



SURFACE VEHICLE RECOMMENDED PRACTICE

J381™

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(R) Windshield Defrosting Systems Test Procedure and
Performance Requirements - Trucks, Buses, and Multipurpose Vehicles

RATIONALE

SAE J381 has been revised based on changes made to SAE J198 that correct, simplify, and expand on the methods required to establish the windshield viewing areas. Establishment of the windshield viewing areas has been removed from this standard and consolidated in SAE J198, thus eliminating duplication and the potential conflict that can result. The side window test criteria has been updated to criteria that are more practical to achieve, and that are based on the needed viewing area. Accommodation has been made for hybrid and electric vehicles that may not use engine coolant as a heat source.

1. SCOPE

This SAE Recommended Practice establishes uniform test procedures and performance requirements for the defrosting system of enclosed cab trucks, buses, and multipurpose vehicles. It is limited to a test that can be conducted on uniform test equipment in commercially available laboratory facilities. For laboratory evaluation of defroster systems, current engineering practice prescribes that an ice coating of known thickness be applied to the windshield and left- and right-hand side windows to provide more uniform and repeatable test results, even though—under actual conditions—such a coating would necessarily be scraped off before driving.

The test condition, therefore, represents a more severe condition than the actual condition, where the defroster system must merely be capable of maintaining a cleared viewing area. Because of the special nature of the operation of most of these vehicles (where vehicles are generally kept in a garage or warmed up before driving), and since defrosting under steady-state over-the-road operations is the main concern, test conditions have been adopted which assume that the engine is warm before the vehicle is driven.

There are two options for producing hot coolant in this recommended practice. Testing using these two approaches on the same vehicle will not necessarily provide identical results. Many vehicle models are offered with optional engines, and each engine has varying coolant temperatures and flow rates. If the test is being conducted to compare the performance of one defroster design to another defroster design, then the external coolant source approach (Test A) will yield the most comparable results. If the test is being conducted to validate the defroster installation on a specific vehicle model with a specific engine, then using the engine to heat the coolant (Test B) will be more appropriate.

This document will be reviewed and revised as technological progress in vehicle defroster test procedure requires.

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Full document details: SAE J381_202006

For more information on this standard, visit
https://www.sae.org/standards/content/J381_202006

Documents

Document Sharing Hub

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 J198 Windshield Wiper Systems - Trucks, Buses, and Multipurpose Vehicles

SAE J941 Motor Vehicle Drivers' Eye Locations

3. DEFINITIONS

3.1 COOLANT

Liquid used for heat transfer composed of 50% ethylene glycol/50% water or other liquids specified by vehicle manufacturer for use in the heat transfer system.

3.2 DAYLIGHT OPENING (DLO)

The maximum opening of any glass aperture which is unobstructed by moldings, masking, frits, or framing.

3.3 DEFROST

To remove ice or frost from the surface of automotive glass surfaces.

3.4 DEFROSTED AREA

That area of the glass surface that is free of frozen ice or frost.

3.5 EV DRIVE UNIT TYPE

An electric vehicle type is referred to as an EV; a hybrid vehicle running in pure electric propulsion mode throughout the test is also called an EV.

3.6 HD DRIVE UNIT TYPE

A hybrid (internal combustion engine with electric propulsion mode) vehicle type is referred to as a HD, unless running in pure electric propulsion mode throughout the test

3.7 HIGH IDLE

A feature provided by the vehicle OEM to run the engine above the normal idling speed, typically used to provide additional power during operation of power takeoff equipment or for warming up the engine.

3.8 IC DRIVE UNIT TYPE

An internal combustion engine vehicle type is referred to as an IC.

3.9 TARGET WINDSHIELD VIEWING AREA

The area of the windshield through which the driver should be able to see to safely operate the vehicle.

3.10 WINDSHIELD DEFROSTER SYSTEM

A heating device designed to defrost the windshield and specified portions of the front right and front left side windows.

4. TEST EQUIPMENT

4.1 Environmental chamber sufficiently large to contain the basic vehicle or basic vehicle body or partial body with provision for circulating air.

4.2 Means for recording the boundaries of the windshield areas defrosted (markers or photographic equipment).

4.3 Engine tachometer with an accuracy of 2% of observed values.

4.4 Stopwatch or other timing device.

4.5 Thermometers, thermocouples, or other temperature measuring devices with an accuracy of ± 0.5 °C.

4.6 Throttle control device (if desired).

4.7 Spray gun for applying distilled water to the windshield and side windows with the following characteristics:

- Fluid: Water.
- Liquid nozzle size diameter: 1.7 mm (0.070 inch).
- Operating gun gauge pressure: 345 kPa (50 psig).
- Airflow rate: $0.34 \text{ m}^3/\text{min} \pm 0.03 \text{ m}^3/\text{min}$ ($12 \text{ ft}^3/\text{min} \pm 1 \text{ ft}^3/\text{min}$).
- Pattern at 200 mm (8 inches) from surface: $250 \text{ mm} \pm 50 \text{ mm}$ (10 inches $\pm$ 2 inches) wide.

4.8 Device for measuring the quantity of water applied to the windshield and side windows.

4.9 Auxiliary power supply for powering the defroster blower motor.

4.10 Anemometer to measure air velocity with a measuring accuracy of $\pm 1.6 \text{ km/h}$ (1 mph).

4.11 Independent coolant supply to provide coolant flow to the heater-defroster system under test.

4.12 Instrument for measuring voltage and amperage.

5. TEST CONDITIONS

5.1 Coolant Source

TEST A: Independent coolant supply.

TEST B: Engine running at $1500 \text{ rpm} \pm 50 \text{ rpm}$ in neutral gear or the high idle rpm set by the vehicle OEM, whichever is higher. An auxiliary means for preheating the engine is permissible to provide easier engine starting. Engine speed shall be maintained with no load (normal engine parasitic loads only) throughout the test.