

SURFACE VEHICLE STANDARD

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SAFETY FOR AGRICULTURAL TRACTORS

Foreword—This reaffirmed document has been changed only to reflect the new SAE Technical Standards Board format.

1. Scope—This SAE Standard is a guide to provide a reasonable degree of personal safety for operators and other persons during the normal operation and servicing of agricultural tractors.

2. References

2.1 Applicable Documents—The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J115—Safety Signs

SAE J137—Lighting and Marking of Agricultural Equipment on Highways

SAE J674—Safety Glazing Materials—Motor Vehicles

SAE J717—Auxiliary Power Take-Off Drives for Agricultural Tractors

SAE J841—Operator Controls for Agricultural Wheeled Tractors

SAE J920—Technical Publications for Off-Road Work Machines

SAE J1041—Brake Test Procedures and Brake Performance Criteria for Agricultural Equipment

SAE J1150—Terminology for Agricultural Equipment

SAE J1170—Rear Power Take-Off for Agricultural Tractors

SAE J1194—Roll-Over Protective Structures (ROPS) for Wheeled Agricultural Tractors

2.1.2 ANSI PUBLICATION—Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ANSI Z26.1—Safety Code for Safety Glazing Materials for Glazing Motor Vehicles Operating on Land Highways

2.1.3 ECE PUBLICATION—Available from

ECE Regulation #43—Uniform Provisions Concerning the Approval of Safety Glazing and Glazing Materials for Installation on Power Driven Vehicles and Their Trailers

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2.2 Definitions

2.2.1 AGRICULTURAL TRACTOR—Refer to SAE J1150.

2.2.2 POWER TAKE-OFF (PTO)—Refer to SAE J1170.

2.2.3 AUXILIARY POWER TAKE-OFF (AUX PTO)—Refer to SAE J717.

2.2.4 SHIELD (OR GUARD)—A barrier which minimizes inadvertent personal contact with machinery-related hazards.

2.2.5 NIP POINT—The pinch point of gears and the run-on point where a belt or chain contacts a pulley, sprocket, or idler.

2.2.6 MOVING MACHINERY PART HAZARD—A source of potential injury created by moving machinery parts which can cause serious injury upon direct contact or by entanglement of personal apparel. This includes but is not limited to nip points and projections on rotating parts.

2.2.7 INADVERTENT CONTACT—Contact between a person and a moving machinery part hazard, or other type of hazard, resulting from the person's unplanned actions during normal operation or servicing.

2.2.8 GUARDED BY LOCATION—A hazard is guarded when it is covered by other parts or components of the machine or when its remote location minimizes inadvertent contact during normal operation or servicing.

3. Operator's Manual

3.1 Operator's manual(s) shall be supplied with each piece of equipment.

3.2 Operator's manual(s) shall provide general safety instructions for normal operation and servicing of the equipment in accordance with SAE J920.

4. **Operator's Controls**—Location, movement, and identification of operator controls shall be in accordance with SAE J841.

5. Safety Interlock Provisions

5.1 For future design, agricultural tractors shall be equipped with devices which assure that the PTO and Auxiliary PTO are disengaged when the engine is being started.

5.2 An interlock shall be provided to prevent starting the engine following the recommended starting procedure unless the transmission is in a neutral position, the transmission clutch is disengaged, or the combination direction and speed control is in a neutral position.

6. Operation and Servicing Provisions

6.1 A suitable station shall be provided for each person required for the operation of the agricultural tractor.

6.2 All agricultural tractors shall have steps and handholds, or other means to facilitate entry and exit from the operating position.

6.3 If the mounting step(s), ladder(s), or handhold(s) of the agricultural tractors are made inaccessible by the installation of equipment, alternate facilities shall be provided.

6.4 Handholds, hand rails, guard rails, or barrier-type safeguards shall be provided, if necessary, to facilitate servicing unless means are provided by other parts of the agricultural tractor.

6.5 Step Requirements for Operating Station

6.5.1 The height of the first step should not exceed 700 mm (27.6 in); preferably 550 mm (21.6 in).

6.5.2 The vertical interval between steps shall not exceed 400 mm (15.7 in); preferably 300 mm (11.8 in). Step intervals shall be reasonably uniform, except that the interval between the top step and platform may be less than other steps.

6.5.3 The width of each step shall be not less than 250 mm (9.8 in).

6.5.4 The combined step depth plus toe clearance shall be not less than 150 mm (5.9 in).

6.5.5 Steps shall have slip-resistant surfaces and be designed to minimize the accumulation of debris.

6.6 Operator platforms shall have slip-resistant surfaces.

6.7 Shielding shall be provided on the back of steps or ladders wherever a protruding hand or foot may contact a moving machinery part hazard.

6.8 Glazing material, such as glass or plastic used in operator's enclosures, shall meet the requirements of SAE J674 except that:

6.8.1 Windshields may conform to tempered safety glass, Item 2 of ANSI Z26.1 (latest issue).

6.8.2 Windshields may include zone toughened glass conforming to ECE Regulation Number 43 (latest issue).

6.8.3 Curved and flat glazing material larger than 1.4 m² (15.1 ft²) for windshields and for side and rear windows of agricultural tractors may deviate from 6.8.1 requirements in that, when broken, what appears to be the 10 largest particles shall weigh no more than the equivalent weight of 64.5 cm² (10 in²) of the sample.

6.9 All sharp edges and corners at the operator's station shall be appropriately treated to minimize potential hazard to the operator.

6.10 Cabs for agricultural tractors shall include provision for emergency exit.

6.10.1 In addition to the primary door, at least one other exit shall be provided.

6.10.2 A second door, windshield(s), a roof panel, or window(s) not on the same wall as the primary door may be considered emergency exits if, from inside the cab, they can be opened or removed quickly without tools.

6.10.3 Emergency exits must have minimum dimensions of a rectangle 610 mm (24.0 in) x 360 mm (14.2 in).

7. Shields (or Guards)

7.1 The following shall be shielded or shall be guarded by location to minimize inadvertent contact with hazards created by:

7.1.1 Moving traction elements in relation to the operator's station.

7.1.2 Revolving engine components.

7.1.3 Nip points of exposed gears, belts, chain drives, and idlers.

7.1.4 Outside faces of pulleys, sheaves, sprockets, and gears on drives that rotate when the engine is running with all clutches disengaged.

7.1.5 Universal joints and other revolving parts with projections such as exposed bolts, keys, or set screws.

7.1.6 Revolving shafts, except smooth shaft ends protruding less than one-half the diameter of the shaft including its locking means.

7.1.7 Surfaces hot enough to cause personal injury during normal operation or servicing.

7.2 Shields shall be free of sharp corners and projections.

7.3 Access doors and shields that must be opened for normal servicing shall be easily opened and closed.

7.4 Shields and their supports shall remain functional and withstand the forces that a 120 kg (265 lb) individual, leaning on or falling against the shield, would exert on that shield in normal operation or servicing. Those shields designed to be used as steps, or where that use can be anticipated, shall remain functional if used as steps by a 120 kg (265 lb) operator.

8. Power Take-off

8.1 Tractors having PTO shafts shall be equipped with PTO shields in accordance with SAE J1170. On future designs:

8.1.1 It is recommended that the PTO shield, or a portion of the shield, shall be movable without detachment from the tractor, if necessary, to facilitate attachment of the implement input driveline to the PTO shaft.

8.1.2 The movable portion of the shield shall be resistant to unintentional movement when in the operating position.

8.2 Provisions per Section 7 shall be made on the tractor to shield the auxiliary PTO when in use.

8.3 A safety sign(s) shall be provided at a prominent location on the tractor specifying the normal PTO speed and that PTO shields are to be kept in place.

9. Tractor Roll-Over Protection

9.1 Tractor roll-over protection meeting the requirements of SAE J1194 shall be provided on wheeled agricultural tractors.

9.2 Batteries, fuel tanks, oil reservoirs, and coolant systems shall be constructed and located or sealed to reduce the possibility of spillage that might be injurious to the operator in the event of upset.

10. Lifted Units

10.1 Controls for lifted units (implements or components of implements and self-propelled machines) shall conform to SAE J841.

10.2 Instructions to securely support or block units including hitch-mounted implements, which must be in a raised position for servicing or adjustment, shall be included in operator's manuals and on safety signs.

11. Travel on Highways

11.1 Lighting and marking of equipment shall conform to SAE J137.

11.1.1 The operator's manual for the agricultural tractor shall instruct the operator to turn on the flashing warning lights whenever traveling on a highway except where such use is prohibited by law.

11.2 Agricultural tractors with operator enclosures (cabs) shall have at least one rearview mirror to permit the operator to see the highway behind the tractor.

11.3 Hitch pins and other hitching devices shall be provided with a retainer to prevent accidental unhitching.

11.4 Provisions shall be made for the use of auxiliary attaching systems, per ASAE S338 where expected uses include towing on highways by single point attachment.

11.5 For towed equipment without brakes, the information in Table 1 shall be provided:

TABLE 1—REQUIRED INFORMATION FOR TOWED EQUIPMENT WITHOUT BRAKES

Road Speed	Weight of Fully Equipped or Loaded Implement(s) Relative to Weight of Towing Machine
Up to 32 km/h (20 mph)	1:1, or less
Up to 16 km/h (10 mph)	2:1, or less
Do not tow	More than 2:1

12. Braking and Parking Requirements—For agricultural tractors braking systems requirements, refer to SAE J1041.

13. Fire Protection

13.1 Shields shall be provided for the engine exhaust manifolds, muffler, and exhaust pipe when necessary to prevent contact with flammable crop materials.

13.2 Fuel sediment bowl assemblies used on gasoline engines shall be fire resistant.

14. Safety Signs

14.1 Safety signs shall be appropriately displayed when necessary to alert the operator and others of the risk of personal injury during normal operations and servicing.

14.2 Safety signs shall conform to the requirements of SAE J115.