



SURFACE VEHICLE STANDARD

J3078™/5

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Supersedes J1535

Performance Test for Windshield Defrosting Systems for Off-Road,
Self-Propelled Work Machines

RATIONALE

SAE J3078 will supersede SAE J1535. The intent of SAE J3078/5 is to provide a standard procedure for defrost testing in a laboratory or in the field for self-propelled work machines. It will provide a minimum performance requirement for defrost that will allow for proper operation of machine and viewing of implements. Additional machine types were added to Table 1. Defrost angles were updated in Table 1. Machines not listed in Table 1 can utilize the performance guidelines in this specification for future machine defrost development.

1. SCOPE

SAE J3078/5 specifies a test method for testing defrosting systems. It is applicable to off-road self-propelled work machines as defined in SAE J1116 and agricultural tractors as defined in ANSI/ASAE S390. The full list of machines covered is included in Table 1.

2. REFERENCES

2.1 Applicable Documents

The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest issue of SAE publications shall apply.

2.1.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or + 1 724-776-4970 (outside USA), www.sae.org.

SAE J381	Windshield Defrosting Systems Test Procedure and Performance Requirements - Trucks, Buses, and Multipurpose Vehicles
SAE J899	Operator's Seat Dimensions for Off-Road Self-Propelled Work Machines
SAE J1116	Categories of Off-Road Self-Propelled Work Machines
SAE J1163	Determining Seat Index Point

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Documents
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2.1.2 ISO Publications

Copies of these documents are available online at <http://webstore.ansi.org>.

ISO 5353 Earth-Moving Machinery - Seat Index Point

ISO 10263-5 Earth-Moving Machinery - Operator Enclosure Environment - Windscreen Defrosting System Test Method

ASAE/ASABE 390 Definitions and Classifications of Agricultural Field Equipment

2.2 Related Publications

The following publications are provided for information purposes only and are not a required part of this SAE Technical Report.

2.2.1 ISO Publications

Copies of these documents are available online at <http://webstore.ansi.org>.

ISO 10263-5 Earth-Moving Machinery - Operator Enclosure Environment - Part 5: Windscreen Defrosting System Test Method

3. DEFINITIONS

3.1 WINDSHIELD DEFROSTER SYSTEM

Means intended to defrost the windscreen and any adjacent glazing surfaces that are determined to be within the zones identified in Table 1.

3.2 DEFROSTED AREA

Area of the glazed surface consisting of dry cleared surface and melted or partially melted (wet) test coating and excluding that area of the glazed surface covered with dry test coating of gray or white ice.

For further explanation on defrosted areas see Figure 1.

4. DEFROSTING TEST

4.1 Test Equipment

4.1.1 Environmental chamber sufficiently large to contain the base machine or machine operator enclosure with provision for circulating air.

4.1.2 In lieu of a cold chamber, the test may be conducted outdoors under test conditions similar to those in a cold chamber (see 4.2).

4.1.3 Means for recording the boundaries of the windshield areas defrosted. (A wax pencil can be used to outline defrosted areas or high-resolution camera to photograph defrosted area.)

4.1.4 Stopwatch or other timing device.

4.1.5 Thermometers or other temperature measuring devices with an accuracy of ± 0.5 °C.

4.1.6 Throttle control device (if desired).

4.1.7 A spray device for applying mist to the windshield with the following characteristics:

- a. Fluid—water (distilled) liquid nozzle size diameter: 1.7 mm.
- b. Operating spray gun gage pressure: 345 kPa $\pm$ 20 kPa.
- c. Spray Pattern at 200 mm from surface: 300 mm $\pm$ 50 mm wide.

4.1.8 Device for measuring quantity of water provided for spray device $\pm$ 2.5%.

4.1.9 Auxiliary power supply for heater blower motor when bench testing operator enclosure only.

4.1.10 Anemometers to measure wind speed with a measuring accuracy within 0.5 m/s.

4.1.11 Coolant flow measurement device (required for operator enclosure test).

4.1.12 Device to measure the rotational frequency (RPM) with a measuring accuracy of 2% of observed value.

4.2 Test Conditions

It is recommended to use a vehicle chamber or enclosed chamber to conduct the defrost test.

If it is not practical to test the base machine due to physical size limitations, the operator's enclosure may be bench tested. Simulating the heat loads imposed by the base machine on the enclosure is allowed. Simulated heat load, if used, must be recorded in the test report. If this laboratory procedure is used, supplemental field testing should be used to confirm the test results.

The following are acceptable types of defrost performance validation methods:

- Vehicle test in the environmental chamber.
- Operator enclosure bench test in the environmental chamber.
- Vehicle outside test.

4.2.1 Heat Transfer Medium (HTM) System Flow

During vehicle testing, HTM flow shall come from engine operation.

During operator enclosure test, coolant from an independent (HTM) source should be used. The independent HTM flow and temperature shall be the same as that resulting from operation of the machine engine, in accordance with the requirement of 4.2.5 from the beginning of the test.

4.2.2 Ambient Air Temperature

The ambient temperature for the defrosting system test shall be -15 °C or colder for the duration of the test. See the ambient temperature measurement location in 4.3.2.

4.2.3 Air Velocity

The ambient wind speed for the defrost system test shall be 5 m/s or less for the duration of the test.

4.2.4 Solar Conditions

Test vehicle must not be subjected to solar load during the tests.

If testing outside, it is recommended that the vehicle is tested at night to avoid environmental effect of solar/radiant heat. If night testing is not practical, all precautions must be made to eliminate solar load effect during day-time testing (i.e., testing in the shade).

4.2.5 Machine Load and Speed

The machine shall be started and operated in accordance with manufacturer's recommended warm-up procedure and then continue at the rated engine speed with no additional load other than the parasitic load required to operate the vehicle for the duration of the test. The warm up procedure and rated speed shall be documented in the report.

4.2.6 Operator Control Settings

Temperature control maximum warm position.

Maximum air flow setting.

Fresh air mode if equipped with selection.

Defrost mode if equipped with selector.

Defrost fan may be used if part of original equipment (at the OEM discretion).

Control settings to be documented in the report.

4.2.7 Louver Position

Only louvers contributing to defrost should be open and adjusted for maximum effectiveness.

Louver adjustment during the test is allowed.

Any louver adjustments during the test to be documented in the test report.

4.2.8 Windshield Wipers

Windshield wipers may be used during the test if part of original equipment.

If windscreen wipers are used, the number of swipes and times are to be listed in the report.

4.2.9 Soak Time

Thermally soak the machine to ensure that the HTM, windscreen, HVAC system with ductwork, and enclosure temperatures are stabilized at the ambient temperature.

If temperature instrumentation is not available, soak for minimum of 10 hours.

If urea diesel exhaust fluid system is used, OEM to define additional soak time requirement.

4.2.10 One operator may be in the enclosure throughout the duration of the test.

4.2.11 Test Voltage

The voltage at the terminals of the blower motor shall be within $\pm 5\%$ of the nominal voltage on a production intended vehicle. If nominal voltage is unknown, the voltage at the terminals of the blower motor shall not exceed 15% above the nominal rating of the system. (Example: 13.8 V on 12 V system, 27.6 V for a 24 V system.) All engine, heater, and defroster units shall be standard production parts or equivalent, adjusted to specified limits.

4.2.12 Engine hood, doors, and windows shall be closed.

4.2.13 If an auxiliary heater (or heaters) is part of the standard heater and defroster system, it may be operated.