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भारतीय मानक मसौदा

कृषि ट्रैक्टरों के लिए ड्राइवर की दृष्टि क्षेत्र – आवश्यकताएं

(आईएस 11442 का दूसरा पुनरीक्षण)

Draft Indian Standard

**DRIVER'S FIELD OF VISION
FOR AGRICULTURAL TRACTORS — REQUIREMENTS**

(Second Revision of IS 11442)

ICS 65.060.10

Agricultural Machinery and Equipment Sectional
Committee, FAD 11

Last date for Comments: **3 April 2025**

FOREWORD

(Formal clause will be added later)

This standard was published in 1985 as an identical adoption of ISO 5721 : 1981 'Agricultural tractors — Operator's field of vision'. Subsequently, the standard was revised in 1996 to align with ISO 5721 : 1989 'Tractors for agriculture — Operator's field of vision' which covered the practical and mathematical methods of determining the masking effects of obstruction on the angles of vision forward, to the rear and upwards of seated operators of tractors and did not take account of detachable implements and mounted elements, for example front loaders, pallets, etc.

Later, ISO 5721 was bifurcated into two parts ISO 5721-1 : 2013 'Agricultural tractors — Requirements, test procedures and acceptance criteria for the operator's field of vision Part 1: Field of vision to the front' and ISO 5721-2 : 2014 'Agricultural tractors— Requirements, test procedures and acceptance criteria for the operator's field of vision Part 2: Field of vision to the side and to the rear'.

In India, tractor manufacturers currently follow AIS-107 : 2009, titled 'Requirements of Driver's Field of Vision for Agricultural Tractors', published by the Automotive Research Association of India (ARAI), Pune which essentially provides the requirements and procedure for measurement of 180-degree forward field of vision of driver of agricultural tractor. However, measurement of rear field of vision is not currently being practiced in India.

Accordingly, the second revision of the standard is being brought out to align it with AIS-107 : 2009. Unlike the previous version, which only provided procedures for measuring visibility without specifying limits, the revised standard will include both the measurement procedure and defined limits for masking effects.

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 : 2022 'Rules for rounding off numerical values (*second revision*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

*Draft Indian Standard***DRIVER'S FIELD OF VISION
FOR AGRICULTURAL TRACTORS — REQUIREMENTS**
(*Second Revision of IS 11442*)**1 SCOPE**

This standard covers the requirements of safe driving and clear forward field of vision for tractors. This standard applies to the 180-degree forward field of vision of the drivers of agricultural tractors.

2 TERMINOLOGY

For the purposes of this standard, the following definitions shall apply.

2.1 Field of Vision — Area which can be viewed from the seated operator's eye position.

2.1.1 Forward Field of vision — All forward and lateral directions in which the driver of the tractor can see.

2.2 Reference Point — The position, fixed by convention, of the tractor driver's eyes notionally located at a single point. The reference point is situated in the plane parallel to the longitudinal median plane of the tractor and passing through the centre of the seat, 700 mm vertically above the line of intersection of that plane and the surface of the seat and 270 mm in the direction of the pelvic support from the vertical plane passing through the front edge of the surface of the seat and perpendicular to the longitudinal median plane of the tractor (*see Fig. 1*). The reference point thus determined is related to the seat when unoccupied and fitted in the central position specified by the tractor manufacturer.

2.3 Semi-Circle of Vision — The semi-circle described by a radius of 12 m around the point situated in the horizontal plane of the road, vertically below the reference point so that the arc seen from the direction in which the vehicle travels, is situated in front of the tractor and that the diameter delimiting the semi-circle forms a right angle with the longitudinal axis of the tractor (*see Fig. 2*).

2.4 Masking Effect — The chords of the sectors of the semi-circle of vision which cannot be seen owing to structural components such as roof-pillars, air intakes or exhaust stacks, frame of the windscreen and protective frame.

2.5 Sector of Vision

The part of field of vision which is bounded:

2.5.1 At the Top — By a horizontal plane passing through the reference point.

2.5.2 In the Plane of Road — By the zone lying outside the semi-circle of vision and forming the continuation of the sector of the semicircle of vision, the chord of which is 9.5 m long, perpendicular to the plane parallel to the longitudinal median plane of the tractor passing through the center of driver seat and bisected by the plane.

3 REQUIREMENTS AND MEASUREMENT OF FIELD OF VISION

3.1 General

The tractor shall be constructed and equipped in such a way that, in road traffic and in farm and forest use, the driver has an adequate field of vision, under all the usual conditions pertaining to highway use and to work undertaken in fields and forests. The field of vision is considered adequate when the driver has, as far as possible, a view of part of each front wheel and when the following requirements are fulfilled.

NOTE — For tractor fitted with front mud guard/chassis type construction / side seating arrangement (i.e. car type seating) front wheel vision shall not be considered as evaluative requirement for field of vision.

3.2 Checking of the Field of Vision

3.2.1 Procedure for Determining Masking Effects

3.2.1.1 The tractor shall be placed on a horizontal surface as shown in Fig. 2. On a horizontal support level with the reference point, there shall be mounted two-point sources of light e.g. 2 x 150 W, 12 V, 65 mm apart and symmetrically located with respect to the reference point. The support shall be rotatable at its centre point about a vertical axis passing through the reference point. For measuring the masking effects, the support shall be so aligned that the line joining the two light sources is perpendicular to the line joining the masking component and the reference point.

The silhouette (deeper shadow) overlaps projected on to the semi-circle of vision by the masking component when the light sources are switched on simultaneously or alternately shall be recorded in accordance with 2.4 (see Fig. 3).

3.2.1.2 Masking effects shall not exceed 1600 mm.

3.2.1.3 Masking effects due to adjacent structural components over 80 mm in width shall be so configured that there is an interval of not less than 550 mm – measured as a chord of the semi-circle of vision-between the centre of two masking effects.

3.2.1.4 There may be no more than six masking effects in the semi-circle of vision and no more than two inside the sector of vision defined in 2.5.

3.2.1.5 Outside the sector of vision, masking effects exceeding 1600 mm but not exceeding 1800 mm are however, permissible if the components causing them cannot be redesigned or relocated: on each side there may be a total of either two such masking effects, one not exceeding 1600 mm and the other not exceeding 1800 mm or two such masking effects neither exceeding 1700 mm.

3.2.1.6 Blind spots caused by type approved rear-view mirrors may be disregarded if the design of these mirrors is such that they cannot be installed in any other way.

3.2.2 Mathematical Determination of Masking Effects for Binocular Vision

3.2.2.1 As an alternative to the procedure set out in 3.2.1 the acceptability of individual masking effects can be determined mathematically. The requirements of clauses 3.2.1.2, 3.2.1.3, 3.2.1.4, 3.2.1.5 and 3.2.1.6 shall apply in respect of the size, distribution and number of the masking effects;

3.2.2.2 For binocular vision with an inter-ocular distance of 65 mm, the masking effect expressed in mm is given by the formula.

$$v = \frac{(b - 65)}{a} \times 12000 + 65$$

where,

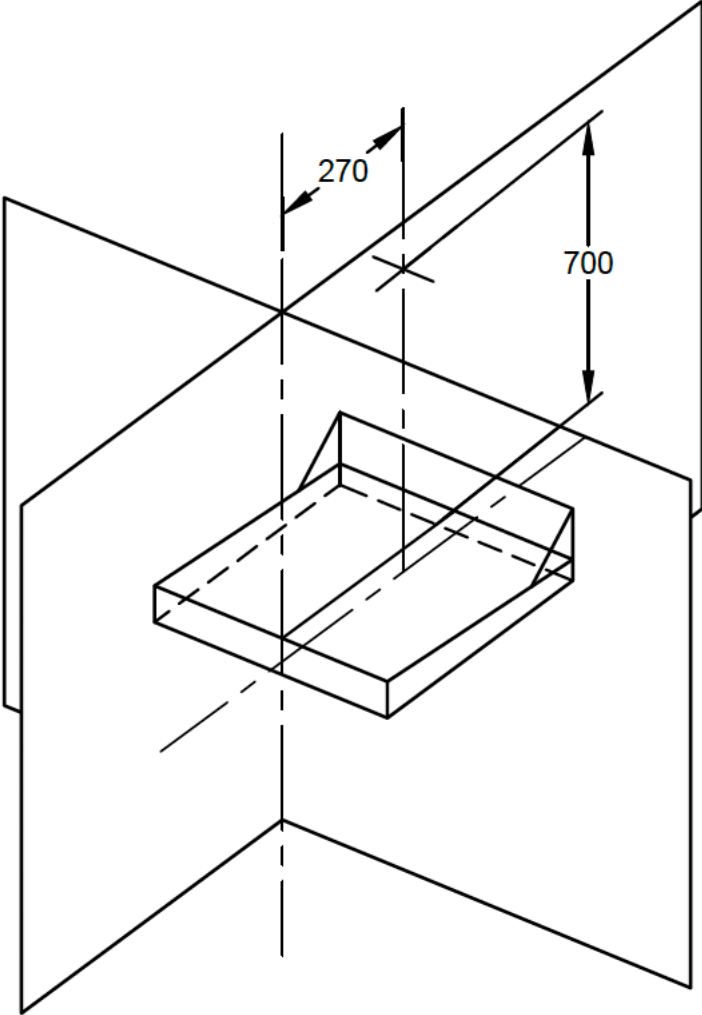
a - is the distance in mm between the component obstructing vision and the reference point measured along the visual radius joining the reference point, the centre of the component and the perimeter of the semi-circle of vision.

b - is the width in millimeters of the component obstructing vision measured horizontally and perpendicular to the visual radius.

3.3 The test methods referred to under clause **3.2** may be replaced by others if the latter can be shown to be equivalent.

3.4 Transparent Area of the Windscreen

For the purpose of determining the masking effects in the sector of vision, the masking effects due to the frame of the windscreen and to any other obstacle may, in accordance with the provisions of **3.2.1.4**, be considered as a single effect provided that the distance between the outermost points of the masking effect does not exceed 700 mm.



All dimensions are in millimetres
FIG. 1 REFERENCE POINT

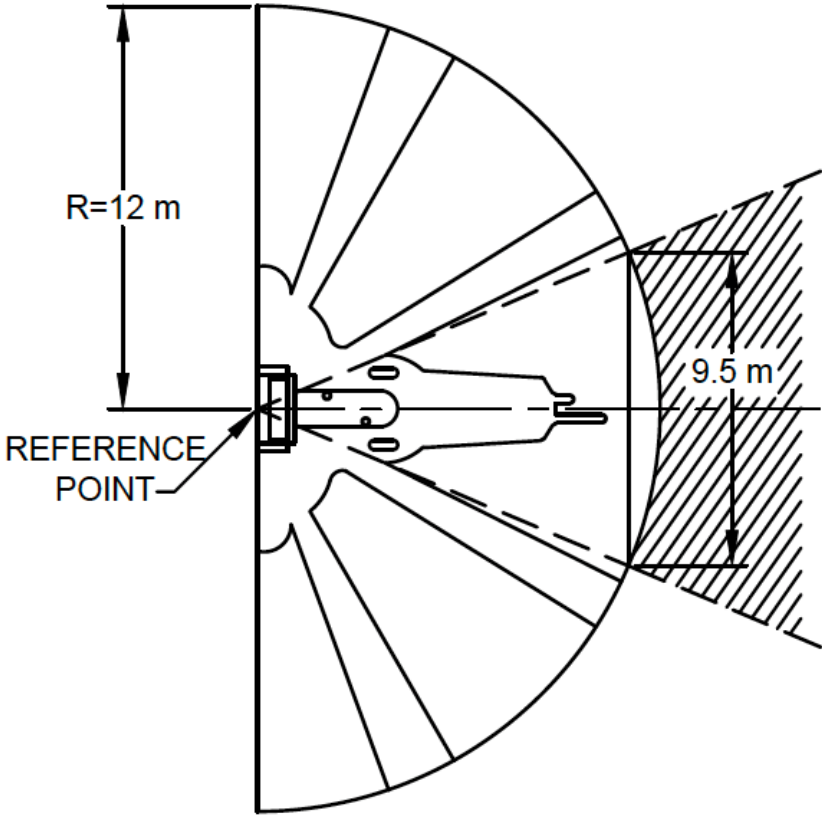
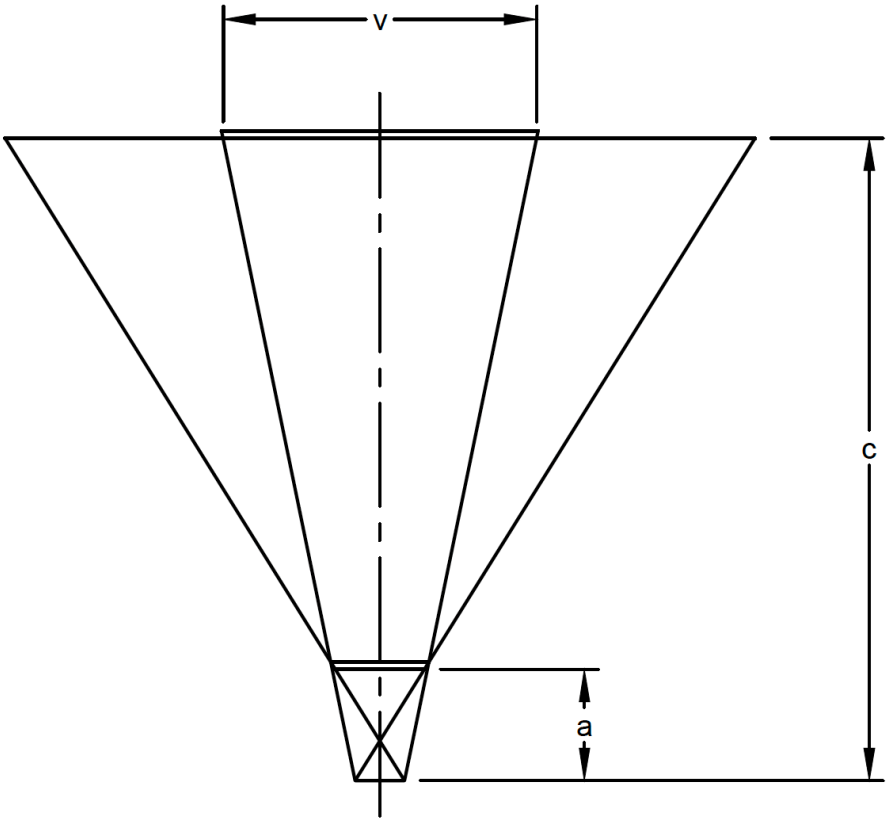


FIG. 2 SEMI-CIRCLE OF VISION



$$\frac{\frac{v-s}{2}}{c} = \frac{\frac{b-s}{2}}{a}$$

$$v = \frac{b-65}{a} \times 12000 + 65$$

FIG. 3 DETERMINATION OF MASKING EFFECTS