National Standard for the People’s Republic of China

GB 11555-200×
In replacement of GB11555-1994
GB11556-1994

Motor vehicles - windshield demisting and defrosting systems
Performance requirements and test methods

(Draft for Approval)

Issued by

General Administration of Quality Supervision,
Inspection and Quarantine of the People’s Republic of China
Standardization Administration of the People’s Republic of China
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Introduction

The Technical contents of this standard are mandatory.


This standard replaces GB11555-1994 “Motor vehicle windshield demisting system performance requirements and test methods” and GB11556-1994 “Motor vehicle windshield defrosting system performance requirements and test methods”.

This standard as been re-drafted as per 78/317/EEC. Appendix A has listed the correlation on the chapter and section numbering between this standard and that in the 78/317/EEC.

The following amendments have been made in this standard according to the actual situations in China when adopting the 78/317/EEC directive.

The differences and their reasons between this standard and the 78/317/EEC directive are as follows:

— Content regarding certification has been removed from 78/317/EEC directive (i.e. chapter 3, 4 of Appendix 1 and Appendix 6). This is due to the difference in format between standard and directive.
— The following have been removed from the 78/317/EEC directive Appendix 1: “2.3 three-dimensional system of coordinate”, “2.4 basic reference marking”, “2.5 seat backrest angle”, “2.6 actual seat backrest angle”, the definition of “seat backrest angle design”; Appendix 2: “determining the H point and the actual seat backrest angle, verification of the relative location between point R and H, and the verification procedures for the correlation between seat backrest angle design and actual seat backrest angle”; Appendix 3: “the correlation between vehicle basic reference marking and the three-dimensional system of coordinate”. Those contents have already been covered in the GB 11551-2003 and GB11562-1994 and are consistent.

For ease of use, the following have been amended to the 78/317/EEC directive in this standard:
— “This directive” has been changed to “this standard”;
— “Definition” has been changed to “terminology and definition”;
— Reference Appendix A has been added.

The main differences between this standard and GB11555-1994 and GB11556-1994:
— “180° range of vision for the driver” (1 in this edition) has been added;
— Definitions for “V point”, “R point” (3.8 and 3.9 in this edition) has been added;
— “Defrosting device” has been changed to “defrosting system” (3.1 in this edition).
— “Defrosting device” has been changed to “defrosting system” (3.4 in this edition).
— “The dimension and the features of vapour generator” (6.2.2.1 d in this edition) has been added;
Within 5 minutes from the start of the test, programmed “fast idle speed” can be used (recommended by manufacturers for cold weather engine start)” and “Voltage on the terminals of the defrosting system should be no more than 20% of the system’s rated voltage” (6.1.1.5 and 6.1.1.9 in this edition) have been added.

Appendix A is for reference.

This standard is brought forward by the National Development and Reform Commission.

This standard is administered by the National Automotive Standardization Technical Committee.

Drafted by: Wuhan Auto Parts Research Institute, Dong Feng Automotive Engineering Research Academe, National Quality Certification Centre.

Drafted by: LI Zaihua, YU Boying, QU Yanping.

This standard was first release in 1994. This is the first revision.
Motor vehicles - windshield demisting and defrosting systems
Performance requirements and test methods

1. Scope

This standard specifies motor vehicle windshield demisting and defrosting systems performance requirements and test methods.

This standard is applicable to 180° range of vision for the driver for M1 vehicles.

2. Reference guidelines

When quoted in this standard, the terms in the following documents become standard terms. Any quoted documents with dates, and all its subsequent amendments to a single (not including the contents of corrigenda) or revised edition, are not applicable to this standard. However, relevant parties who reach an agreement according to the standard are encouraged to research into whether the latest versions of these documents should be used. For documents without a quoted date, the latest version applies to this standard.

GB 11551-2003 Passenger protection for frontal collision (NEQ ECE R94 • 1995)
GB 11562-1994 Requirements and measurement methods of frontal range of vision for the driver (EQV 77/649/EEC:1977)

3. Terminology and definition

The followings are applicable to this standard

3.1.

Defrosting system

The system that thaws the frost or ice on the windshield so that vision is resumed.

3.2.

Defrosting

Remove the frost or ice on the windshield through defrosting or the operation of the windscreen wiper.

3.3.

Defrosted area

The area of the windshield that is dry or completely or partially thawed and covered by damp frost. The frost can be cleared by windscreen wiper from the outside. This does not include the area that is covered by dry frost.
3.4.

Demisting system

Use to clear the cold condensation from the windshield so that normal vision is possible.
3.5.
Mist
The condensation on the windshield.

3.6.
Demisting
Removal of mist from the windshield by demisting system.

3.7.
Demisted area
The area on the windshield where the normal vision is possible after demisting.

3.8.
V points
V point is the point indicating driver’s eye position. It’s determined by the driver’s seating position (if the seat is adjustable, move the seat to furthest back), R point and seat backrest angle design (see GB11562-1994 3.4.1). V point is used to check if the range of vision meets the requirement. V1 and V2 points are usually used to indicate the different positions of V point (see Figure 1).

3.9.
R points
“R point” is “seating reference point”. Its definition is as per GB 11551-2003 3.7.

4. Determine A, B and A area

4.1. A area is the enclosed area formed from where the 4 planes extended from V point (i.e. V1 and V2, see GB 11562-1994 3.5.1; To determine the V point, see GB 11562-1994 5.1) meeting the windshield (see Figure 1).

4.1.1. The vertical plane 13°to the left of the X axis which passes V1 and V2 point.

4.1.2. The plane which forms a 3°elevation to the X axis, passes V1 point and is parallel to Y axis.
4.1.3. The plane which forms a 1° angle of depression to the X axis, passes V2 point and is parallel to Y axis.

4.1.4. The vertical plane 20° to the right of the X axis which passes V1 and V2 point.

(1) Track of the longitudinal centre plane of the vehicle;
(2) Track of the vertical plane that passes the R point;
(3) Track of the vertical plane that passes the V1 and V2 points.

Figure 1 A area

4.2. B area is the area on the windshield outer surface enclosed by the following 4 planes. In addition, it should be at least 25mm inside the edge of the windshield, whichever is smaller (see Figure 2).

4.2.1. The plane which forms a 7° elevation to the X axis, passes V1 point and is parallel to the Y axis.

4.2.2. The plane which forms a 5° angle of depression to the X axis, passes V2 point and is parallel to the Y axis.

4.2.3. The vertical plane 17° to the left of the X axis which passes V1 and V2 points.

4.2.4. Based on the longitudinal centre plane of the vehicle and symmetrical to the plane described in 4.2.3.

4.3. A area is based on the longitudinal centre plane of the vehicle and symmetrical to the A area.
5. Requirements

5.1. Defrosting requirements for windshield

5.1.1. Every vehicle should be equipped with a defrosting system. This is to ensure that visibility can be resumed in cold weather conditions.

5.1.2. The following requirements should be met:

5.1.2.1. 20 minutes after beginning the test, 80% of A area should have been defrosted;

5.1.2.2. 25 minutes after beginning the test, 80% of A area should have been defrosted;

5.1.2.3. 40 minutes after beginning the test, 95% of B area should have been defrosted.

5.2. Demisting requirements for windshield

5.2.1. Every vehicle should be equipped with a demisting system. This is to ensure that visibility is possible in wet weather conditions.

5.2.2. The following requirements should be met:

5.2.2.1. 10 minutes after beginning the test, 90% of A area should have been demisted;

5.2.2.2. 10 minutes after beginning the test, 80% of B area should have been demisted;

(1) Track of the longitudinal centre plane of the vehicle;
(2) Track of the vertical plane that passes the R point;
(3) Track of the vertical plane that passes the V1 and V2 points.

Figure 2 B area
6. Test method

6.1. Windshield defrosting test method

6.1.1. Test conditions

6.1.1.1. Test is conducted under the temperature of \(-18^\circ \text{C} \pm 3^\circ \text{C}\). See Figure 3 for measuring points.

Note: “O” point is on the longitudinal centre plane of the vehicle 300mm in front of the windshield bottom edge.

Figure 3 Test temperature and wind speed measuring point (“O” is the measuring point)

6.1.1.2. Test should be conducted in a low temperature that can accommodate the vehicle. The room should be equipped with a cold air circulation device. Circulate the cold air. The room should be maintained at the temperature specified in 6.1.1.1 for at least 24 hours before the test vehicle is placed in the room.

6.1.1.3. Before the test, clean any smears on both the inside and outside of the windshield with alcohol such as methanol or similar. After drying, wipe with 3%~10% ammonia. Wipe with a dry cotton cloth after drying.

6.1.1.4. During the test, the heat source of the defrosting system is provided by engine coolant, lubricant or other heat sources.

6.1.1.5. The engine speed at neutral should be no more than 50% of the maximum power speed (Within 5 minutes from the start of the test, programmed “fast idle speed” can be used [recommended by manufacturers for cold weather engine start]).

6.1.1.6. Low temperature room air velocity horizontal component should be lower than 2.2 m/s. Its measuring point is as shown in Figure 3.

6.1.1.7. The vehicle battery should be full.

6.1.1.8. During the test, both the defrosting temperature control and the wind speed should be set to “maximum”. The air flow control should be set to “total defrosting”. Air circulation should be set as per vehicle manufacturer’s requirements.
6.1.1.9. The voltage on defrosting system terminals should not be more than 20% higher than the system’s rated voltage.

6.1.1.10. During the test, if windscreen wiper can operate automatically without manual assistance, then it can be used at any time.

6.1.1.11. During the test, engine hood, doors and other apertures should be closed apart from air circulation inlet and outlet. If required by vehicle manufacturer, 1 or 2 windows can be opened at the start of the demisting test. Total opening clearance should be no more than 25mm.

6.1.2. Test instrument, device and requirements

6.1.2.1. The jet gun should meet the following requirements:
   a) Diameter of the nozzle: 1.7mm;
   b) Operating pressure: 350 kPa±20 kPa;
   c) Fluid velocity: 0.395 L/min;
   d) The diameter of the jet prick: (200mm away from nozzle) 300 mm±50 mm.

6.1.2.2. Thermometer or other temperature measurement instruments.

6.1.2.3. Engine speedometer.

6.1.2.4. Stopwatch or other timing instruments.

6.1.2.5. Anemometer or other speed measurement instruments.

6.1.2.6. Voltage gauge.

6.1.2.7. Special pencil, charts and cameras.

6.1.3. Test procedure

6.1.3.1. Turn off the ignition after the test vehicle is brought into the cold room. At least 10 hours is required for the vehicle to be kept under the test temperature. If the temperatures of the engine coolant, lubricant, etc are known to stay constant at the test temperature, this time can be reduced.

6.1.3.2. After procedures in 6.1.3.1 have been carried out, use the jet gun specified in 6.1.2.1, spray water (volume = 0.044 g/cm² x windshield area) evenly onto the exterior surface of the windshield to generate an even layer of ice. The nozzle should be perpendicular to the windshield surface with a distance of 200mm~250mm.

6.1.3.3. After the ice is formed, the vehicle should be kept in the cold room for 30 to 40 minutes. Then 1 or 2 testers should enter the vehicle and start the engine (external devices can be used to start the engine if necessary). When the engine starts running, turn on the defrosting system. Test is considered to have started.

6.1.3.4. Once the test is started, testers should mark the contour of the defrosted area on the interior surface of the windshield every 5 minutes. Signs indicating driver’s side should also be marked.

6.2. Windshield demisting test method

6.2.1. Test conditions

6.2.1.1. Test is conducted under the temperature of -3°C±1°C

6.2.1.2. Before the test, clean any smears on both the inside and outside of the windshield with alcohol such as methanol or similar. After drying, wipe with 3%~10% ammonia. Wipe with a dry cotton cloth after drying.
6.2.1.3. Test room temperature and air velocity should be measured. The measuring position is as shown in Figure 3.

6.2.1.4. Cold room air velocity horizontal component should be lower than 2.2m/s.

6.2.1.5. The engine speed at neutral should be close to but no more than 50% of the maximum power speed.

6.2.1.6. During the test, engine hood, doors and other apertures should be closed apart from air circulation inlet and outlet. If required by vehicle manufacturer, 1 or 2 windows can be opened at the start of the demisting test. Total opening clearance should be no more than 25mm (vertical).

6.2.1.7. The voltage on defrosting system terminals should not be more than 20% higher than the system’s rated voltage.

6.2.1.8. The vehicle battery should be full.

6.2.2. Test instrument, device and requirements

6.2.2.1. The steam generator used in the test (see Figure 4) should meet the following requirements:

Figure 4 Steam generator legend

a) Container with a minimum water volume of 2.25L;

b) Under-3°C±1°C, the heat loss at boiling point should be no more than 75W;

c) The blower should have a capacity of 4.2m³/h~6.0m³/h under 50Pa static pressure;

d) There are 6 vent holes (diameter = 6.3mm) on top of the steam generator;

e) The capacity of the steam generator under -3°C±1°C is n×(70 g/h±5g/h).

Note: “n” is the number of seats as per manufacture’s specification.

f) See Table 1 for the dimension and material of the steam generator.
Table 1 The dimension and material of the steam generator

<table>
<thead>
<tr>
<th>Parts</th>
<th>Dimension</th>
<th>Material</th>
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<tbody>
<tr>
<td>Nozzle</td>
<td>Length: 100mm&lt;br&gt;Inside diameter: 15mm</td>
<td>Brass</td>
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<tr>
<td>Diffusion chamber</td>
<td>Length: 115mm&lt;br&gt;Diameter: 75mm&lt;br&gt;6 steam vents (diameter = 6.3mm) evenly set at the bottom of the diffusion chamber (gap = 25mm)</td>
<td>Brass tube (wall thickness = 0.4mm)</td>
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6.2.2.2. DC adjustable regulated voltage power.
6.2.2.3. Engine speedometer or other measuring instruments.
6.2.2.4. Anemometer or other measuring instruments.
6.2.2.5. Thermometer or other measuring instruments.

6.2.3. Test procedures
6.2.3.1. Determine the A and B areas of the windshield as per specification in chapter 4.
6.2.3.2. The steam generator should be placed behind the backrests of front seats. The air vent should be at 580mm±80mm above the R point of the driver’s seat. If the seat backrest is adjustable, it should be adjusted to the specified angle. If there is not enough room behind the seat backrest, then the steam generator can be placed in front of the backrest, nearest to the location specified above.
6.2.3.3. Drive the vehicle into the test room and then turn off the ignition.
Lower the room temperature until the engine coolant, lubricant and vehicle internal temperature stay constant at -3°C±1°C.
6.2.3.4. Heat the steam generator (with at least 1.7L water) to boiling point.
After it has stabilized, place it in the vehicle and shut the doors.
6.2.3.5. After 5 minutes, 1 or 2 testers enter the vehicle. The steam volume discharged from the generator should be deducted by 70g/h±5g/h for each tester entering the vehicle.
6.2.3.6. 1 minute after the testers have entered the vehicle, start the engine as per manufacturer’s specification. Operate the demisting system as per 6.2.1.5 and set the temperature control as per manufacturer’s requirement. The test is then considered started.
6.2.3.7. 10 minutes after the test is started, record test conditions and draw or take photos of the contour of the demisted area. The driver’s position should also be recorded.
**Appendix A (Reference Appendix) The correlation of the chapter numbering in this standard and 78/317/EEC**

Table A.1 lists the correlation of the chapter numbering in this standard and 78/317/EEC.

**Table A.1 The correlation of the chapter numbering in this standard and 78/317/EEC**

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