

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J942

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(R) Passenger Car Windshield Washer Systems

1. Scope—This SAE Recommended Practice establishes for passenger cars, light trucks, and multipurpose vehicles with GVW of 4500 kg (10 000 lb) or less:

- a. Minimum performance standards for the windshield washer system.
- b. Test procedures that can be conducted on uniform test equipment by commercially available laboratory facilities.
- c. Uniform terminology of windshield washer system characteristics and phenomena consistent with those found in guides for the use of engineering layout studies to evaluate system performance.
- d. Guides for the design and location of components of the systems for function, servicing of the system, etc.

The minimum performance requirements and test procedures, outlined in this document, are based on currently available engineering data. It is intended that all portions of the document will be periodically reviewed and revised as additional data on windshield washer system performance are developed.

2. References

2.1 Applicable Publications—The following publications forms a part of the specification to the extent specified herein. Unless otherwise indicated, the latest revision of SAE publications shall apply.

2.1.1 SAE PUBLICATION—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J198—Windshield Wiper Systems—Trucks, Buses, and Multipurpose Vehicles
SAE J726—Air Cleaner Test Code
SAE J903—Passenger Car Windshield Wiper Systems

2.1.2 ASTM PUBLICATION—Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM D 1149—Test for Accelerated Ozone Cracking of Vulcanized Rubber

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3. Definitions

- 3.1 Windshield Washer System**—An apparatus/container for storing, filtering, if applicable, and applying fluid to the exterior of the windshield glazing surface, excluding the necessary controls to actuate and arrest operations.
- 3.2 Control**—A means for actuating and arresting the operation of the windshield washer system. The actuation and arrest may be coordinated or semi-coordinated with components of the windshield wiper system or may be fully independent. The controls will be excluded in the validation of the document.
- 3.3 Actuation and Arrest**—A use of the controls which causes the windshield washer system to begin and cease operation.
- 3.4 Function**—The windshield washer system shall store, filter, if applicable, and apply fluid to the target area on the windshield glazing surface.
- 3.5 Pump**—A device for transferring the washer solution from the reservoir through the remainder of the washer system to the windshield glazing surface.
- 3.6 Reservoir**—A container, capable of storing the washer solution.
- 3.7 Washer Solution**—The fluid used in the washer system consisting of water or water with appropriate commercial additives. Water is not to exceed 205 ppm hardness.
- 3.8 Commercial Additives**—Materials which are compatible with the system and which may be added to depress the fluid freezing point, assist in cleansing, and/or increase the wetting capacity of the washer solution.
- 3.9 Low Temperature Washer Solution**—A 50% solution of methyl alcohol, or alternatively isopropyl alcohol, and water not greater than 205 ppm hardness for use with low temperature tests.
- 3.10 Nozzle**—A device for directing washer solution to the windshield glazing surface.
- 3.11 Target Area**—The design area on the windshield glazing surface to which the washer solution is directed by the nozzle, with the vehicle at rest.
- 3.12 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 normal to glass surface.
- 3.13 Wash Area**—That portion of the windshield glazing surface within the DLO which is wiped when the wiper blade travels through a wiper cycle.
- 3.14 Wiper Cycle**—The movement of the wiper arm and blade from one extreme to the other and return.
- 3.15 Durability Test Cycle**—The system actuation(s) is defined as 4 s $\pm$ 1 s on and the remainder of a 30-s cycle off. This repeats two times per minute as required in Table 1.

TABLE 1—TEST SEQUENCE

Test	Durability Test Cycles Total	Durability Test Cycles No./min	Ambient Temperatures °C $\pm$ 3
1	2000	2	24.0
2	2000	2	66.0
3	2000	2	−18.0
4	2000	2	24.0

4. Requirements

- 4.1 Washer System Capability**—When tested in accordance with test procedures described in 5.1, the windshield washer system, in conjunction with the wiper system, shall be capable of clearing, within 5 wiper cycles, 80% of the total wash area and 90% of the wash area included in area C as defined in SAE J903 for passenger cars and SAE J198 for trucks, buses, and multipurpose vehicles.
- 4.2 System Strength**—The windshield washer system shall be capable of withstanding the loads induced when either all nozzles are blocked or the system is frozen and tested in accordance with the test procedures established in 5.2. At the completion of the test, the system shall function.
- 4.3 Washer System Priming**—This test shall be conducted on a non-primed or fully drained hose/nozzle system. Washer fluid shall contact the target area and wipers shall begin cycling within 4 s from the time the washer control is activated.
- 4.4 Temperature Performance and Exposure**
- 4.4.1 **LOW TEMPERATURE EXPOSURE**—The windshield washer system must be functional and deliver a minimum of 75% of the original flow rate and deliver fluid to the target area of the glazing surface after being subjected to a total of 6 freeze-thaw cycles with a freeze temperature of -30°C as described in 5.5.2.1. There must be no leakage or disconnection of the tubing.
- 4.4.2 **HIGH TEMPERATURE EXPOSURE**—The windshield washer system must be functional and deliver a minimum of 75% of the original flow rate and deliver fluid to the target area of the glazing surface after exposure to a temperature of 91°C as described in 5.5.2.2. There must be no leakage or disconnection of the tubing.
- 4.4.3 **OPERATING RANGE**—The windshield washer system must be functional and deliver a minimum of 75% of the original flow rate and deliver fluid to the target area of the glazing surface within a temperature range of -18 to 80°C as described in 5.5.2.3. There must be no leakage or disconnection of the tubing.
- 4.5 Durability**—The washer system must be functional and deliver a minimum of 75% of the original flow rate and deliver fluid to the target area of the glazing surface after operating 8000 durability test cycles as specified in 5.6.2.3. There must be no leakage or disconnection of the tubing.
- 4.6 Windshield Washer Tubing**
- 4.6.1 **OZONE RESISTANCE**—After testing in accordance with the test procedures established in 5.6.1, the tubing shall show no visual evidence of splitting or cracking.
- 4.6.2 **TEMPERATURE AGING**—After testing in accordance with the test procedures established in 5.6.2, the tubing shall show no visual evidence of splitting or cracking. The reduction in elongation shall not be greater than 50% in the unexpanded portion of the specimen. There shall be no visual evidence of wax or other contaminants exuding from the tubing.
- 4.6.3 **STRESS RELAXATION**—After testing in accordance with the test procedure established in 5.6.3, the tubing ID shall be no larger than 1.65 times the tubing original nominal ID.
- 4.7 Chemical Resistance**—The windshield washer system shall not be adversely affected when operated with a 50% solution of methyl alcohol or isopropyl alcohol.
- 4.8 Accessibility**—The production intent in-vehicle control and the reservoir filler opening shall be positioned so that they are readily accessible.