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Road vehicles — Rear-window washing and wiping systems for passenger cars — Test methods

Véhicules routiers — Dispositifs de lave-glace et d'essuie-glace pour lunette arrière de voitures particulières — Méthodes d'essai

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Foreword

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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.

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Users should note that all International Standards undergo revision from time to time and that any reference made herein to any other International Standard implies its latest edition, unless otherwise stated.

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Road vehicles — Rear-window washing and wiping systems for passenger cars — Test methods

0 Introduction

This International Standard is one of a series of three covering demisting, defrosting, and washing and wiping systems for the rear-window of passenger cars:

ISO 5897, *Road vehicles — Rear-window demisting system for passenger cars — Test method.*

ISO 5898, *Road vehicles — Rear-window defrosting system for passenger cars — Test method.*

ISO 6255, *Road vehicles — Rear-window washing and wiping systems for passenger cars — Test methods.*

Tests on defrosting, washer and demisting systems for the windscreen of passenger cars are covered respectively in the following International Standards:

ISO 3468, *Road vehicles — Windscreen defrosting systems for passenger cars — Test method.*

ISO 3469, *Road vehicles — Windscreen washer systems for passenger cars — Test methods.*

ISO 3470, *Road vehicles — Windscreen demisting equipment for passenger cars — Test method.*

This International Standard does not specify reference areas or levels of performance, since at the time it was prepared there was insufficient data available.

It gives the test mixture in annex A and shows, in annex B, a method of applying the test mixture to the glazed surface and determining the amount of dry deposited mixture.

It should be noted that it may be possible to carry out tests of a similar nature on windscreen and rear-window simultaneously.

1 Scope and field of application

This International Standard specifies test methods for passenger car (term defined in ISO 3833) rear-window washing and wiping systems, when these are fitted.

The test methods are intended to apply to types of power-driven vehicles which do not differ from one another in respect of the following essential features which affect washing and wiping performance:

a) shape, size and surface characteristics of the rear-window;

b) characteristics of each system designated by the vehicle manufacturer as contributing to the washing and wiping of the rear-window.

2 Reference

ISO 3833, *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, 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: Means or device for starting and stopping the operation of the washing and wiping system(s). The actuation may be completely or partially automatic; operation of the two systems can be independent, semi-coordinated or fully coordinated.

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 % methanol and 50 % water.[1)]

1) Residue not exceeding 205 mg of $CaCO_3$ per litre after evaporation.

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

3.8 rear-window wiping system: Device for wiping the rear-window 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 system manufacturer to which the nozzle applies the washer solution in accordance with the requirements of this International Standard (see clauses 5 and 6).

3.11 test mixture: Mixture as specified in annex A.

3.12 washer solution: Fluid used in the washing system consisting of water[1] 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) operating on a wet window. The parking travel, if it exists, is disregarded.

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

4 Verification of washing system

4.1 General requirements

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

4.2 Test equipment

4.2.1 Test fixture, consisting of a structure used to mount the rear glazed surface 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 — 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 Verification of strength of washing system

4.3.1 Climatic conditions

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

4.3.2 Test equipment

4.3.2.1 Equipment as specified in 4.2.1 or 4.2.2.

4.3.2.2 Suitable **environmental chamber(s)** with temperature-measuring device(s) (thermometer or equivalent).

4.3.3 Test method for full exposure range strength

4.3.3.1 Fill and fully prime the washing system with water[1]. Maintain at an ambient temperature of 20 ± 2 °C for a minimum of 4 h, plug all nozzles and try to operate the washing system six times within 1 min using the input and time specified in the table.

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

Table — Pump operating input level and systems control actuation time

Operation of pump	Pump control input	Pump control actuation time
Hand	135 ± 13 N	4 ± 1 s
Foot	445 ± 44 N	
Power	Maximum power input level specified by the vehicle manufacturer	

4.3.3.2 Fill and fully prime the washing system with water[1]. Cool to a temperature of −18 ± 3 °C and maintain for a minimum of 8 h. Then, at the same temperature, try to operate the washing system six times within 1 min using the input and time specified in the table.

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

1) Residue not exceeding 205 mg of $CaCO_3$ per litre after evaporation.

4.3.3.3 Fill and fully prime the washing system with water[1]. Increase the temperature to 60 ± 3 °C and maintain for 8 h. Then try to operate the washing system six times within 1 min using the input and time specified in the table. At the completion of this test remove the plugs and operate the washing system.

NOTE — If instrumentation is available to ensure that the water and components are at the test 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) may be tested at a temperature of 80 ± 3 °C.

4.4 Procedures to verify functioning of washing system at low and high ambient temperatures

4.4.1 Test equipment

Equipment as specified in 4.2.1 or 4.2.2, and 4.3.2.2.

4.4.2 Test method for full exposure range functioning

4.4.2.1 Test preparation

These tests shall be carried out after completion of the test specified in 4.3 and as follows.

Before each test, fill and fully prime the washing system with water[1], and carry out the tests in 4.4.2.2 and 4.4.2.3.

4.4.2.2 Low-temperature exposure

Lower the ambient temperature to −18 ± 3 °C and maintain it for a minimum of 8 h.

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

Following this period, increase the temperature to 20 ± 2 °C and maintain for 8 h: repeat this freeze/thaw cycle to give a total of six cycles. After the last cycle, test the functioning of the washing system (see 3.3 and 3.10).

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

4.4.2.3 High-temperature exposure

Increase the ambient temperature to 60 ± 3 °C and maintain it for 8 h. Then reduce the temperature to 20 ± 2 °C and maintain it for a minimum of 8 h. Test the functioning of the washing system (see 3.3 and 3.10).

NOTE — If instrumentation is available to ensure that the water and components are at the test 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) may be tested at a temperature of 80 ± 3 °C.

4.4.3 Test method for full functioning range

4.4.3.1 Test preparation

Fill and prime the washing system with low-temperature washer solution (3.4) and carry out the tests in 4.4.3.2 and 4.4.3.3.

4.4.3.2 Low-temperature functioning

Maintain at a temperature of −18 ± 3 °C for a minimum of 8 h. Then, at the same temperature, test the functioning of the system (see 3.3 and 3.10).

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

4.4.3.3 High-temperature functioning

Increase the temperature to 60 ± 3 °C and maintain for 8 h. Then, at the same temperature, test the functioning of the system (see 3.3 and 3.10).

NOTE — If instrumentation is available to ensure that the low-temperature washer solution and components are at the test 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) may be tested at a temperature of 80 ± 3 °C.

4.5 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 4.3.3.1, 4.3.3.3, 4.4.2.3 and 4.4.3.3 need be applied, with the system filled with washer solution or water.

5 Verification of wiping system

5.1 General requirements

A complete wiping system shall be submitted to the test in this clause. At the commencement of the test, the equipment shall be in a condition equivalent to new and shall be of the same type as used in clause 4.

The purpose of this test is to determine the wiped area of the rear-window when tested in accordance with 5.3. The wiping system shall be capable of wiping a specified percentage of a specified area.

1) Residue not exceeding 205 mg of $CaCO_3$ per litre after evaporation.

5.2 Test equipment

5.2.1 Equipment as specified in 4.2.1 or 4.2.2.

NOTE — If the vehicle manufacturer so desires, the washing system may be removed for the purposes of this test. If the washing system is kept and activated, the washer solution shall be as defined in 3.12.

5.2.2 Water spray equipment to apply water to the glazed surface.

5.3 Test method

5.3.1 During the test, the temperature shall be in the range 5 to 40 °C, relative humidity 50 % to 80 %.

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

5.3.2 Adjust the water spray equipment (5.2.2) to provide an equally distributed water flow on the glazed surface at a rain fall rate of 1 ± 0,5 mm/min.

5.3.3 Apply water for the period of the test and operate the wiping system as indicated by the vehicle manufacturer.

5.3.4 Using a suitable marker, outline on the inside of the glazed surface the area that is wiped by the blade(s). (See annex C.)

5.3.5 At the completion of the test, the wiped area shall be recorded and the performance verified.

6 Verification of performance of washing and wiping systems

6.1 General requirements

For the purposes of the test in this clause, the washing and wiping systems shall be of the same model as those used for the tests in clauses 4 and 5 and in a condition equivalent to new.

When tested in accordance with 6.3, 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, within a time of ten wiper cycles but not exceeding 1 min, using the input values specified by the vehicle manufacturer, which shall not exceed those given in the table.

6.2 Test equipment

6.2.1 Test fixture, consisting of a structure used to mount the rear glazed surface and the components of the washing system and wiping system in a manner representative of the vehicle installation.

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

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

6.2.4 Wiper cycle counting device, if required.

6.3 Test method

The test shall be conducted as indicated in 6.3.1 to 6.3.4, regardless of the temperature range (full or restricted). (See clause 4.)

6.3.1 Using the pump operating input level specified by the vehicle manufacturer, but not exceeding that specified in the table, adjust the washing system nozzle(s) as indicated by the vehicle manufacturer.

6.3.2 Thoroughly degrease the outer and inner glazed surfaces using methylated spirit or an appropriate degreasing agent. When dry, apply a 3 % 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.

6.3.3 Apply a quantity of freshly prepared and shaken test mixture (see annex A) uniformly (see annex B) to the entire outer glazed surface, without coating the wiper blades, such that the mean dry deposit is not more than 1,8 mg/cm^2 and not less than 1,2 mg/cm^2, and the ratio between the heaviest sample and the lightest does not exceed 1,4 — i.e.

$$\frac{\text{max.}}{\text{min.}} \leqslant 1{,}4$$

6.3.4 After the mixture has completely dried, activate within 1 h the washing system as indicated by the vehicle manufacturer, for a maximum of 10 cycles of the wiping system, but the time taken not exceeding 1 min. The ambient temperature shall be in the range 5 to 40 °C, relative humidity 50 % to 80 % and the washer system filled with washer solution or low temperature washer solution. Measure the washed/wiped area by the method given in annex C and check the performance.

Annex A

Test mixture

(This annex forms an integral part of the Standard.)

The test mixture shall be composed of :

1 g of NaCMC[1)]

18 g of NaCl

1 g of $BaCO_3$

1 l of water (residue not exceeding 205 mg of $CaCO_3$ per litre after evaporation)

40 g of the constituents 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)

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 as follows :

maximum particle size : 200 µm, with :

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

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

NOTES

1 NaCMC[1)] has been added to obtain an improved adherence of the test mixture to the glazed surface and it is recommended that this should be mixed with the water first in order to obtain a complete solution.

2 $BaCO_3$ has been added to enable the areas which have not been cleared to be more easily identified.

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

Annex B

Method for applying the test mixture

(This annex forms an integral part of the Standard.)

B.1 By spray-gun

B.1.1 Apply a freshly prepared and shaken mixture uniformly by spray-gun as specified in 6.3.3.

The quantity and uniformity of the deposit shall be determined by weighing test samples.

Prior to weighing, remove dust on all areas other than the top surface of the samples by scraping.

B.1.2 For glazed surfaces having a surface area not larger than 0,5 m^2, three samples are required. For surface areas greater than 0,5 m^2, 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.

B.1.3 The thickness of the samples shall be not greater than 1 mm, with a surface area of at least 8 cm^2 (the use of a microscope slide is recommended).

B.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, thereby reducing the drying time between applications and before the tests. It should be noted however 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 5 to 40 °C for the tests.

B.2 Other methods

Other methods of application of the test mixture may be used, provided that the requirements of 6.3.3 are met.

Annex C

Suggested methods of determining washed/wiped and wiped areas

(This annex forms an integral part of the Standard.)

C.1 Washed/wiped area for washing and wiping system

Place a piece of heavy clear tracing paper on the outer glazed surface and trace the rear window outline and also the specified area. Trace the area from which the test mixture has been removed and calculate the percentage of the specified area that was cleared during the test.

NOTE — It is recommended that the cleared area is outlined on the glazed surface prior to transference on to the tracing paper.

C.2 Wiped area

Place a piece of heavy clear tracing paper on the outer glazed surface and trace the rear window outline, the specified area and the wiped area pattern. (See 5.3.4.) Using the traced wiped area pattern, calculate the percentage of specified area that was wiped during the test.