American National Standard

for Powered Shredder/Grinders, Shredder/Baggers, Chippers, and Walk-Behind Chipper/Vacuums –

Safety Specifications

ANSI/OPEI B71.6-2000

Approved American National Standard

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ANSI/OPEI B71.6-2000
Revision of
ANSI/OPEI B71.6-1990

American National Standard for Powered Shredder/Grinders, Shredder/Baggers, Chippers, and Walk-Behind Chipper/Vacuums –

Safety Specifications

Secretariat

Outdoor Power Equipment Institute, Inc.

Approved February 29, 2000

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Contents

Page

Foreword ii

1 Scope 1

2 Normative references 1

3 Definitions 2

4 Controls 3

5 Shields and guarding requirements 3

6 Servicing 4

7 Electrical requirements 4

8 Label requirements 5

9 Safety signs and instructions 5

10 Performance tests 5

11 Tests for fuel lines and fuel tanks 8

Figures

1 Probe 1: Simulated foot 9

2 Probe 2: Simulated arm 9

3 Probe 3: Power drive guards 10

4 Test arrangement 10

5 Safety signs 11

6 Safety instruction for shredders 11

Annexes

A Rationale 15

B Bibliography 18

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Foreword (This foreword is not part of American National Standard B71.6-2000.)

This standard is the second revision of the *American National Standard for Powered Shredder/Grinder and Shredder/Baggers - Safety Specifications.* The first standard was approved and published by the American National Standards Institute in 1982, the first revision in 1990. The principle purpose of this current revision is to bring safety requirements to the current state-of-art and to fulfill ANSI's five-year review process.

There are two annexes in this standard. Annexes A and B are informative and are not considered part of this standard.

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

Suggestions for improvement of this standard will be welcome. They should be sent to the Outdoor Power Equipment Institute, 341 South Patrick Street, Alexandria, VA 22314.

The following organizations recognized as having an interest in the standardization of safety requirements for shredder/grinders, shredder/baggers, chippers, and walk-behind chipper/vacuums were contacted prior to the approval of this revision of the 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 Powered Shredder/Grinders Shredder/Baggers,
Chippers, and Walk-Behind Chipper/Vacuums –

Safety Specifications

1 Scope

The specifications in this standard are intended to apply to rotary and hammermill shredder/baggers, shredder/grinders, chippers and walk-behind chipper/vacuums that are sold for use as consumer products. Power may be supplied by internal combustion engines or electric motors. This standard is not intended to cover those units manufactured and sold primarily as commercial units.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this American National Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this American National Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below.

ANSI Z535.4-1998, *Product safety signs and labels* [1)]

ANSI/SAE J1326-JUL97, *Graphical symbols for operator controls, and displays on off-road, self-propelled work machines* [1)]

ANSI/SAE J2031-JAN90, *High-tension ignition cable* [1)]

ASAE S203-DEC96, *Rear power take-off for agricultural tractors* [2)]

ASTM G23-96, *Standard practice for operating light-exposure apparatus (carbon-arc type) with and without water for exposure of non-metallic materials* [3)]

ASTM G26-96, *Standard practice for operating light-exposure apparatus (xenon-arc type) with and without water for exposure of non-metallic materials* [3)]

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* [1)]

ISO 3767-2: 1991, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment – Symbols for operator controls and other displays – Part 2: Symbols for agricultural tractors and machinery* [1)]

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* [1)]

SAE J1292-1987, *Automobile, truck, truck-tractor, trailer, and motor coach wiring* [4)]

UL 82-1994, *Standard for safety for electric gardening appliances* [5)]

[1)] For electronic copies of some standards, visit ANSI's Electronic Standards Store (ESS) at www.ansi.org. For printed versions of all these standards, contact Global Engineering Documents, 15 Inverness Way East, Englewood, CO 80112-5704, (800) 854-7179.
[2)] Available from the American Society of Agricultural Engineers, 2950 Niles Road, St. Joseph, MI 49085-9569.
[3)] Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.
[4)] Available from the Society of Automotive Engineers, 400 Commonwealth Drive, Warrendale, PA 15096-0001.
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3 Definitions

3.1 chipper: A machine having one or more cutting blades, enclosed for the purpose of reducing bulk organic materials.

3.2 clutch: A device used to engage or disengage the load from the power source.

3.3 discharge zone: Any space wherein material is intended to be ejected from the machine.

3.4 engine start: Change of engine state from not producing power to producing power.

3.5 exhaust system: Consists of engine exhaust pipe, exhaust manifold, and muffler of the drive engine and excludes cylinder heads and connecting adapters.

3.6 guard or shield: A part or assembly that restricts access to the drive shredding or grinding mechanism or any combination thereof.

3.7 material discharge deflector: A fixed or movable component used to direct the flow of processed material discharging from the machine.

3.8 penetration: As used in acceptance criteria in 10.3.3 and 10.4.2, rupture of all layers of tissue paper, Kraft paper, or 350-pound corrugated fiberboard test cell surfaces.

3.9 rotor: A power-driven device that cuts, shears, shreds or grinds organic materials.

3.10 rotor housing: The structure or body of the machine that limits access to the rotor.

3.11 screen or grid: A perforated metal plate or bars or rods located in the discharge area of the machine to assist in reducing bulk organic materials.

3.12 shredder/bagger: A shredder/grinder without a screen or grid generally designed to use a collector bag attached to the discharge opening of the machine for collecting shredded organic materials.

3.13 shredder/grinder: A machine having a rotor, rotor housing and a screen or grid for the purpose of reducing bulk organic materials.

3.14 tissue paper: A class of paper of a characteristic gauzy texture, in some cases fairly transparent, made in weights lighter than 8 kg (18 lb) for 500 sheets, each 600 mm by 900 mm (24 inches by 36 inches). This class includes sanitary tissues, wrapping tissues, wax tissue stock, twisted tissue stock, fruit and vegetable wrapping stock, pattern tissue stock, salesbook tissue stock and creped wadding.

3.15 Kraft paper: Paper made essentially from wood pulp produced by a modified sulfate pulping process. Paper should be of a nominal 23 kg (50 lb) per 93 m^2 (1000 square feet).

3.16 operator presence control: A control designed so that it will automatically interrupt power to the drive when the operator's actuating force is removed.

3.17 chipper vacuum/walk-behind or stationary: A machine designed to collect and reduce small yard debris for disposal.

3.18 yard waste: Organic material, typically found in a residential yard that can be further reduced in size or shape.

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4 Controls

4.1 Control location

No control used for stopping, starting, or speed control shall be located in such a manner as to require the operator to be in the discharge zone without a bag attachment or in front of the engine exhaust outlet.

4.2 Control identification

The controls used for stopping, starting, speed control and engaging attachments shall be identified as to operation and direction by a durable label as described in 8.2. A rope or recoil starter need not be identified. Labels shall be located near the control position and shall be legible to the operator when in position to use the control.

Universal symbols as illustrated in ANSI/SAE J1362 or ISO 3767-1, -2, or -3 may be used.

4.3 Engine-shutoff-control device

A shutoff-control device shall be provided to stop operation of the engine (motor). This device shall require manual and intentional activation in order to restart the engine (motor).

4.4 Operator presence control

Operation of a self-propelled chipper vacuum shall require an operator presence control (normally off) for traction engagement located in the operator hand control position. In a reverse direction of travel, the maximum speed shall not exceed 1 meter per second (2.2 miles per hour).

5 Shields and guarding requirements

5.1 Power drives

5.1.1 All power-driven shafts, chains, belts, gears, friction drives and pulleys, but excluding rotating engine air intake screens except as specified herein, shall be positioned or otherwise guarded to prevent contact by the operator during normal starting and operation of the machine. Exposed ends of smooth shafts may not project more than ½ of their diameter. Rope-starter pulleys may be exposed only when starting the engine. Compliance shall be determined by the probe test described in 10.5.2.

5.1.2 Shielding and guarding for attachments to machines using a power take-off shall meet the requirements of ASAE S203.

5.2 Feed-opening protection

If any feed-opening shield or guard cannot be removed from the machine without the use of tools, but can be statically repositioned without the use of tools, a durable label shall be placed on the machine, instructing the operator to maintain the shield or guard in the recommended position when processing materials as specified on the label.

5.3 Discharge-opening protection

5.3.1 Discharge-opening shields or guards shall return automatically to the position of maximum protection if they are repositioned during the mounting or operation of any discharge attachment.

5.3.2 The periphery of the discharge opening shall extend out at least 50 mm (2 inches) from the moving parts of the cutting or shredding mechanism. A safety sign shall be provided in accordance with 9.2.

5.4 Attachment of shields or guards

Any shield, guard, or feed hopper (except feed-opening or discharge-opening shields or guards) that can be removed without the use of tools shall be assembled and attached in a manner that will prevent the engine (motor) from operating when the shield, guard, or enclosure is not in place. Instructions for the installation and use of these mechanisms shall appear in the operator's manual.

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5.5 Discharge or inlet openings

Discharge or inlet openings that may be fitted with a bag or attachment shall be designed to prevent direct access to and inadvertent contact with the cutting means and not allow discharged material to be discharged directly into the operator position when the bag or attachment is not in place. Discharge or inlet openings that do not meet this requirement shall be fitted with an interlock, which causes the power source and moving parts to come to rest.

5.6 Fuel overflow

Fuel overflow shall not pass through the projected exhaust-outlet area, contact high-tension ignition cables or noninsulated electrical connections, or collect on the machine. Shielding may be required to meet this requirement. Compliance with these requirements shall be determined by the fuel-tank-overfill test given in clause 11.

5.7 Hot surfaces

All exposed hot surfaces that may be contacted during normal starting, operation, and refueling of the machine shall have either a guard or shield to prevent inadvertent contact with exposed components that are hot and may cause burns, or shall be indicated by a durable safety label located adjacent to the surface and thermally insulated or shielded, if necessary.

6 Servicing

6.1 General requirements

Specific written instructions with safety information shall be provided with the equipment for servicing operations recommended by the manufacturer that must be performed with the engine running.

6.2 Equipment servicing

Shields or guards shall be provided to prevent inadvertent operator contact with hazardous servicing points.

7 Electrical requirements

7.1 Line-voltage circuits

All line-operated electrical components shall comply with the applicable electrical requirements contained in UL 82.

7.2 Low-voltage battery-powered circuits (not including magneto grounding circuits)

7.2.1 Cable requirements

Insulated cable shall meet the requirements of SAE J1292 where applicable.

7.2.2 Battery installation

The compartment for a vented storage battery shall have openings to provide ventilation and drainage. Drainage of acid from the battery in its operating position shall not come in contact with parts that will be critically affected in such a manner as to create a hazard to the operator.

7.2.3 Overload protection

All circuits, except for starting motor and ignition circuits, shall have overload protective devices on the battery-feed side of switches; except that for two-wire, nongrounded systems, the overload protection may be located in either line (see ANSI/SAE J156, ANSI/SAE J553, and ANSI/SAE J554).

7.2.4 Terminals and uninsulated electrical parts

Terminals and uninsulated electrical parts shall be protected against short-circuiting by a fuel can or tools during normal servicing, refueling, and lubrication.

7.3 High-tension ignition cable

All high-tension ignition cable shall meet the requirements of ANSI/SAE J2031.

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8 Label requirements

8.1 Machine identification

The basic machine and each major attachment should be provided with identification giving the model number and/or serial number and the name and address of a U.S. or Canadian source of replacement parts and service.

8.2 Label durability

Required labels shall be certified by the machine manufacturer to meet the following label and durability requirements. Permanent safety signs are considered to have a reasonable life if the sign has good color and legibility for a period of at least five years. Exterior durability is based on vertical exposure tests for weatherability in the extreme climate of the United States, or a 2000-hr carbon-arc test in accordance with ASTM G23, or a 2000-hr xenon-arc test in accordance with ASTM G26. Other test methods may be used, providing the method ensures equal or superior sign durability.

8.3 Additional requirements

Labels shall form a durable bond with the base material surface and shall show no appreciable loss of adhesion or legibility during weathering exposure or exposure to spilled fuel or oil. When processed and applied in accordance with the label manufacturer's recommendations, labels shall be weather resistant in accordance with 8.2 and, following normal cleaning procedures, shall show no appreciable fading, discoloration, cracking, crazing, blistering, or dimensional change. Labels shall not curl at the edges.

8.4 Types considered durable

8.4.1 Embossed, indented, cast, or molded label shall be considered sufficient to meet the requirements of 8.1.

8.4.2 Metal plates more than 0.48 mm (0.019 in) thick with embossed or etched lettering, and fastened with rivets or equivalent fastening means, shall be considered sufficient to meet the requirements of 8.1.

8.5 Silk screening

Silk screening or other types of marking, when used, shall meet the applicable requirements of 8.1 and 8.2.

9 Safety signs and instructions

9.1 On product labeling

A durable label, as shown in figure 5(a), or a similar statement of these safety practices shall be provided. This safety label shall carry the signal word "DANGER" and conform to the format and color requirements of ANSI Z535.4. Additional statements of safety practices are allowed and the signal word shall conform to 5.3.2 of ANSI Z535.4. Additional safety pictorials such as shown in Figure 5(b) or in ISO 11684 may be used.

9.2 Safety instructions

A manufacturer shall supply, with the equipment, instructions for operation such as those shown in figure 6. Instructions may be tailored to the specific shredder design.

10 Performance tests

10.1 Test conditions

10.1.1 The machine shall be completely assembled and shall rest on a horizontal surface. The machine shall be operated at the maximum speed specified by the manufacturer. A different machine may be used for each test. However, in each test, the unit shall be operating at the manufacturer's maximum specified operating speed.

10.1.2 Any feed or outlet opening shield or guard that can be removed without the use of tools shall be removed when conducting the throwback, probe, or thrown-object tests.

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10.1.3 Screens or grids that may be removed without the use of tools shall be positioned (or removed) to achieve the minimum (or worst) test conditions in the throwback, probe, and thrown-object tests.

10.1.4 Machines using a bagging attachment shall be tested and accepted as specified in 10.4.1 and 10.4.2.

10.1.5 Any feed or outlet opening shield or guard that cannot be removed without the use of tools, but can be statically repositioned without the use of tools shall be placed in the minimum protection position for the throwback, probe and thrown-object tests. This requirement does not apply to access doors used during maintenance.

10.2 Structural integrity tests

10.2.1 Test method without debris bag

A steel bar of sufficient size shall be inserted into any designated feed opening or manufactured access opening causing a sudden stop of the rotor. If the machine does not stop within 15 seconds, the test shall be considered completed.

10.2.1.1 Test acceptance

No portion of the test bar or machine shall be ejected except through the discharge opening. If the machine does not stop in 15 seconds, the test shall be concluded. The machine shall remain standing in its operating position. No part of the machine necessary for compliance with this standard shall become detached, or deformed so that it no longer complies with the standard. It is not required that the machine be suitable for use after test completion.

10.2.2 Test method with debris bag

A debris bag provided by the manufacturer for use with a chipper shredder or chipper vac shall be tested in accordance with the procedure described in 10.2.2.1–10.2.2.3.

10.2.2.1 Test target

Provide a test target as described in 10.4.1. An additional panel of 350-pound test, double walled corrugated paperboard shall be placed to delineate the chipper or chipper/vac side of the operator zone. This target shall extend from the ground level of the unit upward to a height of 2100 mm (7 feet).

10.2.2.2 Test procedure

Introduce 100 hardened (minimum Rockwell C scale 45) steel balls 13 mm (1/2 inch) diameter, one at a time into inlet or processing chamber allowing discharge into debris bag.

10.2.2.3 Test acceptance

Failure of this test shall consist of evidence of any of the following:

- Penetration of bystander target
- Any strike or penetration of operator zone target
- Any opening of zipper or bag seam
- Dislodging of debris bag from adapter or falling from its normal operating position.

10.3 Throwback test

10.3.1 Test cell construction

A test cell no more than 150 mm (6 inches) from all sides of the machine (excluding handles) shall be constructed from 350-lb double-wall corrugated fiberboard. It shall extend vertically to a height no more than 600 mm (24 inches) above the highest point of the feed opening and no higher than 1500 mm (60 inches) from the shredder-supporting surface. The top of the test cell shall be covered with tissue paper or Kraft paper. The lowest point of the test cell shall extend at least 150 mm (6 inches) below the lowest point of the feed opening. Vent openings may be provided, if necessary, to permit machine operation.

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10.3.2 Test method

Ninety seasoned dowels (commercially available hardwood), 9 mm (3/8 inches) in diameter and 150 mm (6 inches) long, shall be introduced three at a time and dropped at random into the machine. The cutting element shall be rotating at the manufacturer's maximum specified operating speed.

10.3.3 Test acceptance

No object shall exit by penetration of any test-cell surface. If the machine fails, two retests are permitted on the same or identical machines, and both shall pass.

10.4 Thrown-object test

10.4.1 Test method

A wall made from 350-lb double-wall corrugated fiberboard shall be placed at a radius of 2400 mm (8 feet) from the center of the discharge opening or discharge opening shield. The machine should be elevated approximately 600 mm (2 feet) from the horizontal surface. The horizontal surface between the shredder and corrugated wall shall be covered with sand or other absorbent material (see figure 4). One hundred sixpenny nails shall be introduced individually into the feed-intake opening, and penetration of the corrugated target shall be recorded.

10.4.2 Test acceptance

No more than 15 objects shall penetrate the target between the area defined from the shredder-support reference level 600 mm ((2 feet) from the horizontal surface) to 600 mm (2 feet) above the level (see figure 4). None of the test objects shall penetrate the target above that 600-mm (2-foot) level defined. If the machine fails, two tests may be conducted on the same or identical machines, and the machine shall pass both. On machines with bags, no nails shall completely exit the bag. Such exiting of nails shall constitute a failure. Additionally, the bag shall not become separated from its intended position during the test. Such a separation shall be considered a failure.

10.5 Probe tests

10.5.1 Feed intake opening

Two different probes shall be employed as illustrated in figures 1 and 2. Probe 1 (see figure 1) shall be inserted as far as possible into any feed-intake opening less than 18 inches from the horizontal plane upon which the unit is resting, and shall be pivoted 15 degrees side to side as shown in figure 1. Probe 2 (see figure 2) shall be inserted into all areas of any feed-intake opening. The machine shall not be operating during probe testing.

10.5.2 Probe test for power-drive guards

The probe shown in figure 3 shall be used to determine the accessibility of components or surfaces as defined in 5.1.1.

10.5.3 Test acceptance

Contact of any part of the probe with the cutting mechanism or other normally-moving parts shall constitute failure.

10.6 Audible or visual warning

The rotor shall include an audible or visual warning to alert the operator, after either declutching or shutting off drive power, that the rotor is coming to rest. If an audible warning is used, it shall consist of a distinct sound level or pitch change.

10.7 Handle fastening

10.7.1 General

The chipper vac handle shall be fastened to the unit as to prevent unintentional uncoupling during operation. The test in 10.7.2 shall be conducted.

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10.7.2 Test method

The chipper vac shall be positioned on a horizontal supporting surface and restrained from movement at the wheels and frame enclosure. A static force of 223 N (50 lb) shall be applied to the rearward part of the handle on the longitudinal centerline of the chipper vac in a direction toward the front of the unit and parallel to the supporting surface.

10.7.3 Test acceptance

There shall be no failures of the handle or handle supporting structure while static force is applied. Upon removal of force, the handle shall not uncouple.

11 Tests for fuel lines and fuel tanks

11.1 Fuel tank overfill test

11.1.1 Test procedure

With the machine at ambient temperature and parked on a level surface, the fuel tank inlet shall be overfilled with 118 cm^3 (4 oz) of liquid in less than 5 seconds.

11.1.2 Flow characteristics

The test liquid should have the same flow characteristics as the fuel intended for use. An example of an acceptable liquid is Stoddard solvent.

11.1.3 Test acceptance

Overflow test liquid (or fuel) shall be prevented from collecting on the machine (surface wetting is acceptable) and shall not pass through the projected exhaust-outlet area, or contact high-tension ignition cables or noninsulated electrical connections.

11.2 Fuel line axial pull test

Fuel lines shall not pull off fittings or fail when subjected to an axial pull of 44 N (10 lb). The test shall be performed with the test liquid in the line. Short lines held in position by compression shall be excluded from this test.

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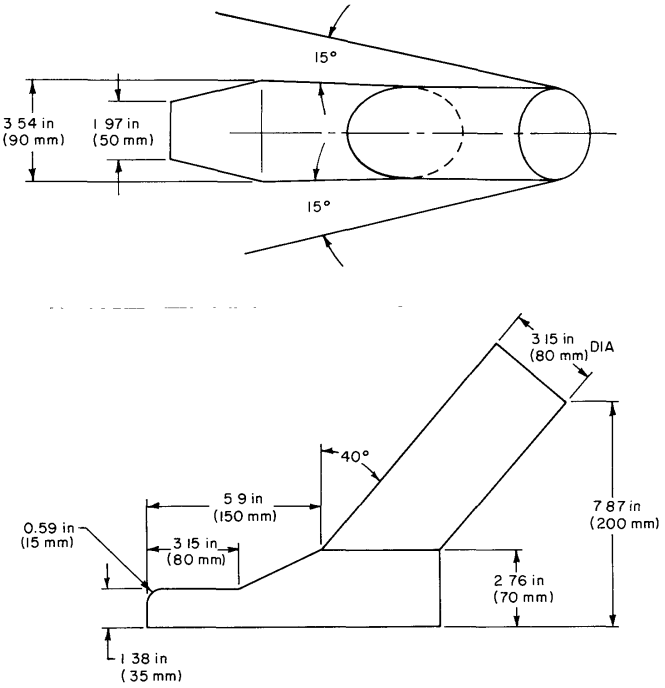


Figure 1 - Probe 1: Simulated foot

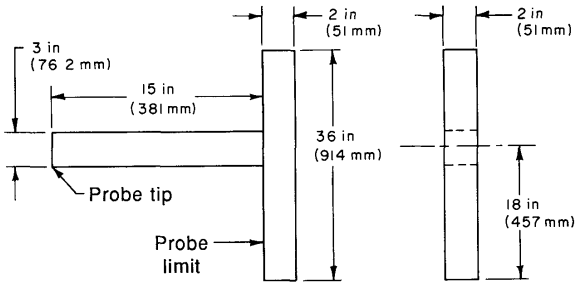


Figure 2 - Probe 2: Simulated arm

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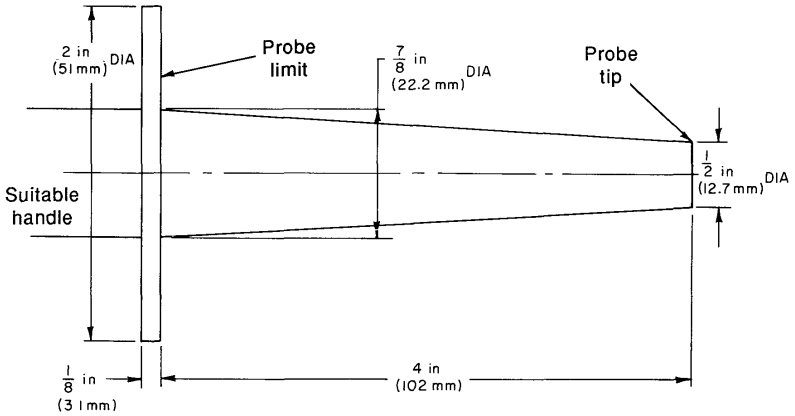


Figure 3 - Probe 3: Power drive guards

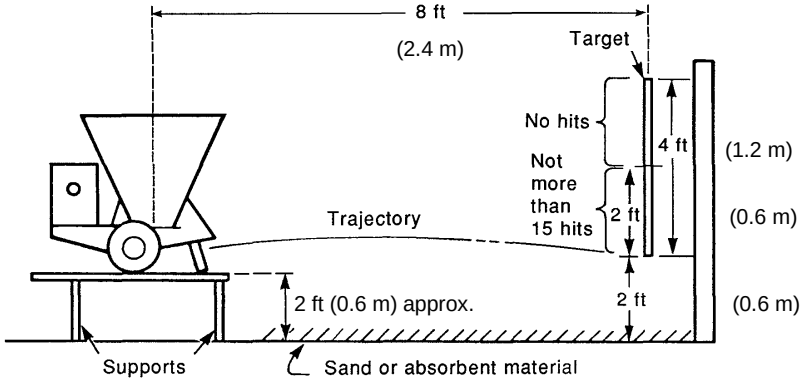
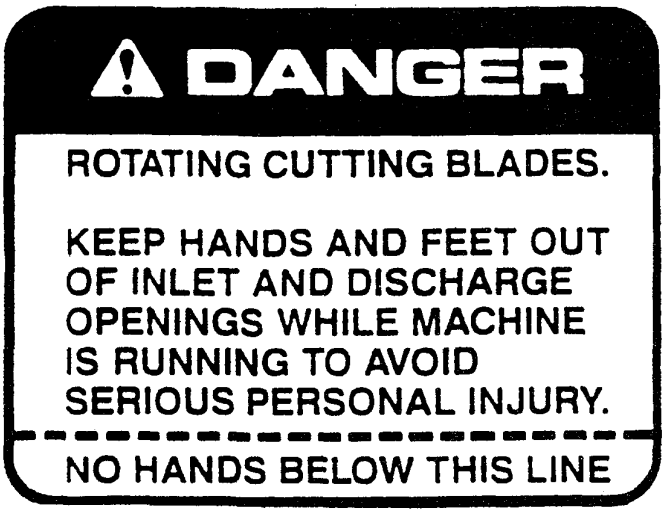


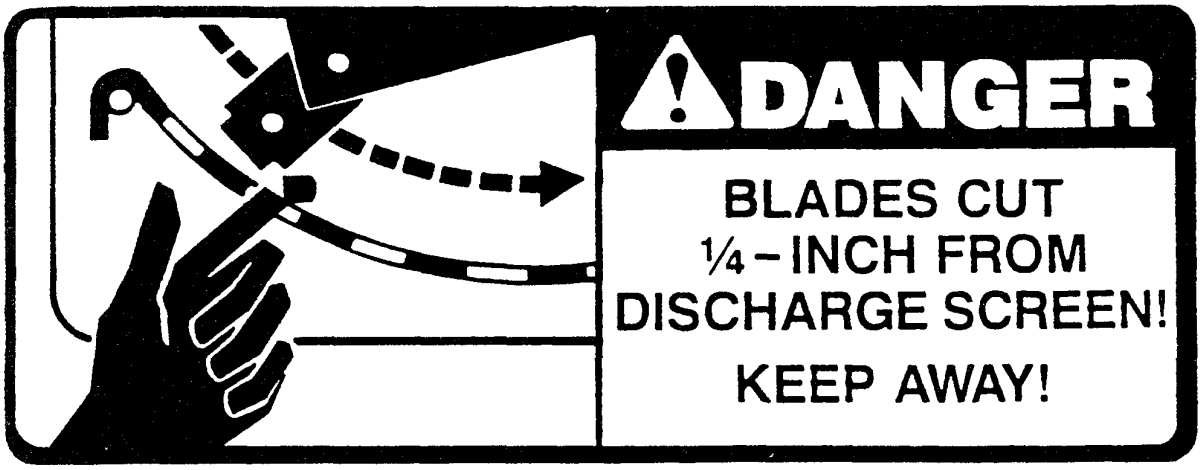
Figure 4 - Test arrangement

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(a) Safety sign



(b) Pictorial safety sign

Figure 5 - Safety signs

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IMPORTANT

Safe Operation Practices for Powered Shredder/Grinders and Walk-Behind Chipper/Vacuums

Training

1. Read the operating and service instruction manual carefully. Be thoroughly familiar with the controls and the proper use of the equipment. Know how to stop the unit and disengage the controls quickly.
2. Never allow children to operate the equipment. Never allow adults to operate the equipment without proper instruction.
3. Keep the area of operation clear of all persons, particularly small children, and pets.
4. Keep in mind that the operator or user is responsible for accidents or hazards occurring to other people, their property, and themselves.

Preparation

1. Thoroughly inspect the area where the equipment is to be used and remove all foreign objects.
2. Disengage all clutches and shift into neutral before starting the engine (motor).
3. Do not operate the equipment without wearing adequate outer garments and safety goggles. Avoid loose-fitting clothes and use protective footwear that will improve footing on slippery surfaces.
4. Warning: Fuel is highly flammable. Take the following precautions:

   (a) Store fuel in containers specifically designed for this purpose.

   (b) Refuel outdoors only and do not smoke while refueling.

   (c) Add fuel before starting the engine. Never remove the cap on the fuel tank or add fuel while the engine is running or when the engine is hot.

   (d) If fuel is spilled, do not attempt to start the engine but move the machine away from the area of spillage and avoid creating any source of ignition until fuel vapors have disappeared.

   (e) Replace all fuel tank and container caps securely.
5. Use extension cord and receptacles as specified by the manufacturer for all units with electric drive motors or electric starting motors.
6. Never attempt to make any adjustments while the engine (motor) is running. (except where specifically recommended by the manufacturer).

Operation

1. Do not put hands or feet near or under rotating parts or at inlet or discharge openings.
2. Exercise extreme caution when operating on or crossing gravel drives, walks or roads. Stay alert for hidden hazards or traffic. Do not carry passengers.
3. After striking a foreign object, stop the engine (motor), remove spark plug wire, and wait for all moving parts to come to a complete stop. Thoroughly inspect the machine for any damage, repair the damage before restarting and operating the machine. Disconnect the cord on electric motors.
4. Exercise caution to avoid slipping or falling.
5. If the machine should start to vibrate abnormally, stop the engine (motor) and check immediately for the cause. Vibration is generally a warning sign of trouble.

Figure 6 - Safety instruction for shredders *(continued)*

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6. Stop the engine (motor) when leaving the operating position, and when making any repairs, adjustments, and inspections.
7. Take all possible precautions as recommended by the manufacturer when leaving the machine unattended. Disengage power take-off, shift into neutral, stop the engine, and remove the key.
8. Before cleaning, repairing, or inspecting, shut off the engine (motor) and make certain that all moving parts have come to a complete stop. Disconnect the spark plug wire, and keep the wire away from the plug to prevent accidental starting. Disconnect the cord on electric motors.
9. Do not operate the engine in a confined space where dangerous carbon monoxide fumes can collect.
10. Never operate the machine without proper guards, plates, or other safety protective devices in place.
11. Keep children and pets away.
12. Do not overload the machine by attempting to chip or shred any material beyond manufacturers recommendation.
13. Never operate the machine at high transport speeds on hard or slippery surfaces.
14. Never allow bystanders near the unit while running.
15. Use only attachments and accessories approved by the manufacturer of the machine.
16. Never operate the machine without good visibility or light.
17. Use extreme caution when reversing or pulling the machine towards you.
18. Do not change the engine governor settings or overspeed the engine.
19. Start the engine or switch on the motor carefully according to the manufacturers instructions. Keep hands and feet away from inlet and discharge areas.
20. Never pick up or carry the machine while the engine is running.
21. Do not operate the machine while under the influence of alcohol or drugs.

Maintenance and Storage

1. Keep machine, attachments, and accessories in safe working condition.
2. Check engine mounting bolts and other hardware at frequent intervals for proper tightness to be sure the equipment is in safe working condition.
3. Never store machine with fuel in the fuel tank inside a building where ignition sources are present, such as hot water and space heaters, clothes dryers and the like. Allow the engine to cool before storing in any enclosure.
4. Always refer to the operator's manual for important details if the machine is to be stored for an extended period.
5. If the fuel tank has to be drained, do this outdoors.
6. Follow the manufacturer's recommendations for safe loading, unloading and storage of machine.

Figure 6 *(continued)*

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Additional Safe Operation Practices for Electric Units

1. Dangerous environments such as damp locations shall be avoided.
2. Do not abuse the cord. A machine should never be pulled by the cord and the cord should never be yanked to disconnect it from the wall receptacle. Keep the cord away from excessive heat, oil, and sharp edges.
3. Disconnect the machine when it is not in use, before servicing, and when changing attachments.
4. Turn off the switch before plugging the cord into the wall receptacle to avoid accidental starting.
5. To prevent shock hazard, the machine should be used only with extension cord suitable for outdoor use as recommended by the machine manufacturer
6. Never use an indoor type of extension cord; these cords are designed for use with lamps and small appliances and are inadequate for high-powered machines.
7. Make sure the cord is in good condition. A cord with cracked or broken insulation is hazardous, particularly in the presence of moisture or combustible material. The cord connectors should also be of rugged construction, in good condition, and be securely attached.
8. If the extension cord is damaged in any manner while operating the machine, remove the cord from the wall receptacle.
9. Use only an electric circuit having adequate capacity as recommended by the manufacturer.
10. Blowing a fuse or tripping a circuit breaker is a warning that an operator is overloading the machine or has too many devices taking power from that circuit, or both. Correct the problem before continuing operation.

Figure 6 *(concluded)*

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Annex A
(informative)

Rationale

This annex gives the rationale behind the various requirements of the standard. The clause numbers correspond to those in the body of the standard.

A.1 Scope

This clause is self-explanatory.

A.2 Normative references

This clause is self-explanatory.

A.3 Definitions

This clause is self-explanatory.

A.4 Controls

A.4.1 The purpose of this requirement is to reduce the possibility of injury, particularly from thrown objects, during the operation of the unit.

A.4.2 This subclause is directed particularly to the new owner to assist him in the operation of the machine. A rope or recoil starter does not need identification since the operator cannot be injured until he/she has used the starter.

A.4.3 Intentional activation is required so that the engine cannot be started accidentally.

A.4.4 The requirement for an operator-pressure control for reverse drive provides safety for the operator in the event he/she should stumble or be pinned by the machine when the machine is operating in reverse.

A.5 Shields and guarding requirements

A.5.1.1 Short, smooth shafts are not considered a hazard. Rope-starter pulleys must be shielded from clothing, etc., after this unit has started.

A.5.2 Some types of material may require the repositioning of a guard in order to process that type of material - for example, long branches being fed into the machine. The warning label is required to remind the operator not to leave the guard in the most open or unsafe position for all types of material.

A.5.3.1 These devices shall automatically return so that they may not be left accidentally in an unsafe position.

A.5.3.2 This extension is required to help prevent the operator from accidentally getting into the blades while working around the discharge opening. The "at least 2 inch" extension of the discharge opening can be above and around (out) from the moving part of the cutting or shredding mechanism.

A.5.4 The purpose is to prevent the operator from operating the machine without the proper guards in place and to provide for shutting down the engine if the guard or shield is removed when the machine is running.

A.5.6 Gasoline may be ignited by a spark from the exhaust system or ignition cables. Collection of gasoline on the unit would promote fires.

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A.6 Servicing

This clause is self-explanatory.

A.7 Electrical requirements

A.7.1 The machine will have been tested for rain under this specification so that any "do not expose to rain" statement is not applicable. Most garden appliances are exposed to rain at one time or another.

A.7.2 and A.7.3

These subclauses are self-explanatory.

A.8 and A.9 Label and safety sign requirements

These clauses describe the requirements that labeling must meet in order to provide the permanency of safety information to the consumer.

A.10 Performance tests

A.10.1.1 Maximum speed is specified because engine speeds may vary considerably from unit to unit.

A.10.1.2 This subclause is self-explanatory

A.10.1.3 If the guard can be removed without the use of tools, the test must be passed without the guard because the guard may well be out of position during actual use of the machine.

A.10.2 The purpose of this test is to ensure that moving components and the housing around them are of sufficient strength that they will contain any parts likely to be broken off during operation. No specific steel bar size is specified because of machine design and size variations and the desire to use performance requirements, wherever possible. If unable to conduct test as described due to design or obstruction at inlet area, a manufactured access opening may be made to complete the test. The requirements in this subclause are compatible with ISO 11148.

A.10.3.1 The test cell is so constructed as to simulate actual use conditions. The 350-pound test board is used to represent the body area of the operator. The tissue paper or Kraft paper is used to represent possible eye contact by flying objects.

A.10.3.2 Dowels are used for uniformity and because they shatter in a possibly dangerous manner.

A.10.3.3 No objects may penetrate the test cell because the operator is normally in proximity to the machine. The face and eyes may be in particular danger.

A.10.4 The machine is elevated on a stand to minimize the ricocheting of inserted objects off the floor. If the shredder is used in a grassy area, the energy of the thrown objects may be absorbed by the grass. The test is to ensure that objects being ejected by the machine are held in a low trajectory where they will be less dangerous to any bystander.

A.10.5 and A.10.6 The purpose of the three probes is to simulate actual conditions likely to be encountered at various levels from the ground. The foot probe is to be used at the lower levels where the operator might inadvertently or purposely place his/her foot. The arm probe is used where the operator may extend his/her arm into the machine. The finger probe is used in areas where an operator might inadvertently place his/her hand or finger into a hazardous zone. A warning decal about entering should be placed near the outlet opening. The outlet opening is not probed because entry into this opening is not considered to be normal or recommended except in case of a clogged chute, when entry may be necessary to clear the clog. Audible warning and warning decals are required to cover this eventuality.

A.11.1 Fuel tank overfill test

This test is required because, while refueling a machine, the operator may inadvertently overfill the fuel tank. If this occurs, the overflow fuel should be drained away in a manner and place that will minimize the possibility that the overflowed fuel will ignite.

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A.11.2 Fuel-line axial-pull test

This test is intended to ensure that fuel lines are adequately retained to minimize inadvertent separation of the fuel line from fittings during normal use.

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Annex B
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Bibliography

ANSI/SAE J156-JUN94, *Fusible links*[1)]

SAE J553-APR96, *Circuit breakers* [4)]

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