INTERNATIONAL STANDARD

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Passenger cars — Windscreen washing systems — Test methods

Voitures particulières — Dispositif de lave-glace du pare-brise — Méthodes d'essai

Reference number
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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 3469 was prepared by Technical Committee ISO/TC 22, *Road vehicles*.

This second edition cancels and replaces the first edition (ISO 3469:1975), of which it constitutes a technical revision and expansion.

Annexes A and B and C form an integral part of this International Standard. Annex D is for information only.

International Organization for Standardization
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Introduction

This International Standard is one of a series of four dealing with the testing of defrosting (ISO 3468), washing (ISO 3469), demisting (ISO 3470) and wiping (ISO 9619) for the windscreen of passenger cars. (See annex D.)

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

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Passenger cars — Windscreen washing systems — Test methods

1 Scope

This International Standard specifies test methods for passenger cars (term 3.1.1 in ISO 3833:1977) windscreen washing systems, when these are fitted.

It is not necessary for the tests to be repeated on types of power-driven vehicles which do not differ from one another in respect to the following essential features which affect washing performance:

a) shape, size and surface characteristics of the windscreen;

b) characteristics of each system designated by the vehicle manufacturer as contributing to windscreen washing.

This International Standard does not specify reference areas or levels of performance.

Annex C to this International Standard specifies a method of applying the test mixture to the glazed surface and determining the amount of dry deposited mixture.

NOTE 1 It may be possible to carry out tests of a similar nature on front windscreens and rear-windows simultaneously.

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 commercial additives: Products which are compatible with the washing and wiping systems and which may be added to lower the washer solution freezing point and/or assist in cleansing, and/or increase the wetting capacity of the washer solution.

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

3.3 functioning of a washing system: Ability of a washing system to direct washer solution onto the target area of the outer glazed surface without leakage or disconnection of a washer pipe when the system is operated in accordance with the vehicle manufacturer's instructions.

3.4 low temperature washer solution: Solution consisting of 50 % ethyl alcohol, and 50 % water. (See 3.16.)

3.5 nozzle: Device for directing washer solution to the outer glazed surface.

3.6 pump: Device for transferring washer solution from the reservoir through the washing system to the outer glazed surface.

3.7 windscreen washing system: Device for storing washer solution and applying it to the windscreen outer glazed surface together with the necessary controls.

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

3.9 reservoir: Container capable of storing washer solution.

3.10 target area: Area indicated by the vehicle or the system manufacturer onto which the nozzle shall apply the washer solution in order that the requirements of this International Standard are met.

3.11 test mixture: Mixture specified in annex A.

3.12 washer solution: Fluid used in the washing system consisting of water (see 3.16) with appropriate commercial additives.

3.13 washed/wiped area: Area on the outer glazed surface from which the test mixture has been removed.

3.14 wiped area: Area of the outer glazed surface that is in contact with the wiper blade(s) when operating on a wet window. The parking travel, if it exists, is disregarded.

3.15 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.

3.16 water: Water with a residue not exceeding 205 mg of $CaCO_3$ per litre after evaporation.

4 Test methods

4.1 General requirements

For the purposes of the tests in this clause, the same washing system shall be submitted to all of the tests. At the start of the tests, the equipment shall be in a condition equivalent to new.

Tests to be conducted at the same temperature may be carried out consecutively.

4.2 Test equipment

4.2.1 Test fixture, consisting of a structure used to mount the windscreen and the components of the washing system and wiping system in a manner representative of the vehicle installation.

4.2.2 Alternatively, **test vehicle fitted with a washing system and a wiping system**.

NOTE 2 It is permissible to re-locate any components other than the nozzle position with respect to the target area for convenience of testing if this does not affect the functioning of the system in the vehicle.

4.2.3 Test mixture as specified in annex A, and the equipment necessary for its application.

4.3 Test equipment for climatic conditions test

NOTE 3 This procedure is intended to cover a representative range of climatic conditions.

4.3.1 Equipment as specified in 4.2.1 or 4.2.2.

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

4.4 Full exposure range strength test procedure

4.4.1 Fill and fully prime the washing system with water (see 3.16). Maintain it at an ambient temperature of 20 °C ± 2 °C for a minimum of 4 h, obstruct all nozzle holes and try to operate the washing system six times within a period of 1 min using the force and time specified in table 1.

NOTE 4 If instrumentation is available to ensure that the water and components are at the test ambient temperature, a shorter soak time may be used.

Table 1 — Pump operating force and actuation time

Operation of pump	Pump control force	Pump control actuation time
Hand	135 N	
Foot	445 N	4 s ± 1 s
Power	Maximum power input level specified by the vehicle manufacturer	

4.4.2 Fill and fully prime the washing system with water (see 3.16) and freeze it by maintaining it at a temperature of −18 °C ± 3 °C for a minimum of 8 h. Following this period and in the same temperature environment, try to operate the washing system six times within a period of 1 min using the force and time specified in table 1.

NOTE 5 If instrumentation is available to ensure that the components are at the test ambient temperature and the water is frozen, a shorter soak time may be used.

4.4.3 Fill and fully prime the washing system with water, maintain it at an ambient temperature of 60 °C ± 3 °C for 8 h and try to operate the washing system, with all the nozzle holes obstructed, six times within a period of 1 min using the force and

time specified in table 1. At the completion of this test, remove the obstructions.

NOTE 6 If instrumentation is available to ensure that the water and components are at the test ambient temperature, a shorter soak time may be used.

If any part of the system is mounted in the engine compartment, that part (or the whole system, at the vehicle manufacturer's discretion) shall be tested at an ambient temperature of 80 °C ± 3 °C.

4.5 Test of washing system functioning at low and high ambient temperatures

4.5.1 Test equipment

Equipment as specified in 4.2.1 or 4.2.2, and 4.3.2.

4.5.2 Test method for full exposure range functioning

These tests shall be carried out after completion of the test specified in 4.4, as follows.

Fill and fully prime the system with water (see 3.16) and carry out the tests in 4.5.2.1 and 4.5.2.2.

4.5.2.1 Low temperature exposure

Freeze the system by maintaining it at an ambient temperature of −18 °C ± 3 °C for a minimum of 8 h.

NOTE 7 If instrumentation is available to ensure that the components are at the test ambient temperature and the water is frozen, a shorter soak time may be used.

Following this period, increase the ambient temperature to 20 °C ± 2 °C, maintain it for 8 h and repeat this freeze-thaw cycle to give a total of six cycles. After the last cycle, test the functioning of the washing system as defined in 3.3 and 3.10.

NOTE 8 If instrumentation is available to ensure that the water and components are at the test ambient temperature, a shorter soak time may be used.

4.5.2.2 High temperature exposure

Increase the ambient temperature to 60 °C ± 3 °C and maintain it for 8 h. Following this period, reduce the ambient temperature to 20 °C ± 2 °C for a minimum of 8 h and test the functioning of the washing system as defined in 3.3 and 3.10.

NOTE 9 If instrumentation is available to ensure that the water and components are at the test ambient temperature, a shorter soak time may be used.

If any part of the system is mounted in the engine compartment, that part (or the whole system at the vehicle manufacturer's discretion) shall be tested at an ambient temperature of 80 °C ± 3 °C.

4.5.3 Test method for full functioning range

Fill and prime the system with low temperature washer solution and carry out the tests in 4.5.3.1 and 4.5.3.2.

4.5.3.1 Low temperature functioning

Maintain the system at an ambient temperature of −18 °C ± 3 °C for a minimum of 8 h. Then, in the same temperature environment, test the functioning of the system as defined in 3.3 and 3.10.

NOTE 10 If instrumentation is available to ensure that the low temperature washer solution and components are at the test ambient temperature, a shorter soak time may be used.

4.5.3.2 High temperature functioning

Maintain the system at an ambient temperature of 60 °C ± 3 °C for 8 h, then in the same temperature environment, test the functioning of the system as defined in 3.3 and 3.10.

NOTE 11 If instrumentation is available to ensure that the low temperature washer solution and components are at the test ambient temperature, a shorter soak time may be used.

If any part of the system is mounted in the engine compartment, the part (or the whole system at the vehicle manufacturer's discretion) shall be tested at an ambient temperature of 80 °C ± 3 °C.

4.6 Test method for restricted temperature range

If the temperature at which the system is to function is not expected to fall below 0 °C, then only test procedures 4.4.1, 4.4.3, 4.5.2.2 and 4.5.3.2 need be applied and the system filled with washer solution or water.

5 Test of windscreen washing system combined with wiping system

5.1 General requirements

For the purposes of this test, the washing system shall be of the same model as those used for the tests in clause 4 and in a condition equivalent to new.

When tested in accordance with the procedure in 5.3, the washing system in conjunction with the wiping system shall be capable of removing the test mixture from a specified percentage of a specified

area, using the force specified by the vehicle manufacturer which shall not however exceed that in table 1.

5.2 Test equipment

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

5.2.2 Alternatively, **test vehicle fitted with a washing system and a wiping system.**

5.2.3 Test mixture as specified in annex A and the equipment necessary for its application.

5.2.4 Wiper cycle counting device, if required.

5.3 Test procedure

The test shall be conducted as follows, regardless of the temperature range (full or restricted: see clause 4).

5.3.1 Using the pump operating force specified by the vehicle manufacturer which shall not however exceed that in table 1, adjust the washing system nozzle(s) as indicated by the vehicle manufacturer.

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

5.3.3 Apply a coating of the test mixture (5.2.3) of 1,5 mg/cm^2 $\pm$ 20 % uniformly to the outer surface of the windscreen and allow it to dry. In case of dispute, see annex C.

5.3.4 After the mixture has completely dried, and within 1 h, operate the washing system as indicated by the vehicle manufacturer, for a maximum of ten cycles of the wiping system but the time taken shall not exceed 1 min. The ambient temperature shall be in the range 5 °C to 40 °C, relative humidity 50 % to 80 % and the washer system filled with washer solution or low temperature washer solution. The washed/wiped area shall then be measured by the method given in annex B and the appropriate performance verified.

NOTE 12 If the result of the test is not significantly influenced, a higher relative humidity value is acceptable.

Annex A
(normative)

Test mixtures

The test mixture shall be chosen from those indicated in either clause A.1 or clause A.2. Whichever mixture is used in the test shall be recorded in the test results.

A.1 Test mixture 1

The test mixture shall be composed of

1 g of NaCMC[1)]
18 g of NaCl
1 g of Na_2CO_3[2)]
1 l of water (see 3.16)
and
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

or

b)

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

In either case a) or b), the particle size distribution shall be 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.

A.2 Test mixture 2

The test mixture shall be composed of the following (*V*/*V*): 92,5 % (*V*/*V*) water (with a hardness of less than 205 g/tonne after evaporation), 5 % (*V*/*V*) aqueous saturated salt (sodium chloride) solution and 2,5 % (*V*/*V*) dust constituted in accordance with table A.1 and table A.2.

Table A.1 — Analysis of test dust

Constituent	Mass % (*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

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

1) NaCMC has been added to obtain an improved adherence of the test mixture on the glazed surface: it is recommended that this should be mixed first with the water in order to dissolve it completely.

NaCMC indicates the sodium salt of carboxymethylcellulose, currently referred to as CMC. The NaCMC to be used in the test mixture should have a degree of substitution (D.S.) of 0,6 to 0,7 and a viscosity of 200 mPa to 300 mPa (200 cP to 300 cP) at 20 °C for a 2 %solution.

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