

AUTOMOTIVE INDUSTRY STANDARD

**Automotive Vehicles –
Windscreen Wiping System for
3 Wheeler Vehicles and
Vehicles treated as such**

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AUTOMOTIVE INDUSTRY STANDARDS COMMITTEE

UNDER

CENTRAL MOTOR VEHICLES RULES – TECHNICAL STANDING COMMITTEE

SET-UP BY

MINISTRY OF ROAD TRANSPORT & HIGHWAYS
GOVERNMENT OF INDIA

December 2004

Status chart of the Standard to be used by the purchaser
for updating the record

Sr. No.	Corrigenda.	Amendment	Revision	Date	Remark	Misc.

General Remarks :

INTRODUCTION

The Government of India felt the need for a permanent agency to expedite the publication of standards and development of test facilities in parallel when the work on the preparation of the standards is going on, as the development of improved safety critical parts can be undertaken only after the publication of the standard and commissioning of test facilities. To this end, the Ministry of Surface Transport (MOST) has constituted a permanent Automotive Industry Standard Committee (AISC) vide order No. RT-11028/11/97-MVL dated September 15, 1997. The standards prepared by AISC will be approved by the permanent CMVR Technical Standing Committee (CTSC). After approval, the Automotive Research Association of India, (ARAI), Pune, being the secretariat of the AIS Committee, has published this standard. For better dissemination of this information ARAI may publish this document on their Web site.

Automotive Industry Standards AIS-019 and AIS-011 regarding test procedure and requirements for windscreen wiping systems for M1 and other than M1 category of vehicles are implemented under CMVR. This standard (AIS-045) fulfills requirements for windscreen wiping systems for Three Wheeler Vehicles and Vehicles treated as such.

The secondary area requirements given in clause A2.2.2.3 of AIS-045 will be implemented one year after the date of implementation of this standard.

For preparation of this standard, considerable assistance has been taken from the following National / International standards/regulations considering their relevance in the current trends and requirements in Indian context :

- AIS-019/2001: 2001 Automotive Vehicles –Windscreen Wiping and Washing System for M1 Category of Vehicles.
- EEC Directive 97/24/EC Chapter 12: Glazing, Windscreen Wipers, Washers, De-icers and De-misters of Bodied Three-Wheel Mopeds, Tricycles and Quadricycles.

The Automotive Industry Standards Committee responsible for preparation of this standard are given in Annexure: D

Automotive Vehicles - Windscreen Wiping System for 3 Wheeler Vehicles and Vehicles treated as such

1.0 SCOPE

- 1.1 This standard is applicable for Windscreen Wiping System used in 3 wheeler vehicles provided with windscreen.
- 1.2 The standard is applicable to three wheelers having steering control located on Right Side of the vehicle and also to the three wheelers having steering control located centrally with respect to the longitudinal median plane of the vehicle.
- 1.3 This standard is also applicable to quadricycles provided with windscreen. (The definition of the quadricycles is under formulation).
- 1.4 The vehicles covered by the scope are termed as 'vehicles' in this standard.

2.0 REFERENCES

- 2.1 IS 14272 (Part 1) – 1995 (under revision)– Automotive vehicles – Types – Terminology: Part 1 Three and four wheelers.

3 DEFINITIONS

- 3.1 **'Vehicle type with regard to its windscreen – wiper system'** means vehicles, which do not differ in such essential respects as;
 - 3.1.1 The external and internal forms and arrangements within the area which may affect visibility;
 - 3.1.2 The shape, dimensions and characteristics of the windscreen and its mounting where these are likely to affect the vision areas covered by Annexure A.
 - 3.1.3 The characteristics of the windscreen-wiper system.
- 3.2 **'V' points** means points whose position within the cab is determined by vertical longitudinal planes passing through the centers 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 Annexure A).
- 3.3 **'R' point, or 'seating reference point'** means a design point defined by the vehicle manufacturer for each seating position *

- 3.4 **‘H’ point** means the pivot center of the torso and thigh of the 3 DH machine installed in the vehicle seat defined by the vehicle manufacturer *
- 3.5 **‘Windscreen datum points’** means points situated at the intersection with the windscreen of lines radiating forward from the V points to the outer surface of the windscreen.
- 3.6 **‘Transparent area of a windscreen’** means that area of a vehicle windscreen or other glazed surface whose light transmittance, measured at right angles to the surface is not less than 70%.
- 3.7 **‘Windscreen-wiper system’** means the 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.
- 3.8 **‘Windscreen-wiper field’** means the area of the outer face of a wet windscreen that is swept by the windscreen wiper.
- 3.9 **‘Windscreen-washer system’** means 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.
- 3.10 **‘Windscreen-washer control’** means 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.
- 3.11 **‘Windscreen-washer pump’** means a device for transferring the windscreen washer fluid from the reservoir to the outer face of the windscreen.
- 3.12 **‘Nozzle’** means a device, which serves to direct the windscreen-washer fluid to the windscreen.
- 3.13 **‘Performance of a windscreen-washer system’** means 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.

*The R-point, H-point will be indicated by the vehicle manufacturer in the layout mentioned in clause 5.7 of Annexure C.

4 REQUIREMENTS

4.1 Windscreen-wiper System.

- 4.1.1 Every vehicle shall be equipped with at least one automatic windscreen-wiper system, i.e. a system which when engine of vehicle 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 94% of Primary Area and 80% of Secondary area as a defined in Annexure A.
- 4.1.3 The windscreen wiper shall have at least one sweep frequency of 40 cycles per minute minimum, a cycle being the forward and return movement of the windscreen wiper.

- 4.1.4 The frequency referred to in 4.1.3 shall be obtained as stated in clauses 5.1.1 to 5.1.7.
- 4.1.5 The windscreen wiper shall be able to operate for two minutes on a dry windscreen as required in clause 5.1.8.
- 4.1.6 The system shall be capable of withstanding stalling for a continuous period of 15 seconds, with the windscreen wiper arms restrained in their vertical position and the windscreen wiper control set at the maximum sweep frequency.
- 4.2** The windscreen wiper blade shall conform to the requirements of Annexure IV to AIS-019/2001.
- 4.3 Windscreen-washer System (if provided).**
- 4.3.1 Windscreen-washer system is not a mandatory fitment but if provided, it shall be 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.
- 4.3.2 The performance of the windscreen-washer system shall not be adversely affected by exposure to the temperature cycles laid down in points 5.2.3 and 5.2.4.
- 4.3.3 The windscreen-washer system must be capable of delivering sufficient liquid to clear 60% of the primary area defined in A 2.2 of Annex A under the conditions described in 5.2.5
- 4.3.4 The capacity of the reservoir containing the liquid must not be less than one liter.

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, following additional conditions shall be met;
- 5.1.3.1 The battery shall be fully charged.
- 5.1.3.1 The engine shall be running at the speed corresponding to $30\% \pm 10\%$ of its peak power speed.
- 5.1.3.2 The dipped – beam headlamps shall be switched on.
- 5.1.3.3 The heating and/or ventilation systems, if fitted, shall be operating at maximum electrical consumption.
- 5.1.3.4 The defrosting and de-misting systems, heating and/or ventilation systems, if fitted and are electrically operated, shall operate under maximum power consumption condition.

- 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 5.1.3 after a preliminary operating time of 20 minutes on a wet surface.
- 5.1.6 The outer face of the windscreen shall be thoroughly degreased by means of methylated spirits or an equivalent degreasing agent. After drying at least 3% and not more than 10%, a solution of ammonia shall be applied. The surface shall be allowed to dry again and shall then be wiped with a dry cotton cloth.
- 5.1.7 A uniform coating of test mixture shall then be applied to the outer surface of the windscreen (see Annexure B) and then allowed to dry.
- 5.1.8 The requirements specified in clause 4.1.5 shall be met under the conditions specified in clause 5.1.3.

5.2 Windscreen-washer System - Test conditions

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 $25 \pm 10^\circ \text{C}$ for a minimum of four hours. All the nozzles shall be plugged and the windscreen-washer control actuated six times in one minute, each time for at least three seconds. If the system is powered by the muscular energy of the driver, the force applied shall be as under: -

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 must be no less than the rated voltage without exceeding it by more than two volts.
- 5.2.1.3 The performance of the windscreen-washer system at the end of the test must be as defined in 5.2.1.

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 $-10 \pm 2^\circ \text{C}$ for a minimum of four hours. The windscreen washer control shall be activated six times in one minute, each time for at least three seconds using the force prescribed in 5.2.1. The system shall then be placed in an ambient temperature of $25 \pm 10^\circ \text{C}$ until the ice has completely thawed but in any case no longer than four hours. 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 $-10 \pm 2^\circ \text{C}$ for a minimum of four hours 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 $25 \pm 10^\circ \text{C}$ until the ice has completely thawed but in any case no longer than 4 Hrs. 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% solution of methanol, or alternatively isopropyl alcohol in water of hardness not greater than 205 gm/tonne.

5.2.3.3 The system shall be placed in an ambient temperature of $-10 \pm 2^\circ \text{C}$ for a minimum of four hours. 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 $80 \pm 3^\circ \text{C}$ for a minimum of eight hours and then in an ambient temperature of $25 \pm 10^\circ \text{C}$. 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 $80 \pm 3^\circ \text{C}$ for a minimum of eight hours. 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 $60 \pm 3^\circ \text{C}$ for a minimum of eight hours. 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 4.3.3).

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 2.2 of Annex II that is cleaned shall then be measured.

5.2.6 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 is requested.

6 APPLICATION FOR CMVR TYPE-APPROVAL

6.1 The application for CMVR type-approval of a vehicle type with regard to its windscreen wiper system shall be submitted by the vehicle manufacturer or by his authorized representative.

6.2 The application shall be accompanied with following documents containing at least the information specified below:

6.2.1 A description of the vehicle referring to the criteria mentioned in 3.1, together with dimensional drawings containing the location of steering, drivers seat, V points, windscreen and the dimensional and angular positions of the vision area defined in Annexure A.

6.2.2 The application for the type approval shall contain at least the technical information as specified in **Annexure C**

6.2.3 A vehicle, representing vehicle type to be approved, shall be submitted to the technical service conducting the type-approval tests.

7 CONFORMITY OF PRODUCTION

7.1 Whole vehicle COP procedure laid down by the Ministry of Road Transport and Highways shall be applicable.

8 CRITERION FOR EXTENSION OF APPROVAL

8.1 Every functional modification in technical specifications declared in accordance with **6.2** shall be intimated to the testing agency.

8.2 Testing agency may then consider, whether,

8.2.1 Vehicle with modifications complies with specified requirements, or,

8.2.2 Any further verification is required.

8.3 In case of **8.2.2**, checks for those parameters, which are affected by the modifications, only need to be carried out.

8.4 In the event of **8.2.1** or in the case of **8.2.2** after successful compliance to requirements, the certificate of compliance shall be validated for the modified version.

8.5 Till the details are finalized, criteria shall be as agreed between the test agency and manufacturer.

ANNEXURE :A

**PROCEDURE TO BE FOLLOWED IN ORDER TO DETERMINE THE
FIELD OF VISION ON THE WINDSCREEN OF THREE WHEELERS
AND QUADRICYCLES**

A1 POSITIONS OF V POINTS

A1.1 Tables A1 and A2 give the position of the V point in relation to the R point as emerging from their X, Y and Z coordinates within three-dimensional reference system.

A1.2 Table A1 indicates the base coordinates for a designated backrest angle of 25°. The positive direction of the co-ordinates is shown in Figure 1. The value of co-ordinate Y shall be zero in case of vehicles having steering control located centrally with respect to the longitudinal median plane of the vehicle.

Table A1

Point V	X	Y	Z
V1	68 mm	5 mm	665 mm
V2	68 mm	5 mm	589 mm

A1.3 Correction to be made to the intended backrest rake angle other than 25°.

A1.3.1 Table A2 gives the additional corrections to be made to the coordinates ΔX for each V point when the intended backrest rake angles differs from 25°. The positive direction of the coordinates is given in Figure 1.

Table A2

Backrest rake angle (Degrees)	Horizontal coordinates ΔX	Vertical coordinates ΔZ
0	- 230 mm	30 mm
1	- 222 mm	30 mm
2	- 213 mm	29 mm
3	- 204 mm	29 mm
4	- 195 mm	28 mm
5	- 186 mm	28 mm
6	-177 mm	27 mm
7	- 167 mm	27 mm
8	- 157 mm	27 mm
9	- 147 mm	26 mm
10 and above	- 137 mm	25 mm

A2 Field of Vision

A2.1 Two field vision is determined from the V points.

A2.2 Field of vision **Primary Area** is the area on the outer protruding surface of the windscreen which is bounded by the four planes described either in A2.2.1 or A2.2.2 emanating forwards from the V points (see Figure 1 and 2)
Field of vision **Secondary Area** is the area on the outer protruding surface of the windscreen which is bounded by the four planes described either in A2.2.1 or A2.2.2 emanating forwards from the V points (see Figure 1,2 and 3)

Note : The figures are for illustration purpose only

A2.2.1 For the vehicles having steering control located centrally with respect to the longitudinal median plane of the vehicle (see figure 1):

A2.2.1.1 Primary Area

- A vertical plane passing through v_1 and v_2 and at an angle of 18° to the left of the X axis;
- A plane parallel to the Y axis, passing through v_1 and at an upward angle of 3° from the X axis;
- A plane parallel to the Y axis, passing through v_2 and at a downward angle of 1° from the X axis;
- A vertical plane passing through v_1 and v_2 and at an angle of 18° to the right of the X axis;

A2.2.1.2 Secondary Area

- A vertical plane passing through v_1 and v_2 and at an angle of 20° to the left of the X axis;
- A plane parallel to the Y axis, passing through v_1 and at an upward angle of 5° from the X axis;
- A plane parallel to the Y axis, passing through v_2 and at a downward angle of 5° from the X axis;
- A vertical plane passing through v_1 and v_2 and at an angle of 20° to the right of the X axis;

A2.2.2 For the vehicles having steering control located on Right side of longitudinal median plane of the vehicle (see figure 2):

A2.2.2.1 Primary Area

- A vertical plane passing through v_1 and v_2 and at an angle of 20° to the left of the X axis;
- A plane parallel to the Y axis, passing through v_1 and at an upward angle of 3° from the X axis;
- A plane parallel to the Y axis, passing through v_2 and at a downward angle of 1° from the X axis;
- A vertical plane passing through v_1 and v_2 and at an angle of 13° to the right of the X axis;

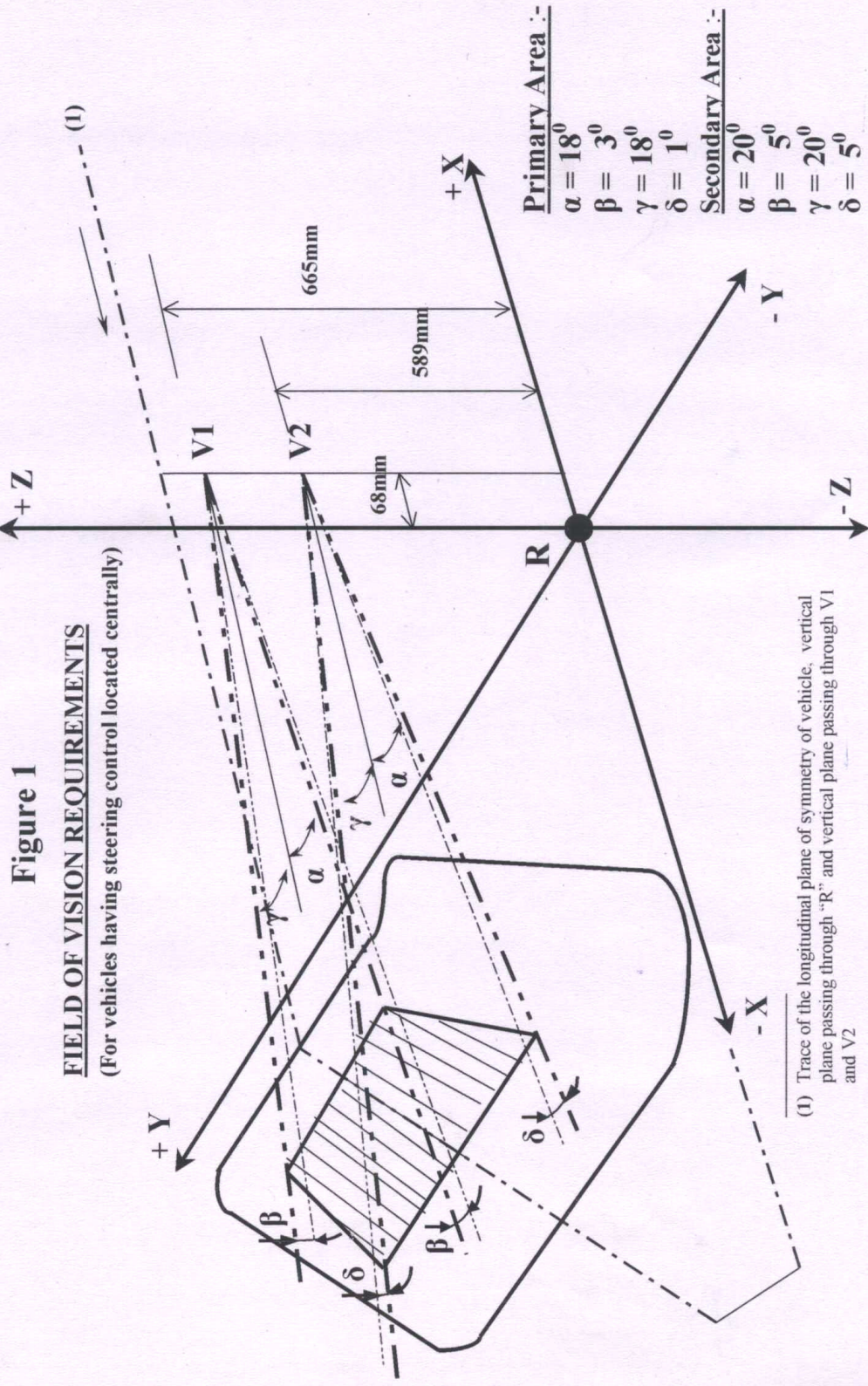
A2.2.2.2 Secondary Area

- A vertical plane passing through v_1 and v_2 and at an angle of 49° to the left of the X axis;
- A plane parallel to the Y axis, passing through v_1 and at an upward angle of 7° from the X axis;

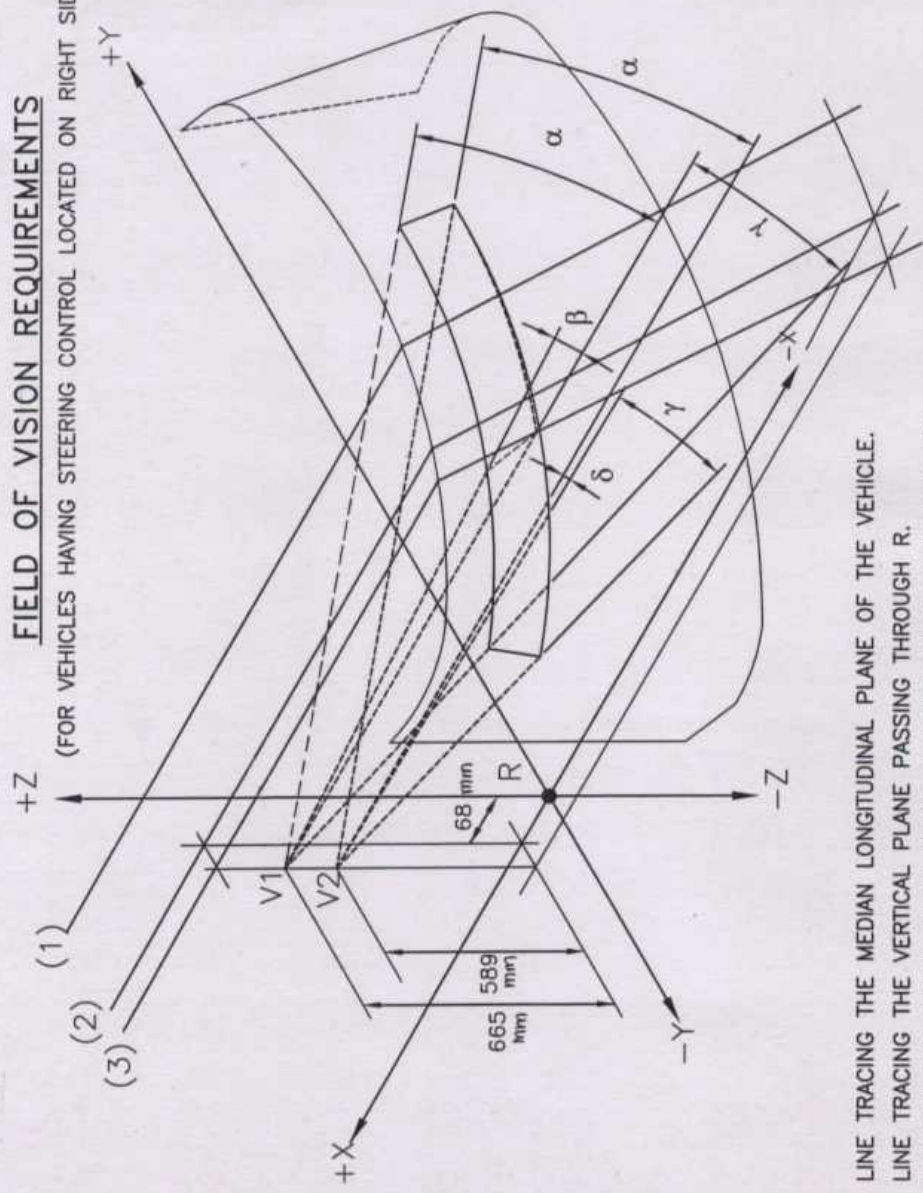
- A plane parallel to the Y axis, passing through v_2 and at an downward angle of 5° from the X axis;
- A vertical plane passing through v_1 and v_2 and at an angle of 17° to the right of the X axis;

A2.2.2.3 Secondary Area (See figure-3)

- A plane parallel to the Y axis, passing through v_1 and at an upward angle of 7° from the X axis;
- A plane parallel to the Y axis, passing through v_2 and at an downward angle of 5° from the X axis;
- A vertical plane passing through v_1 and v_2 and at an angle of 17° to the right of the X axis;
- A plain symmetrical to the former plain in relation to the longitudinal median plain of the vehicle.



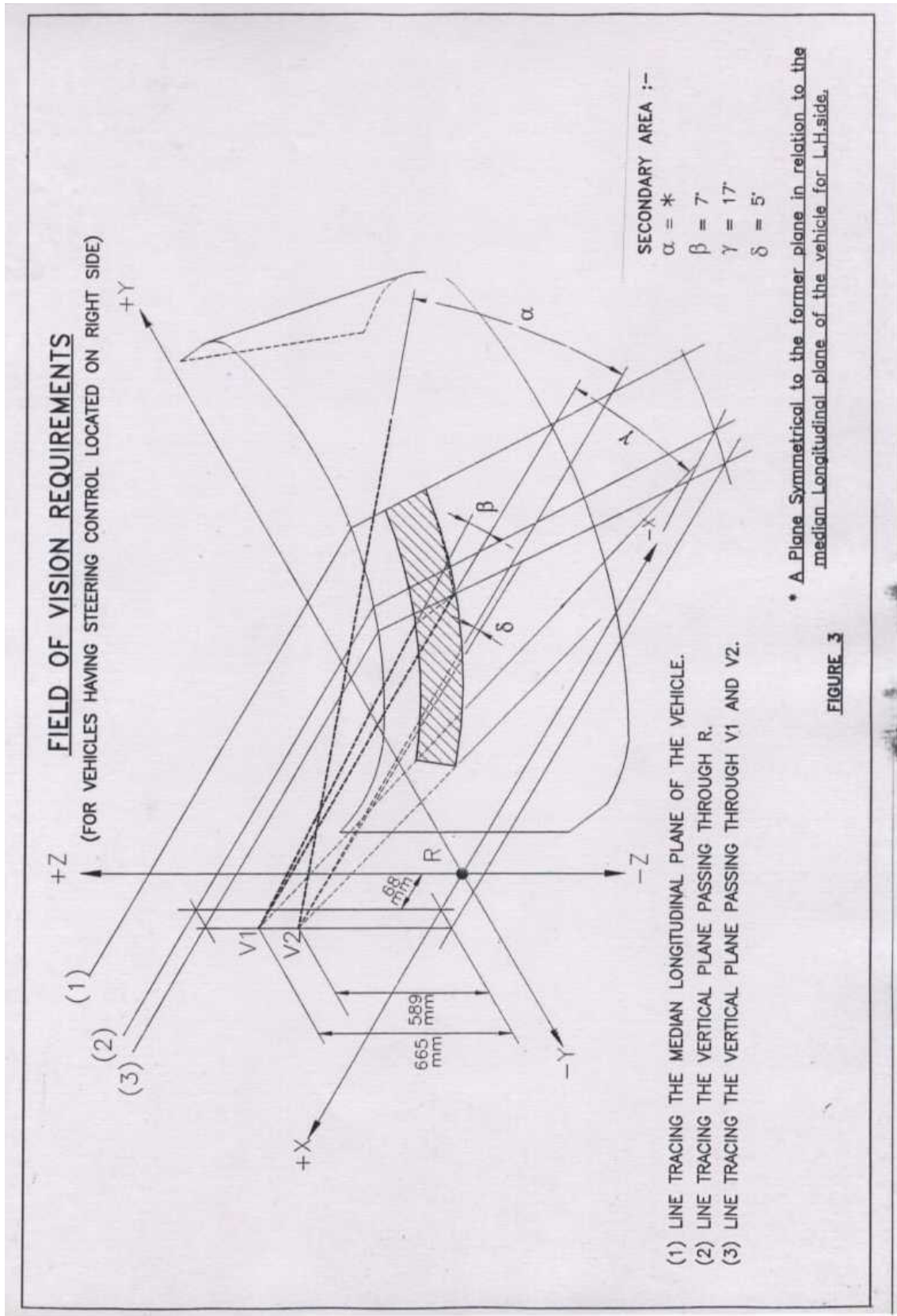
FIELD OF VISION REQUIREMENTS
(FOR VEHICLES HAVING STEERING CONTROL LOCATED ON RIGHT SIDE)



PRIMARY AREA :-	
$\alpha = 20^\circ$	
$\beta = 3^\circ$	
$\gamma = 13^\circ$	
$\delta = 1^\circ$	
SECONDARY AREA :-	
$\alpha = 49^\circ$	
$\beta = 7^\circ$	
$\gamma = 17^\circ$	
$\delta = 5^\circ$	

- (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 V1 AND V2.

FIGURE 2



ANNEXURE : B (See Para 5.1.7)

MIXTURE FOR TESTING WINDSCREEN WIPER SYSTEM

(These details are same as used in AIS -019-2001)

- B1** The test mixture referred to in clause 5.1.8 of this standard shall comprise, by volume, 92.5% water (with a hardness of less than 205 g/tonne after evaporation), 5% aqueous saturated salt (sodium chloride) solution and 2.5 % dust constituted in accordance with Tables B1 and B2.

Table B1
Analysis of test dust

Element	Percentage by mass
SiO ₂	67 to 69
Fe ₂ O ₃	3 to 5
Al ₂ O ₃	15 to 17
CaO	2 to 4
MgO	0.5 to 1.5
Alkalis	3 to 5
Ignition losses	2 to 3

Table B2
Distribution of the coarse dust in accordance with
the dimension of the particles.

Particle size (in μ m)	Distribution according to dimensions (%)
0 to 5	12 \pm 2
5 to 10	12 \pm 3
10 to 20	14 \pm 3
20 to 40	23 \pm 3
40 to 80	30 \pm 3
80 to 200	9 \pm 3

ANNEXURE :C (See Para 6)
**Information to be submitted for type approval of Windscreen wiping
system of Vehicles**

Sr. No	Parameter
1	Name and address of Vehicle manufacturer with Plant Address
2	Name of Model(s)
3	Variant(s)
4	Location of Steering
5	Wind screen wiper
5.1	Type (Power)
5.2	Make
5.3	No. of Wipers
5.4	Wiper Motor
5.4.1	Name of Manufacturer
5.4.2	Type and identification
5.4.3	Rated voltage, V
5.4.4	No. of Sweep frequency, cycles/min
5.4.5	Highest sweep frequency, cycles/min (if provided)
5.4.6	Lowest sweep frequency, cycles/min(if provided)
5.4.7	Difference between the highest and the least one of the lower sweep frequencies, cycles/min (if applicable)
5.5	Wiper Arm
5.5.1	Length
5.5.2	Manufacturer and identification
5.6	Wiper blade
5.6.1	Length
5.6.2	Manufacturer and identification
5.6.3	Rubber material
5.6.4	Type of fixing (as per IS-7827)
5.7	Layout including location of R point, H point, wiping area and related dimensions.

ANNEXURE : D
(See Introduction)
COMMITTEE COMPOSITION
Automotive Industry Standards Committee

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