

SURFACE VEHICLE STANDARD

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(R) MACHINERY FOR FORESTRY—WHEELED SPECIAL MACHINES—VOCABULARY, PERFORMANCE TEST METHODS, AND CRITERIA FOR BRAKE SYSTEMS

Foreword—This SAE Standard is identical to ISO 11169:1993, except for:

- a. The addition of Section 2 titled "References" and renumbering succeeding sections and references
- b. Insertion of SAE references in Sections 1 and 2
- c. Revision of the Foot pedal (foot control) force in Table 2 from 600 N to 700 N

1. **Scope**—This SAE Standard lays down the vocabulary and specifies performance test methods and criteria to enable uniform assessment of the service, secondary, and parking brake systems of wheeled specially designed forestry machines.

This document applies to self-propelled, rubber-tired special forestry machines defined in SAE J1209 or ISO 6814 as skidders, fellers, forwarders, and the various combinations of these machines.

2. References

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

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

SAE J1209—Identification Terminology of Mobile Forestry Machines

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

ISO 6814-1983—Machinery for forestry—Mobile and self-propelled machinery—Identification vocabulary

3. **Definitions**—For the purposes of this document, the following definitions apply.

- 3.1 **Brake Systems**—All the components which combine together to stop and/or hold the machine. Such systems include the control(s), means of power transmission, the brake(s), and all parts connecting the brake to the wheel and tire.

- 3.1.1 **SERVICE BRAKE SYSTEM**—Primary system used for stopping and holding the machine.

- 3.1.2 **SECONDARY BRAKE SYSTEM**—System used for stopping the machine in the event of any single failure in the service brake system.

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3.1.3 PARKING BRAKE SYSTEM—System used to hold a stopped machine in a stationary position.

3.1.4 BRAKE SYSTEM COMPONENTS—(See 3.1.4.1, 3.1.4.2, 3.1.4.3, 3.1.4.4.)

3.1.4.1 Control(s)—Component(s) directly activated by the operator to cause a force to be transmitted to the brake(s).

3.1.4.2 Brake Actuation System—All of the components between the control(s) and the brake(s) which connect them functionally.

3.1.4.3 Brake(s)—Components which directly apply a force to oppose movement of the machine. Brakes may, for example, be of friction, electrical, or fluid types.

3.1.4.4 Retarder—Energy-absorption device normally used to control machine speed while descending gradients.

3.2 Common Component—Component that performs a function in two or more brake systems.

3.3 Machine Mass—Mass of the machine which includes the heaviest combination of manufacturer approved equipment (i.e., winch, dozer, felling head, grapple, etc.) and components (i.e., cab, protective structures, etc.), an operator of 75 kg, and full fuel, lubricating, hydraulic, and cooling systems. The mass of forwarders includes the manufacturer's rated payload.

3.4 Stopping Distance, s —Distance traveled by the machine from the point on the test course at which the machine brake control is initially actuated to the point where the machine comes to a complete halt.

3.5 Mean Deceleration, a —Average rate of change of the velocity of the machine from the instant the brake control is initially actuated until the machine comes to a complete halt.

The mean deceleration, a , in meters per second squared, may be determined from Equation 1:

$$a = \frac{v^2}{2s} \quad (\text{Eq.1})$$

3.6 Burnish—Procedure to condition the frictional surfaces of the machine brake(s).

3.7 Brake Reservoir Pressure—Pressure in the air or hydraulic reservoir(s), if so equipped, to assist the application of force to the brakes.

3.8 Brake System Pressure—Gas or hydraulic pressure available at the brake mechanism.

3.9 Test Course—Surface upon which the test is carried out.

3.10 Cold Brakes—Brakes in one of the following conditions:

- a. The brakes have not been actuated in the previous 1 h, except in accordance with 6.9;
- b. The brakes have been cooled to 100 °C or less when measured on the brake disc or the outside of the brake drum;
- c. In the case of totally enclosed brakes, including oil-immersed brakes, the temperature measured on the outside of the housing is below 50 °C, or within the manufacturer's specification.

- 4. Instrument Accuracy**—The instruments used to carry out the required measurements shall be accurate to the levels given Table 1:

TABLE 1—INSTRUMENT ACCURACY LEVELS

Parameter being measured and related unit	Instrument accuracy
Brake system pressure (kPa)	±3
Machine speed (km/h)	±3
Machine mass (kg)	±2.5
Stopping distance (m)	±1
Brake control actuating force (N)	±3
Slope (%)	±1

- 5. General Requirements**—The requirements for brake systems in 5.1 to 5.6 apply to all machines indicated in Section 1.

- 5.1 Required Brake Systems**—All machines shall be equipped with:

- A service brake system
- A secondary brake system
- A parking brake system

No brake system shall be connected to the wheel and tire through a disconnect such as a clutch or shiftable gearbox.

- 5.2 Common Components**—Brake systems may use common components; however in the event of a failure of any single component other than a tire, the brake systems shall be capable of bringing the machine to a halt in accordance with performance requirements specified for the secondary brake system in 7.6.3.4.

5.3 Service Brake System

- 5.3.1 All machines shall meet the service brake performance requirements of 7.5 and 7.6.

- 5.3.2 The temperature of brake components exposed to debris shall not exceed 120 °C over ambient when measured within 1 min after completing the stopping test described in 7.6. The point of measurement shall be the outer surface of the drum or the periphery of the disc.

- 5.3.3 If other systems are provided with power from the service brake system, any failure in these systems shall be considered as a failure in the service brake system.

- 5.4 Secondary Brake System**—All machines shall meet the secondary brake performance requirements of 7.6.

The secondary brake system shall be actuated by a manual control. In addition, automatic application is permitted if a warning device is actuated prior to the automatic application.

5.5 Parking Brake System

- 5.5.1 All machines shall meet the parking brake performance requirements of 7.5.