 Stability

The machine shall be of an adequate stable design. The machine shall have a bearing surface which transmits to the ground a maximum pressure of 400 kPa.

The machine shall be designed to be stable when parked according to the instruction handbook (see 6.3 e)) on firm ground, with an inclination up to 8,5° in any direction.

4.10 Guarding of mechanical drives

The guarding of power transmission from an external power source (e. g. a tractor) to the log splitter shall comply with 4.3.2.3 of prEN 1553:1999.

To ensure protection against hazards related to accessible moving power transmission parts, the machine shall be fitted with guards complying with EN 953.