<u>**DRIVER'S FIELD OF VISION**</u>

<u>Transmitted by the expert from India</u>

PREAMBLE

Directive 77/649/EEC applies to 180° forward field of vision of the drivers of vehicles in category M1. Forward field of vision for drivers is an active safety aspect. Although this has been addressed through the directive 77/649/EEC, the need for norms on the subject for other categories of vehicles is being felt.

Further it is also observed that the vehicles that comply to the requirements of 77/649/EEC have serious blind zones due to the A-pillar and other members. This prompts the need for a regulation that will address the visibility requirements in a more holistic approach.

The proposed document is focused on the methods of measuring the driver's field of direct forward vision, in the phase - I. Based on this method of measurement and further analysis, the acceptance criteria for adequate vision will have to be determined.

DIRECT FORWARD FIELD OF VISION FOR VEHICLES

1. SCOPE
Measurement procedure for clear forward field of vision for the driver of vehicle categories N1, N2, N3, M1, M2 and M3.

2. PURPOSE AND REFERENCE

2.1 This document is intended to provide a visual format that can describe the driver's entire viewing environment. This environment can then be analyzed to determine what the driver is capable of seeing.

2.2 The measurement principle is based on German regulation StvZO 35b and SAE J 1750.

3. DEFINITIONS

3.1 Forward field of Vision

"Forward field of vision" is the totality of directions, to the front and to the side, which are visible to the driver from his seating position through 180 degrees.

3.2 Eye Point

For the purposes of determining the limit of vision it is assumed that the driver's eyes are at a single point (eye point) which lies in a perpendicular 700 mm above the unoccupied seat in its central position. The said perpendicular lies at a distance of 130 mm forward of the backrest and on the centre line of the seat. The limit of vision on the ground is measured from this point - the vehicle shall be unladen.

In case of adjustable seats, in order to determine the eye point, the seat position should be considered as per the vehicle manufacturer's recommendation.

3.3 Semi-circle of vision

"Semi-circle of vision" is a semi-circle with a radius of 12 m, the centre of which is a point vertically below the reference point in the horizontal road level, and which lies in front of the vehicle, in the direction of driving. The diameter terminating the semi-circle forms a right angle with the longitudinal axis of the vehicle (Figure attached).

3.4 Blind spots

"Blind spots" are the chords of the sectors of the semi-circle of vision which are obstructed / masked by structural elements such as roof supports, windscreen frames, jib, etc.

4. PROCEDURE FOR MEASURING THE BLIND SPOTS.

Two alternate methods are suggested vide clause no. 4.1 and 4.2.

4.1 – Direct verification on the vehicle

For this, manufacturer shall provide scale drawing of the vehicle with following details:

- Dimensions of the cabin and vehicle
- Dimensions of the obstructions and their width along the line of sight
- Distance of the obstruction from the eye point
- Projection of the blind spot along the line of sight (similar to that shown in figure attached)
- Dimensions of the blind spots along the semi circle of vision
- Distance between the blind spots
- Calculation for the above blind spot projections

This drawing based on the calculated details of the blind spots will illustrate the clear vision zones for the driver.

4.2 Optical method

This method may be used as an alternate to drawings and calculations for determining the blind spots. This is based on optical principle. Light source positioned at the eye point of the driver would cast shadow of the obstructions on the floor. The projected shadow on the 12m radius semi circle with respect to the driver's seating position can be measured. The effect is as if a lamp at the driver's eyes casts a shadow of a window, mirror or other item onto the plane.

Procedure : (Refer to figure attached)

- Position the vehicle on a flat surface
- Plot the semi circle of vision – a 12m radius circle with the driver's eye point projected down on the ground as the centre.
- Fix the sector of vision by locating the chord measuring 9.5m, bifurcated by a perpendicular line passing through the driver's eye point.
- Locate a lamp at the eye point. The lamp selected will be such that the image of the shadow cast on the floor is sharp enough to clearly measure the width of the blind spot.
- Measure the width of the blind spots along the semi circle of vision
- Measure the distances between the blind spots
- Width of the obstruction along the line of sight and distance of the blind spot from the eye point may be measured, if precision equipment is available. Alternately this may be referred from the manufacturer's drawing.

5. DETERMINATION OF ADEQUACY OF FIELD OF VISION

The above procedure will provide datum for assessing the clear vision zones and blind zones. Criteria for acceptance will have to be derived based on studies. The alternate proposals are:

- Adopt the limits prescribed in German regulation StvZO-35b. However applicability of the limits and formulae referred therein have to be corroborated.
- Consider the proposal of the expert from Japan – a cylinder 1.2m tall should be visible to the driver, at least partly. Some further considerations in the same:-
  - o The size of the cylinder may be determined based on the most vulnerable object that can cause accident i.e., children between the ages of 8 to 13.
  - o The distance at which the object should be visible, can be based on the possible approach speed of the vehicles to cause such accidents i.e., 10 km/h. At this speed the average stopping distance could be 3m. Hence the driver must be able to see a 13 year old at a distance of 3m around. If the vision is inadequate, then the same may be compensated through indirect means, say, by placing a bumper view mirror or radar sensor etc.

Side Window
Opening

A Pillar

Front End

Lane Markers

Y Scale (meters)

Vent Window
Division Bar

Plane
Mirror

Eye Point

X Scale (meters)