IS 15804 (2008): Automotive vehicles - Windscreen wiping and washing system for M1 category of vehicles - Requirements [TED 11: Automotive Electrical Equipment]

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भारतीय मानक

स्वचल वाहन — एम1 श्रेणी के वाहनों की विंडस्क्रीन पोंछने और धुलाई की पद्धति — अपेक्षाएँ

Indian Standard

AUTOMOTIVE VEHICLES — WINDSCREEN WIPING AND WASHING SYSTEM FOR M1 CATEGORY OF VEHICLES — REQUIREMENTS

ICS 43.040.65

BUREAU OF INDIAN STANDARDS
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Automotive Electrical Equipment and Instruments Sectional Committee, TED 11

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Electrical Equipment and Instruments Sectional Committee had been approved by the Transport Engineering Division Council.

Windscreen wiping and washing systems are meant to ensure good visibility under adverse weather conditions.

In the formulation of this standard, considerable assistance has been derived from the following:

AIS-019/2001 Automotive vehicles — Windscreen wiping and washing system for M1 category of vehicles

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

AUTOMOTIVE VEHICLES — WINDSCREEN WIPING AND WASHING SYSTEM FOR M1 CATEGORY OF VEHICLES — REQUIREMENTS

1 SCOPE

This standard specifies requirements for windscreen wiping and washing systems for M1 class of vehicles.

The requirements of this standard are so worded as to apply to category M1 vehicles in which the driver is on the right.

2 REFERENCE

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

IS No.	*Title*
14272 (Part 1) : 1995	Automotive vehicles — Types — Terminology: Part 1 Three and four wheelers

3 DEFINITIONS

For the purpose of this standard, definitions given in IS 14272 (Part 1), and the following shall apply.

3.1 Vehicle Type with Regard to Its Windscreen-Wiper and Windscreen-Washer Systems — Vehicle type with regard to its windscreen-wiper and windscreen-washer system means vehicles, which do not differ in such essential aspects as:

a) The external and internal forms and arrangements within the area which may affect visibility;

b) The shape, dimensions and characteristics of the windscreen and its mounting; where these are likely to affect the vision areas; and

c) The characteristics of the windscreen-wiper and windscreen-washer systems.

3.2 Three-Dimensional Reference Grid — A reference system which consists of a vertical longitudinal plane *X-Z*, a horizontal plane *X-Y* and a vertical transverse plane *Y-Z* (*see* Annex A). The grid is used to determine the dimensional relationships between the positions of design points on drawings and their position on the actual vehicle. The procedure for situating the vehicle relative to the grid is specified in Annex A, all coordinates referred to ground zero shall be based on a vehicle in running order plus one front-seat passenger, the mass of the passenger being 75 kg ± 1 percent.

Vehicles fitted with suspension enabling their ground clearance to be adjusted shall be tested under the normal conditions of use specified by the manufacturer.

3.3 Primary Reference Marks — These are holes, surfaces, marks and identification signs on the vehicle body. The type of reference mark used and the position of each mark relative to *X*, *Y* and *Z* co-ordinates of the three-dimensional reference grid and to a design ground plane shall be specified by the vehicle manufacturer. These marks may be the control points used for body assembly purposes.

3.4 Actual Torso Angle — The angle measured between a vertical line through the '*H*' point and the torso line using the back angle quadrant on the 3 DH machine. The actual torso angle corresponds theoretically to the design torso angle.

3.5 Design Torso Angle — The angle measured between a vertical line through the '*R*' point and the torso line in a position which corresponds to the design position of the seat-back established by the vehicle manufacturer.

3.6 '*V*' Points — Points whose position in the passenger compartment is determined by vertical longitudinal planes passing through the centres of the outermost designated seating positions on the front seat and in relation to the *R* point and the design angle of the seat-back, which points are used for verifying compliance with the field of vision requirements (*see* Annex B).

3.7 '*R*' Point or Seating Reference Point — Design point defined by the vehicle manufacturer for each seating position and established with respect to the three-dimensional reference system.

3.8 '*H*' Point — Pivot center of the torso and thigh of the 3 DH machine installed in the vehicle seat in accordance with clause **6**.

3.9 Windscreen Datum Points — Points situated at the intersection with the windscreen of lines radiating forward from the *V* points to the outer surface of the windscreen.

3.10 Transparent Area of a Windscreen — Area of a vehicle windscreen or other glazed surface whose light transmittance, measured at right angles to the surface is not less than 70 percent.

3.11 Horizontal Seat-Adjustment Range — Range of normal driving positions designated by the vehicle manufacturer for the adjustment of the driver's seat in the direction of the *X*-axis (*see* **3.3**).

3.12 Extended Seat-Adjustment Range — Range designated by the vehicle manufacturer for the adjustment of the seat in the direction of *X*-axis (*see* **3.3**) beyond the range of normal driving positions and used for converting seats into beds or facilitating entry into the vehicle.

3.13 Windscreen-Wiper System — System consisting of a device for wiping the outer face of the windscreen, together with the accessories and control necessary for starting and stopping the device.

3.14 Windscreen-Wiper Field — The area of the outer face of a wet windscreen that is swept by the windscreen-wiper.

3.15 Windscreen-Washer System — The system consisting of a device for storing a fluid and applying it to the outer face of the windscreen, together with the controls necessary for starting and stopping the device.

3.16 Windscreen-Washer Control — A device or accessory for starting and stopping the windscreen washer systems. Starting and stopping may be coordinated with the operation of the windscreen-wiper or be totally independent of it.

3.17 Windscreen-Washer Pump — A device for transferring the windscreen-washer fluid from the reservoir to the outer face of the windscreen.

3.18 Nozzle — A device which serves to direct the windscreen-washer fluid to the windscreen.

3.19 Performance of a Windscreen-Washer System — The ability of a windscreen-washer system to apply fluid to the target area of the windscreen without leakage or disconnection of a tube of the washer system occurring when the system is used normally.

4 REQUIREMENTS

4.1 Windscreen-Wiper System

4.1.1 Every vehicle shall be equipped with at least one automatic windscreen-wiper system, that is a system which when the vehicle's engine is running is able to function without any action by the driver other than that needed for starting and stopping the windscreen-wiper.

4.1.2 The windscreen-wiper field shall cover not less than 80 percent of vision area *B* as a defined in **B 2.3** of Annex B.

4.1.2.1 In addition the windscreen-wiper field shall cover not less than 98 percent of vision area *A* as defined in **B-2.2** of Annex B.

4.1.3 The windscreen-wiper shall have at least two sweep frequencies.

a) One of not less than 45 cycles/min (a cycle being the forward and return movement of the windscreen wiper).
b) One of not less than 10 and not more than 55 cycles/minute.
c) The difference between the highest and at least one of the lower sweep frequencies shall be at least 15 cycles/min.

4.1.4 The sweep frequencies prescribed in **4.1.3** shall be achieved as indicated in **5.1** to **5.1.5** and **5.1.7**.

4.1.5 Intermittent operation windscreen-wiper system may be used for the purposes of complying with the requirements of **4.1.3** provided that one of the frequencies complies with the requirements of **4.1.3**(a) and that one of the other frequencies obtained when the main frequency is interrupted is not less than 10 cycles/min.

4.1.6 When the windscreen-wiper system is stopped by the use of the windscreen-wiper control, the blades should return automatically to their position of rest.

4.1.7 The system shall be capable of withstanding stalling for 15 s. The use of automatic circuit protection device is allowed, provided that for possible resetting no action is required on controls other than the windscreen-wiper control. The test procedure and conditions are set out in **5.1.6**.

4.1.8 The windscreen-wiper field shall meet the minimum requirements of **4.1.2** when the wipers are tested at a sweep frequency conforming to the provisions of **4.1.3**(b) under the conditions set out in **5.1.9**.

4.1.9 The aero-dynamic effects associated with the windscreen's size and shape, and the efficiency of the windscreen-wiper system, shall be determined under the following conditions.

4.1.9.1 When subjected to a relative air speed equal to 80 percent of the vehicle's maximum speed but not exceeding 160 km/h, the windscreen-wiper systems, operating at maximum frequency, shall continue to sweep a field as specified in **4.1.2.1**, with the same efficiency and under the some conditions as set out in item **5.1.9.2**.

4.1.10 The wiper-arm mounting shall enable the wiper-arm to be displaced from its position on the windscreen so as to allow the windscreen to be manually cleaned. This requirement does not apply to devices which, when parked, are in an area of the windscreen which is hidden from view by parts to the vehicle (such as the bonnet, instrument panel, etc).

4.1.11 The windscreen-wiper system shall be capable of operating for two minutes on a dry windscreen with the outside temperature at −10 ± 2°C under the conditions specified in **5.1.10**.

4.2 Windscreen-Washer System

4.2.1 Every vehicle shall be fitted with a windscreen-washer system which is capable of withstanding the loads produced when the nozzles are plugged and the system is actuated in accordance with the procedure set out in **5.2.1** and **5.2.2**.

4.2.2 The performance of the windscreen-washer system shall not be adversely affected by exposure to the temperature cycles laid down in points in **5.2.3** and **5.2.4**.

4.2.3 The windscreen-washer system must be capable of delivering sufficient liquid to clear 60 percent of the area defined in **B-2.2** of Annex B under the conditions described in **5.2.5**.

4.2.4 The capacity of the reservoir containing the liquid must not be less than one litre.

4.2.5 Test procedure and test requirements for windscreen-wiper blade are given in Annex C.

5 TEST PROCEDURE

5.1 Windscreen-Wiper System

The tests described below shall be carried out under the following conditions, unless otherwise specified.

5.1.1 The ambient temperature shall not be less than 10°C and more than 40°C.

5.1.2 The windscreen shall be kept constantly wet.

5.1.3 In the case of an electric windscreen-wiper system the following additional conditions shall be met.

5.1.3.1 The battery shall be fully charged.

5.1.3.2 The engine shall be running at 30 percent of the speed at which it develops maximum power.

5.1.3.3 The dipped-beam headlamps shall be switched on.

5.1.3.4 The heating and/or ventilation systems, if fitted, shall be operating at maximum electrical consumption.

5.1.3.5 The defrosting and demisting systems, if fitted, shall be operating at maximum electrical consumption.

5.1.4 Compressed air operated or vacuum operated windscreen-wiper systems shall be able to function continuously at the prescribed sweep frequencies whatever the engine speed or engine load.

5.1.5 The sweep frequencies of windscreen-wiper systems shall comply with the requirements of **4.1.3** after a preliminary operating time of 20 min on a wet surface.

5.1.6 The requirements of **4.1.7** shall be satisfied when the wiper-arms are restrained in their vertical position for a period of 15 s with the windscreen-wiper control set at the maximum sweep frequency.

5.1.7 The outer face of the windscreen shall be thoroughly degreased by means of methylated spirit or an equivalent degreasing agent. After drying, a solution of ammonia of not less than 3 percent and not more than 10 percent shall be applied. The surface shall be allowed to dry again and shall then be wiped with a dry cotton cloth.

5.1.8 A coating of the test mixture (*see* Annex D) shall be applied uniformly to the outer surface of the windscreen and allowed to dry.

5.1.9 For the purpose of measuring the field of the windscreen-wiper system, prescribed in **4.1.2** and **4.1.2.1**, the outer face of the windscreen shall be treated as indicated in **5.1.7** and **5.1.8** or by some other equivalent method.

5.1.9.1 A trace of the windscreen-wiper field shall be made and compared with a trace of the vision areas specified in **4.1.2** and **4.1.2.1** in order to verify that the requirements are met.

5.1.9.2 Where the outer face of the windscreen has been prepared as described in **5.1.7** and **5.1.8** the windscreen washer may be used in all of the tests.

5.1.10 The requirements of **4.1.11** shall be met after the vehicle has been in an ambient temperature of −10 ± 2°C for a minimum of 4 h. The windscreen-wiper system is set to operate under the conditions set out in **5.1.3** with the control at the position of maximum frequency. There are no requirements regarding the field swept.

5.2 Windscreen-Washer System

5.2.1 *Test No.* 1

5.2.1.1 The windscreen-washer system shall be filled with water, fully primed, and placed in an ambient temperature of 25 ± 10°C for a minimum of 4 h. All the nozzles shall be plugged and the windscreen-washer control actuated six times in 1 min, each time for at least 3 s. If the system is powered by the muscular energy of the driver, the force applied shall be that shown in the following table:

Type of Pump	*Force to be Applied*
Hand	11 to 13.5 daN
Foot	40 to 44.5 daN

5.2.1.2 For electric pumps, the test voltage shall be no less than the rated voltage without exceeding it by more than 2 V.

5.2.1.3 The performance of the windscreen-washer system at the end of the test shall be as defined in **4.2.1**.

5.2.2 *Test No.* 2

5.2.2.1 The windscreen-washer system shall be filled with water, fully primed, and placed in an ambient temperature of –10 ± 2°C for a minimum of 4 h. The windscreen-washer control shall be activated six times in 1 min, each time for at least 3 s using the force prescribed in **5.2.1**. The system shall then be placed in an ambient temperature of 25 ± 10°C until the ice has completely thawed but in any case no longer than 4 h. The performance of the windscreen-washer system shall then be verified by actuating it as prescribed in **5.2.1**.

5.2.3 *Test No.* 3 *(Low Temperature Exposure Test)*

5.2.3.1 The windscreen-washer system shall be filled with water, fully primed, and placed in an ambient temperature of –10 ± 2°C for a minimum of 4 h so that the total mass of the water in the washer system is frozen. The system shall then be placed in an ambient temperature of 25 ± 10°C until the ice has completely thawed but in any case no longer than 4 h. This freeze/thaw cycle shall be repeated six times. The performance of the windscreen-washer system shall then be verified by actuating it as prescribed in **5.2.1**.

5.2.3.2 The windscreen-washer system shall be filled and fully primed with a low-temperature windscreen-washer fluid consisting of a 50 percent solution of methanol, or alternatively isopropyl alcohol in water of hardness not greater than 205 g/tonne. The system shall be placed in an ambient temperature of –10 ± 2°C for a minimum of 4 h. The performance of the windscreen-washer system shall be verified by actuating it as prescribed in **5.2.1**.

5.2.4 *Test No.* 4 *(High-Temperature Exposure Test)*

5.2.4.1 The windscreen-washer system shall be filled with water, fully primed, and placed in an ambient temperature of 80 ± 3°C for a minimum of 8 h and then in an ambient temperature of 25 ± 10°C. When the temperature has stabilized, the performance of the windscreen-washer system shall be verified by actuating it as prescribed in **5.2.1**.

5.2.4.2 If part of the windscreen-washer system is situated in the engine compartment, the system shall be filled with water, fully primed, and placed in an ambient temperature of 80 ± 3°C for a minimum of 8 h. The performance of the windscreen-washer system shall be verified by actuating it as prescribed in **5.2.1**.

5.2.4.3 If no part of the windscreen-washer system is situated in the engine compartment, the system shall be filled with water, fully primed, and placed in an ambient temperature of 60 ± 3°C for a minimum of 8 h. The performance of the windscreen-washer system shall be verified by actuating it as prescribed in **5.2.1**.

5.2.5 *Test No.* 5 *(Windscreen-Washer System Capability Test Prescribed in* **4.2.3**)

5.2.5.1 The windscreen-washer system shall be filled with water and fully primed. With the vehicle stationary and no significant wind effect, the washer nozzle or nozzles shall be pointed towards the target area of the outer face of the windscreen. If the system is powered by the muscular energy of the driver the force required to do this shall not exceed that specified in **5.2.1.1**. If the system is powered by an electric pump the requirements of **5.1.3** shall apply.

5.2.5.2 The outer face of the windscreen shall be treated as prescribed in **5.1.7** and **5.1.8**.

5.2.5.3 The windscreen-washer system shall then be actuated in the manner indicated by the manufacturer for 10 cycles of automatic operation of the windscreen-wiper system at maximum frequency and the proportion of the vision area defined in **B-2.2** of Annex B that is cleaned shall then be measured.

5.3 All the windscreen-washer tests described in **5.2.1** to **5.2.4** shall be carried out on one and the same windscreen-washer system, either attached to a vehicle of a type for which CMVR type-approval has been sought, or not attached to a vehicle, in the case of a system for which CMVR type-approval as a separate technical unit has been requested.

6 PROCEDURE FOR DETERMINING THE *H* POINT AND THE ACTUAL SEAT-BACK ANGLE AND FOR VERIFYING THE RELATIVE POSITIONS OF THE '*R*' AND '*H*' POINTS AND THE RELATIONSHIP BETWEEN THE DESIGN SEAT-BACK ANGLE AND THE ACTUAL SEAT-BACK ANGLE

6.1 The vehicle shall be preconditioned at the manufacturer's discretion, at a temperature of 25 ±10°C to ensure that the seat material reaches room temperature. If the seat to be checked has never been sat upon, a 70 to 80 kg person or device shall sit on the seat twice for 1 min to flex the cushion and back. At the manufacturer's request all seat assemblies shall remain unloaded for a minimum period of 30 min prior to installation of the 3 DH machine.

6.2 The vehicle attitude is kept as per the co-ordinates of 'Fiducial marks' (holes, surfaces, marks or indentations on the vehicle body as defined by the manufacturer) in the three-dimensional reference system.

6.3 The seat, if it is adjustable, shall be adjusted first to the rearmost normal driving or riding position, as indicated by the vehicle manufacturer, taking into consideration only the longitudinal adjustment of the seat, excluding seat travel used for purpose other than normal driving or riding positions. Where other modes of seat adjustment exists (vertical, angular, seat-back, etc) these will be then adjusted to the position specified by the vehicle manufacturer. For suspension seats, the vertical position shall be rigidly fixed corresponding to a normal driving position as specified by the manufacturer.

6.4 Place the seat and back assembly of the 3 DH machine so that the centre plane of the occupant (C/LO) coincides with the centre plane of the 3 DH machine. At the manufacturer's request, the 3 DH machine may be moved inboard with respect to the C/LO if the 3 DH machine is located so far outboard that the seat edge will not permit leveling of the 3 DH machine.

6.5 Attach the foot and lower leg assemblies to the seat pan assembly, either individually or by using the *T*-bar and lower leg assembly. A line through the '*H*' point sight buttons shall be parallel to the ground and perpendicular to the longitudinal centre plane of the seat.

6.6 Adjust the feet and leg positions of the 3 DH machine as follows.

6.6.1 Designated seating position; driver and outside front passenger.

6.6.1.1 Both feet and leg assemblies shall be moved forward in such a way that the feet take up natural positions on the floor, between the operating pedals, if necessary. Where possible the left foot shall be located approximately the same distance to the left of the centre plane of the 3 DH machine as the right foot is to the right. The spirit level verifying the transverse orientation of the 3 DH machine is brought to the horizontal by readjustment of the seat pan, if necessary or by adjusting the leg and foot assemblies towards the rear. The line passing through the '*H*' point sight button shall be maintained perpendicular to the longitudinal centre plane of the seat.

6.6.1.2 If the left leg cannot be kept parallel to the right leg and the left foot cannot be supported by the structure move the left foot until it is supported. The alignment of the sight button shall be maintained.

6.7 Apply lower leg and thigh weights and level the 3 DH machine.

6.8 Tilt the back pan forward against the forward stop and draw the 3 DH machine away from the seat-back using the *T*-bar. Reposition the 3 DH machine on the seat by one of the following methods.

6.8.1 If the 3 DH machine tends to slide rearward, use the following procedure. Allow the 3 DH machine to slide rearward until a forward horizontal restraining load on the *T*-bar is no longer required, that is, until the seat pan contacts the seat-back. If necessary, reposition the lower leg.

6.8.2 If the 3 DH machine does not tend to slide rearward, use the following procedure. Slide the 3 DH machine rearward by applying a horizontal rearward load to the *T*-bar until the seat pan contacts the seat-back.

6.9 Apply a 100 ± 10 N load to the back and pan assembly of the 3 DH machine at the intersection of the hip angle quadrant and the *T*-bar housing. The direction of the load application shall be maintained along a line passing by the above intersection to a point just above the thigh bar housing. Then carefully return the back pan to the seat-back. Care shall be exercised throughout the remainder of the procedure to prevent the 3 DH machine from sliding forward.

6.10 Install the right and left buttock weights and then, alternately, the eight torso weights. Maintain the 3 DH machine level.

6.11 Take all measurements.

6.11.1 The co-ordinates of the '*H*' point are measured with respect to the three-dimensional reference system.

6.11.2 The actual torso angle is read on the back angle quadrant of the 3 DH machine with the probe in its fully rearward position.

6.12 If a re-run of the installation of the 3 DH machine is desired, the seat assembly should remain unloaded for a minimum period of 30 min prior to the re-run. The 3 DH machine should not be left loaded on the seat assembly longer than the time required to perform the test.

6.13 If the seats in the same row can be regarded as similar (bench seat, identical seats, etc) only one '*H*' point and one 'actual torso angle' shall be determined for each row of seats.

6.13.1 In the case of the front row, the driver's seat.

6.13.2 In the case of the rear row or rows, an outer seat.

ANNEX A

(*Clause* 3.2)

METHOD FOR DETERMINING THE DIMENSIONAL RELATIONSHIP BETWEEN THE VEHICLE'S PRIMARY REFERENCE MARKS AND THE THREE-DIMENSIONAL REFERENCE GRID

A-1 RELATIONSHIP BETWEEN REFERENCE GRID AND VEHICLE'S PRIMARY REFERENCE MARKS

To verify specific dimensions on or within a vehicle submitted for type approval in accordance with this standard, the relationship between the coordinates of the three-dimensional reference grid defined in **3.3** have been laid out at the initial vehicle-design stage, and the positions of the primary reference marks defined in **3.4** of this standard shall be established accurately so that specific points on the vehicle manufacturer's drawings can be located on an actual vehicle produced from those drawings.

A-2 METHOD FOR ESTABLISHING RELATIONSHIP OF REFERENCE GRID TO REFERENCE MARKS

For this purpose, a ground reference plane shall be constructed, which is marked with the *X-X* measurement and the *Y-Y* measurement. The method of achieving this is set out in Fig. 1 the reference plane being a hard, flat, level surface on which the vehicle stands, and which has two measuring scales firmly fixed to its surface; these shall be graduated in millimeters, the *X-X* scale being not less than 8 m long, and the *Y-Y* scale not less than 4 m long. The two scales must be set at right angles to each other as shown in Fig. 1. The intersection of the scales is ground zero.

A-3 EXAMINATION OF THE REFERENCE PLANE

In order to provide for minor variations in the level of the reference plane or test area, it is necessary to measure the deviations from ground zero along both the *X* and *Y* scales at intervals of 250 mm and to record the readings obtained so that corrections can be made when checking the vehicle.

A-4 ACTUAL TEST ATTITUDE

In order to provide for minor changes in suspension height, etc it is necessary to have available a means of bringing the primary reference marks to the correct coordinate positions relative to the design attitude before further measurements are taken. In addition, it must be possible to make minor lateral and/or longitudinal adjustments to the vehicle's position so as to place it correctly in relation to the reference grid (*see* Fig. 2).

A-5 RESULTS

The vehicle having been correctly placed relative to the reference grid and in its design attitude, the site of the necessary points for studying the forward visibility requirements can be readily determined. Test methods to determine these requirements may include the use of theodolites, light sources or shadow devices, or any other method which can be shown to give equivalent results.

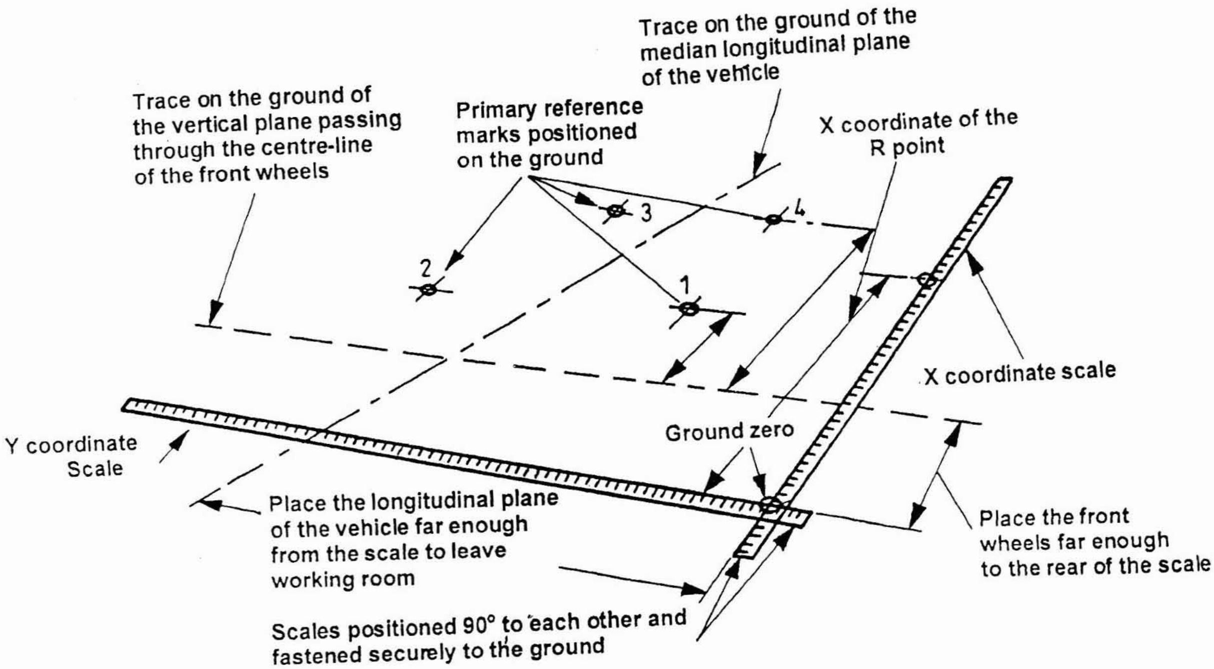


FIG. 1 LEVEL WORK SPACE

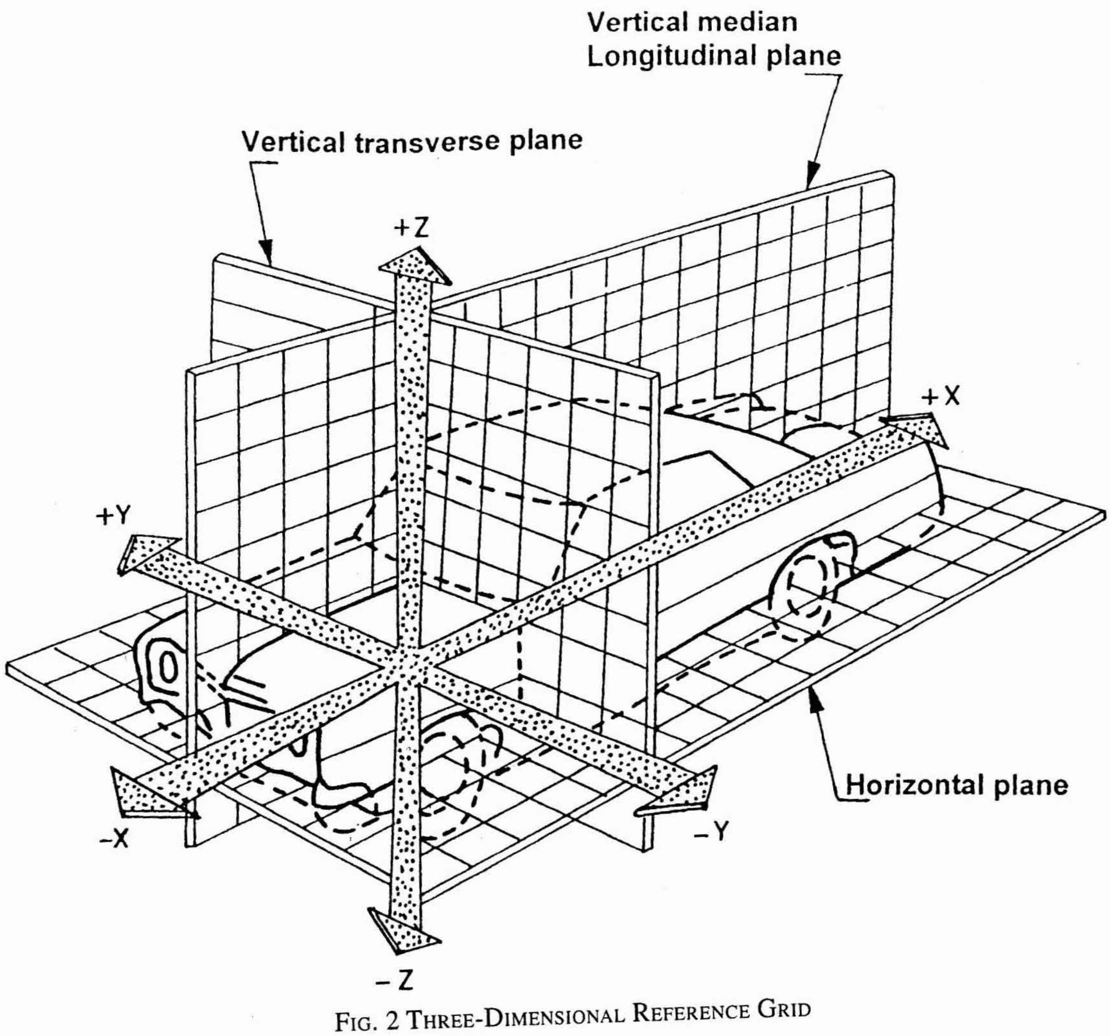


FIG. 2 THREE-DIMENSIONAL REFERENCE GRID

ANNEX B

(*Clauses* 3.6, 4.1.2, 4.1.2.1, 4.2.3 *and* 5.2.5.3)

PROCEDURE FOR DETERMINING VISION AREAS ON WINDSCREENS OF CATEGORY M1 VEHICLES IN RELATION TO THE 'V' POINTS

B-1 POSITIONS OF THE 'V' POINTS

B-1.1 The positions of the '*V*' points in relation to the *R* point, as indicated by *XYZ* coordinates from the three-dimensional reference grid, are as shown in Tables 1 and 2.

B-1.2 Table 1 indicates the basic coordinates for a design seat-back angle of 25°. The positive direction for the coordinates is indicated in Fig. 3.

Table 1 Basic Coordinates for a Design Seat-Back Angle of 25°
(*Clauses* B-1.1 *and* B-1.2)

Sl No. (1)	*V* Point (2)	*X* mm (3)	*Y* mm (4)	*Z* mm (5)
i)	*V*1	68	+ 5	665
ii)	*V*2	68	+ 5	589

B-1.3 Correction for design seat-back angles other than 25°.

B-1.3.1 Table 2 shows the further corrections to be made to the *X* and *Z* coordinates of each *V* point when the design seat-back angle is not 25°. The positive direction for the coordinates is shown in Fig. 3.

B-2 VISION AREAS

B-2.1 Two vision areas shall be determined from the V points.

B-2.2 Vision area *A* is the area on the outer surface of the windscreen bounded by the following four planes extending forward from the *V* point (*see* Fig. 4):

a) A vertical plane passing through V_1 and V_2 and at an angle of 13° to the left of the *X*-axis;
b) A plane parallel to the *Y*-axis, passing through V_1 and at an upward angle of 3° from the *X*-axis;
c) A plane parallel to the *Y*-axis, passing through V_2 and at an downward angle of 1° from the *X*- axis;
d) A vertical plane passing through V_1 and V_2 and at an angle of 20° to the right of the *X*-axis; and
e) A plane symmetrical to the former plane in relation to the median longitudinal plane of the vehicle.

B-2.3 Vision area *B* is the area of the outer surface of the windscreen, which is more than 25 mm from the

Table 2 Corrections for Design and Seat-Back Angles Other than 25°
(*Clauses* B-1.1 *and* B-1.3.1)

Sl No. (1)	Seat-Back Angle Degree (2)	Horizontal Coordinates ΔX mm (3)	Vertical Coordinates ΔZ mm (4)	Seat-Back Angle Degree (5)	Horizontal Coordinates ΔX mm (6)	Vertical Coordinates ΔZ mm (7)
i)	5	– 186	28	23	– 18	5
ii)	6	– 177	27	24	– 9	3
iii)	7	– 167	27	25	0	0
iv)	8	– 157	27	26	9	– 3
v)	9	– 147	26	27	17	– 5
vi)	10	– 137	25	28	26	– 8
vii)	11	– 128	24	29	34	– 11
viii)	12	– 118	23	30	43	– 14
ix)	13	– 109	22	31	51	– 18
x)	14	– 99	21	32	59	– 21
xi)	15	– 90	20	33	67	– 24
xii)	16	– 81	18	34	76	– 28
xiii)	17	– 72	17	35	84	– 32
xiv)	18	– 62	15	36	92	– 35
xv)	19	– 53	13	37	100	– 39
xvi)	20	– 44	11	38	108	– 43
xvii)	21	– 35	9	39	115	– 48
xviii)	22	– 26	7	40	123	– 52

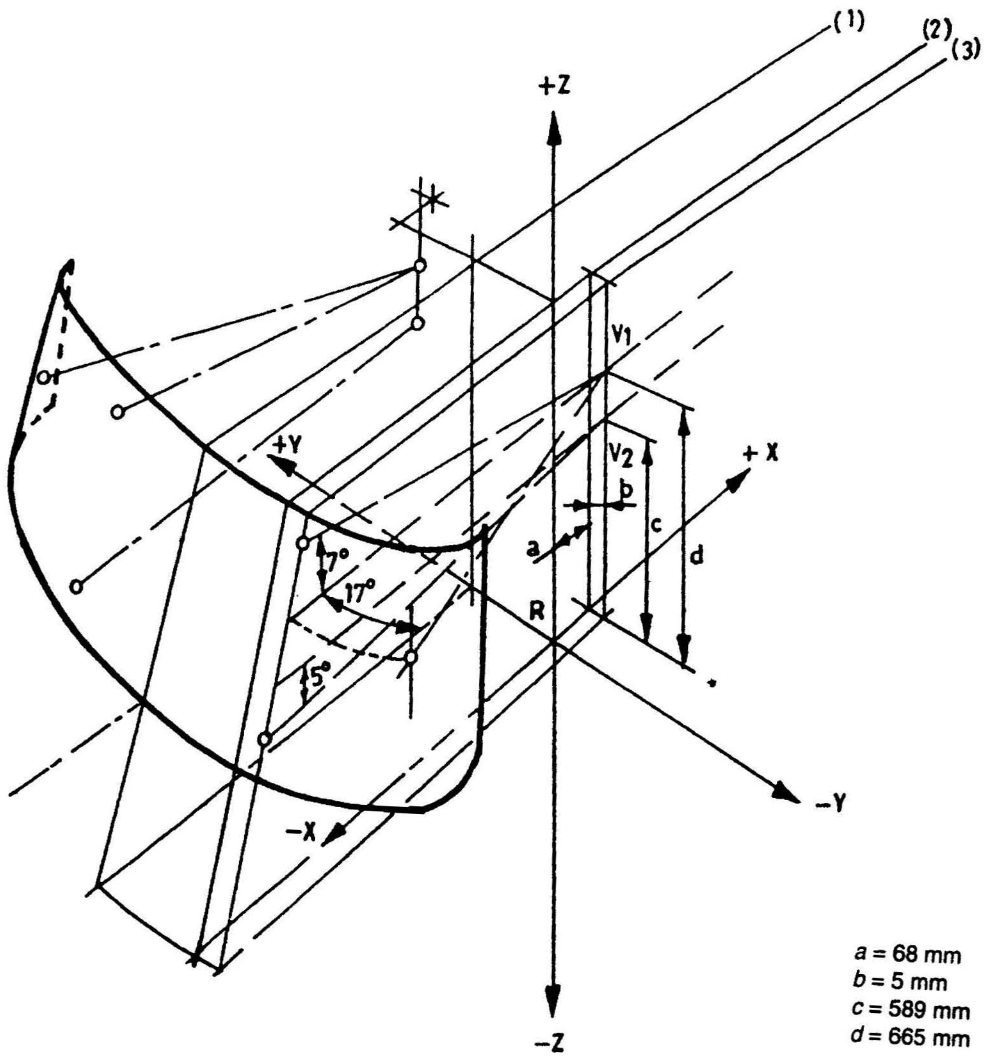
outer edge of the transparent area and is bounded by the intersection of the following four planes with the outer surface of the windscreen (*see* Fig. 5):

a) A plane parallel to the *Y*-axis, passing through V_1 and at an upward angle of 7° from the *X*-axis;

b) A plane parallel to the *Y*-axis, passing through V_2 and at an downward angle of 5° from the *X*-axis;

c) A vertical plane passing through V_1 and V_2 and at an angle of 17° to the left of the *X*-axis; and

d) A plane symmetrical to the former plane in relation to the median longitudinal plane of the vehicle.



1) Line tracing the median longitudinal plane of the vehicle.
2) Line tracing the vertical plane passing through *R*.
3) Line tracing the vertical plane passing through V_1 and V_2.

FIG. 3 DETERMINATION OF '*V*' POINTS

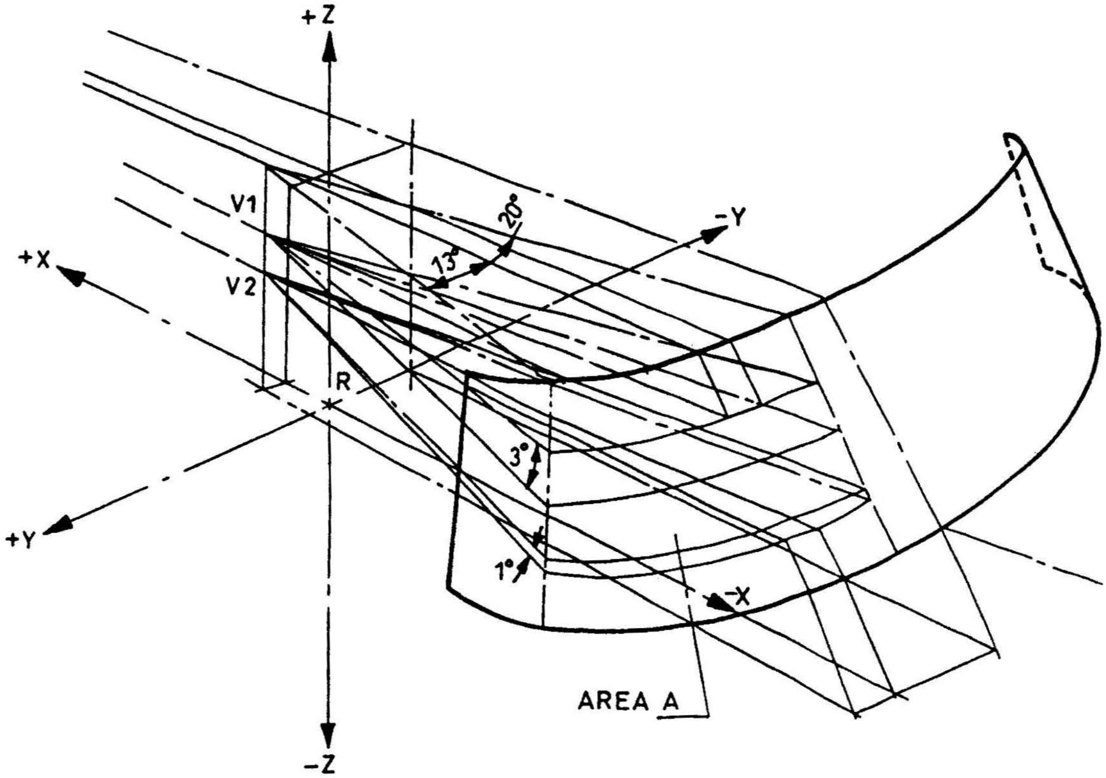
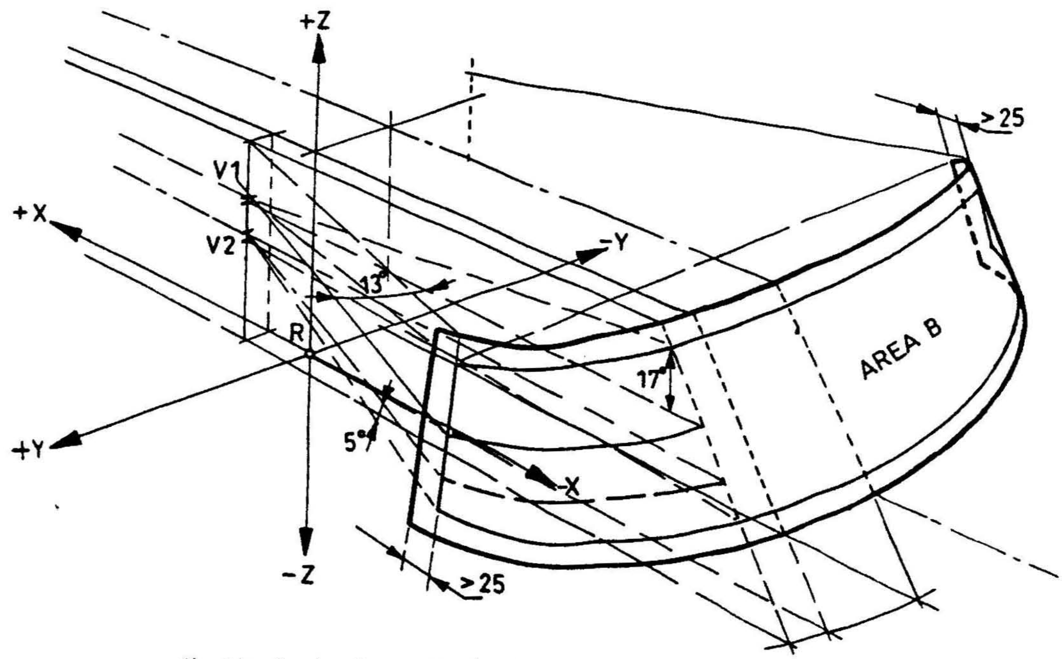


FIG. 4 VISION AREA *A*



1) Line tracing the median longitudinal plane of vehicle.
2) Line tracing the longitudinal plane passing through *R*.
3) Line tracing the longitudinal plane passing through V_1 and V_2.

FIG. 5 VISION AREA *B*

ANNEX C

(*Clause* 4.2.5)

TEST PROCEDURE AND TEST REQUIREMENTS OF WINDSCREEN-WIPER BLADE

C-1 AGEING TEST

The wiper blade element of the wiper blade assembly shall withstand the ozone test.

C-1.1 Preparation of Wiper Blade Element

A 150-mm specimen of the wiper blade element assembly is to be installed in a suitable clamping fixture, in which it is to be stretched so as to cause an extension of 15 percent measured between gauge marks that are 100 mm apart. The mounted specimens are then to be exposed for 48 hours in an ozone-free atmosphere.

C-1.2 Procedure

Test specimens are to be placed in the ozone test chamber for a period of 72 h. The test chamber is to be operated at a temperature of 40 ± 30°C and at a concentration of 50 ppm, by volume.

C-1.3 Specimens shall be examined for signs of cracks and shall not show cracks under '7X' magnification.

C-2 CHEMICAL RESISTANCE

A section of the wiper blade element when placed in a 50 percent solution of either methyl or isopropyl alcohol for a period of 24 h shall not exceed by more than 2 percent weight change.

ANNEX D

(*Clause* 5.1.8)

TEST MIXTURE SPECIFICATION FOR WINDSCREEN WIPER SYSTEM AND WINDSCREEN-WASHER SYSTEM TESTS

D-1 The test mixture referred to in **5.1.8** shall consider of the following (by volume): 92.5 percent water (with a hardness of less than 205 g/tonne after evaporation) 5 percent aqueous saturated salt (sodium chloride) solution and 2.5 percent dust constituted in accordance with Tables 3 and 4.

Table 3 Analysis of Test Dust

Sl No.	Constituent	Percent by Mass
(1)	(2)	(3)
i)	SiO_2	67 - 69
ii)	Fe_2O_3	3 - 4
iii)	Al_2O_3	15 - 17
iv)	CaO	2 - 4
v)	MgO	0.5 - 1.5
vi)	Alkalis	3 - 5
vii)	Ignition loss	2 - 3

Table 4 Particle Size Distribution of Coarse-Grade Dust

(*Clause* D-1)

Sl No.	Particle Size µm	Particle Size Distribution Percent
(1)	(2)	(3)
i)	0 - 5	12 ± 2
ii)	5 - 10	12 ± 3
iii)	10 - 20	14 ± 3
iv)	20 - 40	23 ± 3
v)	40 - 80	30 ± 3
vi)	80 - 200	9 ± 3

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Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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