American National Standard

for Snow Throwers – Safety Specifications

ANSI B71.3-2005

Approved American National Standard

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Revision and redesignation of
ANSI/OPEI B71.3-1995

American National Standard

for Snow Throwers – Safety Specifications

Sponsor

Outdoor Power Equipment Institute, Inc.

Approved December 15, 2004

American National Standards Institute, Inc.

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Foreword (This foreword is not part of American National Standard ANSI B71.3-2005.)

The standard is a revision of American National Standard for Snow throwers - Safety specifications, ANSI/OPEI B71.3 -1995. The present revision was prepared by the B71.3 Committee on Snow Throwers as part of OPEI's continuing work on standards.

The principal purpose of this revision was to update the scope, to include commercial turf machine attachments, address hand-in-chute accidents, and eliminate some tests that are not relevant.

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

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

The following organizations and individuals, recognized as having an interest in the standardization of safety requirements for snow throwers, were contacted prior to the approval of this revision of the standard. Inclusion in this list does not necessarily imply that the organization concurred with the submittal of the proposed standard to ANSI.

American Consulting and Testing, Inc.

American Honda Motor Company, Inc.

American Society of Agricultural Engineers

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Consumer Product Safety Commission

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American National Standard

for Snow Throwers – Safety Specifications

Part I: General

1 Scope

The specifications in this standard apply to (a) walk-behind power snow throwers, (b) ride-on power snow throwers, (c) lawn ride-on tractors with snow thrower attachments, (d) lawn and garden tractors with snow thrower attachments, and (e) lever-steer ride-on machines with snow thrower attachments. These specifications are not intended to apply to hand-held snow throwers nor to airport, highway, and agricultural types of snow removal machines and equipment.

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 B71.1-2003, *Commercial Turf Care Equipment – Walk Behind Mowers and Ride-On Machines with Mowers – Safety Specifications*

ANSI B71.4-2004, *Commercial Turf Care Equipment – Safety Specifications*

ANSI Z535.4-2002, *Product Safety Signs and Labels*

ANSI/SAE J1362-JUL97, *Graphical Symbols for Operator Controls and Displays on Off-Road Self-Propelled Work Machines*

ANSI/UL 73-1998, *Motor-Operated Appliances*

ASTM G152, *Standard Practice for Operating Open Flame Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials*

ASTM G153, *Standard Practice for Operating Enclosed Carbon Arc Light Apparatus for Exposure of Nonmetallic Materials*

ASTM G155, *Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials*

ISO 11684:1995*, Tractors, Machinery for Agricultural and Forestry, Powered Lawn and Garden Equipment – Safety Signs and Hazard Pictorials – General Principles*

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 3767-2/Amd3:2000

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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*

SAE J156-2000, *Fusible Links*

SAE J554-1987, *Electric Fuses (Cartridge Type)*

SAE J594-1995, *Reflex Reflectors*

SAE J1127-2000, *Battery Cables*

SAE J1128-2000, *Low Tension Primary Cable*

SAE J1284-1988, *Blade-Type Electric Fuses*

SAE J2031-2001, *High Tension Ignition Cable*

SAE J1292-1981, *Automotive, Truck, Truck Tractor, Trailer and Motor Coach Wiring*

SAE J258-2000, *Circuit Breaker – Internal-Mounted Automatic Reset*

SAE J553-1996, *Circuit Breakers*

SAE JISO 3411, *Earth-Moving Machinery - Human Physical Dimensions of Operators and Minimum Operator space envelope*

3 Definitions

3.1 arctic mitten: A large insulated mitten (see Figure 1).

3.2 barrier: The vertical plane determined by an obstruction, such as a handle or steering wheel, that restrains the operator (see Figure 2).

3.3 brake: The mechanism used to: (a) decelerate, (b) stop, or (c) hold a vehicle or components.

3.4 braking distance: The distance traveled between the point of the first application of the brake control and the point at which the machine or combination comes to rest.

3.5 clutch: A device used for engaging or disengaging the load from the power source.

3.6 collector: An auger or similar device used to gather snow.

3.7 collector housing: The structure, framework, or integral shields that limit access to, and egress of, material from the collector.

3.8 durable label: A label used as a safety sign or for instruction or identification and that meet or exceed the requirements of clauses 8 and 16 of this standard.

3.9 engine (motor) kill switch: A normally off, shutoff control for the engine (motor).

3.10 engine (motor) start: The change of engine (motor) state from not producing power to producing power.

3.11 guard or shield: A part or an assembly that restricts access to the hazard areas.

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3.12 hazard zone: A three-dimensional area that might be hazardous for a person to occupy (see Figure 2). The hazard zone moves with the discharge chute and does not include the space behind the discharge chute that is guarded by the discharge chute.

3.13 impeller: A power-driven device that imparts energy to discharge the snow. For the purposes of this standard, when the collecting function of a device is combined with the impelling function, the device will be called an "impeller."

3.14 impeller housing: The structure, framework, or integral shield that limits access to, and egress of, material from the impeller.

3.15 legible lettering: Sans-serif gothic uppercase lettering such as standard medium, folio medium, news gothic bold, or equivalent. Minimum letter height should be one unit of height for every 500 units of viewing distance.

3.16 line voltage circuit: A circuit involving a potential that is not to exceed 130 volts and is in excess of those of a low-voltage circuit. (See 2.3 of ANSI/UL 73.)

3.17 low-voltage circuit: A circuit involving a peak open-circuit potential of not more than 42.4 volts supplied by a primary battery, by a standard Class 2 transformer, or by a suitable combination of a transformer and a fixed impedance, which, as a unit, complies with all performance requirements for Class 2 transformers. (See 2.4 of ANSI/UL 73.)

3.18 man (95th percentile): The physical dimensions of an adult male as defined in SAE JISO 3411.

3.19 manual start: Utilization of operator force to rotate engine for starting purposes.

3.20 neutral return: A device that will return the ground speed control selector to the neutral position from either the forward or reverse ground travel positions.

3.21 operating control: Any device for operating the snow thrower. Included are the engine or motor starting and stopping controls (excluding choke and primer), all drive engaging controls, the drive-speed-changing controls, and the snow discharge movable-guide control. A rope or recoil starter shall not be considered a control.

3.22 operator control position: The area within which all controls requiring operation from the operator position shall be located (see Figure 2).

3.23 operator position: The area occupied by the operator during normal operation of the machine. See Figure 2.

3.24 operator-presence control (normally off control): A control designed so that it will automatically stop power to a drive when the operator's actuating force is removed.

3.25 parking brake system: A system used to hold one or more brakes (or braking means) continuously in an applied position.

3.26 projected exhaust outlet area: This is the projection of the exhaust outlet openings perpendicular to the perimeter of the openings. For multiple openings, such as perforated outlets, the perimeter is determined by connecting the adjacent outermost holes with a series of tangent lines to circumscribe the area of the outlet holes pattern. (A 360° hole pattern on the outer perimeter of the exhaust system will require connecting lines at each end of the hole pattern.) For tubular or ducted outlets, the projection is determined by an extension from the wall of each outlet.

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3.27 retard: A delay in the motion of the machine speed control or directional control, or both, or a delay in the machine response to control movement.

3.28 right, left: The designation that refers to the orientation of the machine or snow thrower when the operator is at the operator's position, facing forward in the intended direction of machine operation.

3.29 service brake system: The primary brake system used for decelerating and stopping a machine.

3.30 shall: The word "shall" is to be understood as a requirement.

3.31 should: The word "should" is to be understood as a recommendation.

3.32 snow discharge deflector: A movable component used to direct snow discharging from a snow discharge chute.

3.33 snow discharge chute: A movable or fixed component that directs snow discharging from the impeller housing.

3.34 snow thrower

3.34.1 hand-held: A snow thrower that, at some time during normal operation, is intended to be completely supported by the user.

3.34.2 lever-steer ride-on: A machine in which steering, traction-drive engagement, and speed-control functions are combined and controlled by hand-operated lever(s). These lever(s) may also control the braking function. (Also called *lever-steer machine)*.

3.34.3 ride-on: A self-propelled ride-on machine that is designed for throwing snow.

3.34.4 self-propelled: A snow thrower equipped with a means for powered propulsion, other than the collector or impeller, such as wheels or tracks.

3.34.5 walk-behind: A snow-throwing machine, either pushed or self-propelled, normally controlled by the operator walking behind the unit.

3.35 snow thrower attachment: A detachable snow-throwing machine designed for use with a propulsion machine.

3.36 starting device: A handle, lever, switch, or similar device required to actuate a starting mechanism.

3.37 tiller bar steering: A steering means that extends from one side or opposite sides of the axis of steering control rotation, the use of which tends to cause the operator's weight to shift opposite to the direction of turn.

3.38 tractor

3.38.1 lawn and garden ride-on: A self-propelled machine, designed and advertised for general purpose lawn and garden work, having the following characteristics:

- Designed to supply power for home lawn, home garden, and yard maintenance implements;
- Generally designed for mowing lawns;

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- Shall have all implements separate from the tractor;
- Provides means to lift an implement such as a moldboard plow, tiller, cultivator, snow thrower, sweeper, or dozer blade.

3.38.2 lawn ride-on: A self-propelled machine, designed and advertised for general purpose lawn work, having the following characteristics:

- Designed to supply power for home lawn and yard maintenance implements;
- Generally designed for mowing lawns;
- May have implements separate from the tractor;
- May provide for means to lift an implement such as a sweeper or snow thrower.

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Part II: Walk-behind snow throwers – Requirements and test procedures

4 Controls

4.1 General requirements

4.1.1 Control identification

Durable labels shall be used to identify and show the direction of operation of all operating controls except the snow discharge chutes, for which identification is optional. Labels shall be located near control positions and shall be legible to the operator when in position to use the control. Legible lettering shall be used with a minimum letter height of not less than 3 mm (0.12 in). Universal symbols, as illustrated in ANSI/SAE J1362 or ISO 3767-1, 2, or 3, may be used with, or in place of, words to convey the message

4.1.2 Control location

4.1.2.1 Engine (motor) controls and snow discharge chute controls shall not be located in the hazard zones (see Figure 2 (A) and (B)).

4.1.2.2 All other operating controls shall be located in the operator control position (see Figure 2).

4.1.3 Operability

All operating controls shall be operable by an operator wearing arctic mittens (see Figure 1).

4.1.4 Control design

Controls shall be designed to prevent hazardous conditions, such as pinching or cutting the operator, during normal operation of the control with or without arctic mittens.

4.1.5 Resistance to movement

Controls shall have sufficient resistance to movement to meet the requirements of 9.2.1 and 9.3.

4.2 Specific requirements

4.2.1 Shutoff control device

A shutoff control device shall be provided to stop operations of the engine (motor). This device shall require manual and intentional activation in order to start the engine (motor). A key switch, or similar device, shall be provided to prevent unauthorized starting of the engine (motor), unless manual start is the only means of starting the engine. The shutoff control device and the key switch or similar device may be combined in one control.

4.2.2 Engine speed control

The direction of motion for an engine (motor) speed hand-lever control shall be generally forward or upward, or both, to increase speed, and generally rearward or downward, or both, to decrease speed.

4.2.3 Drive interlock

A means shall be provided to prevent the starting of the engine (motor) when either the traction drive or impeller drive is engaged. Such means shall not be required on a traction drive or impeller drive that is equipped with operator-presence (normally off) controls. If the engine

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(motor) can be started from behind the barrier (see Figures 2(A) and 2(B)), the impeller drive need not be disengaged.

4.2.4 Impeller and collector control

4.2.4.1 A means shall be provided that automatically stops the impeller and collector within 5 seconds when the operator leaves the operator position. It shall require intentional reactivation after stopping and shall comply with the torque requirement of 4.2.4.2.

4.2.4.2 The impeller and collector shall stop within 5 seconds, and remain stopped, when the control is disengaged. With the engine (motor) stopped, the impeller and collector shall resist a torque of at least 1.13 N • m (10 in • lb) at completion of the tests given in 9.2.1 and 9.3, measured at the impeller and collector shaft in the direction of normal rotation. If an engine (motor) kill control is the only control used, the impeller and collector shall stop in 5 seconds and the torque requirement shall not apply.

4.2.5 Self-propelled walk-behind snow throwers

4.2.5.1 A traction drive engagement control shall be provided. If the control is not a squeeze-grip control, it shall move in the direction of intended travel for engagement. A means shall be provided to permit the machine to be transported under its own power without impeller engagement.

4.2.5.2 The reverse-function-of-traction-engagement control shall be an operator-presence (normally off) control.

4.2.5.3 A means shall be provided to permit engagement of the impeller without engagement of traction drive.

5 Guards, shields, chutes, deflectors, and housings

5.1 General

All guards, shields, chutes, deflectors, and housings shall comply with all applicable test requirements of clause 9.

5.2 Installation

All guards, shields, chutes, and deflectors shall be designed to prevent their removal from the machine without tools.

5.3 Snow discharge chutes and deflectors

5.3.1 Snow discharge chutes shall be provided to control the direction of discharge. The control for adjustment of the chute, if provided, shall not be located in the hazard zone or cause the operator to enter the hazard zone (see Figures 2(A) and 2(B)).

5.3.2 Snow discharge deflectors shall be provided to direct the flow of discharge leaving the discharge chutes. The deflector may be part of the discharge chute.

5.3.3 The discharge limit shall not intersect the operator position, as illustrated in Figure 2.

5.3.4 A durable label with a pictorial, such as shown in Figure 3A, warning of impeller contact, shall be located near the snow discharge opening. The pictorial or text should convey the message to shut off the engine before unclogging the discharge chute. If a signal word is used, it shall be “DANGER.” (See sections 8 and 10).

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5.4 Collector and or impeller housing

5.4.1 The sides shall cover the diametrical extremities of the collector/impeller except as shown in Figure 4. The housing opening limits shall not intersect the operator position (see Figures 2A and 4).

5.4.2 Ancillary openings, such as those required to facilitate manufacture or mount accessories, shall not intersect the operator position. Openings that intersect the operator position shall be guarded in compliance with 5.1 and 5.2. Intersection, as applied here, is defined as allowing line-of-sight between the collector and/or impeller, and the operator position.

5.4.3 A durable label with a pictorial, such as that shown in Figure 3(B), warning of contact with the rotating collector shall be located on the collector housing. The pictorial or text should convey the message to keep hands and feet away from the collector. If a signal word is used, it should be "DANGER." (See clauses 8 and 10.)

5.5 Power drives

Nip and pinch points (related to exposed gears, friction drive components, belts, chains, and idlers) and outside faces of pulleys, sheaves, sprockets, and gears shall be guarded by location or otherwise guarded to prevent inadvertent contact by the operator during normal starting and operation of the machine.

These guarding requirements shall not apply (a) during maintenance activities and (b) to rotating shafts protruding less than half of their outside diameter.

Compliance with these requirements shall be determined by the probe test given in 9.5.

5.6 Hot surfaces

All exposed surfaces that are likely to be contacted during normal starting, operation, and refueling of the machine shall meet the requirements of 9.4.

5.7 Engine exhaust

Engine exhaust emissions shall not be directed at the operator during normal starting and operation of the machine.

5.8 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. Compliance with these requirements shall be determined by the fuel tank overfill test given in 9.7.

5.9 Snow clean out tool

This requirement applies to walk-behind snow throwers with more than a single-stage throwing mechanism. A suitable tool(s) shall be provided for clearing blockages of the discharge chute. It shall be attached to the snow thrower and readily accessible to the operator. A durable label shall be affixed to the snow thrower with a warning message or pictorial indicating that blockages should be cleared only after shutting the engine off and only with a clean-out tool, not by hand. This may be combined with the discharge chute message. See 5.3.4.

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6 Servicing

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

6.2 General service written instructions shall be provided with the equipment for servicing operations recommended by the manufacturer to maintain the equipment in safe operating condition.

7 Electrical requirements

7.1 General

The specifications given in this standard are not intended to completely cover electrical requirements. There are such pronounced differences in the sizes and types of electrically driven outdoor power equipment that no materials, conductors, insulation, or other components can be specifically designated as standard. Therefore, all such items shall be carefully chosen for each application, giving maximum consideration to safety, efficiency, and accessibility. For these reasons, the references to the standards and recommended practices of the Society of Automotive Engineers (SAE) in this clause should be considered as guidance in design rather than exact conformance requirements. Any equivalent alternates will be considered acceptable.

7.2 Line voltage

The electrical requirement for line voltage equipment is not covered in this standard.

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

7.3.1 Insulated cables

Insulated cables comprising wiring circuits should be protected by rubber, plastic, nonmetallic tape, or nonmetallic braid covering capable of withstanding severe abrasion except where otherwise protected or not in potentially abrasive contact with metal surfaces. This wiring assembly shall, where possible, be grouped together, be properly supported, and be located so that no portion is in contact with the carburetor, metallic fuel line, the exhaust system, moving parts, or sharp edges. Any edges of metal members subject to contact with the cables shall be rounded or protected to prevent possible damage to the cable by cutting or abrasion. (See SAE J2031, J1127, J1128, and J1292.)

7.3.2 Battery installation

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

7.3.3 Overload protection

All circuits, except 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 shall be located in either line. (See SAE J554, J156, J258, J553, and J1284.)

7.3.4 Terminals and noninsulated electrical parts

Terminals and noninsulated electrical parts shall be protected to prevent short circuiting by the fuel can or tools during normal refueling and lubrication servicing.

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8 Label durability requirements

8.1 General

Required labels shall be certified by the machine manufacturer to meet the following label durability requirements.

8.1.1 Permanent safety signs are considered to have a reasonable life if the sign has good color and legibility for a period of at least 5 years. Exterior durability is based on vertical exposure tests for weatherability in the extreme climates of the United States, or a 2000-h carbon-arc test per ASTM G152 and ASTM G153 or a 2000-h xenon-arc test per ASTM G155. Other test methods may be used, providing the method ensures equal or superior sign durability.

8.1.2 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 8.1.1 and, following normal cleaning procedures, shall show no appreciable fading, discoloration, cracking, crazing, blistering, or dimensional change. Labels shall not curl at the edges.

8.2 Types considered durable

An embossed, cast, or molded label (sign) shall be considered durable.

8.3 Silk screening

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

9 Tests for power snow throwers

9.1 Test conditions

Unless otherwise stated, the test conditions given in 9.1.1 through 9.1.6 shall apply to 9.2.1, 9.2.2, 9.3, 9.4, and 9.6.

9.1.1 Assembly

The snow thrower shall be completely assembled.

9.1.2 Test position

The assembly of 9.1.1 shall rest on a horizontal surface.

9.1.3 Test speed

The engine shall be set at the equipment manufacturer's maximum specified speed. Then all mechanisms necessary for the equipment to perform its intended functions shall be engaged, where applicable. The control shall be fixed to maintain the maximum speed.

9.1.4 Restraints

Resilient restraints may be used to keep the snow thrower in position during the tests given in 9.2 and 9.3.

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9.1.5 Number of units to be tested and sequence of tests

For the tests given in this standard, the following conditions shall apply: The manufacturer has the option of running one or any number of machines for tests (1) through (4). For test (5) and (6) only one machine shall be used. Test (5) should be followed by test (6).

The tests are as follows:

(1) Temperature of exposed surfaces (see 9.4)

(2) Probe (see 9.5)

(3) Fuel tank overfill (see 9.6)

(4) Fuel line (see 9.7)

(5) Controls (see 9.3)

(6) Structural integrity (see 9.2)

9.2 Structural integrity tests

9.2.1 Unbalance test

9.2.1.1 Test procedure

A minimum impeller unbalance, *K*s, in gram-meters (ounce-inches) shall be determined by the formula:

$700L^3$ = gram-meters of unbalance

($L^3/63$ = ounce-inches of unbalance)

where *L*=impeller outside diameter, in meters (inches).

This unbalance shall be created by removing or adding material until the required unbalance is obtained. The snow thrower shall be run in this unbalanced condition for 1 uninterrupted hour.

9.2.1.2 Test acceptance

The machine shall have failed this test if either of the following occurs:

a) Loss or failure of any part or component that results in noncompliance with applicable parts of this standard;

b) Movement of the controls from the position selected at the beginning of test or shifting of the snow discharge guide more than 15 degrees from the selected position.

9.2.2 Guards

9.2.2.1 Test procedure

A smooth steel sphere having a diameter of approximately 51 mm (2 in) and weighing a minimum 0. 54 kg (1.18 lb) shall be used.

If guards can be struck from above, the sphere shall be dropped vertically; if not, the sphere shall be suspended by a cord and allowed to fall from rest as a pendulum to strike the guards. In either case, the vertical travel of sphere shall be at least 1.3 meters (51 inches).

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One drop shall be made on each guard being tested.

For guards made of nonmetallic material, the test shall be repeated on:

a) a different sample (or samples) that has been in an air-oven for 7 hours at a uniform temperature not less than 10°C (18°F) higher than the maximum operating temperature of the material measured under normal operating conditions, but not less than 70°C (158°F). The sample (or samples) shall not be tested until it has returned to room temperature.

b) a sample (or samples) that has been conditioned at -20°C (-4°F) for 7 hours and shall be tested immediately.

9.2.2.2 Test acceptance

The guard shall have failed this test if either of the following occurs:

a) Cracking that affects the functional strength of the part;

b) Any condition that results in noncompliance with applicable sections of this standard.

Acceptance shall not be affected if a guard deformed during the test can be readily restored to its original shape.

9.3 Controls test

9.3.1 Test procedure

The engine shall be run for 15 uninterrupted minutes, with controls in disengaged position. This test is not required on a machine with an engine (motor) kill switch.

9.3.2 Test acceptance

The criteria for failure shall be the same as in 9.2.1.2. In addition, the machine shall have failed this test if the impeller rotates more than three revolutions in the 15-minute test period.

9.4 Temperature of exposed surfaces

9.4.1 Limitations

All hot surfaces that exceed 65.6°C (150°F) and that are likely to be contacted by the operator during normal starting, operating, or refueling shall be indicated by a durable safety label (see clauses 8 and 10) located adjacent to the surface and be thermally insulated or shielded (if necessary) so that such surfaces will not exceed a temperature of 148.9°C (300°F) at 4.4°C (40°F) ambient. Pictorials may be used to convey the message. Surfaces that must comply shall be determined by the probe test given in 9.5.

9.4.2 Method of test

Surface temperatures shall be taken after the engine has operated no-load for 1 hour or until a steady-state temperature has been obtained. The temperature measuring system shall enable the surface temperatures to be determined within 2%. Temperature measurements shall be made at any temperature and corrected to 4.4°C (40°F) ambient.

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Corrected surface temperature

= measured surface temperature °C(°F)

+ 4.4°C (40°F)

– ambient temperature °C(°F)

9.5 Probe test

9.5.1 Test procedure

CAUTION: The following procedures should be conducted with the engine not running.

Simulate the operator during normal starting and operation of the machine and insert the finger probe shown in Figure 5 into all openings to its maximum depth (105.2 mm (4.1 in)) or until a force of 4.4 N (1 lb) is attained. As the finger probe is inserted, rotate and position it in all possible angles with the opening, attempting to contact the part or parts under test. The finger probe shall not be inserted beyond the length of the finger probe (105.2 mm (4.1 in)).

9.5.2 Test acceptance

The machine shall be considered properly guarded if one of the following applies:

a) The hazard cannot be contacted with the finger probe shown in Figure 5 when held by a 95th percentile man (see clause 3, *Definitions*), maneuvering the probe in any manner;

b) The hazard is under and within the perimeter of the chassis elements, such as the frame or fender, and the hazard cannot be reached with the finger probe shown in Figure 5 when held by a 95th percentile man maneuvering the finger probe as follows:

1) From above the chassis elements, downward through openings in or between the elements;

2) Underneath the chassis elements allowing only horizontal or downward probe movement, or both. Upward probe movement shall not be permitted;

c) The hazard is controlled by an operator presence control such that the 95th percentile man, when functioning in accordance with (a) and (b), cannot reach the hazard while simultaneously actuating the operator-presence control in its normal manner.

9.6 Fuel tank overfill test

9.6.1 Test procedure

With the machine on a level plane, the fuel tank inlet shall be overfilled by 118 cm^3 (4 oz) of liquid within 5 seconds.

9.6.2 Flammability

The test liquid should be nonflammable and approximately the same viscosity as the fuel intended for use.

9.6.3 Test acceptance

The machine shall have failed this test if the test liquid:

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a) passes through the projected exhaust outlet area;

b) collects on the machine;

c) comes in contact with the high-tension ignition cables or any noninsulated electrical connection.

9.7 Fuel line axial pull test

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

10 Safety instructions and signs – Machine

10.1 Safety instructions

A durable label shall be provided to inform the user of the potential hazards that may be encountered in the normal operation and servicing of the snow thrower and power-driven attachments. (A similar instruction shall also be included in the operator's manual.) Pictorials may be used to convey the message.

10.2 Safety signs

All safety signs shall be in accordance with the format, color and signal word requirements of ANSI Z535.4 or ISO 11684 and shall conform to clause 8.

11 Safety instructions – Operator's manual

A manufacturer shall supply with the equipment pertinent instructions for safe operation such as shown in Figure 6.

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Part III: Ride-on machines with snow thrower attachments – Requirements and test procedures

12 Controls

12.1 General requirements

12.1.1 Control identification

Durable labels shall be used to identify and show the direction of operation of all operating controls except the steering wheel, manual lift control, and the snow discharge chutes, for which identification is optional. Labels shall be located near control positions and shall be legible to the operator when in position to use the control. Legible lettering shall be used with a minimum letter height of not less than 3 mm (0.12 in). Universal symbols, as illustrated in ANSI/SAE J1362 or ISO 3767-1, 2, or 3, may be used to convey the message.

12.1.2 Control location

12.1.2.1 Engine (motor) controls and manual lift controls shall not be in the hazard zone (see Figure 2(C)).

12.1.2.2 All other operating controls shall be in the operator control position (see Figures 2(C) and 2(D)).

12.1.3 Operability

All operating controls shall be operable by an operator wearing arctic mittens (see Figure 1).

12.1.4 Control design

Controls shall be designed to prevent hazardous conditions, such as pinching or cutting the operator, during normal operation of the control with or without arctic mittens.

12.1.5 Resistance to movement

Controls shall have sufficient resistance to movement to meet the requirements of 18.2.1 and 18.3. Tilt of the machine shall not affect movement of controls as determined by 18.10.

12.1.6 Steering lever(s) on lever-steer machines

Steering control(s) motion shall not be hindered.

12.2 Specific requirements

12.2.1 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 start the engine (motor). A key switch, or similar device, shall be provided to prevent unauthorized starting of the engine (motor), unless manual start is the only means of starting the engine. The shutoff control device and the key switch or similar device may be combined in one control.

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12.2.2 Engine speed control

12.2.2.1 Hand operated

The direction of motion for an engine (motor) speed hand-lever control shall be generally forward or upward, or both, to increase speed, and generally rearward or downward, or both, to decrease speed.

12.2.2.2 Foot operated

When a foot-operated engine or motor speed control pedal is provided, it shall be operated by the right foot with the direction of motion generally forward or downward, or both, to increase speed. It shall be located within the operator control position.

12.2.3 Drive interlock

A means shall be provided to prevent starting of the engine (motor) unless: (a) the impeller drive is disengaged and (b) the traction drive is disengaged or in neutral.

12.2.4 Impeller and collector control

12.2.4.1 Automatic stop

A means shall be provided that will automatically stop the impeller or kill the engine when the operator leaves the operator position. The impeller may resume operation upon reactivation of the operator-presence control, provided the impeller has not stopped. It shall require reactivation after stopping and shall comply with the torque requirement of 12.2.4.2.

12.2.4.2 Stopping time

The impeller and collector shall stop within 5 seconds, and remain stopped, when the control is disengaged. With the engine (motor) stopped and the control disengaged, the impeller and collector shall resist a torque of at least 1.13 N • m (10 in • lb) at completion of the tests given in 18.2.1 and 18.3, measured at the impeller shaft in the direction of normal rotation

12.2.4.3 Stationary operation

A means may be provided to allow stationary operation of power take-off (PTO) without an operator in the operator position. Such means shall automatically return to the operational mode of 12.2.4.1 when the operator returns to the operator position.

12.2.4.4 Impeller or traction disengagement

A means shall be provided to permit the machine to be transported under its own power without the impeller engaged. A means shall also be provided to permit engagement of the impeller without engagement of traction drive.

12.2.5 Lift controls

12.2.5.1 When hand lift controls are provided, the direction of motion shall be generally forward or downward to lower the attachment and generally rearward or upward to raise the attachment.

12.2.5.2 When a foot control is provided, the direction of the motion of the forward part of the control shall be generally downward to lower the attachment and generally upward to raise the attachment.

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12.2.5.3 The lifting action of the power-operated lift device shall be rendered inoperative by removal of a key or by some similar device.

12.2.6 Pedal slip-resistance

Foot pedals shall have slip-resistant surfaces or other means of minimizing the possibility of the operator's foot slipping off the pedals.

12.2.7 Control response

For combination directional and variable-speed controls or directional controls, or their effect on the motion of the machine, whether actuated by hand, foot, or other means, retard shall be accomplished by at least one of the following:

a) A change in direction of the control actuation other than the general path described by the control. A distinct actuation at right angles to the general control motion shall be required;

b) A distinct change in force level of the control actuation at the point of control entry into the selected direction;

c) A positive means of retarding machine acceleration, such as linkage or valving, so that the operator does not lose control of the machine when passing through the transition zones from neutral to either the forward or reverse direction.

12.2.8 Clutch control requirements for traction clutch, neutral return, or both

12.2.8.1 Foot pedal control

When provided, a foot pedal control shall be actuated by the operator's left foot, with the direction of motion generally forward or downward, or both, for disengagement. Operator-presence (normally off) controls shall not be included in this requirement.

12.2.8.2 Hand-operated control

When provided, a hand-operated control shall be moved generally rearward or toward the operator for disengagement. Operator-presence (normally off) controls shall not be included in this requirement.

12.2.8.3 Operator-presence (normally off) control

A generally forward or downward motion on a foot-actuated operator-presence (normally off) control, when provided, shall produce clutch engagement. A right-foot operator-presence (normally off) control shall be outboard of the service brake pedal.

12.2.8.4 Traction clutch or neutral return, or both, and brake combined

When a foot-operated (either foot) combination machine clutch or neutral return, or both, and a brake control is used, the direction of actuation shall be generally forward or downward, or both, to cause traction disengagement. Provision shall be made to retain control of the machine during the transition zone of brake disengagement to tractive engagement.

12.2.8.5 Lever-steer controls

On lever-steer machines, the engagement or disengagement of the clutch is accomplished by displacement of the lever(s). Movement of the lever(s) generally forward shall result in forward motion. Movement of the lever(s) generally rearward shall result in rearward motion.

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12.2.9 Brake controls

12.2.9.1 Service brake system

A service brake system shall be provided.

12.2.9.1.1 Foot-operated brakes

12.2.9.1.1.1 Brakes combined with a traction clutch or neutral return, or both, shall meet the requirements of 12.2.8.4.

12.2.9.1.1.2 When a separate brake pedal is provided, it shall be actuated by the operator's right foot.

12.2.9.1.1.3 For foot actuation, the direction of motion shall be generally forward, or downward, or both, for stopping.

12.2.9.1.1.4 When independent wheel brakes are provided with a pedal to control each wheel, both pedals shall be actuated by the operator's right foot, with the inner pedal controlling the left wheel and the outer pedal controlling the right wheel. In addition, a means shall be provided to lock the pedals together.

12.2.9.1.1.5 The service brake shall override hand-operated and operator-presence (normally off) traction drive control.

12.2.9.1.2 Combined lever-steer and brake controls

Braking shall be accomplished by motion of the lever(s) in direction opposite that of machine travel.

12.2.9.2 Parking brake

12.2.9.2.1 A parking brake shall be provided and the control shall be located convenient to the operator. The direction of engagement shall be clearly identified with a durable label.

12.2.9.2.1.1 A hand-operated parking brake control, when provided, shall be moved generally rearward or upward to engage or set.

12.2.9.2.1.2 A foot-operated parking brake control, when provided, shall be moved generally forward or downward to engage or set.

12.2.9.2.2 A combination parking brake and service brake may be provided.

12.2.10 Traction speed control

12.2.10.1 Fixed-ratio transmission speed selector controls, when provided, shall be located within the operator control position and the shifting patterns shall be clearly identified with a durable label.

12.2.10.2 A hand-operated direction control for engine drive machines (nonvariable speed), when provided, shall be moved generally forward for forward machine motion, and generally rearward for rearward machine motion. A neutral position shall be provided and provisions shall be made to retard movement of the control into the forward or rearward directions. A hand-operated direction

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control for electric drive machines (nonvariable speed), when provided, shall be moved generally forward for forward machine motion, and generally rearward for rearward machine motion. Provisions shall be made to retard movement of the control or its effect when moving into the forward or rearward directions.

12.2.10.3 A hand-operated variable speed machine control, when provided, shall be moved generally forward or upward, or both, to increase speed.

12.2.10.4 A single-lever hand-operated combination directional and variable speed control, when provided, shall have a definite neutral zone with some means of retarding the control or its effect when moving into the forward or rearward direction. The control shall be moved generally forward for forward travel and increasing forward speed and shall be moved generally rearward for rearward travel and increasing rearward speed. The control shall remain in the selected position or move to a slower speed position unless repositioned by operator action.

12.2.10.5 The foot-actuated combination directional and variable speed control shall be operated as follows:

a) If a single pedal is used for the combination directional and variable speed control, it shall be operated by the right foot. It shall produce forward motion with a generally forward or downward toe motion on the pedal and rearward motion with a generally rearward or downward heel motion. Increased displacement of the pedal shall produce increased speed in either direction. Provisions shall be made for a definite neutral zone with some means of retarding the control or its effect when moving into the generally forward or rearward directions;

b) If two pedals are used for the combination directional and variable speed control, they shall both be operated by the right foot. Generally forward or downward motion on the outer pedal shall produce reverse motion and increase rearward speed of the machine. Generally forward or downward motion on the inner pedal shall produce forward motion and increase forward speed of the machine.

12.2.10.6 Traction speed control

For lever-steer machines, movement of the lever(s) shall be generally forward for forward motion, and generally rearward for rearward motion. Increased displacement of the lever(s) shall produce increased traction speed. A neutral zone or position shall be provided.

12.2.11 Steering control

12.2.11.1 Ride-on machines (except lever steer)

The machine shall turn right when the steering controls are turned in a clockwise motion. The machine shall turn left when the steering controls are turned in a counterclockwise motion.

12.2.11.2 Lever-steer machines with two control levers

The machine shall turn right when the left lever is displaced further in the direction of machine travel than the right lever. The machine shall turn left when the right lever is displaced further in the direction of machine travel than the left lever.

12.2.11.3 Lever-steer machines with a single control lever with lateral displacement for steering control

The machine shall turn right when the lever is moved generally to the right. The machine shall turn left when the lever is moved generally to the left.

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12.2.11.4 Lever-steer machines with a single control lever with rotational displacement for steering control

The machine shall turn right when the left extremity of the control is rotated in the direction of machine travel. The machine shall turn left when the right extremity of the control is rotated in the direction of machine travel.

12.2.11.5 Ride-on machines

12.2.11.5.1 The steering mechanism shall not inadvertently lock in any operating position.

12.2.11.5.2 Tiller bar steering shall not be permitted.

13 Guards, shields, chutes, deflectors, and housings

13.1 General

All guards, shields, chutes, deflectors, and housings shall comply with all applicable test requirements in clause 18.

13.2 Installation

All guards, shields, chutes, and deflectors shall be designed to prevent removal from the machine without tools.

13.3 Snow chutes and deflectors

13.3.1 Snow discharge chutes shall be provided to control the direction of discharge. The control for adjustment of the chutes shall be located in the operator control position (see Figure 2(C)).

13.3.2 Snow discharge deflectors shall be provided to direct the flow of discharge leaving the discharge chutes. The deflector may be part of the discharge chute.

13.3.3 The discharge limit shall not intersect the operator control position, as illustrated in Figure 2(C).

13.3.4 A durable label with a pictorial, such as that shown in Figure 3(A), warning of impeller contact, shall be located near the snow discharge opening. The pictorial or text should convey the message to shut off the engine before unclogging the discharge chute. If a signal word is used, it shall be “DANGER.” (See clauses 16 and 19.)

13.4 Collector and/or impeller housing

13.4.1 The sides shall cover the diametrical extremities of the collector/impeller except as shown in Figure 4. The housing opening limits shall not intersect the operator control position. (See Figures 2(C), 2(D), and 4.)

13.4.2 Ancillary openings, such as those required to facilitate manufacture, or mount accessories, shall not intersect the operator control position. Openings that intersect the operator control position shall be guarded in compliance with 5.1 and 5.2. Intersection, as applied here, is defined as allowing line-of-sight between the collector and/or impeller, and the operator control position.

13.4.3 A durable label with a pictorial, such as that shown in Figure 3(B), warning of contact with the rotating collector shall be located on the collector housing. The pictorial or text should convey the message to keep hands and feet away from the collector. If a signal word is used, it should be “DANGER.” (See clauses 16 and 19.)

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13.5 Power drives

Nip and pinch points (related to exposed gears, friction drive components, belts, chains, and idlers) and outside faces of pulleys, sheaves, sprockets, and gears shall be guarded by location or otherwise guarded to prevent inadvertent contact by the operator during normal starting, mounting, and operation of the machine.

These guarding requirements shall not apply (a) during maintenance activities and (b) to rotating shafts protruding less than half of their outside diameter.

Compliance with these requirements shall be determined by the probe test given in 18.5.

13.6 Hot surfaces

All exposed surfaces that are likely to be contacted during normal starting, mounting, operation, and refueling of the machine shall meet the requirements of 18.4.

13.7 Engine exhaust

Engine exhaust emissions shall not be directed at the operator during normal starting, mounting, and operation of the machine.

13.8 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. Compliance with these requirements shall be determined by the fuel tank overfill test given in 18.8.

14 Servicing

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

14.2 General service written instructions shall be provided with the equipment for servicing operations recommended by the manufacturer to maintain the equipment in safe operating condition.

15 Electrical requirements

15.1 General

The specifications given in this standard are not intended to completely cover electrical requirements. There are such pronounced differences in the sizes and types of electrically driven outdoor power equipment that no materials, conductors, insulation, or other components can be specifically designated as standard. Therefore, all such items shall be carefully chosen for each application, giving maximum consideration to safety, efficiency, and accessibility. For these reasons, the references to the standards and recommended practices of the Society of Automotive Engineers (SAE) in this clause should be considered as guidance in design rather than exact conformance requirements. Any equivalent alternates will be considered acceptable.

15.2 Line voltage

The electrical requirement for line voltage equipment is not covered in this standard.

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

15.3.1 Insulated cables

Insulated cables comprising wiring circuits should be protected by rubber, plastic, nonmetallic tape, or nonmetallic braid covering capable of withstanding severe abrasion except where otherwise protected or not in potentially abrasive contact with metal surfaces. This wiring assembly shall, where possible, be grouped together, be properly supported, and be located so that no portion is in contact with the carburetor, metallic fuel lines, the exhaust system, moving parts, or sharp edges. Any edges of metal members subject to contact with the cables shall be rounded or protected to prevent possible damage to the cables by cutting or abrasion. (See SAE J2031, J1127, J1128, and J1292.)

15.3.2 Battery installation

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

15.3.3 Overload protection

All circuits, except 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 shall be located in either line. (See SAE J554, J156, J258, J553, and J1284.)

15.3.4 Terminals and noninsulated electrical parts

Terminals and noninsulated electrical parts shall be protected to prevent short circuiting by the fuel can to tools during normal refueling and lubrication servicing.

16 Label durability requirements

16.1 General

Required labels shall be certified by the machine manufacturer to meet the following label durability requirements.

16.1.1 Permanent safety signs are considered to have a reasonable life if the sign has good color and legibility for a period of at least 5 years. Exterior durability is based on vertical exposure tests for weatherability in the extreme climates of the United States, or a 2000-h carbon-arc test per ASTM G152 and ASTM G153 or a 2000-h xenon-arc test per ASTM G155. Other test methods may be used, providing the method ensures equal or superior sign durability.

16.1.2 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 16.1.1 and, following normal cleaning procedures, shall show no appreciable fading, discoloration, cracking, crazing, blistering, or dimensional changes. Labels shall not curl at the edges.

16.2 Types considered durable

An embossed, cast, or molded label (sign) shall be considered durable.

16.3 Silk screening

Silk screening or other types of marking, when used, shall meet the requirements of 16.1.

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17 General requirements

17.1 Slip-resistant surface

A slip-resistant surface or other means shall be provided to minimize the possibility of an operator's foot slipping off the foot supports or platforms.

17.2 Reflectors

Machines with a snow thrower shall be equipped with two red-color reflex reflectors. They shall face rearward and be mounted a minimum of 305 mm (12 in) above the ground. A red taillight, visible at 91.4 meters (300 feet), may be substituted for reflectors. Reflectors shall comply with section J of ANSI/SAE J594. Reflectors or tailights may be provided with the snow thrower attachments if the propelling machine is not equipped with reflectors or taillights.

18 Tests for power snow throwers

18.1 Test conditions

Unless otherwise stated, the test conditions given in 18.1.1 through 18.1.5 shall apply to 18.2.1, 18.3, 18.4, 18.6, 18.7, and 18.8.

18.1.1 Assembly

The snow thrower shall be completely assembled. A snow thrower attachment shall be mounted on the machine.

18.1.2 Test position

The assembly of 18.1.1 shall rest on a horizontal surface.

18.1.3 Test speed

The engine shall be set at the equipment manufacturer's maximum specified speed. Then all mechanisms necessary for the equipment to perform its intended functions shall be engaged where applicable. The control shall be fixed to maintain the maximum speed.

18.1.4 Restraints

Resilient restraints may be used to keep the snow thrower or machine in position during the tests given in 18.2 and 18.3.

18.1.5 Number of units to be tested and sequence of tests

For the tests given in this standard, the following conditions shall apply: The manufacturer has the option of running one or any number of machines for tests (1) through (6). For tests (7) and (8) only one machine shall be used. No brake adjustment shall be made between tests. For tests (9) and (10) only one machine shall be used. Test (9) shall be followed by test (10).

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The tests are as follows:

(1) Temperature of exposed surfaces (see 18.4).

(2) Probe (see 18.5).

(3) Fuel tank overfill (see 18.8).

(4) Fuel line (see 18.9).

(5) Stability – Ride-on vehicles (see 18.6).

(6) Tilt – Controls (see 18.10).

(7) Parking brake system (see 18.7.3).

(8) Service brake system (see 18.7.2).

(9) Controls (see 18.3).

(10) Structural integrity (see 18.2).

18.1.6 Exceptions

Tests that are identical to tests in ANSI B71.1 may be waived if compliance has been verified during certification to that standard.

18.2 Structural integrity tests

18.2.1 Unbalance test

18.2.1.1 Test procedure

A minimum impeller unbalance, *Ks,* in gram-meters (ounce-inches) shall be determined by the formula:

$700L^3$ = gram-meters of unbalance

($L^3/63$ = ounce-inches of unbalance)

where

L = impeller outside diameter, in meters (inches).

This unbalance shall be created by removing or adding material until the required unbalance is obtained. The snow thrower shall be run in this unbalanced condition for 1 uninterrupted hour.

18.2.1.2 Test acceptance

The machine shall have failed this test if any of the following occur:

a) Loss or failure of any part or component that results in noncompliance with applicable parts of this standard;

b) Movement of the controls from the positions selected at the beginning of test or shifting of the snow discharge guide more than 15 degrees from the selected position.

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18.2.2 Guards

18.2.2.1 Test procedure

A smooth steel sphere having a diameter of approximately 51 mm (2 in) and weighing a minimum 0.54 kg (1.18 lb) shall be used.

If guards can be struck from above, the sphere shall be dropped vertically; if not, the sphere shall be suspended by a cord and allowed to fall from rest as a pendulum to strike the guards. In either case, the vertical travel of sphere is to be at least 1.3 meters (51 inches).

One drop shall be made on each guard being tested.

For guards made of nonmetallic material, the test shall be repeated on:

a) a different sample (or samples) that has been in an air-oven for 7 hours at a uniform temperature not less than 10°C (18°F) higher than the maximum operating temperature of the material measured under normal operating conditions, but not less than 70°C (158°F). The sample (or samples) shall not be tested until it has returned to room temperature;

b) a sample (or samples) that has been conditioned at – 20°C (– 4°F) for 7 hours and shall be tested immediately.

18.2.2.2 Test acceptance

The guard shall have failed this test if any of the following occur:

a) Cracking that affects the functional strength of the part;

b) Any condition that results in noncompliance with applicable parts of this standard.

Acceptance shall not be affected if a guard deformed during the test can be readily restored to its original shape.

18.3 Controls test

18.3.1 Test procedure

The engine shall be run for 15 uninterrupted minutes, with controls in disengaged position. This test is not required on a machine with an engine (motor) kill switch.

18.3.2 Test acceptance

The criteria for failure shall be the same as in 18.2.1.2. In addition, the machine shall have failed this test if the impeller rotates more than three revolutions in a 15-minute test period.

18.4 Temperature of exposed surface

18.4.1 Limitations

All hot surfaces that exceed 66°C (150°F) and that are likely to be contacted by the operator during normal starting, mounting, operating, or refueling shall be indicated by a durable safety label (see clauses 16 and 19) located adjacent to the surface and be thermally insulated or shielded (if necessary) so that such surfaces will not exceed a temperature of 148.9°C (300°F) at 4.4°C (40°F) ambient. Surfaces that must comply shall be determined by the probe test given in 18.5. Pictorials may be used to convey the message.

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18.4.2 Test method

Surface temperatures shall be taken after the engine has operated no-load for 1 hour or until a steady-state temperature has been obtained. The temperature measuring system shall enable the surface temperatures to be determined within 2%. Temperature measurements shall be made at any temperature and corrected to 4.4°C (40°F) ambient.

Corrected surface temperature

= measured surface temperature °C(°F)

+ 4.4°C (40°F)

– ambient temperature °C(°F)

18.5 Probe test

18.5.1 Test procedure

CAUTION: The following procedures should be conducted with the engine not running.

Simulate the operator during normal starting, mounting, and operation of the machine and insert the probe shown in Figure 6 into all openings to its maximum depth (105.2 mm (4.1 in)) or until a force of 4.4 N (1 lb) is attained. As the probe is inserted, rotate and position it in all possible angles with the opening, attempting to contact the part or parts under test. The probe shall not be inserted beyond the length of the probe (105.2 mm (4.1 in)).

18.5.2 Test acceptance

The machine shall be considered properly guarded if one of the following applies:

a) The hazard cannot be contacted with the probe shown in Figure 5 when held by a 95th percentile man (see clause 3, *Definitions*) maneuvering the probe in any manner;

b) The hazard is under and within the perimeter of the chassis elements, such as the frame, fender, and footrest, and the hazard cannot be reached with the probe shown in Figure 5 when held by a 95th percentile man maneuvering the probe as follows:

1) From above the chassis elements, downward through openings in or between the elements;

2) Underneath the chassis elements allowing only horizontal or downward probe movement, or both. Upward probe movement shall not be permitted;

c) The hazard is controlled by an operator-presence control such that the 95th percentile man, when functioning in accordance with (a) and (b), cannot reach the hazard while simultaneously actuating the operator-presence control in its normal manner.

18.6 Stability

18.6.1 General requirements

Stability determination and measurement shall be performed under static conditions.

A 91-kg (200-lb) weight secured to the seat shall be used to simulate an operator. The center of gravity of the weight shall be 150 mm (6 in) above the lowest point of the operator supporting surface of the seat and 250 mm (10 in) forward of the seat back. The forward measurement of

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250 mm (10 in) shall be made from the back of an actual operator when seated normally on the unit. If the seat is adjustable, it shall be positioned at the most forward position when checking forward stability and in the most rearward position when checking rearward stability.

18.6.1.1 For machine stability determination, ballast shall be added only when the manufacturer designates that its use is required on the machine.

If a manufacturer designates ballast is required, the snow thrower shall be tested with the designated ballast installed.

Ride-on machines shall be tested with snow thrower attachment attached in its highest transport position. Specific ballast requirements shall be identified in the operator's manual (see clause 20).

18.6.1.2 Pneumatic tires shall be inflated to the pressure recommended in the operator's manual for normal operation.

18.6.1.3 All wheels may be locked to prevent rotation about the axle.

18.6.1.4 Steerable wheels shall be held in the straight-ahead position.

18.6.1.5 The stability requirements shall apply for all tire combinations on all wheel tread settings approved by the machine manufacturer.

18.6.2 Test procedure

The stability of the machine shall be determined as follows:

a) Place the machine, supported on its wheels, on a variable-slope single plane (tilt table) with a friction surface under the wheels equivalent to a 16- to 35-grit abrasive material. The table shall be tilted until:

1) lift-off of the upper wheels of the machine occurs or

2) the minimum angle for acceptance as specified in 18.6.3 is attained;

b) Position the machine on the tilt table as follows:

1) *Longitudinal:* The longitudinal centerline of the machine shall be perpendicular to the intersection line of the lowest edge of the table and a horizontal plane. Position the machine first with its front end on the downhill side and then with its rear end on the downhill side;

2) *Lateral:* The longitudinal centerline of the machine shall be parallel to the intersection line of the lowest edge of the table and a horizontal plane. Position the machine first with its right side on the downhill side and then with its left side on the downhill side.

18.6.3 Test acceptance

18.6.3.1 Lift-off

Lift-off shall have occurred when a strip of 1 mm (20 gage) steel, 50 mm (2 in) wide, can be pulled from or moved under any tire with a force of 10N (2 lbf) or less.

18.6.3.1.1 Longitunidal

The angle of the tilt table with the machine positioned as in 18.6.2(b)(2) shall be 20° (36.4% slope), minimum, with either end downhill, before lift-off occurs.

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18.6.3.1.2 Lateral

The angle of the tilt table with the machine positioned as in 18.6.2(b)(2) shall be 20° (36.4% slope), minimum, with either side downhill, before lift-off occurs.

18.7 Braking requirements and tests

18.7.1 General requirements

Braking system requirements shall apply to the machine and snow thrower combination. For these tests, the machine shall be equipped with the tires offered by the manufacturer that provide the least tread area in contact with the test surface. Ballast shall be added only when the manufacturer designates that its use is required on the machine.

18.7.2 Service brake system test

18.7.2.1 Requirements

The machine shall be equipped with a means capable of stopping its motion in both directions in a braking distance of 189 millimeters for each km/h (0.3m (1 ft) for each mi/hr) up to a maximum machine velocity of 13 km/h (8 mi/h). (For example, a machine moving at 8.0 km/h (5 mi/h) shall stop in 1.5 meters (5 feet).

For maximum machine velocities in excess of 12.9 km/h (8 mi/h) use

$S=0.0147\ V^2$

($S = V^2/8$)

where

S = Stopping distance, in meters (feet)

V = Test speed, in kilometers (miles) per hour

This test shall be performed with a maximum force of 222 N (50 lbf) applied to the pedal.

18.7.2.2 Test procedure

18.7.2.2.1 The test shall be conducted on a substantially level (not to exceed ±1% grade), dry, smooth, hard-surfaced area of concrete, asphalt (or other surface with equivalent coefficient of surface friction), that is free from loose material.

18.7.2.2.2 An operator with a minimum weight of 91 kg (200 lb) shall be seated on the machine during the test.

18.7.2.2.3 When testing a machine equipped with separate clutch and brake control means, the clutch shall be disengaged simultaneously with the brake engagement.

18.7.2.2.4 The snow thrower attachment shall be in the highest transport position.

18.7.2.2.5 A force of 890 N (200 lbf) shall be applied to the foot brake pedal prior to the service brake test.

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18.7.3 Parking brake system

18.7.3.1 Requirements

The machine shall be equipped with a parking brake system that shall hold the machine in any direction when parked on a 16.7° (30%) slope.

18.7.3.2 Test procedure

18.7.3.2.1 The test shall be conducted on a smooth, flat surface with tractive conditions equivalent to resting on a 16- to 36-grit abrasive material.

18.7.3.2.2 The transmission speed selector shall be in neutral with the engine shut off.

18.7.3.2.3 Tests shall be run with: (a) the 91-kg (200-lb) weight positioned as in 18.6.1 and (b) without the 91-kg (200-lb) weight or the operator in position.

18.7.3.2.4 The snow thrower shall be in the lowered position.

18.8 Fuel tank overfill test

18.8.1 Test procedure

With the machine on a level plane, the fuel tank inlet shall be overfilled by 118 cm^3 (4 oz) of liquid within 5 seconds.

18.8.2 Flammability

The test liquid should be nonflammable and approximately the same viscosity as the fuel intended for use.

18.8.3 Test acceptance

The machine shall have failed this test if the test liquid:

a) passes through the projected exhaust outlet area;

b) collects on the machine;

c) comes in contact with high-tension ignition cables or any noninsulated electrical connection.

18.9 Fuel line axial pull test

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

18.10 Tilt test – Controls

The control position shall not be affected by the tilting of the machine, snow thrower, or combination of machine and snow thrower.

18.10.1 Test procedure

This test is to be conducted according to the stability test procedure in 18.6.2.

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18.10.2 Inactivation of controls

Controls shall be placed in the stop, disengaged, or lift position (or other inactive position).

18.10.3 Test acceptance

Controls shall not move to the run, engaged, lowered, or other activating position at the extreme tilt specified for stability acceptance in 18.6.3.

19 Safety instructions and signs – Machine

19.1 Safety instructions

A durable label statement of safety practices in normal operating and servicing of the vehicle and power-driven attachments shall be provided. Pictorials may be used to convey the message.

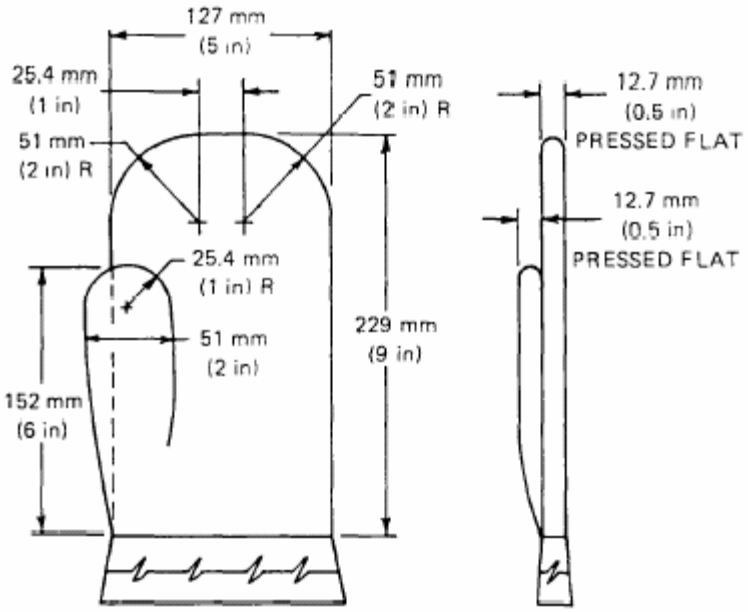
19.1.1 All safety signs shall be in accordance with the format, color and signal word requirements of ANSI Z535.4 or ISO 11684 and shall conform to the requirements of clause 16. Pictorials may be used to convey the message.

19.1.2 If ballast is necessary, a durable safety sign conveying the message that ballast is required on the machine shall be affixed to the attachment.

20 Safety instructions – Operator's manual

A manufacturer shall supply, with the equipment, pertinent instructions for safe operation, such as are shown in Figures 6 and 7. These instructions shall be tailored to the specific snow thrower design. In addition, specific instructions shall be provided regarding the use of ballast, including location and amount of weight, if the use of ballast is required to comply with the stability test outlined in 18.6.

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NOTES

1 All dimensions approximate, without hand in glove.

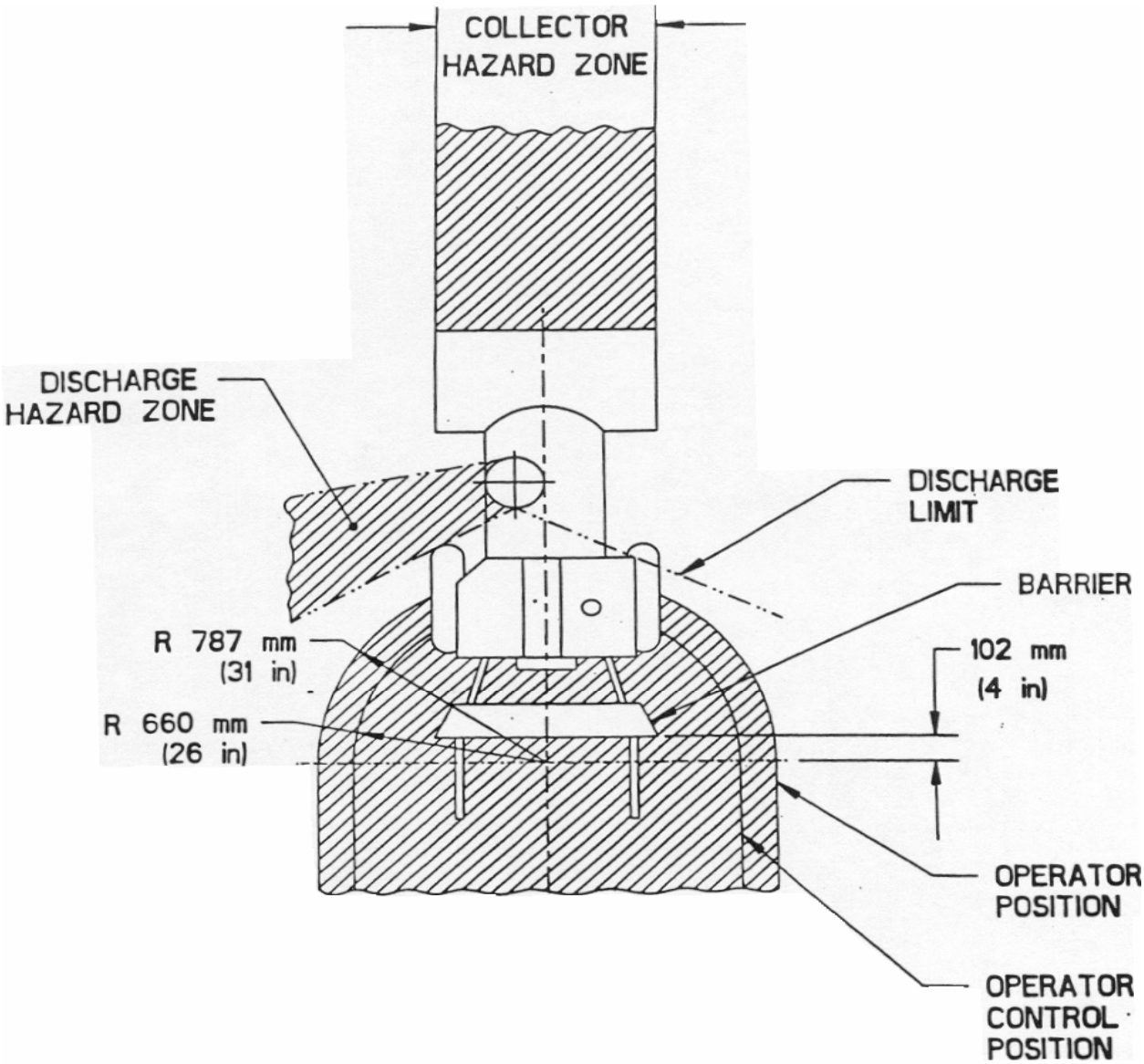
2 Material – buckskin outer shell with knit liner.

Figure 1 – Arctic mitten

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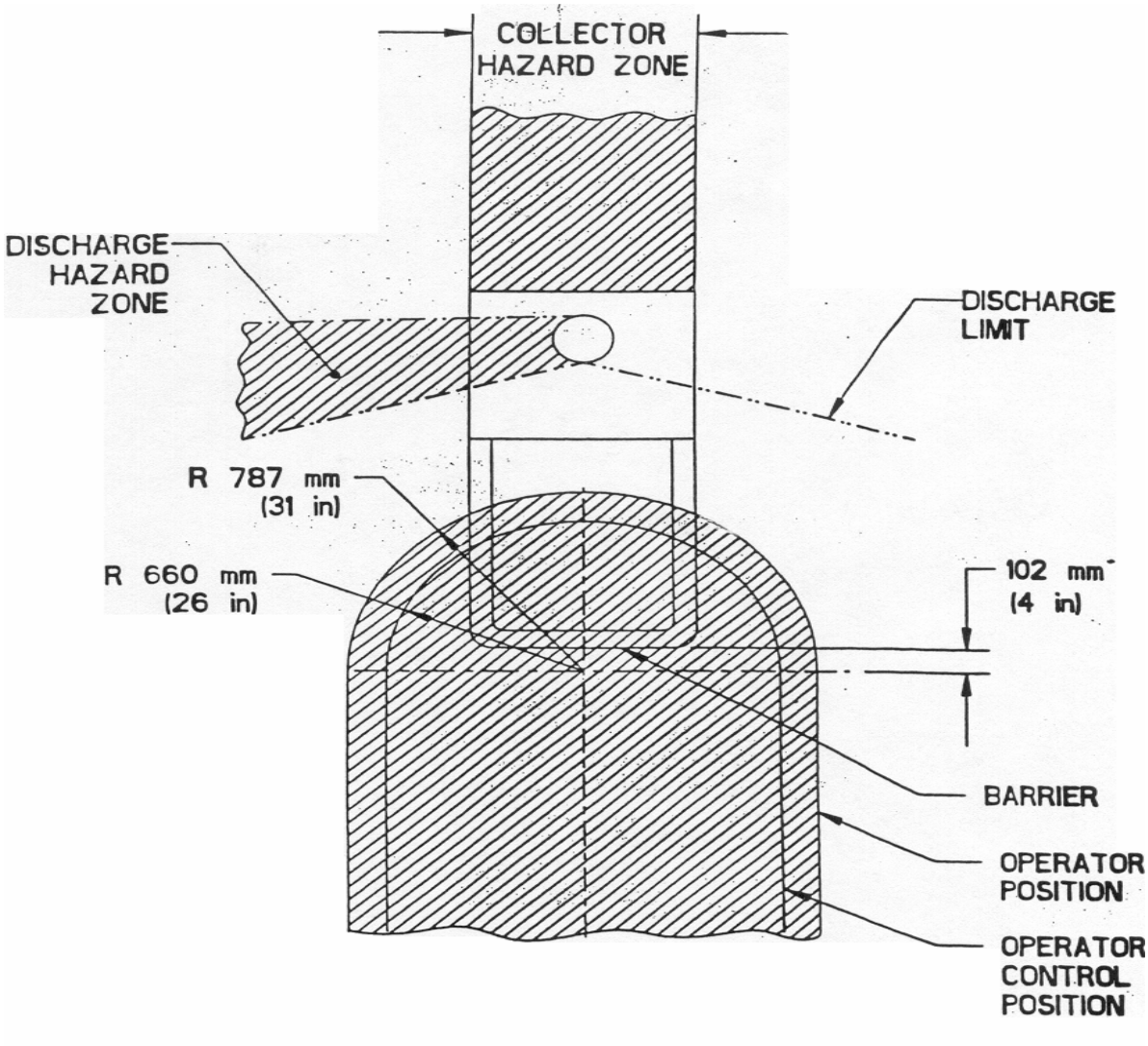


NOTE: Discharge hazard zone limit shall be determined by a line tangent to, or in line with, the inside walls of the discharge chute. The discharge hazard zone moves as the discharge chute is moved from side to side. Operator position shall not intersect the discharge hazard zone.

a) Walk-behind snow throwers – Two stage – Top view

Figure 2 – Operator position, operator control position, and hazard zones

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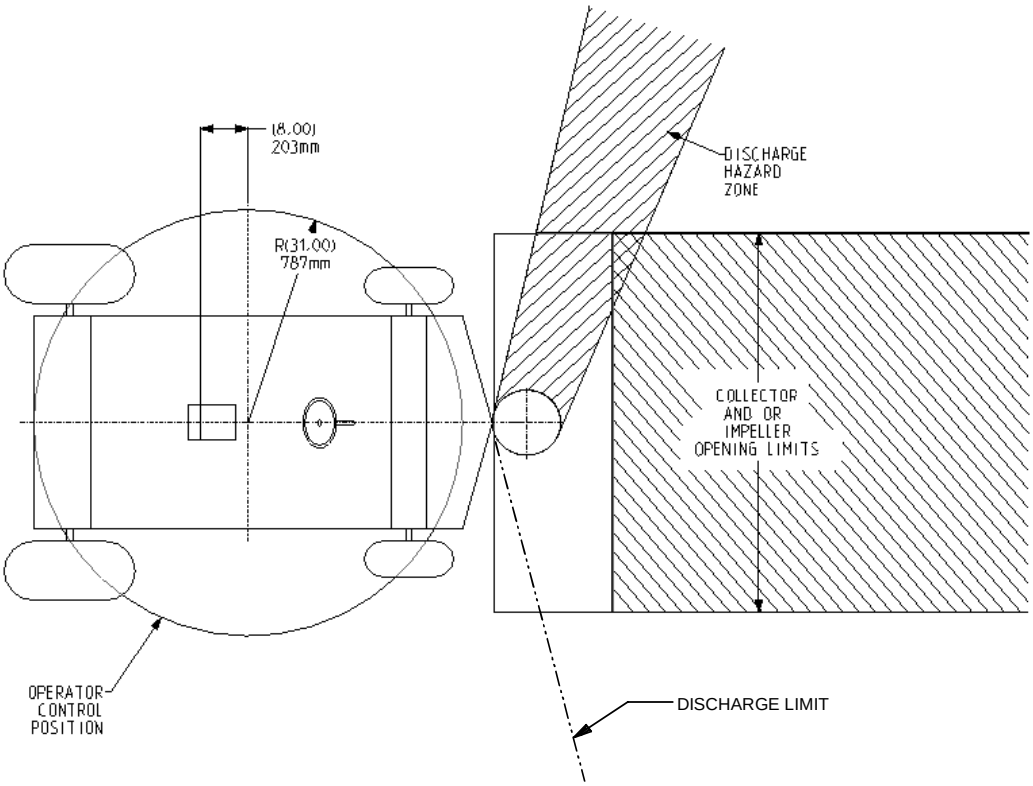


NOTE: Discharge hazard zone limit shall be determined by a line tangent to, or in line with, the inside walls of the discharge chute. The discharge hazard zone moves as the discharge chute is moved from side to side. Operator position shall not intersect the discharge hazard zone.

b) Walk-behind snow throwers – Single stage – Top view

Figure 2 *(continued)*

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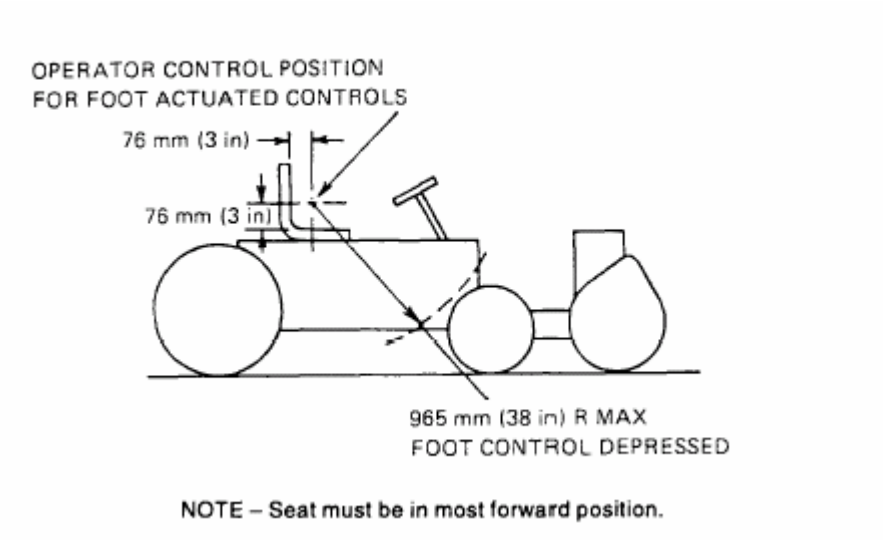


NOTE – Seat must be in most forward position. Discharge hazard zone limit shall be determined by a line tangent to, or in line with, the inside walls of the discharge chute. The discharge hazard zone moves as the discharge chute is moved from side to side. The operator control position shall not intersect the discharge hazard zone.

c) Ride-on snow throwers – Top view

Figure 2 *(continued)*

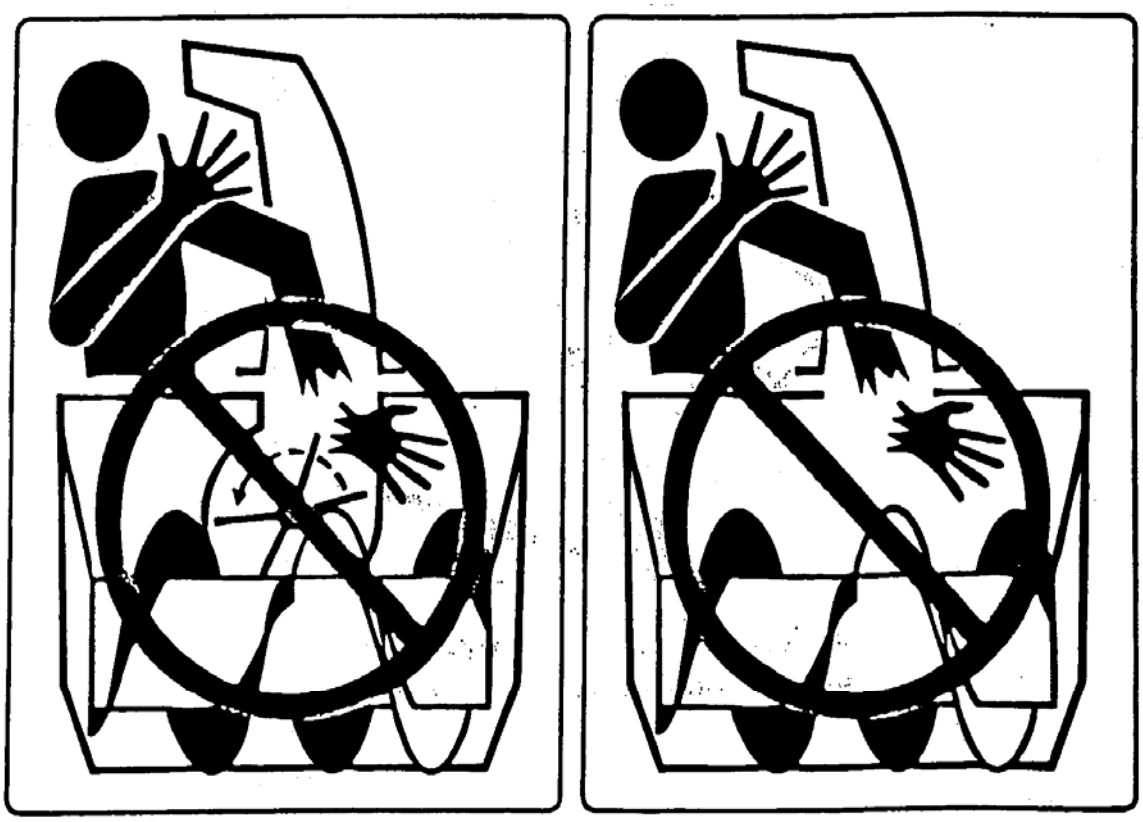
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d) Ride-on snow throwers – Side view

Figure 2 *(concluded)*

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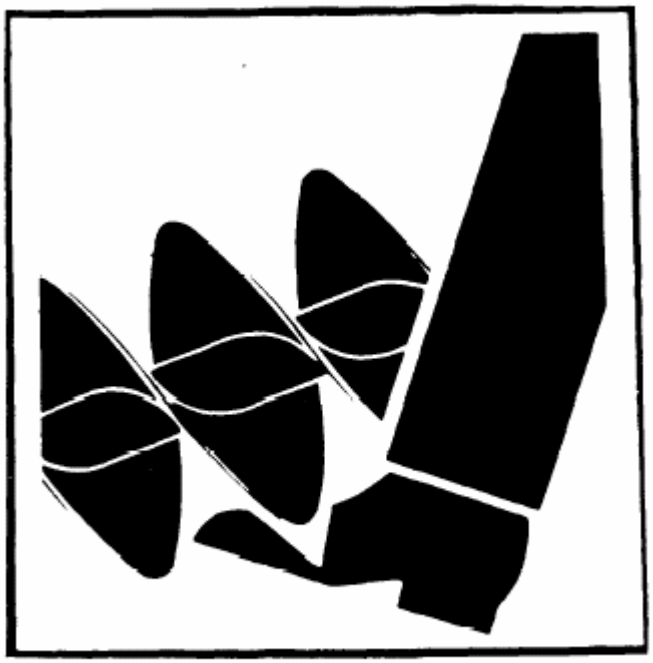


Single- or Two-Stage Machine **Single-stage Machine**

a) Pictorials for snow discharge opening

Figure 3 – Pictorials for safety labels

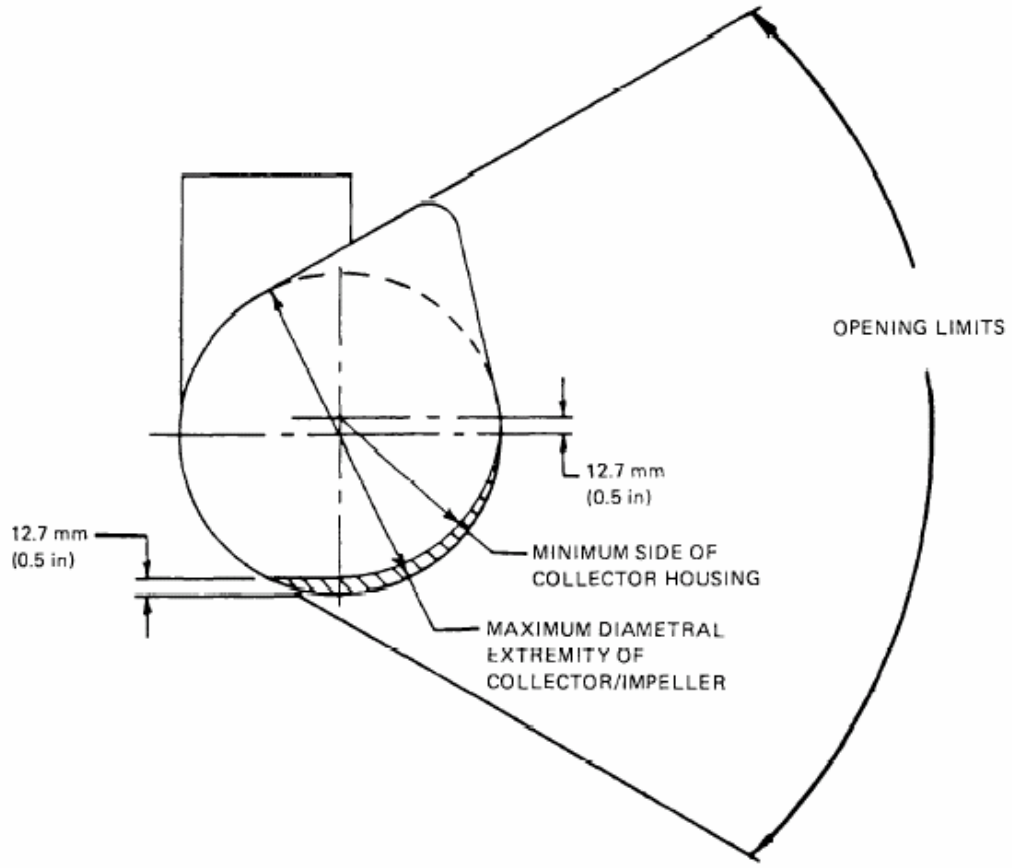
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b) Pictorial for collector and/or impeller housing

Figure 3 *(concluded)*

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NOTE – Shaded area indicates maximum allowable exposure of collector.

Figure 4 – Snow thrower housing

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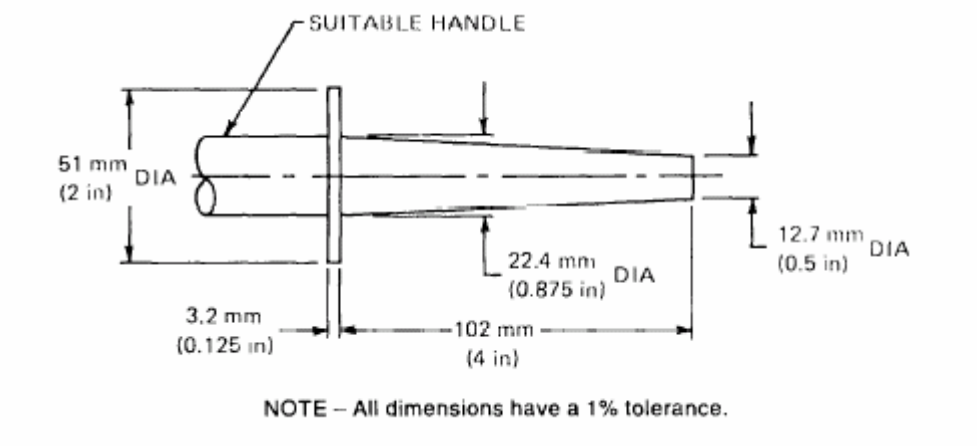


Figure 5 – Finger probe

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IMPORTANT

Safe Operation Practices for Walk-Behind Snow Throwers

This snow thrower is capable of amputating hands and feet and throwing objects. Failure to observe the following safety instructions could result in serious injury.

Training

1. Read, understand and follow all instructions on the machine and in the manual(s) before operating this unit. 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.

4. Exercise caution to avoid slipping or falling, especially when operating the snow thrower in reverse.

Preparation

1. Thoroughly inspect the area where the equipment is to be used and remove all doormats, sleds, boards, wires, and other foreign objects.

2. Disengage all clutches and shift into neutral before starting the engine (motor).

3. Do not operate the equipment without wearing adequate winter garments. Avoid loose fitting clothing that can get caught in moving parts. Wear footwear that will improve footing on slippery surfaces.

4. Handle fuel with care; it is highly flammable

   (a) Use an approved fuel container.

   (b) Never add fuel to a running engine or hot engine.

   (c) Fill fuel tank outdoors with extreme care. Never fill fuel tank indoors.

   (d) Never fill containers inside a vehicle or on a truck or trailer bed with a plastic liner. Always place containers on the ground, away from your vehicle, before filling.

   (e) When practical, remove gas-powered equipment from the truck or trailer and refuel it on the ground. If this is not possible, then refuel such equipment on a trailer with a portable container, rather than from a gasoline dispenser nozzle.

   (f) Keep the nozzle in contact with the rim of the fuel tank or container opening at all times, until refueling is complete. Do not use a nozzle lock-open device.

Figure 6 – Safety instructions for walk-behind snow throwers

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(g) Replace gasoline cap securely and wipe up spilled fuel.

(h) If fuel is spilled on clothing, change clothing immediately.

5. Use extension cords and receptacles as specified by the manufacturer for all units with electric drive motors or electric starting motors.

6. Adjust the collector housing height to clear gravel or crushed rock surface.

7. Never attempt to make any adjustments while the engine (motor) is running (except when specifically recommended by manufacturer).

8. Always wear safety glasses or eye shields during operation or while performing an adjustment or repair to protect eyes from foreign objects that may be thrown from the machine.

Operation

1. Do not put hands or feet near or under rotating parts. Keep clear of the discharge opening at all times.

2. Exercise extreme caution when operating on or crossing gravel drives, walks, or roads. Stay alert for hidden hazards or traffic.

3. After striking a foreign object, stop the engine (motor), remove the wire from the spark plug, disconnect the cord on electric motors, thoroughly inspect the snow thrower for any damage, and repair the damage before restarting and operating the snow thrower.

4. If the unit should start to vibrate abnormally, stop the engine (motor) and check immediately for the cause. Vibration is generally a warning of trouble.

5. Stop the engine (motor) whenever you leave the operating position, before unclogging the collector/impeller housing or discharge chute, and when making any repairs, adjustments or inspections.

6. When cleaning, repairing or inspecting the snow thrower, stop the engine and make certain the collector/impeller and all moving parts have stopped. Disconnect the spark plug wire and keep the wire away from the plug to prevent someone from accidentally starting the engine.

7. Do not run the engine indoors, except when starting the engine and for transporting the snow thrower in or out of the building. Open the outside doors; exhaust fumes are dangerous.

8. Exercise extreme caution when operating on slopes.

9. Never operate the snow thrower without proper guards, and other safety protective devices in place and working.

10. Never direct the discharge toward people or areas where property damage can occur. Keep children and others away.

Figure 6 *(continued)*

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11. Do not overload the machine capacity by attempting to clear snow at too fast a rate.

12. Never operate the machine at high transport speeds on slippery surfaces. Look behind and use care when operating in reverse.

13. Disengage power to the collector/impeller when snow thrower is transported or not in use.

14. Use only attachments and accessories approved by the manufacturer of the snow thrower (such as wheel weights, counterweights, or cabs).

15. Never operate the snow thrower without good visibility or light. Always be sure of your footing, and keep a firm hold on the handles. Walk; never run.

16. Never touch a hot engine or muffler.

Clearing a Clogged Discharge Chute

Hand contact with the rotating impeller inside the discharge chute is the most common cause of injury associated with snow throwers. Never use your hand to clean out the discharge chute.

To clear the chute:

1. SHUT THE ENGINE OFF!

2. Wait 10 seconds to be sure the impeller blades have stopped rotating.

3. Always use a clean-out tool, not your hands.

Maintenance and Storage

1. Check shear bolts and other bolts at frequent intervals for proper tightness to be sure the equipment is in safe working condition.

2. Never store the machine with fuel in the fuel tank inside a building where ignition sources are present such as hot water heaters, space heaters, or clothes dryers. Allow the engine to cool before storing in any enclosure.

3. Always refer to operator's manual for important details if the snow thrower is to be stored for an extended period.

4. Maintain or replace safety and instruction labels, as necessary.

5. Run the machine a few minutes after throwing snow to prevent freeze-up of the collector/impeller.

Figure 6 *(concluded)*

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IMPORTANT

Safe Operation Practices for Ride-on Snow Throwers

This snow thrower is capable of amputating hands and feet and throwing objects. Failure to observe the following safety instructions could result in serious injury.

Training

1. Read, understand and follow all instructions on the machine and in the manual(s) before operating this unit. 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.

Preparation

1. Thoroughly inspect the area where the equipment is to be used and remove all doormats, sleds, boards, wires, and other foreign objects.

2. Disengage all clutches and shift into neutral before starting the engine (motor).

3. Do not operate the equipment without wearing adequate winter garments. Avoid loose fitting clothing that can get caught in moving parts. Wear footwear that will improve footing on slippery surfaces.

4. Handle fuel with care; it is highly flammable

    (a) Use an approved fuel container.

    (b) Never add fuel to a running engine or hot engine.

    (c) Fill fuel tank outdoors with extreme care. Never fill fuel tank indoors.

    (d) Never fill containers inside a vehicle or on a truck or trailer bed with a plastic liner. Always place containers on the ground, away from your vehicle, before filling.

    (e) When practical, remove gas-powered equipment from the truck or trailer and refuel it on the ground. If this is not possible, then refuel such equipment on a trailer with a portable container, rather than from a gasoline dispenser nozzle.

    (f) Keep the nozzle in contact with the rim of the fuel tank or container opening at all times, until refueling is complete. Do not use a nozzle lock-open device.

    (g) Replace gasoline cap securely and wipe up spilled fuel.

    (h) If fuel is spilled on clothing, change clothing immediately.

Figure 7 – Safety instructions for ride-on snow throwers

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5. Adjust the collector housing height to clear gravel or crushed rock surface.

6. Never attempt to make any adjustments while the engine (motor) is running (except when specifically recommended by manufacturer).

7. Always wear safety glasses or eye shields during operation or while performing an adjustment or repair to protect eyes from foreign objects that may be thrown from the machine.

Operation

1. Do not put hands or feet near or under rotating parts. Keep clear of the discharge opening at all times.

2. Exercise extreme caution when operating on or crossing gravel drives, walks, or roads. Stay alert for hidden hazards or traffic.

3. After striking a foreign object, stop the engine (motor), remove the wire from the spark plug, thoroughly inspect the snow thrower for any damage, and repair the damage before restarting and operating the snow thrower.

4. If the unit should start to vibrate abnormally, stop the engine (motor) and check immediately for the cause.

5. Stop the engine (motor) whenever you leave the operating position, before unclogging the collector/impeller housing or discharge guide, and when making any repairs, adjustments or inspections.

6. When leaving the machine unattended, disengage the power take-off, lower the attachment, set the parking brake, stop the engine, and remove the key.

7. When cleaning, repairing or inspecting the snow thrower, make certain the collector/impeller and all moving parts have stopped. Disconnect the spark plug wire and keep the wire away from the plug to prevent someone from accidentally starting the machine. Do not run the engine indoors, except when starting the engine and for transporting the snow thrower in or out of the building. Open the outside doors; exhaust fumes are dangerous.

8. Do not clear snow across the face of slopes; go up and down. Exercise extreme caution when operating on slopes. Do not attempt to clear steep slopes.

9. Never operate the snow thrower without proper guards, and other safety protective devices in place.

10. Never direct the discharge toward people or areas where property damage can occur. Keep children and others away.

11. Do not overload the machine capacity by attempting to clear snow at too fast a rate.

12. Never operate the machine at high transport speeds on slippery surfaces. Look behind and use care when backing.

13. Do not carry passengers.

Figure 7 *(continued)*

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14. Disengage power to the collector/impeller when snow thrower is transported or not in use.

15. Use only attachments and accessories approved by the manufacturer of the snow thrower (such as wheel weights, counterweights, or cabs).

15. Never operate the snow thrower without good visibility or light.

Clearing a Clogged Discharge Chute

Hand contact with the rotating impeller inside the discharge chute is the most common cause of injury associated with snow throwers. Never use your hand to clean out the discharge chute.

To clear the chute:

1. SHUT THE ENGINE OFF!

2. Wait 10 seconds to be sure the impeller blades have stopped rotating.

3. Always use a clean-out tool, not your hands.

Maintenance and Storage

1. Check shear bolts and other bolts at frequent intervals for proper tightness to be sure the equipment is in safe working condition.

2. Never store the machine with fuel in the fuel tank inside a building where ignition sources are present such as hot water heaters, space heaters, or clothes dryers. Allow the engine to cool before storing in any enclosure.

3. Always refer to operator's manual for important details if the snow thrower is to be stored for an extended period.

4. Maintain or replace safety and instruction labels, as necessary.

5. Run the machine a few minutes after throwing snow to prevent freeze-up of the collector/impeller.

Figure 7 *(concluded)*

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Annex A
(informative)

Rationale

This annex gives the rationale behind the various requirements of this voluntary safety standard. The section numbers used in this annex correspond to those used in the body of the standard.

Part I: General

A.1 Scope

The purpose of the scope is to establish the coverages and limitations of the standard. The unique design of hand-held snow throwers guards the operator from rotating element contact by position; therefore, these snow throwers are not included. Large, unique machines such as those used at airports, on highways and those used for agricultural purposes are not covered by the standard. Complete coverage of electrical requirements is not included in order to avoid unnecessary duplication of, or conflict with, requirements established in other standards.

A.3 Definitions

The purpose of each definition is to establish the meaning of words or phrases to express the intent of the drafters.

Part II: Walk-behind snow thrower – Requirements and test procedures

A.4 Controls

A.4.1 General requirements

A.4.1.1 Control identification

Most controls relating to the operation of the unit are to be identified by a durable label to assist the operator in readily identifying critical controls and in the proper operation of these controls. Legible lettering requires that the manufacturer use a letter type, height, and size that can be read by the operator when in a position to use a control. One unit of height for each 500 units of viewing distance is recommended. A minimum letter height of 3 mm is required. This letter height will satisfy a viewing distance of up to 1.5 meters.

The standard also allows the use of international symbols as illustrated in ANSI/SAE J1362, thus negating the need to provide translation into other languages for those controls included in ANSI/SAE J1362.

A.4.1.2 Control location

This subclause requires that operating controls be located within the operator control position, convenient to the operator. The engine control is primarily used during initial starting of the engine. Therefore, it does not have to be in the operator control position but cannot be located in the hazard zone.

A.4.1.3 Operability

A snow thrower is generally operated under severe cold conditions. It is important that the operator be able to safely operate the machine wearing cold weather hand protection. Arctic mittens were selected since this handwear generally represents the bulkiest of hand protection.

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A.4.1.5 Resistance to movement

A snow thrower may be subjected to unusual vibrations that could cause controls to move from their preselected positions. This vibration may be caused by accumulation of ice on rotating components, creating an unbalanced condition.

A.4.2 Specific requirements

A.4.2.1 Shutoff control device

This device requires manual and intentional reactivation in order to reduce the probability of inadvertent starting. The key switch or similar device will allow the owner or operator to curtail unauthorized operation of easily started machines.

A.4.2.2 Engine speed control

These requirements are consistent with both domestic and international standards for other outdoor power equipment.

A.4.2.3 Drive interlock

This requirement prevents inadvertent motion of the machine or rotation of the collector/impeller when starting the power source.

A.4.2.4 Impeller and collector control

Five-second stopping time is generally less than the normal time it takes an operator to leave the operator's position and to reach the hazard area of the rotating impeller. This stopping time applies both to the automatic stop requirement and to the manual deactivation of the impeller control. The impeller torque resistance requirement is intended to address inadvertent impeller rotation when the drive has been disengaged. The automatic impeller stop means may allow reactivation of the impeller, providing the impeller has not stopped. This is to allow reengagement in the event the operator inadvertently released the drive control and wished to continue snow thrower operation without having to initiate the restart procedure.

A.4.2.5 Self-propelled walk-behind snow throwers

The direction of traction drive control engagement has been selected to improve logical operation of the control. For control disengagement, by resisting the direction of machine motion on the control, the machine will stop.

The requirement for an operator-presence 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.

Impeller disengagement during transport across snow-free areas improves safety for bystanders by:

a) minimizing injury potential from inadvertent contact with the collector/impeller;

b) minimizing injury potential from thrown objects.

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Traction disengagement with the impeller engaged improves safety for the operator by reducing the propensity of the snow discharge guide to plug by:

1) allowing forward motion to stop while the machine clears itself of snow without additional snow being forced into the impeller;

2) allowing interrupted forward motion when operating in extreme conditions such as very deep or heavy, wet freezing snow.

A.5 Guards, shields, chutes, deflectors, and housings

A.5.1 General

The adequacy of guards, shields, chutes, deflectors, and housing is determined by the applicable tests of clause 9. (See 9.2, 9.4, 9.5, and 9.7.)

A.5.2 Installation

This requirement tends to discourage the removal of guards unless required for servicing.

A.5.3 Snow discharge chutes and deflectors

These guides and deflectors control the direction of the material being discharged from the snow thrower and therefore help protect the operator and the bystanders. The safety sign (5.3.4) contains a pictorial to alert the operator to potential hazards. The manufacturer may modify the pictorial to match his machines and hazard patterns .

A.5.4 Collector and/or impeller housing

These housings help protect the operator from thrown objects and minimize inadvertent contact by operators or bystanders with the collector and/or impeller. To minimize the chances of potential injury, the label (safety sign) is provided as an additional warning.

A.5.5 Power drives

This requirement is for protection of the operator from inadvertent contact with the power drives.

A.5.6 Hot surfaces

This requirement helps protect the operator from burns.

A.5.7 Engine exhaust

This requirement helps protect the operator from exhaust fumes.

A.5.8 Fuel overflow

These requirements minimize the hazard of fire from ignition of spilled fuel.

A.5.9 Snow clean-out tool

Accident data shows hand-in-chute injury to be the dominant hazard pattern for two-stage snow throwers. This requirement will provide a readily accessible and preferable alternative for cleaning out a clogged discharge chute.

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A.6 Servicing

This clause provides guidelines for safe operation.

A.7 Electrical requirements

The requirements in this clause minimize electrical hazards in those areas that might not be normally covered in other standards.

A.9 Tests for power snow throwers

These tests are intended to cover the normal range of adverse conditions encountered by a snow thrower and to provide uniform tests for determining compliance with the standard. The sequence of tests are such that the results of the first tests are evaluated by subsequent tests. The sequence of tests also leaves the destructive test until last.

A.9.2 Structural integrity tests

A.9.2.1 Unbalance test

This test simulates unbalance conditions, such as from heavy ice build-up on the rotating components or the loss of the components, which generally results in excessive vibration of the snow thrower. This unbalance can affect the integrity of the fasteners, the components (such as guards and shields), or of the retention of control. These effects of the unbalance may occur separately or simultaneously. The unbalance formula shown in 9.2.1.1 was derived from the unbalance formula for rotary mower blades.

A.9.2.2 Guards

Snow throwers normally operate under low temperature conditions in which the strength of materials used could be adversely affected by such temperatures.

A.9.3 Controls test

This test verifies the integrity of the retention of control in the event the engine of a machine is allowed to remain running unattended; i.e., prevent a control from inadvertently engaging.

A.9.4 Temperature of exposed surfaces

This test determines the surface and areas of the machine that must be guarded or the surfaces that should be indicated with a safety sign warning of the hot surfaces that could be contacted.

A.9.5 Probe test

This test is used to determine the potentially hazardous area that may be contacted during normal starting and operation of the machine. The procedure allows for guarding by location since areas not accessible during normal operation are not probed.

A.9.6 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 should be drained away in manner and place that will minimize overflowed fuel ignition.

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A.9.6.3 Test acceptance

This requirement extends to all machine surfaces including the traction system. Surface wetting is allowable.

A.9.7 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 during normal use.

A.10 Safety instructions and signs – Machine

This clause is intended to provide the operator with readable labels and instructions for safe operations.

A.11 Safety instructions – Operator's manual

This clause is intended to provide consumers with a list of instructions for safe operations.

Part III: Ride-on machines with snow thrower attachments – Requirements and test procedures

A.12 Controls

A.12.1 General requirements

A.12.1.1 Control identification

See rationale of 4.1.1. The ride-on machine requirements exempt the steering wheel and manual lift controls, in addition to the snow discharge guide, from the identification requirements. The steering control is considered to be obvious and therefore does not require identification and the lift control is not considered a critical control.

A.12.1.2 Control location

See rationale of 4.1.2. Manual lift controls are allowed to be located out of the operator control position. Since a snow thrower is a relatively heavy attachment, mechanical advantage can be gained by providing a longer arc of the lift control handle that will reduce the effort needed to raise the attachment. This requires movement of the control outside of the operator position.

A.12.1.3 Operability

See rationale of 4.1.3.

A.12.1.4 Control design

See rationale of 4.1.4.

A.12.1.5 Resistance to movement

See rationale of 4.1.5.

A.12.1.6 Steering lever(s) on lever-steer machines

Safe operation of lever-steer machines is enhanced by free movement of the levers. Changing the motion or excessively retarding such movement may create a hazard by hindering quick application of the brake or steering controls.

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A.12.2 Specific requirements

A.12.2.1 Shutoff control device

See rationale of 4.2.1.

A.12.2.2 Engine speed control

A.12.2.2.1 Hand operated

See rationale of 4.2.2.

A.12.2.2.2 Foot operated

Foot-operated engine speed control requirements are consistent with automobile, agricultural, and construction equipment and other outdoor power equipment.

A.12.2.3 Drive interlock

See rationale of 4.2.3.

A.12.2.4 Impeller and collector control

The requirements for the impeller control for ride-on snow throwers is similar to that of walk-behind snow throwers except that if the automatic stop of the impeller is accomplished by engine kill, the five-second stopping time is not required. The stopping time is waived because the operator is in a less convenient position to rapidly reach the impeller of ride-on equipment when compared to walk-behind equipment. The sound of the engine stopping is a further indication that components may still be turning. This is not obvious when the engine is allowed to remain running.

The impeller torque resistance requirement is intended to address inadvertent impeller rotation when the drive has been disengaged.

Lawn and garden tractors must accommodate stationary PTO-driven equipment without an operator in the normal operating position. The stationary operation provision allows the tractor to be used for its utility function and still maintain the operator-presence safety feature for mobile PTO operation without the operator having to consciously restore the safety system.

A.12.2.5 – 12.2.11 This series of requirements is intended to provide a relatively uniform control environment, somewhat analogous to the operation of other outdoor power equipment, which therefore reduces the possibility of injuries that might result from nonfamiliar control locations or control movement.

A.13 Guards, shields, chutes, deflectors, and housings

A.13.1 General

The adequacy of guards, shields, chutes, deflectors, and housing is determined by the applicable tests of clause 18. (See 18.2, 18.4, 18.5, and 18.8.)

A.13.2 Installation

This requirement tends to discourage the removal of guards unless required for servicing.

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A.13.3 Snow chutes and deflectors

These chutes and deflectors control the direction of the material being discharged from the snow thrower and therefore protect the operator and the bystanders. The safety sign (13.3.4) contains a pictorial to alert the operator to potential hazards. The manufacturer may modify the pictorial to match their machines and hazard pattern.

A.13.4 Collector and/or impeller housing

These housings protect the operator from thrown objects and minimize inadvertent contact by operators or bystanders with the collector and/or impeller. To minimize the chances of potential injury, the label (safety sign) is provided as an additional warning.

A.13.5 Power drives

The requirement is for protection of the operator from inadvertent contact with the power drives.

A.13.6 Hot surfaces

This requirement protects the operator from burns.

A.13.7 Engine exhaust

This requirement helps protect the operator from exhaust fumes.

A.13.8 Fuel overflow

These requirements minimize the possibility of fire hazard from ignition of spilled fuel.

A.14 Servicing

This clause provides guidelines for safe operation.

A.15 Electrical requirements

The requirements in this clause minimize electrical hazards in those areas that might not be normally covered in other standards.

A.18 Tests for power snow throwers

These tests are intended to cover the normal range of adverse conditions encountered by a snow thrower and to provide uniform tests for determining compliance with this standard. The sequence of tests are such that the results of the first tests are evaluated by subsequent tests. Tests that are identical to those of ANSI B71.1, and have been conducted on the machine, do not have to be repeated for this standard.

A.18.2 Structural integrity tests

A.18.2.1 Unbalance test

This test simulates unbalance conditions, such as heavy ice build-up on the rotating components or the loss of the components, which generally results in excessive vibration of the snow thrower. This unbalance can affect the integrity of the fasteners, the components (such as guards and shields), or the retention of control. These effects of the unbalance may occur separately or simultaneously. The unbalance formula shown in 9.2.1.1 was derived from the unbalance formula for rotary mower blades.

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A.18.2.2 Guards

Snow throwers normally operate under low temperature conditions in which the strength of materials used could be adversely affected by such temperatures.

A.18.3 Controls test

This test verifies the integrity of the retention of control in the event the engine of a machine is allowed to remain running unattended; i.e., prevent a control from inadvertently engaging.

A.18.4 Temperature of exposed surfaces

This test determines the surfaces and areas of the machine that must be guarded or the surfaces that should be indicated with a safety sign warning of the hot surfaces that are likely to be contacted.

A.18.5 Probe test

This test is used to determine the potentially hazardous area that may be contacted during normal starting and operation of the machine. The procedure allows for guarding by location since areas not accessible during normal operation are not probed.

A.18.6 Stability

This clause establishes minimum requirements for stability of riding machines. These procedures are similar to the stability tests described in ANSI B71.1. A ride-on machine should be tested with the snow thrower attachment in place.

A.18.7 Braking requirements and tests

These tests are also similar to the tests described in ANSI B71.1. relative to dynamic stopping. This standard includes a brake structural integrity test to determine the adequacy of the brake system under panic conditions.

A.18.8 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 overflowed fuel ignition.

A.18.8.3(b) Test acceptance

This requirement extends to all machine surfaces including the traction system. Surface wetting is allowable.

A.18.9 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 during normal use.

A.18.10 Tilt test – Controls

This test further enhances the integrity of the machine's control system by ensuring machine attitude does not affect inadvertent movement of the controls.

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A.19 Safety instructions and signs– Machine

This clause is intended to provide the operator with readable labels and instructions for safe operations.

A.20 Safety instructions – Operator's manual

This clause is intended to provide consumers with a list of instructions for safe operations.

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