

INTERNATIONAL STANDARD

ISO
9619

First edition
1992-12-15

Passenger cars — Windscreen wiping systems — Test method

*Voitures particulières — Dispositif d'essuie-glace du pare-brise —
Méthode d'essai*



Reference number
ISO 9619:1992(E)

Foreword

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Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 9619 was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Sub-Committee SC 17, *Visibility*.

Annexes A, B, C and D form an integral part of this International Standard.

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International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Introduction

This International Standard is one of a series of four Standards dealing respectively with the testing of defrosting (ISO 3468), washing (ISO 3469), demisting (ISO 3470), and wiping systems (ISO 9619) for windscreens.

The testing of demisting, defrosting, and washing and wiping systems and equipment for rear windows of passenger cars is dealt with in ISO 5897, ISO 5898 and ISO 6255 respectively.

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Passenger cars — Windscreen wiping systems — Test method

1 Scope

This International Standard specifies the test method for passenger car (term 3.1.1 in ISO 3833:1977) windscreen wiping systems, when they are fitted. It does not specify reference areas or levels of performance.

The tests need not be repeated on types of power-driven vehicles which do not differ from one another in respect of the following essential features as far as windscreen wiping performance is concerned:

- a) shape, size, surface characteristics and aerodynamic characteristics of the windscreen and its surroundings;
- b) characteristics of each system designated by the vehicle manufacturer as contributing to wiping of the windscreen.

This International Standard permits aerodynamic tests to be carried out either in a wind tunnel or on a test track, the results from which are equivalent.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 3833:1977, *Road vehicles — Types — Terms and definitions*.

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 control: Device or accessory for starting and stopping the windscreen wiper system. Starting and stopping may be coordinated with the operation of the windscreen washer or be totally independent of it.

3.2 test mixtures: Mixture as specified in annex A.

3.3 test fluid: Water with sufficient additives to enable a permanent record to be made of the wiped area, but which does not affect the performance of the wiping system. (See annex B.)

3.4 wiped area: Area of the outer glazed surface that is cleared by the wiper blade(s) when operating on a wet windscreen. The parking travel, if it exists, is disregarded.

3.5 dry windscreen: Windscreen which has been cleaned in accordance with 4.3.2.

3.6 wet windscreen: Windscreen which is uniformly wetted over its whole area at a simulated rainfall rate of at least 1 mm/min, calculated normal to the glazed surface.

3.7 test speed: Ground speed on road or track, or relative airspeed in wind tunnel at 0° yaw angle.

3.8 wiper cycle: Movement of a wiper blade which is required to cover its wiping travel and to return to its starting point. The parking travel, if it exists, is disregarded.

3.9 wiper travel: Arc that the blade travels in one cycle.

3.10 wiping system frequency: Number of wiper cycles per unit of time.

3.11 windscreen wiping system: Device for wiping the outer glazed surface of the windscreen, together with the necessary accessories and controls.

3.12 windscreen washing system: Device for storing washer solution and applying it to the wind-

screen outer glazed surface, together with the necessary controls.

3.13 spray equipment: Equipment which may be attached to the vehicle, which will produce a wet windscreen but which will not significantly affect the aerodynamic characteristics of the vehicle.

4 Verification of wiping system

4.1 General requirements

4.1.1 For the purposes of these tests a complete wiping system shall be submitted to all of the tests. At the commencement of the tests, the equipment shall be in a condition equivalent to new and the blades shall be clean.

4.1.2 The purpose of these tests is to determine the windscreen wiped area. When tested in accordance with the procedures in 4.3 and 4.4, the wiping system shall be capable of clearing a specified percentage of a specified area.

4.2 Test equipment

4.2.1 For static tests, a test fixture consisting of a structure used to mount the windscreen and the components of the wiping system in a manner representative of the vehicle installation or a **test vehicle**.

4.2.2 For aerodynamic tests, either a test vehicle or a test fixture which has representative vehicle aerodynamic properties.

NOTE 1 It is permissible to relocate any components for the convenience of testing if this does not affect the verification of the system in the vehicle.

4.2.3 Test mixture or test fluid and related equipment necessary for its application.

4.2.4 Static test facility, test track or wind tunnel.

4.3 Static test

4.3.1 For the period of the tests the ambient temperature shall be in the range 5 °C to 40 °C. The electrical conditions shall be as given in 5.3.1.2.

Prior to testing, locate spray equipment and adjust the test fluid.

4.3.2 Thoroughly degrease the outer and inner glazed surface using an appropriate degreasing agent. When dry, apply a 3 % (V/V) to 10 % (V/V) solution of ammonia in water, allow to dry and finally wipe with a dry cotton cloth or a paper towel that contains no additive.

4.3.3 Trace the specified reference area on the windscreen inner surface using suitable marking means.

4.3.4 Apply test fluid and operate the wiping system as indicated by the vehicle manufacturer for eight cycles $\pm$ two cycles. Stop fluid spray but continue wiping for a further two cycles. Any deposit subsequent to the completion of wiper operation shall not be included within the specified area.

NOTE 2 Other equivalent methods (e.g. talc spray) may be used provided that they give equivalent results.

4.3.5 At the completion of the test, record the wiped area and verify the appropriate performance. (See annex D.)

4.4 Aerodynamic test

4.4.1 General

For the purposes of this test, the requirements of 4.4.1.1 and 4.4.1.2 apply and the test shall be conducted as given in either 4.4.2 or 4.4.3 as specified by the vehicle manufacturer.

4.4.1.1 This test is to be conducted, when required, at a specified speed. This test does not apply to vehicles when their maximum speed is less than 60 km/h.

4.4.1.2 The environmental conditions on the test track or in the wind tunnel shall be as follows:

- temperature: 5 °C to 40 °C;
- for the track test, the wind speed measured in any direction shall be as low as possible; it shall not exceed 15 % of the vehicle ground speed and shall not affect uniform distribution of spray onto the windscreen;
- for the track test, the road surface shall be dry enough not to influence test results.

4.4.2 Track test

4.4.2.1 Test preparation

Prior to the test, install the spray equipment on the vehicle and adjust the spray to provide a wet windscreen at the specified test speed over the test distance. Fill and fully prime the spray equipment with test fluid.

Thoroughly degrease the outer and inner glazed surface using the procedure given in 4.3.2.

Trace the specified reference area on the windscreen inner surface using suitable marking means.

4.4.2.2 Test conditions

Electrical conditions shall be as given in 5.3.1.2. The dipped beam headlamps shall be switched on.

The heating and or ventilation system, if fitted, shall be operated at maximum electrical consumption. The defrosting and demisting system, if fitted, shall be operated at maximum electrical consumption.

4.4.2.3 Test procedure

Run the test vehicle at the specified test speed.

Apply the test fluid and, when it reaches the windscreen, operate the wiping system as indicated by the vehicle manufacturer for a maximum of 30 cycles.

Stop application of test fluid.

After two additional wiper cycles, stop wiper system. Any deposit subsequent to the completion of the wiper operation shall not be included in the specified area.

Record the wiped area on the windscreen and verify the appropriate performance by the method given in annex D.

4.4.3 Wind tunnel test

4.4.3.1 Test preparation

4.4.3.1.1 Thoroughly degrease the outer and inner glazed surface using the procedure given in 4.3.2.

Trace the specified reference area on the windscreen inner surface using suitable marking means.

4.4.3.1.2 Apply a coating of the test mixture (see annex A) of $1,5 \text{ mg/cm}^2 \pm 20 \%$ evenly to the outer surface of the windscreen and allow to dry. In case of dispute, the method given in annex C shall be used.

4.4.3.1.3 Fill and fully prime the windscreen-washer system with water.

Locate the car with its longitudinal centre-line coincident with the tunnel longitudinal centre-line, windscreen facing the wind.

Apply the parking brake and immobilize the car suitably on the test platform, for example with wheel chocks.

4.4.3.2 Test conditions

The windscreen shall be kept constantly wet using the washer system.

The engine shall run at 30 % of the speed at which it develops maximum power.

The electrical conditions shall be as given in 5.3.1.2. The dipped beam headlamps shall be switched on.

The heating and/or ventilation system, if fitted, shall be operated at maximum electrical consumption. The defrosting and demisting system, if fitted, shall be operated at maximum electrical consumption.

4.4.3.3 Test procedure

The operator and observer(s) enter the car.

Activate the tunnel fans and accelerate them to the required speed.

In combination with the washer, and at the same time, actuate the wipers at the highest frequency and for the number of cycles specified by the manufacturer.

Stop operating the washer system.

After two additional wiper cycles, stop the wiper system. Any deposition subsequent to the completion of the wiper operation shall not be included in the specified area.

Record the wiped area on the windscreen and verify the appropriate performance by the method given in annex D.

5 Verification of functioning of wiping system

5.1 General requirements

For the purposes of these tests, a complete wiping system shall be submitted to all of the tests. At the commencement of the tests, it shall be in a condition equivalent to new.

5.2 Test equipment

5.2.1 Test fixture, consisting of a structure used to mount the windscreen and components of the wiping system in a manner representative of the vehicle installation or a **test vehicle**.

5.2.2 Spray equipment.

5.2.3 Wiper frequency counting device, if required.

5.2.4 Voltmeter.

5.2.5 Suitable environmental chamber with temperature-measuring device (a thermometer or equivalent).

5.3 Frequency test

5.3.1 Test conditions

5.3.1.1 For the period of the tests, the ambient temperature shall be in the range 5 °C to 40 °C.

5.3.1.2 The power input level at the wiper frequency control shall be with the battery fully charged, and the voltage at the terminals of the wiping system shall be not more than 20 % above the nominal rating of the system.

5.3.2 Test procedure

Adjust the spray to provide a wet windscreen.

Thoroughly degrease the outer and inner glazed surface using the procedure given in 4.3.2.

Apply water to the windscreen and apply the prescribed power as described in 5.3.1.2 to the wiper frequency control and determine the frequency of the blades after 20 min over a minimum period of 1 min.

At the completion of the test, record the frequency.

5.4 Stall test

5.4.1 Test conditions

For the period of the tests, the ambient temperature shall be in the range 5 °C to 40 °C.

The power input level at the wiper frequency control shall be as given in 5.3.1.2.

5.4.2 Test procedure

Restrain a wiper arm in the vertical position against the windscreen.

Set the wiper frequency control to maximum. After 15 s, switch it off for a period of 5 min.

Re-run the frequency test as specified in 5.3 at the same frequency as that of the original test. After 5 min, check the frequency over a minimum period of 1 min and compare with the original frequency.

At the completion of the test, record the frequency(s).

5.5 Low temperature test

5.5.1 Test equipment

5.5.1.1 Test fixture, consisting of a structure used to mount the windscreen and the components of the wiping system in a manner representative of the vehicle installation or a **test vehicle**.

5.5.1.2 Suitable environmental chamber with temperature-measuring device (thermometer or equivalent).

5.5.1.3 Wiper frequency counting device, if required.

5.5.2 Test procedure

Thoroughly degrease the outer and inner glazed surface using the procedure given in 4.3.2.

Maintain the test fixture or vehicle for 4 h at $-18\text{ °C} \pm 3\text{ °C}$.

Set the wipers to operate at the specified frequency.

The power input level shall be as specified in 5.3.1.2.

Allow the system to operate for 5 min and at the end of this period, determine the frequency over a period of 1 min.

At the completion of the test, record the frequency(s).

Annex A (normative)

Test mixture

A.1 The test mixture shall be either as specified in A.2 or in A.3. The mixture used in the test shall be recorded in the test results.

A.2 The test mixture is composed of

1 g of NaCMC (sodium salt of carboxy-methylcellulose)

18 g of NaCl

1 g of Na_2CO_3

1 l of water (residue not exceeding 205 mg of CaCO_3/l after evaporation)

40 g of either a) or b):

a)	Constituent	% (m/m)
	SiO_2	73 to 76
	Fe_2O_3	4 to 5
	Al_2O_3	16 to 17
	MgO	0,5 to 1,5
	CaO	3 to 4

b) Test dust as specified in table A.1.

In either case a) or b), the particle size distribution shall be as follows:

maximum particle size 200 μm , with:

less than 15 % (m/m) between 80 μm and 200 μm , and

less than 30 % (m/m) between 0 and 10 μm .

NOTES

3 NaCMC has been added to obtain an improved adherence of the test mixture on the glazed surface and it is recommended that this should be mixed first with the water in order to obtain a complete solution.

4 Na_2CO_3 has been added to enable the areas which have not been cleared to be more easily identified.

A.3 The test mixture is composed of the following:

92,5 % (V/V) water (with a hardness of less than 205 g/t after evaporation).

5 % (V/V) aqueous saturated salt (sodium chloride) solution.

2,5 % (V/V) dust constituted in accordance with tables A.1 and A.2.

Table A.1 — Analysis of test dust

Constituent	% (m/m)
SiO_2	67 to 69
Fe_2O_3	3 to 5
Al_2O_3	15 to 17
CaO	2 to 4
MgO	0,5 to 1,5
Total alkalis	3 to 5
Ignition loss	2 to 3

Table A.2 — Particle size distribution of coarse-grade dust

Particle size μm	Particle size distribution %
0 to 5	12 ± 2
5 to 10	12 ± 3
10 to 20	14 ± 3
20 to 40	23 ± 3
40 to 80	30 ± 3
80 to 200	9 ± 3

Annex B
(normative)

Test fluid

The test fluid shall be composed of

1 l of water;

10 g Ca(OH)_2 (hydrated lime) or any other substance, such as Na_2CO_3 or chalk, which will assist in the determination of the wiped area but which does not affect the performance of the wiping system.

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Annex C

(normative)

Method for applying test mixture

C.1 Application by spray gun

C.1.1 Apply a freshly prepared and shaken mixture uniformly by spray gun as specified in 4.4.3.1.2.

The quantity and uniformity of the deposit is to be determined by weighing test samples. Prior to weighing, dust on all areas other than the top surface of the samples shall be removed by scraping.

C.1.2 For glazed surfaces having a surface area not larger than 0,5 m², three samples are required. For surface areas greater than 0,5 m² five samples are required.

These shall be located uniformly on the glazed area outside the wiped area including the parking travel, but located as close as possible to the wiped area.

C.1.3 The thickness of the samples shall be not greater than 1 mm, with a surface area of at least 8 cm² (the use of a microscope slide is recommended).

C.1.4 With the agreement of the vehicle manufacturer, the vehicle interior heating system, or any exterior system may be used to increase the temperature in order to reduce the drying time between applications and before the tests.

It should however be noted that application of excessive heat may affect the test results. Therefore, if artificial drying procedures are used, the intention should be to achieve a condition of drying equivalent to that obtained by natural methods. For this reason the temperature of the glazed surface should not exceed 40 °C.

The vehicle shall be at an ambient temperature in a range 10 °C to 40 °C for the tests.

C.2 Other methods

Other test mixture application methods may be used, provided that the requirements of 4.4.3.1.2 are met.

Annex D
(normative)

Method of determining wiped area

Place a heavy clear tracing material on the exterior glazed surface and trace the windscreen outline, the specified area and the wiped area. Using the traced wiped area, calculate the percentage of specified area that was wiped during the test.

NOTE 5 It is recommended that the cleared area is outlined on the glazed surface prior to transference onto the tracing material.

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