PASSENGER CAR
WINDSHIELD DEFROSTING SYSTEMS - SAE J902

SAE Recommended Practice

Report of Body Engineering Committee approved August 1964.

1. SCOPE

The scope of this SAE Recommended Practice is to establish uniform test procedures and minimum performance requirements for passenger car windshield defrosting systems. It is limited to tests that can be conducted on uniform test equipment in commercially available laboratory facilities.

The test procedures and minimum performance requirements, outlined in this recommended practice, are based on currently available engineering data. It is the intent that all portions of the recommended practice will be periodically reviewed and revised as additional knowledge regarding vehicle defroster performance is developed.

2. DEFINITIONS

2.1 DEFROST - Melt frost or ice on the inside or outside surface of the glass with the defroster system.

2.2 DEFOG - Remove moisture from the inside surface of the glass with the defroster system.

2.3 WINDSHIELD DEFROSTER SYSTEM - Means intended to defrost or defog the windshield.

2.4 DEFROSTED AREA - That area of the windshield composed of dry surface and melted or partically melted (wet) frost, and excluding that area of the windshield covered with dry frost.

2.5 DRIVER EYE LEVEL - This is the eye level established by the vehicle manufacturer for the vehicle under consideration.

2.6 CRITICAL AREA - That area of the windshield surface bounded by a line 2 in. (5 cm) above normal driver eye height at the top, a line 9 in. (23 cm) below normal driver eye level at the bottom and by lines 8 in. (20 cm) to either side of the center line of vision (as determined by the steering column).

3. GENERAL REQUIREMENTS

3.1 After 20 minutes of operation the critical area of the windshield shall be 80% defrosted.

3.2 The area of defrost pattern on the passenger side of the windshield shall be comparable to that specified in 3.1 for driver's side after 25 minutes of operation.

3.3 After 40 minutes of operation, the entire windshield area shall be 95% defrosted.

DEFROSTING TEST

4.1 TEST EQUIPMENT -

(a) Cold chamber sufficiently large to contain the complete vehicle with provision for circulating cold air.

(b) Means for recording the boundaries of the windshield areas defrosted (a wax pencil is commonly used for outlining defrosted areas).

(c) Engine tachometer.

(d) Stopwatch or other timing device.

(e) Thermometers or other temperature measuring devices.

(f) Throttle control device (if desired).

(g) Spray gun for applying water to windshield. (Binks Model 62 and Nozzle 66ND, 66SF, or equivalent equipment.)

(h) Device for measuring quantity of water used.

(i) Auxiliary power supply for blower motor.

(j) Anemometer.

4.2 TEST CONDITIONS

(a) Cold Chamber Temperature - 0 ± 5 F (-18 ± 3 C).

(b) Engine Speed - 1000 rpm, neutral gear.

(c) Wind velocity - 1 mph (1.6 kmh) max, with a room air change of 90 times per hr.

(d) Soak Time - 10 hr minimum (see also paragraph 4.4.2, Note).

(e) Number of Vehicle Occupants during Test - Two, max.

(f) Windshield Wipers - Off.

(g) Defroster System Air - On full. Blower on high.

(h) Test Voltage - To be 15% over nominal system rating at the blower motor (e.g., 13.8 on a 12-v system) or the supply end of motor dropping resistor.

(i) Temperature Control - In maximum position.

(j) All engine heater and defroster units shall be standard production parts adjusted to specified limits.

(k) Engine hood, doors, windows, and vents (except heater intake) closed.

4.3 TEST INSTRUMENTATION -

4.3.1 The temperature of the engine coolant shall be

measured in the thermostat pocket below (upstream of) the engine thermostat.

4.3.2 The temperature of the coolant entering and leaving the heater unit shall be measured as close to the unit inlet and outlet pipes as possible.

4.3.3 The temperature of the defroster air shall be measured at a point in the defroster outlet (or outlets) that is in the main air flow and which is, at least, 1 in. (2.5 cm) below (upstream of) the plane of the defroster outlet opening. The use of multiple temperature measurements is recommended as a means of obtaining an average temperature in large defroster outlet units. At least one temperature measurement shall be made in each outlet unit.

CAR MODEL: _____ DESCRIPTION OF HEATER - DEFROSTER:
BODY TYPE: _____
CAR NO.: _____
TEST DATE: _____
TEST NO.: _____
LOCATION: _____
OBSERVERS: _____
WINDSHIELD AREA: _____ sq in.
CRITICAL AREA: _____ sq in.

SOAK PERIOD: _____ hr at _____ F; ROOM AIR: Changes/hr _____

ICE APPLICATION:
Water Spray Gun Type: _____
Nozzle Type: _____
Spray Gun Pressure: 50 psi
Water Used: 0.010 oz/sq in. of windshield area

TEST CONDITIONS CHECK LIST:
Engine Speed: 1000 rpm ☐ Gear: Neutral ☐
Wind velocity at windshield: _____ mph
Voltage to heater motor or resistor: _____ volts (115% nominal voltage)
Control position: max temp ☐; full defrost ☐
No. of people in car: _____; Doors and windows closed tightly: ☐
Engine thermostat nominal control temp: _____ F.

TEST DATA
Remarks: _____

Time from Start, minutes	Temperature, F				Defroster Area						
	Room	Engine Water*	Heater Water In	Heater Water Out	Defroster Air Left**	Defroster Air Right**	% of critical Left	% of critical Right	% Total	Height, in.*** Left	Height, in.*** Right
0											
5											
10											
15											
20											
25											
30											
35											
40											

*Under thermostat.
**In nozzles.
***Maximum height relative to eye level in critical area (+ = above eye level).

Fig. 1 - Typical test data record

4.3.4 The ambient air temperature and the air velocity at the windshield shall be measured at a point that is located on the center line of the vehicle, one foot (30 cm) ahead of the base of the windshield, at a level half way between top and bottom of the windshield.

4.4 TEST PROCEDURE -

4.4.1 The cold chamber shall have been maintained at or below the specified test temperature for not less than 24 hr preceding the vehicle soak period.

4.4.2 Vehicle Soak Period - The vehicle with engine hood open, shall stand inoperative at the specified test temperature to soak for a period of not less than 10 hr.

NOTE: If instrumentation is available to assure that engine coolant and lubricant are stabilized at test temperature, a shorter soak time may be used.

4.4.3 Ice Application - Following the vehicle soak period, a coating of ice shall be formed on the windshield as follows: with specified ambient temperature and air velocity, the windshield shall be sprayed with 0.010 oz (0.046 ml) of water/sq in. (sq cm) of glass area applied by means of a spray gun with 50 psi (3.5 kg/sq cm) air pressure at the gun to form an even coating of ice over the entire glass surface.

The spray nozzle is held perpendicular to, and 8-10 in. (20-25 cm) from the glass, stroked back and forth evenly in horizontal overlapping layers, working from top to bottom of one side, the center, and then the opposite side of the windshield in this order. This sequence is repeated until all the liquid is applied.

Upon completion of the icing process, an additional soak period of not less than 30 minutes, and not more than 40 minutes, shall have elapsed before start of the test.

4.4.4 With observer(s) in the vehicle the engine shall be started. This shall mark the start of the test period. Test conditions described in paragraph 4.2, are to be maintained throughout the duration of the test.

4.4.5 The observer(s) shall outline the defrosted areas on the inner side of the windshield at intervals of 5 minutes as the test proceeds.

4.4.6 At completion of the test, the defrosted pattern shall be transferred to vellum by tracing.

4.4.7 Tests shall be run twice and averaged.

4.5 RECORDING OF TEST DATA - Fig. 1 illustrates a typical form for recording test data.