



WINDSHIELD WIPER SYSTEMS — TRUCKS, BUSES, AND MULTIPURPOSE VEHICLES — SAE J198

SAE Recommended Practice

Report of Body Engineering Committee and Automotive Safety Committee approved January 1971.

1. Scope—This SAE Recommended Practice establishes uniform test procedures and minimum performance requirements for windshield wiper systems and wiper blades of trucks, buses, and multipurpose passenger vehicles. The evaluation procedures include those tests that can be conducted on uniform test equipment by commercially available laboratory facilities. Besides the terminology included in paragraph 2, uniform terminology of windshield wiper system characteristics and phenomena may be found in SAE J903. Also included are guides for the use of engineering layout studies to evaluate system performance. 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 data regarding windshield wiper system performance are developed.

2. Definitions

2.1 Windshield Wiper System—The wiper system consists of all the apparatus for clearing the exterior of the windshield glazing surface, together with the necessary devices and controls to actuate and arrest the operations.

2.2 Windshield Wiper Blade—A device for clearing the effective wipe pattern, capable of receiving pressure from an arm, comprising a suitable superstructure supporting and controlling a wiper blade element.

2.3 Wiper Blade Element—The resilient member of the wiper blade that contacts the windshield glazing surface.

2.4 Wiped Area—The specific areas on the windshield glazing surface which shall be covered by the effective wiper pattern. These areas

were developed as being compatible with viewing requirements necessary to operate the types of vehicles listed in Table 1.

2.5 Eyellipse—A statistical representation of the driver's eye location in a motor vehicle, as defined in SAE J941. For the purpose of this recommended practice, the head turn consideration in SAE J941 will not be used.

2.6 Effective Wipe Pattern—That portion of the wet windshield glazing surface which is cleared when the wiper blade travels through a cycle with system on highest frequency.

2.7 Multipiece Windshield—A windshield consisting of two or more windshield glazing surface areas.

2.8 Cycle—A cycle shall consist of wiper blade movement during system operation from one extreme of the windshield wipe pattern to the other extreme and return.

2.9 Daylight Opening (DLO)—The term "daylight opening" (DLO) refers to the maximum unobstructed opening through any glass aperture, with reveal or garnish moldings adjoining the glazing surface installed according to a given direction or projection.

2.10 Light-Duty Utility Vehicle—A light-duty utility vehicle is a personnel and/or cargo carrying vehicle with basic gvwt of 8000 lb or less and with the basic design intended for both on and off highway use.

2.11 Passenger Carrying Derivative—A passenger carrying derivative is a vehicle where the basic design, other than driver-windshield relationship, has been modified for the purpose of carrying occupants.

3. General Performance Requirements

3.1 Windshield Wiper System Requirements

3.1.1 REQUIRED WIPED AREA—The minimum windshield wiped area is described by three specific areas on the exterior windshield glazing surface. The three areas are developed with the vehicle loaded to the manufacturer's base design load and are identified in Table 1 as areas A, B, and C. Each area has been established using the angles of Table 1 applied as shown in Fig. 1. In the side view, the upper and lower boundary of the area is established by the intersection of two planes, which are seen as lines in the side view tangent to the upper and lower edges of the eyellipse, with the windshield glazing surface. The planes are fixed by angles above and below the XX line. In the plan view the left and right boundary of the area is established by the intersection of two vertical planes tangent to the left and right edges of the eyellipse with the windshield glazing surface. The planes are fixed by angles to the left and right of the XX line. The areas used in determining the percentage of wiped area are those areas on the exterior glazing surface which are not within 1 in. of the edge of the daylight opening (pillars, division bar, header, etc.). The percentage is the ratio of wiped area within the defined area to the defined area. Using test procedures established in paragraph 4.1, see Table 2 for percentages to be wiped.

3.1.2 FREQUENCY—The windshield wiper system shall be designed to provide two or more frequencies. One of the frequencies shall be a minimum of 45 cycles/min. The highest and one lower frequency shall differ by at least 15 cycles/min. Such lower frequency shall be at least 20 cycles/min. These frequencies must be obtainable under normal vehicle operating conditions regardless of engine speed and engine load, following test procedures and test conditions established in paragraph 4.2.

3.1.3 DURABILITY—Wiping system, except for element of wiper blade, must remain functional after operating 1,500,000 cycles, using test procedures and test conditions established in paragraph 4.2.

3.1.4 SYSTEM STRENGTH—The system shall be capable of withstanding the loads induced by stall, using test conditions and test procedures established in paragraph 4.3, with all mechanical components remaining functional.

3.1.5 TEMPERATURE OPERATIONAL CAPABILITY—The windshield wiper system shall be capable of operating between temperatures of 130 ± 5 F (55 C) and -20 ± 5 F (-30 C), using test procedures and test conditions established in paragraph 4.4.

TABLE 1

Classification	F Dim	Area	Angle Up, deg	Angle Down, deg	Angle Left, deg	Angle Right, deg
Truck, CBE and CAE ^a	0-40	A	10	5	18	56
		B	5	3	14	53
		C	5	1	10	15
	40-50	A	8	7	18	56
		B	3	5	14	53
		C	3	3	10	15
	50-Up	A	8	9	18	56
		B	1	7	14	53
		C	1	5	10	15
Buses, CBE— School and Commercial ^b	50-60	A	7.5	22	22	62
		B	3	22	22	62
		C	1	16	22	15
Buses, Forward Control— School and Commercial	50-60	A	7	14	18	65
		B	2	11	18	65
		C	1	11	18	25
Forward Control or Multipurpose	All	A	9	7	18	56
		B	4	4	14	53
		C	2	2	10	15
Light Duty Utility Vehicle ^a	All	A	7	5	16	49
		B	4	3	13	49
		C	4	2	8	13
Van, Multistop ^a	Open	A	7	12	18	58
		B	2	11	15	56
		C	1	6	10	15
Trucks, COE	40-Up	A	6	9	18	56
		B	1	7	14	53
		C	1	5	10	15
Miscellaneous						

NOTES: See SAE J687 for nomenclature. Angles are minimum.

^a Specifications also cover passenger carrying derivatives.

^b Geometric center of eyellipse located 18 in from centerline of vehicle.

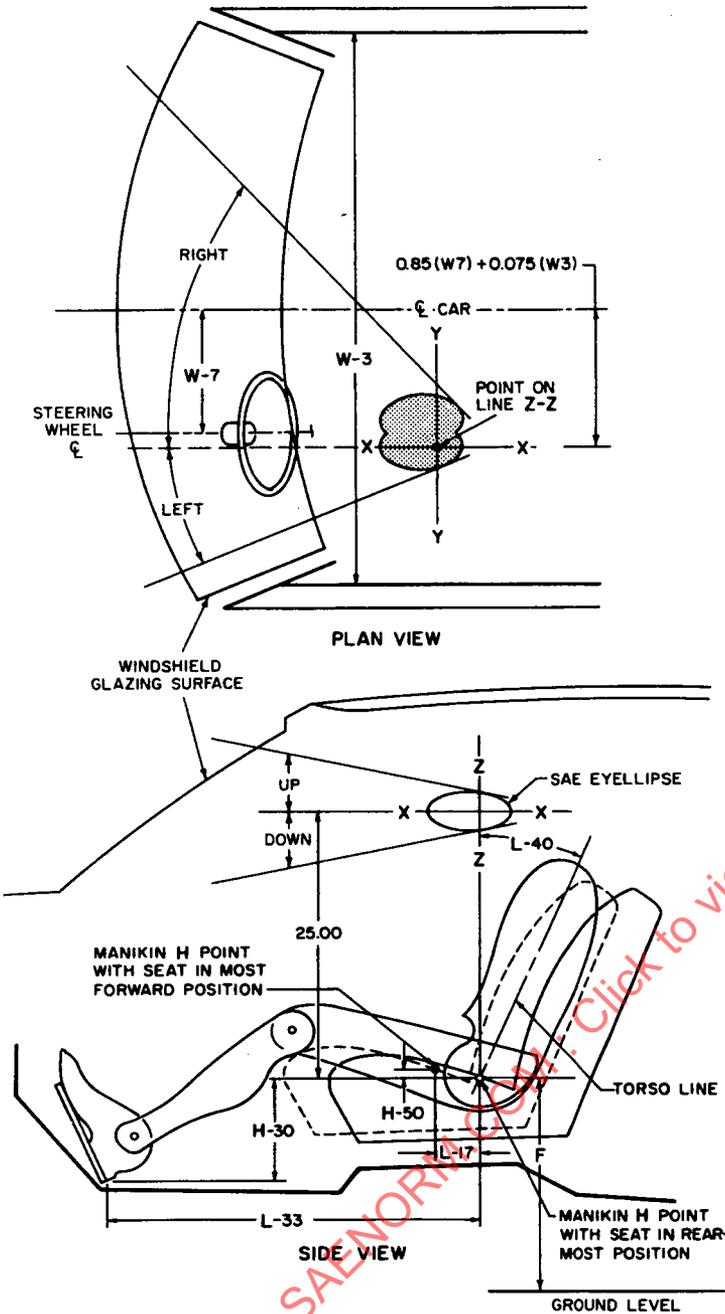


FIG. 1—EYELLIPSE TEMPLATE LOCATION

TABLE 2

Windshield Type	Minimum Percent to be Wiped		
	Area A	Area B	Area C
One Piece	80	94	99
Multipiece	65	70	84

3.1.6 ACCESSIBILITY—The control for the wiper system should be positioned so that it is readily accessible to the driver.

3.2 Windshield Wiper Blade Requirements

3.2.1 DURABILITY—Using test procedures and test conditions described in paragraph 4.2, the windshield wiper blade, except for wiper blade element, shall remain functional after operating 1,500,000 cycles and the wiper blade element shall wipe 75% of the effective wipe pattern after 500,000 cycles.

3.2.2 AGING—The wiper blade element of the wiper blade assembly shall withstand the ozone test established in paragraph 4.5, with an ASTM rating of two or better, as defined in ASTM D 1171, Method of Test for Weather Resistance Exposure of Automotive Rubber Compounds.

3.2.3 CHEMICAL RESISTANCE—A section of the wiper blade element when placed in a 50% solution of either methyl or isopropyl alcohol for a period of 24 hr shall not exceed more than 2% weight change.

4. Test Methods

4.1 Area to be Wiped Test Procedure

4.1.1 TEST EQUIPMENT

(a) Drafting equipment sufficient for full size windshield and wiper system layout.

(b) Transparent heavy gage plastic sheet—Prepared clear acetate or equivalent.

(c) Test buck—A test buck shall consist of a structure capable of maintaining, throughout the test, the proper relationship of the glazing surface and the windshield wiping system components as established by the vehicle manufacturer.

(d) Power source—Must be capable of supplying power to the drive motor as required.

(e) Spray equipment—Spray nozzles to apply water to glazing surface.

4.1.2 TEST PROCEDURE

4.1.2.1 Drafting

(a) Work to exterior surface of windshield glazing.

(b) The design wipe pattern shall be shown plus the growth due to wet windshield and high-speed wiper operation. This growth may be determined experimentally or an allowance of 2 deg each direction of wipe may be utilized.

(c) All calculations to be made in the unwrapped view.

(d) In vehicle position plan view and side view, layout windshield surface, DLO (daylight opening), 95th percentile eyellipse per Appendix of SAE J941, and the areas A, B, and C, generated on the exterior of the windshield glazing surface using the angles from Table 1.

(e) Develop an unwrapped view of the windshield glazing surface and DLO. Design the wipe pattern, apply growth as described in paragraph 4.1.2.1(b) and transfer the pattern together with areas A, B, and C into this unwrapped view.

(f) Calculate the percentages of areas A, B, and C that are wiped with design pattern plus growth, in the unwrapped view, see Fig. 2 and compare the values with those of Table 2.

4.1.2.2 Test Buck Evaluation

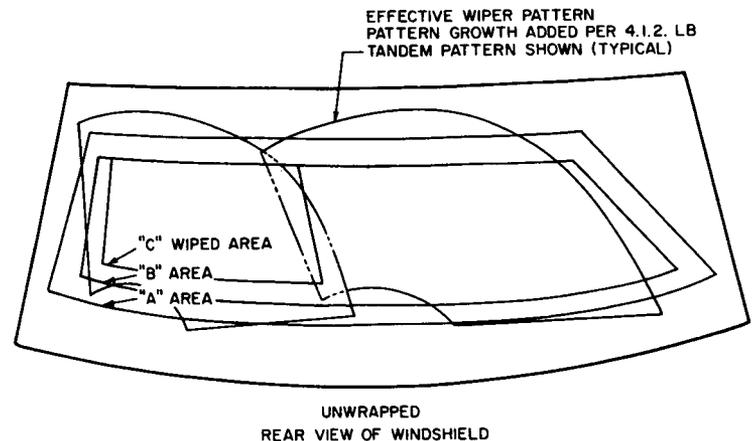


FIG. 2—WIPED AREA EVALUATION, DRAFTING TEST PROCEDURE—UNWRAPPED VIEW SHOWING WIPED PATTERN AND AREAS A, B, AND C

(a) Operate test buck with water on, wiper system on high speed and mark outline of wipe pattern.

(b) Transfer full size unwrapped view with wipe pattern and areas A, B, and C as determined in paragraph 4.1.2.1(e) to transparent heavy gage plastic sheet.

(c) Transfer wipe pattern from test buck to plastic sheet and recalculate the percentages of areas A, B, and C that are wiped and compare the values with those of Table 2.