# SAFETY FOR INDUSTRIAL WHEELED EQUIPMENT—SAE J98

**SAE Recommended Practice**

Report of Construction and Industrial Machinery Technical Committee approved May 1973.

*1. Purpose*—This SAE Recommended Practice is intended to improve the degree of personal safety for operators and others involved during the normal operation and servicing of industrial wheeled equipment. Avoidance of accidents also depends upon the care exercised by such persons. (See SAE J135.)

*2. Definitions*

**2.1 Industrial wheeled equipment** is defined as that class of tractors and associated equipment used in operations such as landscaping, construction services, loading, digging, grounds keeping, and highway maintenance.

**2.2 Propelling vehicles** are tractors or self-propelled units.

**2.3 Towed, semi-mounted, and mounted equipment** are equipment used in conjunction with propelling vehicles as defined in paragraph 2.3.

**2.4 A highway** is the entire width between the boundary lines of every way publicly maintained when any part thereof is open to the use of the public for purposes of vehicular travel. (Uniform Vehicle Code published by National Committee on Uniform Traffic Laws and Ordinances.)

*3. Service*

3.1 Servicing or adjusting shall be done with the engine stopped, unless specific instructions to perform certain operations with the engine running are provided with the equipment.

3.2 Access shall be provided to the areas requiring regular servicing, adjusting, or inspecting.

*4. Operator Controls*

4.1 Location and movement of operator controls shall be in accordance with SAE J297.

4.2 Controls should be identified. If symbols are used, they shall be in accordance with SAE J298.

4.3 Foot pedals shall be of adequate size, spacing, and appropriate configuration, and shall have either slip-resistant surfaces or other means of minimizing the possibility of operator's foot slipping off the pedals.

4.4 Hand controls shall be of appropriate configuration and size to permit an adequate grasp and hand clearance.

*5. Operating and Servicing Positions*

5.1 All propelling vehicles and equipment shall be equipped with access systems in accordance with SAE J185.

5.2 If the mounting steps or ladder and the hand holds of the propelling vehicle are made inaccessible by installation of integrally mounted equipment, similar facilities for steps and hand holds shall be provided on the equipment.

5.3 A slip-resistant means shall be provided on the operator's platform to minimize the possibility of feet slipping off the platform.

5.4 Glazing material, such as glass or plastic used in cabs, shall be of a type and quality that minimizes the risk of injury due to fragmentation when fractured in accordance with SAE J674.

5.5 If the operation of the equipment or vehicle requires a second person on either the propelling vehicle or the equipment, a suitable position shall be provided which conforms to paragraph 5. Instructions shall discourage any other person from riding on either the equipment or the propelling vehicle.

*6. Power Take-Off*

**6.1** The power take-off and power take-off drive lines shall conform to the safety provisions of SAE J718, SAE J719, and SAE J721.

6.2 Tractors capable of driving the 540 rpm rear power take-off shaft in excess of 600 rpm or the 1000 rpm rear power take-off in excess of 1100 rpm or the auxiliary power take-off in excess of 1100 rpm shall be equipped with an instrument which will indicate when the PTO is operating at the normal operating speed.

6.3 The tractor shall be equipped with means to prevent the operator from inadvertently operating the power take-off in excess of 630 rpm for the 540 rpm shaft or 1150 rpm for the 1000 rpm shaft.

6.4 The tractor shall be equipped with a master shield on the rear power take-off (Fig. 1). The master shield shall have sufficient strength to support the weight of the operator without taking a permanent set.

6.4.1 Provisions shall be made on the tractor to properly shield the auxiliary power take-off shaft when it is connected to a drive assembly.

6.5 The rear and the auxiliary power take-off shafts shall be coveed at all times, either by a master shield or other protective means when not connected to a drive assembly.

6.6 Both towed and integral-type power take-off driven equipment shall be equipped with adequate shielding for that portion of the power line that is furnished as a part of the driven equipment. This shielding shall prevent the operator from coming in contact with positively driven rotating members of the power line. The shield for the power line between the driven equipment and tractor rear power take-off shall be integral with and journaled on the rotating member. Where integral power take-off driven equipment are of a design requiring removal of the tractor master shield, such driven equipment shall also include adequate protection for that portion of the tractor power shaft which protrudes from the tractor.

6.7 Appropriate signs shall be provided at prominent locations on the tractor and the power driven equipment specifying:

6.7.1 The normal operating speed of the power take-off shaft (540 or 1000 rpm).

6.7.2 That the power line safety shields are to be kept in place.

6.8 The information specified in paragraphs 6.7.1 and 6.7.2 shall also be shown in the instruction manual.

*7. Tractor Rollover Protection*—Rollover protection (ROPS) shall conform to SAE J1042 and SAE J1043.

*8. Shields or Guards*

**8.1 Traction Elements**—All propelling vehicles shall be provided with fenders or guards to minimize the possibility of the operator or observer when in the normal position from contacting moving traction elements, unless the propelling vehicle is fitted with equipment or other means of accomplishing this purpose.

**8.2 Engine Components**—Provision shall be made to minimize the possibility of personal contact with rotating components when the engine is running.

**8.3 Heat Protection**—A guard or shield shall be provided to minimize the possibility of inadvertent contact during normal operation or servicing with any exposed elements which may cause burns.

**8.4 Power Drives on Propelling Vehicles and Equipment**—The acute entry angles[1] of exposed gears, belts, and chain drives and idlers shall be covered by shields, rods, mesh, or other portions of the machine to minimize the possibility of inadvertent contact.

8.5 Constant running drives, or drives that rotate when the engine is running with all clutches disengaged, shall have the outside face of pulleys, sheaves, sprockets, and gears, plus the sides at acute entry angles covered by a shield.

8.6 Projections, such as exposed bolts, keys or set screws on sprockets, sheaves or pulleys, shall be shielded unless covered by other portions of the equipment.

8.7 Revolving shafts shall be shielded unless covered by other components.

8.8 Ground drives shall be shielded in accordance with paragraphs 8.4, 8.6, and 8.7 if personnel are exposed to them while the drives are in motion.

8.9 Functional components, such as cutterbars, flail rotors, mixing augers, conveying augers, rotary tillers, and similar units which must be exposed for proper function shall be shielded to a degree consistent with the intended function of the component.

8.10 Access doors and shields, which present the risk of injury from functional components when not in place, shall not be readily detached from the machine.

8.11 Access doors and shields for functional components which continue to rotate after the power is disengaged and present the risk of injury shall have a suitable warning provided in the immediate area.

*9. Lifted Units*—A means shall be provided to protect against inadvertent dropping of lifted units on propelling vehicles or equipment which must be in raised position for normal servicing or adjusting.

*10. Travel on Highways*

10.1 Lighting and marking of propelling vehicles and equipment shall conform to SAE J99.

10.1.1 The operator's manual for the unit shall instruct the user to operate the flashing warning light whenever the propelling vehicle is on a highway except when such use is prohibited by law.

10.2 Hitch pins and other hitching devices shall be provided with

[1]Acute entry angle is the mesh point of gears or the run-on point where a belt or chain contacts a sheave, sprocket, or idler.