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Document Name: SAE J902A: Passenger Car Windshield Defrosting Systems

CFR Section(s): 49 CFR 571.103

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WASHINGTON, D.C.

PASSENGER CAR WINDSHIELD DEFROSTING SYSTEMS — SAE J902a

SAE Recommended Practice

Report of Body Engineering Committee approved August 1964 and last revised March 1967. Editorial change June 1967.

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 herein reflect the extensive knowledge and experience which automotive engineers have accumulated in development of windshield defrosting practices. Current engineering practice prescribes that for laboratory evaluation of defroster systems an ice coating, rather than frost, be applied to the windshield to provide more uniform and repeatable test results, frost formation of uniform density being the more difficult to accomplish. The time element for ice removal, therefore, is longer than that required to remove frost, which is the prime purpose of the defroster system.

In accordance with established policies of the SAE Technical Board, all portions of this recommended practice will be reviewed and revised to reflect technological progress regarding vehicle defroster performance.

NOTE: Because of such differing factors as greater vehicle size, engine operating characteristics, windshield configuration, etc., a separate SAE Recommended Practice is under development covering test procedures and requirements for defrosting systems of trucks, multi-purpose vehicles, and buses.

2. Definitions

2.1 Defrost—Melt frost or test ice coating on the inside or outside surface of the glass with the defroster system.

2.2 Windshield Defroster System—Means intended to defrost the windshield.

2.3 Defrosted Area—That area of the windshield composed of dry surface and melted or partially melted (wet) frost, and excluding that

area of the windshield covered with dry frost, and which is defined and qualified by the following:

2.3.1 The driver's seat in the rearmost position. (See Fig. 1.)

2.3.2 The 95th percentile tangential cutoff two-dimensional eye range contour in accordance with the SAE J941 shall be used. (See Table 1.)

2.3.3 The plan view reference line which is defined as the plan view line outboard of the steering wheel centerline and parallel to the vehicle centerline at a distance 0.15 of the dimension from the steering wheel center to the left-hand extremity of the shoulder room dimension. This dimension can be determined by taking 0.50 of the shoulder room dimension minus the distance from steering wheel centerline to centerline of car, and multiplying by 0.15. (See Fig. 2.)

2.3.4 The glazing surface reference line which is defined as the line of intersection of the glazing surface with the horizontal plane 25 in. above the manikin H point as defined in the SAE J826. (See Fig. 1.)

3. General

3.1 Area to be Defrosted—The minimum windshield area that shall be defrosted is described by the use of three specific areas identified in Table 1 as area A, B, and C. Each area has been established using the

TABLE 1 — AREAS TO BE DEFROSTED

Area	Minimum Percent Defrosted in 30 min	Angles, Deg ^a			
		Left	Right	Up	Down
A	80	18	56	10	5
B	95	14	53	5	3
C	100	10	15	5	1

^a See Figs. 1 and 2.

angles of Table 1 applied as shown in Figs. 1 and 2. In Fig. 1, the upper and lower boundaries of the area are established by the intersection of two planes, tangent to the upper and lower sides of the eye range contour, with the windshield glazing surface. The planes are fixed by angles above and below the glazing surface reference line. In Fig. 2, the left and right boundaries of the area are established by the intersection of two planes tangent to the left and right sides of the eye range contour. The planes are fixed by angles to the left and right of the plan view reference line. Using the test procedures established in paragraph 4.4, a minimum of 80% of area A, 95% of area B, and 100% of area C should be defrosted in 30 minutes. The 5% undefrosted portions of area B shall be located only along the periphery of this area. Fig. 3 illustrates all of the areas on a typical windshield.

NOTE: It is recognized that in some small passenger cars the areas defined in Table 1 may be off the windshield glazing surface. In such instances, the defrosting requirement shall apply only to those portions in the areas which are actually on the windshield glazing surface.

4. Defrosting Test

4.1 Test Equipment

- Test chamber sufficiently large to contain the basic vehicle, with provision for circulating cold air.
- Means for recording the boundaries of the windshield areas defrosted. (A wax pencil is commonly used for outlining defrosted areas.)
- Engine tachometer.
- Stopwatch or other timing device.
- Thermometers or other temperature measuring devices.
- Throttle control device (if desired).
- Spray gun for applying water to windshield (Binks Model 62 spray gun, with fluid nozzle 66 and air nozzle 66SD, 66SF, or equivalent equipment).
- Device for measuring quantity of water.
- Auxiliary power supply for blower motor.
- Anemometer.

4.2 Test Conditions

- Test chamber temperature— 0 ± 5 F (-18 ± 3 C).
- Engine speed—1500 rpm nominal neutral gear.
- Air velocity—1 mph maximum, directed at the windshield parallel to the longitudinal centerline of the vehicle.
- Soak time—10 hr (except as noted in paragraph 4.4.2).
- Number of vehicle occupants during test—Two maximum.
- Windshield wipers—Turned off. Wiper blades and arms to be off the windshield glazing surface during ice application.
- Defroster system air—On full. Blower on high speed.
- 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.
- Temperature control—In maximum position.
- All engine, heater, and defroster units shall be standard production parts or equivalent, adjusted to specified limits.
- Engine hood, doors, windows, and controllable vents 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.

4.3.4 The test chamber air temperature and the air velocity at the windshield shall be measured at a point that is located on the centerline of the vehicle, 1 ft (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 test 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 shall stand inoperative at the specified test temperature to soak for a period of not less than 10 hr.

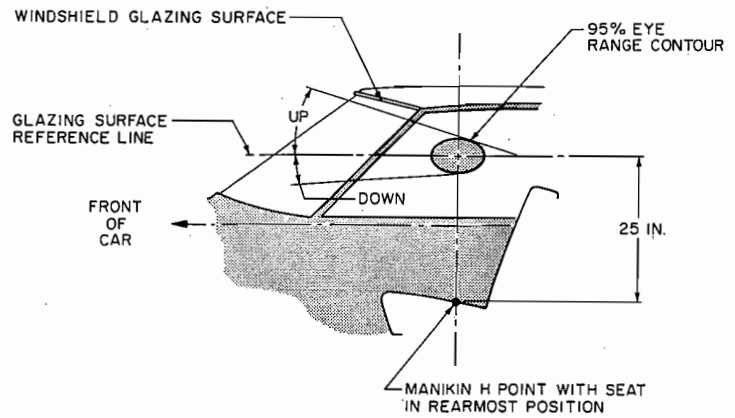


FIG. 1—SIDE VIEW OF AREA GENERATION

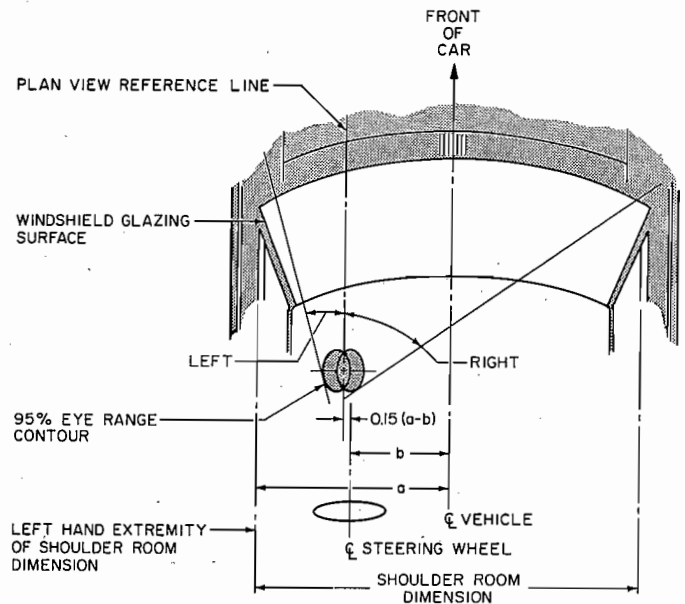


FIG. 2—PLAN VIEW OF AREA GENERATION

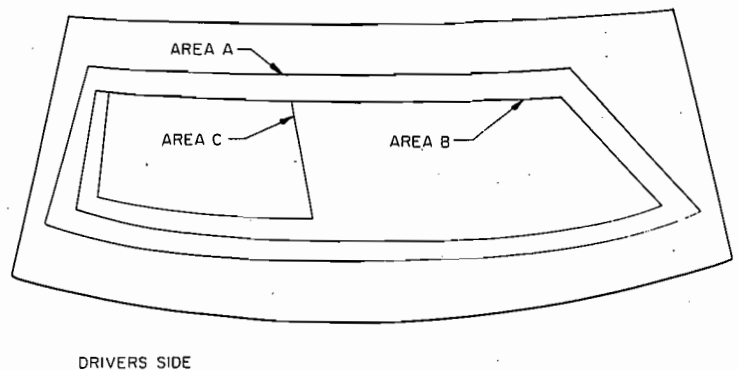


FIG. 3—TYPICAL LOCATION OF AREAS A, B, AND C AS VIEWED FROM INTERIOR OF VEHICLE

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

SOAK PERIOD: _____ hr at _____ F:

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

TEST CONDITIONS CHECKLIST:
 Engine Speed: 1500 rpm Gear: Neutral
 Wind velocity at windshield: _____ mph
 Voltage to heater motor or resistor: _____ volts (115% nominal)
 Control position: max temp full defrost
 No. of people in car: _____; Doors and windows closed tightly:
 Engine thermostat nominal. Control temp: _____ F. Vehicle ambient temp: _____ F.

TEST DATA
 Remarks: _____

Time from Start, minutes	Temperature, F						Defrosted Area, %		
	Room	Engine	Heater Water		Defroster Air		A	B	C
		Water*	In	Out	Left**	Right**			
0							X	X	X
5							X	X	X
10							X	X	X
15							X	X	X
20							X	X	X
25							X	X	X
30									
35							X	X	X
40							X	X	X

*Under thermostat.
 **In nozzles.

X - Optional

FIG. 4—TYPICAL TEST DATA RECORD

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 outer surface of the windshield as follows: With specified ambient temperature, 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 ± 5 psi (3.5 ± 0.2 kg/sq cm) air pressure at the gun while spraying to form an even coating of ice over the entire glass surface.

The spray nozzle (adjusted to full fan pattern and maximum flow) 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 the specified quantity of 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 start of the test period. Test conditions described in paragraph 4.2, are to be maintained throughout the duration of the test. As the test proceeds the temperature at thermocouple location specified in paragraph 4.3.4 may increase due to the effect of engine heat. However, the temperature shall not exceed +10 F (-12.2 C).

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. The vellum shall be marked to identify the driver's side.

4.4.7 Tests shall be run twice and averaged.

4.5 Recording of Test Data—Fig. 4 illustrates a typical form for recording test data.