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Working Party on Lighting and Light-Signalling (GRE)  
(Fifty-first session, 15-19 September 2003,  
agenda item 2.3.)

PROPOSAL FOR DRAFT AMENDMENTS TO DRAFT REGULATION ON  
ADAPTIVE FRONT-LIGHTING SYSTEM (AFS)

Transmitted by the expert from Poland

Note: The text reproduced below was prepared by the expert from Poland, in order to change the co-ordinate system for defining photometric requirements from 25 m screen to road level surface (RS) and surface at the eye-level of the glare exposed drivers (GS). It refers to document TRANS/WP.29/GRE/2002/18.

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Note: This document is distributed to the Experts on Lighting and Light-Signalling only.

**A. PROPOSAL**

Annex 3,

Insert new figures 1, 2 and 3 and tables 1, 1a to 1d, to read: (see next pages).

Figure 1. (former), renumber as figure 4 and amend its title to read:

"Figure 4. For information only: Angular position of passing beam photometric requirements"

Table 1: (former), renumber as table 2 and amend its title to read:

"Table 2: For information only: Passing beam photometric requirements"

Table 2: (former), renumber as table 3.

Insert new tables 4 and 5, to read:

"Table 4: Passing beam Zone III, defining points.

<b>Zone III</b>		<i>Point number:</i>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	<b>6</b>	<b>7a</b>	<b>8a</b>
<i>Basic points</i>	<i>Class C, V</i>	<i>L, R [m]</i>	<i>L 4.0</i>	<i>L 1.0</i>	<i>R 1.0</i>	<i>R 2.0</i>	<i>R 2.0</i>	<i>R 0.5</i>	<i>0.0</i>	<i>R 5.9</i>
		<i>Ahead [m]</i>	<i>28.6</i>	<i>7.2</i>	<i>7.2</i>	<i>14.3</i>	<i>19.1</i>	<i>19.1</i>	<i>84.3</i>	<i>84.3</i>
<i>Position on GS</i>	<i>Class W, E</i>	<i>L, R [m]</i>	<i>L 4.0</i>	<i>L 1.0</i>	<i>R 1.0</i>	<i>R 2.0</i>	<i>R 2.0</i>	<i>R 0.5</i>	<i>L 0.7</i>	<i>R 5.9</i>
		<i>Ahead [m]</i>	<i>28.6</i>	<i>7.2</i>	<i>7.2</i>	<i>14.3</i>	<i>19.1</i>	<i>19.1</i>	<i>84.3</i>	<i>84.3</i>

Table 5: Photometric requirements for Zone III and segment BLL

<i>Distance from vehicle front</i>	<i>7m÷14m</i>	<i>14m÷19m</i>	<i>19m÷28m</i>	<i>28m÷50m</i>	<i>50m÷75m</i>	<i>75m÷84m</i>
	<i>Class C, V</i>					
<i>Zone III [lx]</i>	<i>17.1÷4.3</i>	<i>4.3÷2.4</i>	<i>2.4÷1.1</i>	<i>1.1÷0.4</i>	<i>0.4÷0.2</i>	<i>0.2÷0.1</i>
<i>BLL [lx]</i>	<i>&lt;17.1</i>	<i>&lt;4.3</i>	<i>&lt;2.4</i>	<i>&lt;1.1</i>	<i>&lt;0.4</i>	<i>&lt;0.2</i>
	<i>Class E, W</i>					
<i>Zone III [lx]</i>	<i>24.45÷6.1</i>	<i>6.1÷3.43</i>	<i>3.43÷1.52</i>	<i>1.52÷0.5</i>	<i>0.5÷0.22</i>	<i>0.22÷0.1</i>
<i>BLL [lx]</i>	<i>&lt;24.45</i>	<i>&lt;6.1</i>	<i>&lt;3.34</i>	<i>&lt;1.52</i>	<i>&lt;0.5</i>	<i>&lt;0.8</i>
	<i>Bending modes</i>					
	<i>Class C, V, W, E</i>					
<i>Zone III [lx]</i>	<i>24.45÷6.1</i>	<i>6.1÷3.43</i>	<i>3.43÷1.52</i>	<i>1.52÷0.5</i>	<i>0.5÷0.22</i>	<i>0.22÷0.1</i>
<i>BLL [lx]</i>	<i>&lt;24.45</i>	<i>&lt;6.1</i>	<i>&lt;3.34</i>	<i>&lt;1.52</i>	<i>&lt;0.5</i>	<i>&lt;0.8</i>
<i>4.1.</i>	<i>In any place on the left side of the BLL segment illumination can not be bigger than in BLL segment at the same distance from vehicle or in zone III respectively.</i>					

Table 3 (former), renumber as table 6 and amend its title to read:

"Table 6: For information only. Passing beam zones III, defining corner points"

Table 4 (former), renumber as table 7.

\* \* \*

"Figure 1: Position of passing beam photometric requirements on the road surface (RS) for class C, V, W, E.

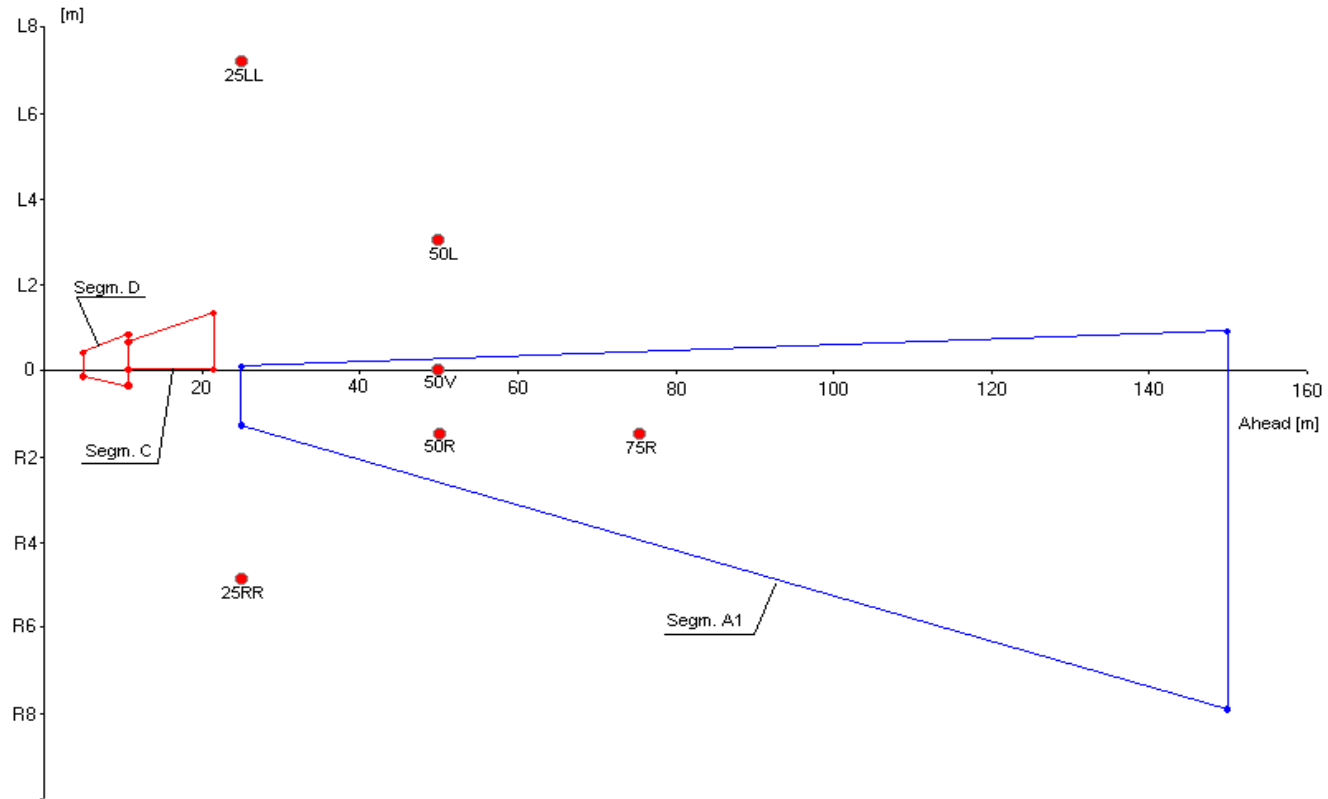


Figure 2: Position of passing beam photometric requirements on the surface at the eye-level of the glare exposed drivers (GS) for Class C,V passing beam.

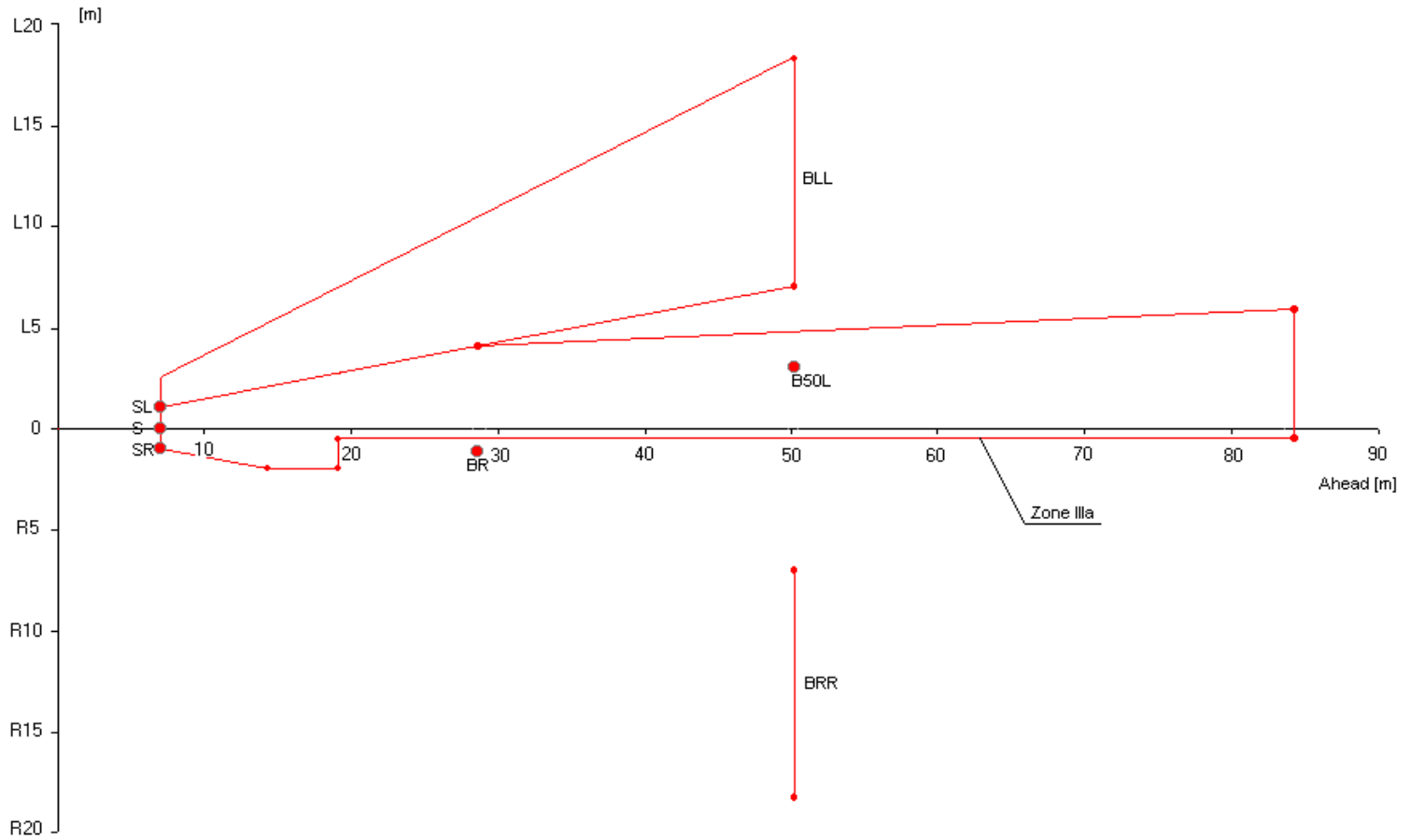


Figure 3: Position of passing beam photometric requirements on the surface at the eye-level of the glare exposed drivers (GS) for Class W,E passing beam.

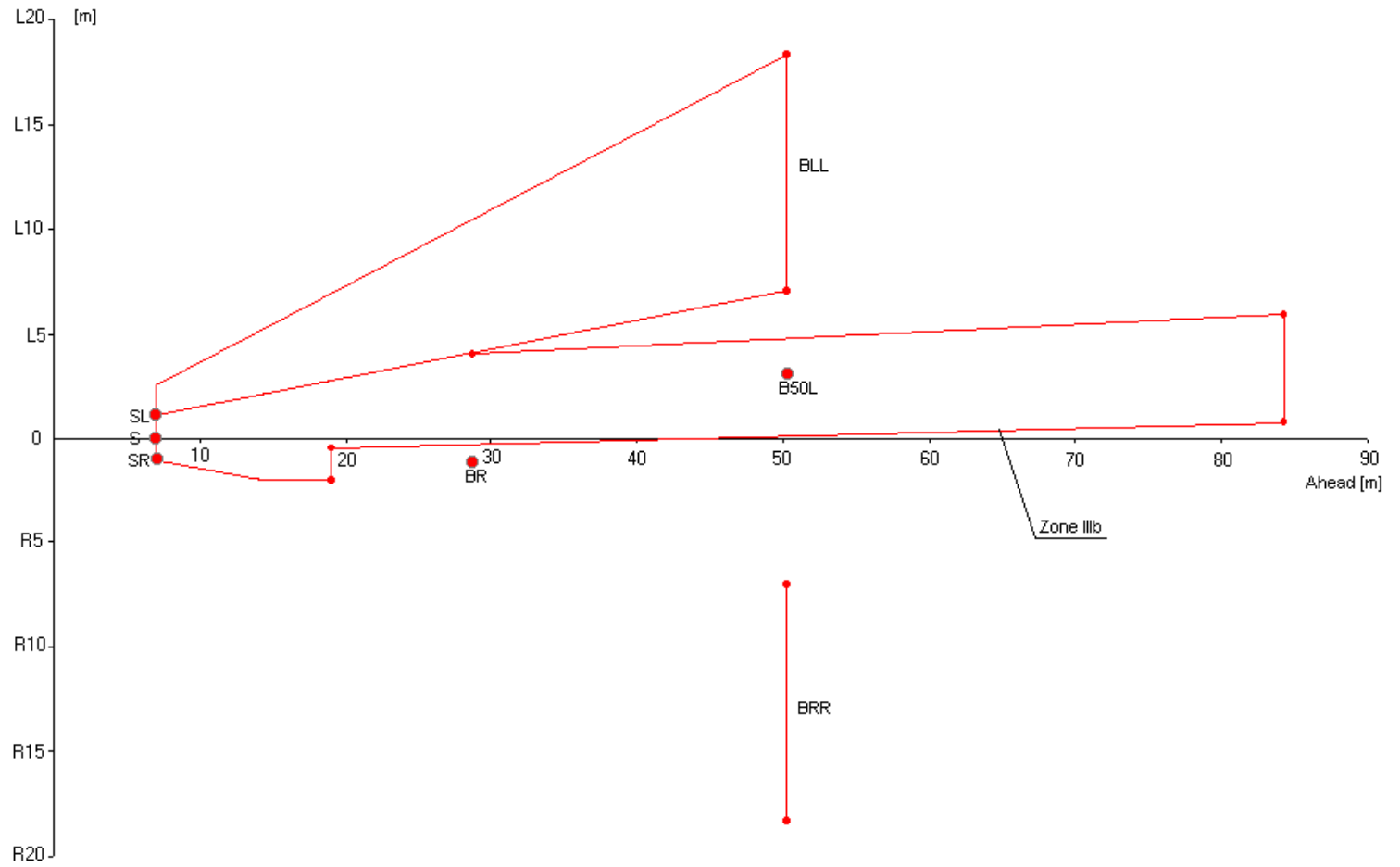


Table 1: Passing beam photometric requirements expressed in lux on RS and GS for system (lighting units energized simultaneously).

tabled requirements expressed in lux on RS, GS			Points position on RS, GS [m]			class C (basic) passing beam		class V (town) passing beam		class E (motorway) passing beam		class W (wet road) passing beam	
			L (left) or R (right)	Ahead									
No	Element		at/from	to	to	min	max	min	max	min	max	min	max
1	<b>B50L</b>	GS	L 3.0		50.0		0.2		0.2		0.4		0.4
2	<b>HV</b> (as specified by <b>Table Ia</b> of this annex)	GS			0.0								
3	<b>BR</b>	GS	R 1.2		29.0	0.3	3.1	0.2	1.5	0.3	3.1	0.3	4.6
4	Segment <b>BRR</b>	GS	R 7.0	R 18.3	50.0		2.0		0.5		2		3.0
5	Segment <b>BLL</b>	GS	L 7.0	L 18.3	50.0		0.4		0.5		0.5		0.5
6	<b>P</b> (as specified by <b>Table Ia</b> of this annex)	GS	L 0.0		0.0								
7	<b>Zone III</b> (as specified by <b>Table 4</b> and <b>Table 5</b> of this annex)	GS											
8	<b>S</b>	GS	V 0.0		7.0	2.4		2.4		2.4		2.4	
9	<b>SL</b>	GS	L 1.0		7.0	1.2				1.2		1.2	
10	<b>SR</b>	GS	R 1.0		7.0	1.2				1.2		1.2	
11	<b>50R</b>	RS	R 1.5		50.0			3.00					
12	<b>75R</b>	RS	R 1.5		75.0	2.6				4.0		5.3	
13	<b>50V</b>	RS	V 0.0		50.0	3.0		1.5		6.0		6.0	
14	<b>50L</b>	RS	L 3.0		50.0	2.1	12.5	1.0	12.5	4.0		4.0	17.5
15	<b>25LL</b>	RS	L 7.1		25.0	2.8		2.0		2.8		8.0	
16	<b>25RR</b>	RS	R 4.8		25.0	2.8		2.0		2.8		8.0	
17	Segment <b>C</b>	RS	L 1.3	V 0.0	21.5								54.2
18	Segment <b>D</b>	RS	L 0.8	R 0.3	11.0		340.0		340.0		340.0		195.6
19	<b>I<sub>max</sub></b> (previous <b>E<sub>max</sub></b> )	RS				12 500	31 250	6 250	31 250	12 500	56 250	21 875	50 000

Part A

Table 1a: Passing beam photometric requirements expressed in lux on GS for system) recalculated for U0,57 deg inclination of system reference axis.

Table requirements expressed in lux on GS			Points position on GS [m]			class C (basic) passing beam		class V (town) passing beam		class E (motorway) passing beam		class W (wet road) passing beam	
			L (left) or R (right)		Ahead	min	max	min	max	min	max	min	max
A'	No	Element	at/from	to	to	min	max	min	max	min	max	min	max
	2	<b>HV</b>	0.0		50.0		0.4		0.4				
	6	<b>P</b>	L 6.0		50.0	0.1						0.1	

Table 1b: Bending modes passing beam photometric requirements expressed in lux on GS for system

Table requirements Expressed in lux on GS			Points position on GS [m]			class C (basic) passing beam		class V (town) passing beam		class E (motorway) passing beam		class W (wet road) passing beam	
			L (left) or R (right)		Ahead	min	max	min	max	min	max	min	max
B	No	Element	at/from	to	to	min	max	min	max	min	max	min	max
	1	<b>B50L</b>	L 3.0		50.0		1.2		1.2				
	2	<b>HV <u>1</u></b>	0.0		50.6		0.5		0.5				
	7	<b>Zone III</b> (as specified by <b>Table 4</b> and <b>Table 5</b> in this annex)											
	14	<b>50L</b>	L 3.0		50.0	1.0		0.5		2.0		2.0	
	19	<b>I max</b> (previuos <b>E<sub>max</sub></b> )				7 500	31 250	3 750	31 250	7 500	56 250	15 000	50 000

1/ point HV recalculated for 0.57 inclination

Table 1c: Segment A1 corners position.

<i>position in meters</i>		<i>Class C (basic) passing beam</i>		<i>Class V (town) passing beam</i>		<i>Class E (motorway) passing beam</i>		<i>Class W (wet road) passing beam</i>	
<i>No</i>	<i>beam part designation and requirement</i>	<i>L, R [m]</i>	<i>Ahead [m]</i>	<i>L, R [m]</i>	<i>Ahead [m]</i>	<i>L, R [m]</i>	<i>Ahead [m]</i>	<i>L, R [m]</i>	<i>Ahead [m]</i>
<b>1c.1</b>	<i>In any place on right and left beside A1 (RS) segment, vertical illumination can not be bigger than any value of tested units in A1 segment at the same distance from vehicle</i>	<b>L 0.9</b>	150	L 0.9	150	L 0.9	150	L 0.9	150
		R 7.9	150	R 7.9	150	R 7.9	150	R 7.9	150
		L 0.1	25	L 0.1	25	L 0.1	25	L 0.1	25
		R 1.3	25	R 1.3	25	R 1.3	25	R 1.3	25

Table 1d: Segment A1 defining values.

<i>Distance from vehicle front</i>		<i>25m÷50m</i>	<i>50m÷75m</i>	<i>75m÷100m</i>	<i>100m÷125</i>	<i>125m÷150</i>
<i>Illumination at the road surface (RS) in [lx]</i>	<i>Class V</i>	>10	>3	-	-	-
	<i>Class W, C</i>	>10	>6	>1	>0.5	-
	<i>Class E</i>	>10	>6	>2	>1.5	>0.5

"



## B. JUSTIFICATION

The AFS system is a new quality in head lighting. It is a complicated solution comparing standard headlamps. Simplifications made for standard headlamps regulations in case of AFS can lead to different illumination of the road and glare depending on number, mounting positions and partial beam patterns of lighting units. It is a result of defining photometric requirements for measuring screen co-ordinate system.

In such situation, the same points of measuring screen for each lighting unit are in different places on the road. Mathematically added photometric values measured for each lighting unit at the screen co-ordinate system may not fulfil the assumed illumination on road points as well as on eyes of drivers.

It is proposed to express photometric requirements for two separate surfaces: road surface (RS) and surface at the eye-level of the glare exposed drivers (GS) which are equivalent to those proposed in Draft XXX Regulation: RS – bottom part of the screen, GS – top part of the screen. The RS and GS co-ordinate system has a significant advantage: it describes the whole system performance independently of the number of lighting units and their locations.

The measurement devices and methods for type approval are still unchanged. It is explained in details in informal document No. 11 of the fiftieth GRE session.

Photometric values for RS and GS are equivalent to the measuring screen proposed in Draft XXX Regulation. They are proposed in this way as that for AFS consisting of two identical lighting units mounted at typical height (one on the left and one on the right side – similar as for standard headlamps).

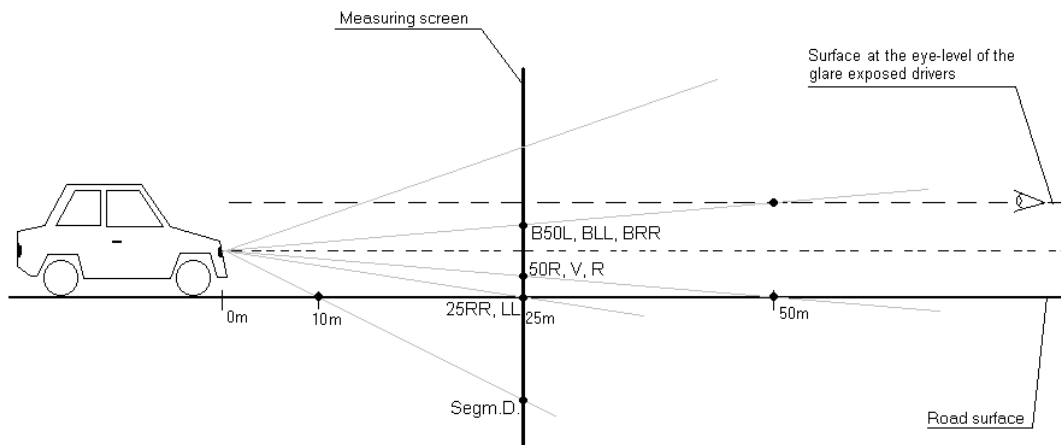


Fig. 1. View of vertical intersection of present and proposed co-ordinates systems.

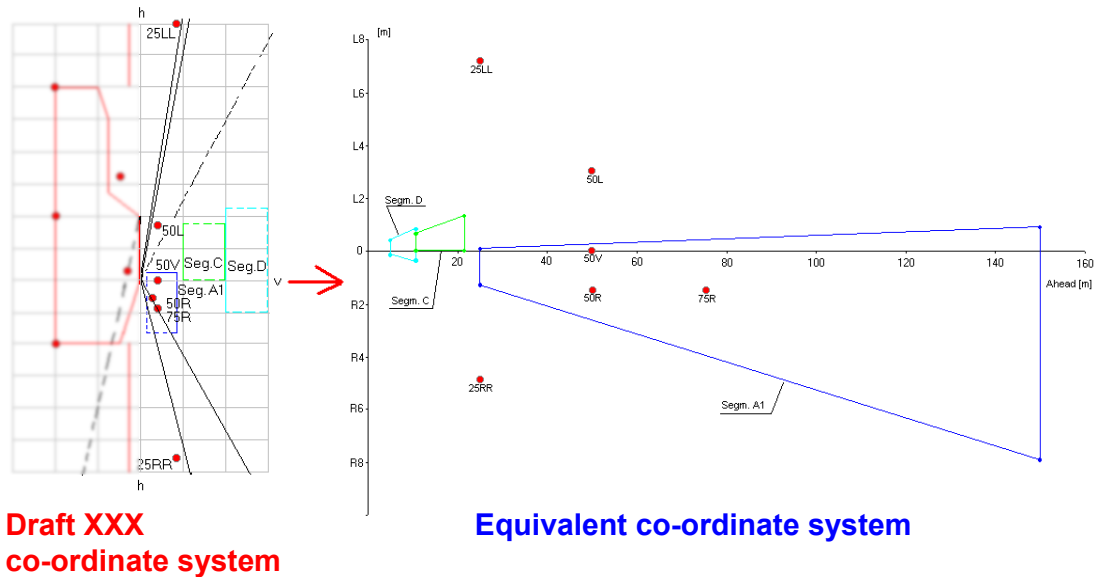


Fig. 2. Measuring screen and its representation on RS.

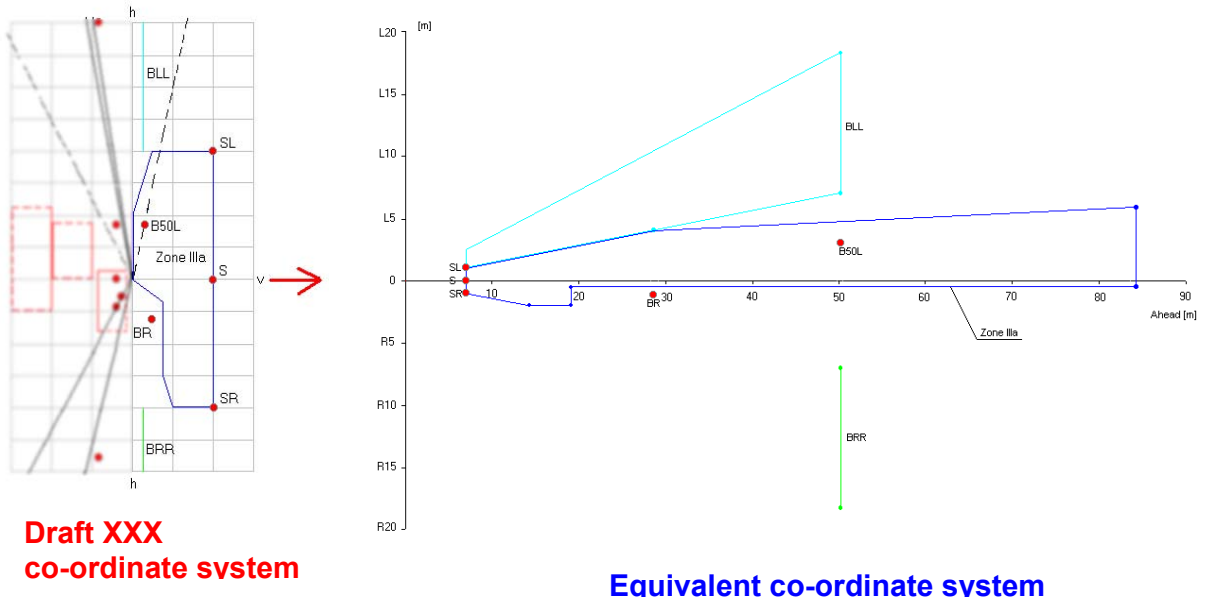


Fig. 3. Measuring screen and its representation on GS.

It is possible to do similar changes in present headlamps regulations but there are two significant reasons to do it first for AFS:

- 1) AFS is a much more complicated system and in principle is vehicle connected. The proposed description significantly simplifies dealing with the photometric performance of the system as a whole. This is not so important for a pair of standard headlamps which can be mounted and aimed on different vehicles.
  - 2) Manufacturers of standard headlamps are used to screen rules and any change will need transitional provisions and rules which will need time and will cause delays. Introducing from the beginning improved, uniform rules for AFS will give the possibility to make appropriate production preparations, and will prevent resistance to changes just after introducing the new Regulation.
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