

American National Standard

*for Outdoor Power Equipment –
Internal Combustion Engine–Powered
Hand-Held Grass Trimmers
and Brushcutters –
Safety and Environmental Requirements*



**ANSI/OPEI
B175.3-2019**
Revision of
ANSI/OPEI B175.3-2013

American National Standard
for Outdoor Power Equipment –
**Internal Combustion Engine–Powered
Hand-Held Grass Trimmers
and Brushcutters –
Safety and Environmental Requirements**

Sponsor

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Foreword (This foreword is not part of American National Standard ANSI/OPEI B175.3-2019.)

This is the fourth revision of *American National Standard for Outdoor Power Equipment - Internal Combustion Engine-Powered Hand-Held Grass Trimmers and Brushcutters - Safety and Environmental Requirements*, ANSI/OPEI B175.3-2019. The first edition of this standard was developed under the auspices of the Portable Power Equipment Manufacturers Association (PPEMA). The following editions of this standard were developed under the auspices of the Outdoor Power Equipment Institute (OPEI).

A summary of the principal changes included in this revision is as follows:

- Clause 6.1, addition of engine starting device requirements;
- Clause 7.1, addition of cutting attachment retention requirements;
- Clause 7.2.3, addition of production against power driven parts;
- Clause 11, addition of hot surface requirements;
- Clause 14.1, addition of throttle engagement requirements;
- Clause 16, addition of protection against parts of the unit under high voltage;
- Annex C, addition of a new normative Annex C on Hot Surfaces and adjustment of designation letters in the titles of subsequent Annexes.

This standard contains five normative annexes, which are all considered part of this standard. Annex A is informative and not considered part of this standard.

Consensus for this standard was achieved by use of the Canvass Method.

Suggestions for improvements to this standard are welcome. They should be sent to the Outdoor Power Equipment Institute, 1605 King Street, Alexandria, VA 22314.

The following organizations recognized as having an interest in the standardization of safety requirements for grass trimmers and brushcutters were contacted prior to the approval of this standard. Inclusion in the list does not necessarily imply that the organization concurred with the submittal of the proposal to ANSI.

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American National Standard
for Outdoor Power Equipment –

Internal Combustion Engine–Powered Hand-Held Grass Trimmers and Brushcutters – Safety and Environmental Requirements

1. Scope and Purpose

1.1. Scope

The requirements of this Standard apply to:

- a) Internal combustion engine–powered, hand-held, grass trimmers intended for use with flexible nonmetallic line, or other types of nonmetallic cutting attachments, and
- b) Internal combustion engine–powered, hand-held, brushcutters intended for use with cutting blades and other cutting attachments.

NOTE – If a grass trimmer is marketed by the manufacturer as convertible to a brushcutter, then the converted unit shall comply with requirements for brushcutters and vice-versa.

A convertible unit may be marketed as a grass trimmer or a brushcutter without including the devices required for conversion in the packaging, provided the operator manual clearly addresses the need to acquire and use the required conversion devices and the manufacturer makes such devices available as optional equipment. Trimmers and brushcutters with back mounted power units are not covered by this standard.

This standard is not applicable to units equipped with metallic cutting attachments consisting of more than one piece, e.g., pivoting chains or flail blades.

The requirements of this standard do not cover cutting attachments not approved for use by the equipment manufacturer. However, the applicable test procedures, related to cutting attachments, contained within this standard may be used by a component manufacturer of after-market cutting attachments to qualify their cutting attachments for use on grass trimmers or brushcutters manufactured by entities other than the component manufacturer. Should the manufacturer of after-market cutting attachments choose to comply with this standard, such manufacturer shall conduct the tests relating to the cutting attachments on the units they recommend them for and keep records related to the test results.

NOTE – English conversions are shown in brackets and are included for information only.

The effective implementation date of this standard shall be two (2) years after the publication date and shall apply to all products built after that date. Manufacturers may also comply with this standard any time after the publication date.

“ANSI/OPEI B175.3-2019” and “ANSI B175.3-2019” may be used interchangeably wherever referenced in this standard.

1.2. Purpose

The purpose of this standard is to establish safety and environmental requirements for internal combustion engine–powered, hand-held, grass trimmers and brushcutters.

2. Normative References

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.”

ANSI/ASTM E29 -08, *Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications*

ANSI/ISEA Z87.1, *American National Standard for Occupational and Educational Personal Eye and Face Protection Devices*

ANSI/SAE J184-1998, *Qualifying a Sound Data Acquisition System (Surface Vehicle Recommended Practice)*

ANSI/UL 969-2018, *Marking and Labeling Systems*

IEC 61032 Ed. 2.0b b Cor.1:2003, *Protection of Persons and Equipment by Enclosures – Probes for Verification*

IEC 61672-1:2013, *Electroacoustics – Sound level meters – Part 1: Specifications*

IEC 61672-2:2017, *Electroacoustics – Sound level meters – Part 2: Pattern evaluation tests*

ISO 1431-1:2004, *Rubber, vulcanized or thermoplastic – Resistance to ozone cracking – Part 1: Static and dynamic strain testing*

ISO 7918:1995, *Forestry machinery – Portable brushcutters and grass trimmers – Cutting attachment guard strength*

ISO 8893:1997-12, *Forestry machinery – Portable brushcutters and grass trimmers – Engine performance and fuel consumption*

ISO 22867:2011, *Forestry and garden machinery – Vibration test code for portable hand-held machines with internal combustion engines – Vibration at the handles*

ISO 22868:2011, *Forestry and garden machinery – Noise test code for portable hand-held machines with internal combustion engines – Engineering method (Grade 2 accuracy)*

SAE J335-2012, *Multiposition Small Engine Exhaust System Fire Ignition Suppression*

U.S. Department of Agriculture Forest Service, *Standard for Spark Arresters for Internal Combustion Engines 5100-1d*

UL 60745-1 First Edition (IEC 60745-1:2006), *Hand-Held Motor-Operated Electric Tools - Safety - Part 1: General Requirements*

3. Definitions

- 3.1. Barrier:** A device intended to restrain the operator from moving toward the cutting attachment and vice-versa, and intended to prevent inadvertent operator contact with the cutting attachment. (See Figures 1 and 5.)
- 3.2. Blade-Capable Units:** All brushcutters, and any trimmer that its manufacturer markets as convertible to a brushcutter.
- 3.3. Blade Thrust:** The sudden sideways, forward or backward motion of the unit, which may occur when the blade jams or catches on an object such as a sapling or tree stump.
- 3.4. Brushcutter:** Unit using a rotating blade made of metal or plastic intended to cut weeds, brush, small trees and similar vegetation. (See Figure 2(a).)
- 3.5. Clutch:** A mechanism for connecting and disconnecting a driven member to and from a rotating source of power.
- 3.6. Cutting Attachment:** Any rotating device(s) used to cut vegetation.
- 3.7. Cutting Attachment Shield:** A structure covering a portion of the cutting attachment.
- 3.8. Cutting Blade:** A rotating device made of rigid material with cutting edges.

- 3.9. Cutting Path:** Cutting width equal to the blade diameter, or two times the distance from the center of the cutting attachment to the line limiter for cutting means with flexible nonmetallic line(s) or string(s).
- 3.10. Drive Shaft:** A shaft used to transmit power from the engine to the cutting attachment.
- 3.11. Dry Weight:** Weight of the unit with empty fuel/oil tank(s) and without cutting attachment and cutting attachment guard(s).
- 3.12. Family:** A series of units that are identical except for the engine mass and displacement.
- 3.13. Grass Trimmer:** A unit using flexible nonmetallic line(s), string(s), or similar nonmetallic cutting means, such as pivoting blades, intended to cut vegetation. (See Figure 2(b).)
- 3.14. Hand-Held:** A unit that during operation is supported and controlled by the user. A harness may aid in providing support.
- 3.15. Handle(s):** A structure that enables the operator to hold and control the unit during operation.
- 3.16. Harness:** Adjustable strap(s) by which the unit is suspended from the operator, which may or may not include a waist belt.
 - a) Single Harness:** The weight of the unit is distributed through one strap to the operator.
 - b) Double Harness:** Two straps that distribute the load of the unit over both shoulders of the operator.
 - c) Restrictive Harness:** A harness including a waist belt or other protective device designed for the purpose of supporting part of the total unit weight and restricting movement of the harnessed unit toward or away from the operator to the extent allowed by other devices such as barriers. (See Figure 1.)
- 3.17. Line Limiter:** A device for controlling flexible line length.
- 3.18. Maximum Power Speed:** Engine speed at which maximum corrected brake power is obtained. Maximum power speed is obtained in accordance with ISO 8893.
- 3.19. May:** Indicates a permissive condition.

- 3.20. Muffler:** Device for reducing engine exhaust noise and directing the flow of the exhaust gases.
- 3.21. Occasional Use:** Infrequent or moderate, non-income use.
- 3.22. Operating/Cutting Position:** Examples of operating/cutting positions are illustrated in Figure 1. This standard does not specify the operating/cutting position. The dimensions provided are based on the operator position shown in Figure 1. Should the operating position be on the opposite side of the examples shown in Figure 1, then the dimensions referred to would be reversed.
- 3.23. On/Off Stop Control:** A control that allows the engine to run or stop.
- 3.24. Output Shaft:** The shaft to which the cutting attachment is connected.
- 3.25. Power Head:** Power source for the unit.
- 3.26. Quick Release Mechanism:** A device which allows the operator to disconnect from the unit in case of emergency.
- 3.27. Room Temperature:** $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ($68^{\circ}\text{F} \pm 9^{\circ}\text{F}$).
- 3.28. Shaft Housing:** A structure that encloses and supports the drive shaft and that connects the engine to the cutting attachment.
- 3.29. Shall:** Indicates a mandatory requirement.
- 3.30. Spark Arresting Muffler:** A muffler that contains a device through which exhaust gases pass to limit the size of particle emissions.
- 3.31. Starter:** A mechanism that rotates the engine crankshaft.
- 3.32. Support Fitting:** Element of the unit to which the harness is attached.
- 3.33. Throttle:** A device that adjusts the volume of fuel and air mixture delivered to the combustion chamber of an internal combustion engine.
- 3.34. Throttle Control:** A device activated by the operator to regulate the throttle.
- 3.35. Throttle Control Lock-out:** A mechanism which prevents the unintentional activation of the throttle control unless the operator releases it.
- 3.36. Throttle Control Latch:** A device to temporarily set the throttle in a partially open position to aid in starting the engine.

3.37. Throttle Linkage: A mechanism that transmits motion from the throttle control to the throttle.

3.38. Unit: A complete grass trimmer and/or brushcutter.

3.39. Vegetation: Grass, weeds, brush, saplings or the like.

4. Cutting Attachment Shield

The purposes of a shield are to:

- 1) provide a means for including a line limiter for a shield intended to be used with flexible line cutting attachments;
- 2) indicate to the operator the plane of operation of the cutting attachment;
- 3) provide the operator with a visual means of determining the cutting edge;
- 4) reduce the likelihood of operator contact with the cutting attachment;
- 5) reduce the amount of cutting debris thrown back toward the operator; and
- 6) elevate the cutting device off the ground during starting.

These statements assume that the product is used as intended by the manufacturer. These purposes should be accomplished while maintaining the utility of the product and without increasing the likelihood of removal or modification of the shield.

4.1. Requirements

4.1.1. All units shall be designed to accept a cutting attachment shield. The shield shall be included with the unit at the time of purchase.

4.1.2. When installed in accordance with manufacturer's recommendations, a shield shall remain in the originally installed position when evaluated in accordance with 4.2.

4.1.3. A shield and its mounting shall not crack or break when evaluated in accordance with 4.2.

4.1.4. A brushcutter shield shall meet the dimensional requirements in accordance with ISO 7918. (See Figure 3.)

4.1.5. A grass trimmer shield shall meet the dimensional requirements in accordance with ISO 7918. (See Figure 4.)

4.2. Cutting Attachment Shield Test Procedure

4.2.1. Cutting Attachment Shield Integrity Test

- a) The shield shall be impacted with a 2.5 kg (5.5 lb) pendulum from a height of 1000 mm (40 in). The pendulum arm mass shall be as light as possible. (See Figure 8.)
- b) The unit shall be mounted on a swivel bracket as close to the power head as possible. (See Figure 8.)
- c) Shields and/or mountings shall be conditioned at the test temperature for 4 hours:
 - 1) Metallic shields and/or mountings shall be tested at $20^{\circ}\text{C} \pm 5.6^{\circ}\text{C}$ ($68^{\circ}\text{F} \pm 10^{\circ}\text{F}$);
 - 2) Nonmetallic shields and/or mountings, for string trimmers shall be tested at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($104^{\circ}\text{F} \pm 4^{\circ}\text{F}$);
 - 3) Nonmetallic shields and/or mountings for brushcutters shall be tested at $40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ ($104^{\circ}\text{F} \pm 4^{\circ}\text{F}$) and at $-25^{\circ}\text{C} \pm 3^{\circ}\text{C}$ ($-13^{\circ}\text{F} \pm 5^{\circ}\text{F}$) after reconditioning.
- d) Twenty-five impacts shall be conducted at the rear edge and twenty-five impacts at the side edge of the same shield.

5. Clutches

5.1. Power Disengagement

All blade capable units shall have a clutch that disengages power to the cutting attachment when the engine speed is reduced to the manufacturer's recommended idling speed.

6. Engine Starting and Stopping Devices

6.1. Engine Starting Device

An engine starting device shall be provided. If a manual starter is provided, it shall be permanently attached to the unit, and if using a rope, shall have a recoil device. If an electric starter is provided, it shall require two or more separate and dissimilar actions to activate. A combination manual/electric starter must fulfill all requirements.

The means of starting the engine shall be verified by inspection and functional testing.

6.2. Engine Stopping Device

6.2.1. Applicability and Location

All units shall be equipped with an engine stopping device that brings the engine to a complete stop. For blade-capable units only, the control for this device shall be so positioned that it can be operated while the unit is being held with both hands, and its operation shall not depend on sustained manual effort. The engine-stopping device for non-blade-capable units may depend on sustained manual effort.

6.2.2. Identification

The purpose and method of operation of the device shall be clearly and durably marked. The color of the control shall contrast to the background.

7. Cutting Attachment

7.1. Retention

When acted upon by the driving torque of the unit, the fastener system for flexible nonmetallic cutting attachments shall be tightened by the driving torque.

For all other cutting attachments, the following requirements apply:

The fastening system shall be secured against detaching during use by;

- having a fastening system that is tightened by the driving torque of the unit, or
- having a fastening system secured by a method not acted upon by rotational forces

The method of attachment shall provide tension (clamping force) to the blade to prevent movement of the blade during normal use. The blade attachment shall withstand the test torque as follows:.

The function of the attachment method shall be verified by the following test procedure.

- a) Install the cutting attachment in accordance with the instructions.
- b) Lock the power transmission shaft.
- c) Apply to the blade a rotational torque, M , N · m:

$$M = 0,4 \times V \times k$$