



SLOVENSKI STANDARD
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Garden equipment - Pedestrian controlled lawn aerators and scarifiers - Safety

Gartengeräte - Handgeführte Rasen-Bodenbelüfter und Vertikutierer - Sicherheit

Matériel de jardinage - Aérateurs et scarificateurs à conducteur à pied - Sécurité

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EUROPEAN STANDARD

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Garden equipment - Pedestrian controlled lawn aerators and scarifiers - Safety

Matériel de jardinage - Aérateurs et scarificateurs à conducteur à pied - Sécurité

Gartengeräte - Handgeführte Rasen-Bodenbelüfter und Vertikutierer - Sicherheit

This European Standard was approved by CEN on 1 April 2004 and includes Amendment 2 approved by CEN on 6 June 2009.

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EN 13684:2004+A2:2009 (E)**Foreword**

This document (EN 13684:2004+A2:2009) 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of an identical text or by endorsement, at the latest by January 2010, and conflicting national standards shall be withdrawn at the latest by January 2010.

This document includes Amendment 2, approved by CEN on 2009-06-06.

This document supersedes EN 13684:2004.

The start and finish of text introduced or altered by amendment is indicated in the text by tags $\boxed{A_2}$ $\boxed{A_2}$.

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).

$\boxed{A_2}$ For relationship with EC Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. $\boxed{A_2}$

Annexes A, C and E are normative. Annexes B and D are informative.

This document includes a Bibliography.

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

0 Introduction

This document is a type C standard as stated in EN 1070.

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this document.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards, for machines that have been designed and built according to the provisions of this type C standard.

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EN 13684:2004+A2:2009 (E)**1 Scope**

This European Standard specifies safety requirements and their verification for the design and construction of pedestrian controlled integrally powered lawn aerators and scarifiers which are designed for re-generating lawns by, for instance, combing out grass, thatch and moss or cutting vertically into the lawn face using tines which rotate about a horizontal axis. It describes methods of elimination or reduction of hazards arising from their use. In addition, it specifies the type of information to be provided by the manufacturer on safe working practices.

Throughout this standard, the term “machine” applies to those machines known as aerators, scarifiers, corers, lawn rakes or grass rakes.

This standard does not apply to aerators/scarifiers made from a machine falling within the scope of EN 709:1997 when fitted with an aerating/scarifying implement, non-powered aerators, vertical axis aerators or those aerators which cut into the soil by means of a reciprocating motion or by water pressure. The electrical aspects of mains operated machines are covered by EN 60335-1. The safety aspects of batteries other than batteries for starting the engine and the electrical safety aspects of battery powered lawn aerators and scarifiers are not covered by this standard.

This standard deals with all significant hazards, hazardous situations and events relevant to scarifiers and aerators, when they are used as intended and under the conditions foreseen by the manufacturer (see Clause 4).

Environmental hazards and EMC have not been considered in this standard.

This document is not applicable to aerators/scarifiers which are manufactured before the date of publication of this document 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 294:1992, *Safety of machinery — Safety distance to prevent danger zones being reached by the upper limbs.*

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 1033:1995, *Hand-arm vibration — Laboratory measurement of vibration at the grip surface of hand-guided machinery — General.*

EN 1070, *Safety of machinery — Terminology.*

EN 60335-1:2002, *Household and similar electrical appliances — Part 1: General requirements (IEC 60335-1:2001, modified).*

EN ISO 354:2003, *Acoustics - Measurement of sound absorption in a reverberation room (ISO 354:2003).*

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 11201:1995, *Acoustics — Noise emitted by machinery and equipment — Measurement of emission sound pressure levels at a work station and at other specified positions — Engineering method in an essentially free field over a reflecting plane (ISO 11201:1995).*

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).*

EN ISO 12100-1:2003, *Safety of machinery - Basic concepts, general principles for design - Part 1: Basic terminology, methodology (ISO 12100-1:2003).*

EN ISO 12100-2:2003, *Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles (ISO 12100-2:2003).*

ISO 3767-1:1998, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 1: Common symbols.*

ISO 3767-3:1995, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 3: Symbols for powered lawn and garden equipment.*

ISO 3767-4:1993, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Symbols for operator controls and other displays — Part 4: Symbols for forestry machinery.*

ISO 3864-1:2002, *Graphical symbols — Safety colours and safety signs — Part 1: Design principles for safety signs in workplaces and public areas.*

ISO 11684:1995, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Safety signs and hazard pictorials — General principles.*

3 Terms and definitions

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

3.1

braking system

combination of one or more brakes and the related means of operation and control

3.2

catcher

part or combination of parts which provides a means for collecting grass, thatch, moss or other debris

3.3

control

means or device which will control the operation of the machine or any specific operating function thereof

3.4

working position

any depth setting of the tines designated by the manufacturer

EN 13684:2004+A2:2009 (E)**3.5****discharge chute**

extension of the tine enclosure from the discharge opening, generally used to control the discharge of material from the tines

3.6**discharge opening**

gap or opening in the tine enclosure through which grass, thatch, moss and other debris may be discharged

3.7**front discharge**

denotes throwing out grass, thatch and moss so that they will be collected in a catcher which is located in front of the tines

3.8**handle**

all parts likely to be hand-held for guiding the machine in normal use

3.9**lawn aerator (also known as corer)**

machine which uses the ground to determine the depth of cut, designed for penetrating the lawn surface

3.10**lawn scarifier (also known as lawn rake)**

machine designed to scratch the surface, or earth face thereby also combing the lawn

3.11**maximum operating engine/motor speed**

highest engine/motor speed obtainable when adjusted in accordance with the machine manufacturer's specifications and/or instructions with the tines engaged

3.12**normal operation**

any use of the machine which is specified by the manufacturer and which is consistent with such activities as combing thatch, starting, stopping, fuelling, connecting to (or disconnecting from) a power source

3.13**normal use**

normal operation, plus routine maintenance, servicing, cleaning, transporting, attaching or removing accessories, and making adjustments as determined by the manufacturer's instructions

3.14**operator control**

any control requiring operator actuation to perform specific functions

3.15**operator presence control**

control designed so that it will automatically interrupt power to a drive when the operator's actuating force is removed

3.16**operator zone**

zone for persons operating a machine as presented in Figure 1

3.17**parking brake**

device incorporated in the machine which, when operated, prevents the machine from moving from a stationary position and which will remain applied without the operator being present

3.18**power source**

engine or motor which provides mechanical energy for movement of the tines and traction drive

3.19**rear discharge**

denotes throwing out grass, thatch and moss so that they will be collected in a catcher which is located behind the tines

3.20**service brake**

designated primary means for decelerating and stopping a machine from its ground travel speed

3.21**tine**

mechanism used to provide the penetrating or scratching action of a machine

3.22**tine enclosure**

part or assembly which provides the protective means around the tines

3.23**tine tip circle**

path described by the outermost point of the tine as it rotates about its shaft axis

3.24**traction drive**

means (system) used to transmit power from the power source to the ground drive means

3.25**width of cut**

total width of scarification/aeration measured across the tines at right angles to the direction of travel

4 List of significant hazards

This Clause contains for defined danger zones all the significant hazards, hazardous situations and events covered by this standard, identified by risk assessment as significant for this type of machines and which require specific action by the designer or manufacturer to eliminate or to reduce the risk (see Table 1).

It is the responsibility of the manufacturer to check whether or not the safety requirements specified in this standard apply to each significant hazards presented by its specific machine and to validate that the risk assessment is complete with particular attention to:

- the intended use of the machine including maintenance, setting and cleaning and its reasonably foreseeable misuse;
- the identification of all significant hazards associated with the machine.

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Table 1 — List of significant hazards associated with scarifiers and aerators

Ref. No. ^a	Hazard	Location or event	Clause/sub-clause of this standard
Hazards, hazardous situations and hazardous events			
1	Mechanical hazards due to:		
	— machine parts or work pieces, e.g.:		
	e) inadequacy of mechanical strength;	Tine failure/strength	5.14
	— accumulation of energy inside the machinery e.g.:		
	g) liquids and gases under pressure;	Hydraulic fluid leakage/burst	5.6, 6.1
1.2	Shearing hazard	Contact with moving parts	5.2, 5.3, 5.10.2, 5.15, 6.1, 6.2 and annex A
1.3	Cutting or severing hazard	Contact with moving parts	5.2, 5.3, 5.10.2, 5.15, 6.1, 6.2 and annex A
1.4	Entanglement hazard	Contact with moving parts	5.2, 5.3, 5.10.2, 5.15, 6.1, 6.2 and annex A
1.5	Drawing-in or trapping hazard	Contact with moving parts	5.2, 5.3, 5.10.2, 5.15, 6.1, 6.2 and annex A
1.6	Impact hazard	Hit by thrown objects	5.3, 5.13
1.9	High pressure fluid injection or ejection hazard	Penetration by high pressure fluid	5.6, 6.1
2	Electrical hazards due to:		
2.1	Contact of persons with live parts (direct contact)	Contact with live parts	5.9.3
2.3	Approach to live parts under high voltage	Contact with HT ignition parts	5.9.3
2.5	Thermal radiation or other phenomena such as the projection of molten particles and chemical effects from short circuits, overloads, etc.	Protection against circuit overload	5.9.2.3
3	Thermal hazards, resulting in:		
3.1	Burns, scalds and other injuries by a possible contact of persons with objects or materials with an extreme high or low temperature, by flames or explosions and also by the radiation of heat sources	Contact with hot parts	5.4
4	Hazards generated by noise, resulting in:		
4.1	Hearing loss (deafness), other physiological disorders (e.g. loss of balance, loss of awareness)	Hearing damage	5.16, 6.1, 6.2 and annex A, annex C
5	Hazards generated by vibration		
5.1	Use of hand-held machines resulting in a variety of neurological and vascular disorders	Vibration white finger	5.17, 6.1, annex E
			(continued)

Table 1 — List of significant hazards associated with scarifiers and aerators (continued)

7	Hazards generated by materials and substances (and their constituent elements) processed or used by the machinery		
7.1	Hazards from contact with or inhalation of harmful fluids, gases, mists, fumes, and dusts	Breathing engine exhaust fumes	5.5, 6.1
		Contact with hazardous fluids	5.7, 6.1
7.2	Fire or explosion hazard	Abrasion of wire insulation etc	5.9.2.1
8	Hazards generated by neglecting ergonomic principles in machinery design as, e.g. hazards from:		
8.1	Unhealthy postures or excessive effort	Position of controls	5.8.1
8.2	Inadequate consideration of hand-arm or foot-leg anatomy	Position of controls	5.8.1
		Position of handle	5.12
8.3	Neglected use of personal protection equipment	Eye and ear protection	6.1, annex A
8.7	Inadequate design, location or identification of manual controls	Position of controls	5.8.1, 5.8.2
9	Combination of hazards		
10	Unexpected start-up, unexpected over-run/over-speed (or any similar malfunction) from:		
10.6	Errors made by the operator (due to mismatch of machinery with human characteristics and abilities, see 8.6)	Removal of guards before stopping machine	5.3
		Over-speed of engine	5.8.1
		Leaving unattended machine running	5.8.3
16	Break-up during operation	Broken tines	5.14
17	Falling or ejected objects or fluids	Thrown objects	5.3, 5.13
Additional hazards, hazardous situations and hazardous events due to mobility			
20	Relating to the travelling function		
20.1	Movement when starting the engine	Movement of the machine	5.8.1, 5.8.3, 5.8.4
20.2	Movement without a driver at the driving position	Operator presence control — tines	5.8.3
		Operator presence control — traction	5.8.4
20.6	Insufficient ability of machinery to be slowed down, stopped and immobilised	Stopping from travelling	5.11.1, 5.11.2
		Keeping stationary	5.11.3
21	Linked to the work position (including driving station) on the machine		
21.4	Mechanical hazards at the work position: c) fall of objects, penetration by objects e) contact of persons with machine parts or tools (pedestrian controlled machines)	Thrown objects	5.3, 5.13
		Feet in contact with tines	5.12
			(continued)

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Table 1 — List of significant hazards associated with scarifiers and aerators (concluded)

21.8	Noise at the work position	Hearing damage	5.16, 6.1, 6.2 and annex A, annex C
21.9	Vibration at the work position	Vibration white finger	5.17, 6.1, annex E
22	Due to the control system		
22.1	Inadequate location of manual controls	Position of controls	5.8.1
22.2	Inadequate design of manual controls and their mode of operation	Reverse only with rearward movement of control	5.8.4
24	Due to the power source and to the transmission of power		
24.1	Hazards from the engine and the batteries	Harm from battery vapour	5.9.2.2
25	From/to third persons		
25.1	Unauthorised start-up/use	Removable key	5.10.1
25.2	Drift of a part away from its stopping position	Positive stop control	5.10.1
26	Insufficient instructions for the driver/operator		6.1, 6.2 and annex A
^a References are according to EN 1050:1996, annex A			

5 Safety requirements and/or protective measures

5.1 General

The machines shall comply with the safety requirements and/or protective measures of this Clause. In addition, the machine shall be designed according to the principles of EN ISO 12100 for hazards relevant but not significant, which are not dealt with by this document (e.g. sharp edges on the outside of the machine).

5.2 Power driven components (other than the cutting means)

All power driven transmission components except the ground-contacting parts of the machine shall be guarded to prevent contact with these parts during normal operation. For guarding of the tines see 5.15.

Except where otherwise stated in this standard all openings and safety distances shall conform to 4.5.1 and 4.5.3 of EN 294:1992.

Compliance shall be checked by inspection and measurement.

5.3 Guard attachment

Guards allowing access to power driven components, other than the tines, shall be interlocked at least according to category 1 of EN 954-1, to cause the moving parts to come to rest before access can be gained. While the power driven component is exposed it shall not be possible for it to be driven. Other guards shall be fixed guards and shall not be detachable without the use of tools, or the construction of the machine shall be such that it cannot be used without the guard in its guarding position. Guarding shall be designed to prevent hazardous thrown objects. This shall be tested according to 5.13.

5.4 Hot exhaust surfaces

5.4.1 General

Exposed components of the power source exhaust system having a surface temperature greater than 80 °C at (20 ± 3) °C ambient temperature shall be considered hot and shall be guarded so that they are not accessible to unintentional contact during normal use. These parts, which shall also include the power source exhaust guard, are considered accessible if the area contactable by the appropriate test cone (see Figure 2) is larger than 10 cm².

It is not necessary to test the accessibility of hot parts while they are hot. Allow the hot parts to cool before using the cone(s).

5.4.2 Test equipment and method of test

5.4.2.1 Temperature measuring equipment

The temperature measuring equipment for hot surfaces shall have an accuracy of ± 4 °C.

5.4.2.2 Method of test

The test shall be conducted in the shade. The power source shall be operated at its maximum operating engine/motor speed until the surface temperatures stabilise. Identify the hot surface area(s) on the power source exhaust system and guard. Temperatures shall be determined by correcting the observed temperature by the difference between the specified ambient and test ambient temperature.

When the distance between the identified hot area and the nearest control is > 100 mm, Cone A in Figure 2 shall be used. For a distance ≤ 100 mm between the identified hot area and the nearest control, Cone B in Figure 2 shall be used.

For Cone A, with the axis of the cone anywhere between 0° and 180° to the horizontal and with the nose or point of the cone in a downward to horizontal direction, move the cone towards the hot surface. Cone A shall not be moved in an upward direction. Cone B shall be moved in any direction.

When moving the cone(s), determine if contact is made with the hot surface area(s) by the cone tip or conical surface of the cone.

5.4.3 Test acceptance

The tip or conical surface of Cone A or Cone B shall not be able to make contact with a hot surface area greater than 10 cm².

5.5 Protection from exhaust fumes

Engine exhaust, shall not be directed towards the operator.

Compliance shall be checked by inspection.

5.6 Pressurised components

Hydraulic systems and their components shall comply with the relevant parts of EN 982:1996. Pressurised hoses, lines and components shall be located or shielded so that in the event of rupture the fluid cannot be discharged directly on to the operator when in the operating position.