

**INFORMATION ON THE FORWARD VISION OF BUS DRIVERS**  
(Regulation No.125)

Transmitted by the expert from Hungary

On the last GRSG session – when India informed the group about the ongoing work and asked the other experts to provide available information to this subject, Hungary offered to look for old GRSA documents dealing with this question.

Two GRSA documents have been found (1977) both of them dealing with the “Draft provisions on driver’s cab of Public Service Vehicles.” More subjects are discussed in these documents (e.g. dimensions of driver’s compartment, arrangement foot and hand controls, driver’s seat, etc.) Only the paragraphs dealing with forward vision of the driver will be cited below.

**UK. DOCUMENT**

**7. DRIVERS FIELD OF VIEW**

7.1. **The forward horizontal field of view** of the driver is dependant on his ocular perception being a combination of:

- a. Binocular view – the total field of view that can be seen by both exes simultaneously;
- b. Monocular view – the total field of view that can be seen one eye at a time;
- c. Ambinocular view - the total field of view that can be seen by either eye separately. It is not limited to the binocular field but includes in addition, monocular field visible to the right eye but not the left eye, and vice versa.

The vision capability applied by sight lines down which the driver sees or could see by turning his eyes, i.e. “direct field of view” can also be extended by the driver turning his head to combine his “peripheral view”. Hence the driver 180° forward horizontal field of view is a combination of these above capabilities with the need to take into account the limits of intrusion into this field by visual obscurations and obstructions viewed directly e.g. windscreen pillars or intersection bars, door/A pillars, body structure, interior mirrors etc.

The limits of these visual obscurations of the drivers binocular view are determined by measurement in a horizontal plane between tangents connecting the eye points to the binocular obstruction, expressed in degrees. A method usually applied for this purpose is by means of projections from a light source representative of the eye points to the respective reference points to give the degrees of obscuration.

## 7.2. **UNECE Draft Regulation** TRANS/SC1/WP.29/R43 (Drivers Field of View).

7.2.1. The above draft regulation concerning the approval of vehicles with regard to the drivers field of view, defines and prescribes the requirements applicable to the 180° forward field of view of the drivers of passenger cars.

7.2.2. The Required Specifications of the draft Regulation prescribe data to be established on the vehicle preparatory to carrying out the Test Procedures that are involved and complex. Similarly the Test Procedures are extensive in their application. The basis of the requirements is fixed vision angles being prescribed as suitable for application to passenger cars and it is apparent that for Public Service Vehicles the values of the angles of vision may well need to be varied, relative to the greater height of the drivers eye point above the road, either progressively or as a step-function.

Alternatively the whole basis of regulation could be changed to specify Visibility Targets as outlined in paragraph 7.3. below. The specification of these Targets which could be applied to all categories of vehicles would require considerable research work although some has already taken place in the USA.

7.2.3. In the circumstances the question as to whether the requirements in the R43 draft regulation are suitable or can be adapted to cover Public Service Vehicle requirements could well be held abeyance until the procedures have been proved as a satisfactory means to establish Drivers Field or View on passenger cars.

In addition it is considered that for PSV's the drivers visibility requirements should extend to facilities for him to see clearly from his seat the immediate interior of each service door.

## 7.3. **Visibility targets (drivers field of view)**

7.3.1. An alternative approach resulting from research and studies in the USA, has been given to Drivers Filed of View being determined by Visibility Targets as established by investigations into the various classes of objects encountered in the drivers view through the windscreen based on a see-to-stop criteria e.g. traffic signals (kerb and overhead); traffic signs (kerb and overhead); pedestrian (stationary and moving); parked vehicles and other fixed objects; cyclists, other moving vehicular traffic; intersecting traffic-junctions and opposing traffic. These respective classes of objects when projected into three dimensional volumes have been analysed to form two dimensional visibility targets from which a rectilinear Composite Forward Field of View Target has been generated.

7.3.2. Similarly criteria derived from overtaking traffic (peripheral vision and mirror vision) and rear-approaching traffic behind the driver (mirror vision) have been summarized into Side Field of View and Rear Field of View – Composite Targets.

7.3.3. As regards the Composite Forward Field of View Target whilst the tabulated values which express the horizontal and vertical angles for lines of sight between the drivers eye point and the perimeter of the forward composite target are specified for passenger cars, methods have been given to develop them for other categories of vehicles which could well be applicable to Public Service Vehicles.

## **HUNGARIAN DOCUMENT**

### **5. Requirements on the driver's vision**

- 5.1. The driver's eye point in relation to the "R" point is illustrated in Fig.6. In the case of numerical values given through two digits the first one always relates to a male of 5 percentile dimensions, while the second one to a male of 95 percentile.
- 5.2. The requirements on the visibility through windscreen and/or through the field to be cleared by windscreen-wipers, using the same markings as in Fig.8., are summarized in Table VI. The procedure how to verify and/or measure in numerical values specified is described in Annex.
- 5.3. Rear-view mirrors shall be visible through the field to be cleared by windscreen-wipers.

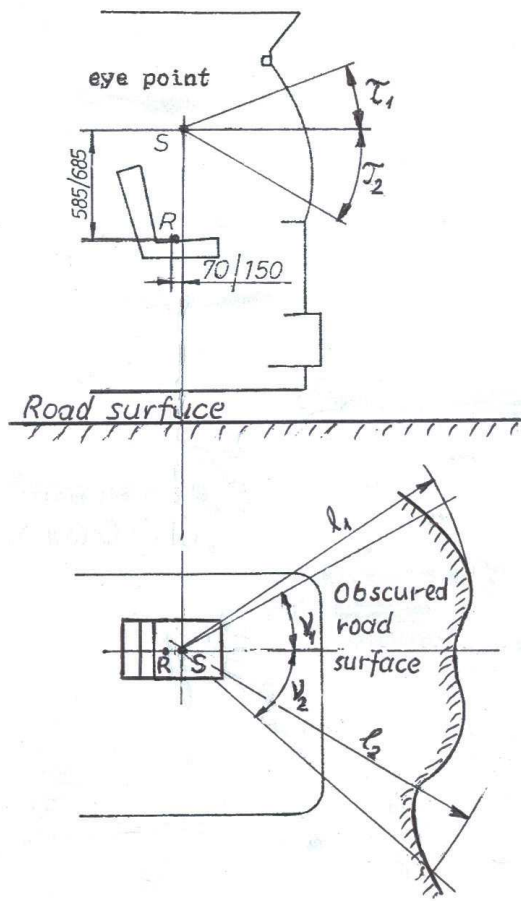


Fig.6.

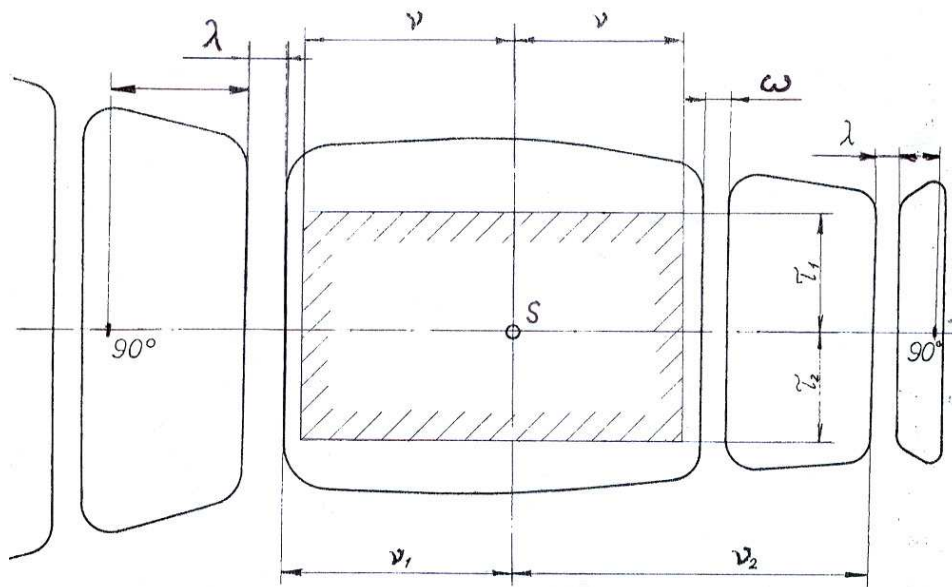


Fig.8.

Table VI.

Visibility parameters to be verified	Markings	Values
Visual angle to the left-side	$\gamma_1$	min. $25^\circ$
Visual angle to the right-side	$\gamma_2$	min. $60^\circ$
Continuous obscurity within $/\gamma_1 + \gamma_2/$ area permitted	$\omega$	max. $3^\circ$
Continuous obscurity permitted outside $/\gamma_1 + \gamma_2/$ area up to an angle of $\pm 90^\circ$	$\lambda$	max. $10^\circ$
The quantities of obscurities permitted within the whole hemisphere		max. 5 pieces
In the horizontal plane at eye level the driver's forward field of vision must not be impaired by any intrusion within the area as follows:		
In the range of undisturbed visibility the forward field of vision shall be		
- upwards	$\gamma_1$	$15^\circ$
- downwards	$\gamma_2$	$30^\circ$
Within the visual angle of $\gamma_1 = 25^\circ$ to the left-side it shall be ensured that the farthest point of the road obscured before the driver shall be from the driver's eye point projected to the ground at a distance of	$l_1$	max. 3,5 m
Within the visual angle to the right-side of $\gamma_1 = 60^\circ$ it shall be ensured that the farthest point of the road obscured before the driver shall be from the driver's eye point projected to the ground at a distance of	$l_2$	max. 6,0 m
Visibility coefficient through the field swept by the windscreen-wiper /See overleaf/	$W_w$	min. 60%
Height of the field swept by the windscreen-wiper		min. 680 mm
Width of the field swept by the windscreen-wiper		min. 900 mm
Area obscured between windscreen pillars and the field swept by the windscreen-wiper		max. $5^\circ$
In the case of a split windscreen the area obscured in the non-swept field within $/\gamma_1 + \gamma_2/$ area at the driver's eye level shall be		max. $10^\circ$
In the case of a non-split windscreen the overlapping of swept areas shall be		min. $10^\circ$

$\frac{x}{x}$  The procedure of measuring it is described in the Annex

## ANNEX

The P.S.V. shall be located perpendicularly to the diameter of a semi-cylindrical screen having a radius of  $R = 3.500$  mm and height of  $K = 3.500$  mm in such a way that the driver's eye point (S) is in the vertical axis of the cylindrical screen.

To the driver's eye point an incandescent lamp or a camera shall be located, and illuminated and/or visible areas shall be measured.

In order to make measurement easier the screen shall have a network whose lines are spaced in the horizontal plane at a distance of 10 degrees from each other and the network lines in the vertical plane at a distance of 500 mm from each other, so making possible to determine the scale ratio necessary for the photographic evaluation.

In the Figure enclosed herewith a measurement scheme is illustrated.

In order to evaluate measurement results ratios shall be determined as follows:

1. Visibility coefficient

$$W_v = F_v/F_o * 100 \text{ (per cent)}$$

where:  $F_v$  = screen surface area visible to the driver from the P.S.V. cab  
 $F_o$  = the whole screen surface

2. Visibility coefficient through the windscreen area swept by the windscreen-wipers

$$W_w = F_w/F_o * 100 \text{ (per cent)}$$

where:  $F_w$  = screen surface area visible through the windscreen area swept by the windscreen-wipers  
 $F_o$  = the whole screen surface

