

TECHNICAL REPORT

**ISO/TR
11842**

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1997-05-01

Road vehicles — Comparison of statutory photometric requirements in various countries for lighting devices

*Véhicules routiers — Comparaison des exigences photométriques
réglementaires des dispositifs d'éclairage dans les différents pays*



Reference number
ISO/TR 11842:1997(E)

Foreword

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ISO/TR 11842, which is a Technical Report of type 3, was prepared by ISO/TC 22, *Road vehicles*, Subcommittee SC 8, *Lighting and signalling*.

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Road vehicles — Comparison of statutory photometric requirements in various countries for lighting devices

1 Scope

This Technical Report compiles photometric requirements for headlamps [main beam (upper beam) and dipped beam (low beam)] and fog lamps from existing provisions for lighting devices, established by national or international legislations in various countries.

2 References

SAE J579 DEC84, *SEALED BEAM HEADLAMP UNITS FOR MOTOR VEHICLES*.

SAE J583 MAY81, *FRONT FOG LAMPS*.

U.S. FEDERAL MOTOR VEHICLE SAFETY, STANDARD 108.

ECE R1.01, CORRIGENDUM 1, 18MR86, *UNIFORM PROVISIONS CONCERNING TYPE APPROVAL OF MOTOR VEHICLE HEADLAMPS EMITTING AN ASYMMETRICAL PASSING BEAM AND/OR A DRIVING BEAM AND EQUIPPED WITH FILAMENT LAMPS OF CATEGORY R2*.

ECE R8.02 AS AMENDED BY R8.04, *UNIFORM PROVISIONS CONCERNING THE APPROVAL OF MOTOR VEHICLE HEADLAMPS EMITTING AN ASYMMETRICAL PASSING BEAM OR A DRIVING BEAM OR BOTH AND EQUIPPED WITH HALOGEN LAMPS (H1, H2, OR H3 LAMPS)*.

ECE R19.02 08MY88, *UNIFORM PROVISIONS CONCERNING THE APPROVAL OF MOTOR VEHICLE FRONT FOG LAMPS*.

ECE R20.01 AS AMENDED BY R20.02, 03JL86, *UNIFORM PROVISIONS CONCERNING THE APPROVAL OF MOTOR VEHICLE HEADLAMPS EMITTING AN ASYMMETRICAL PASSING BEAM OR A DRIVING BEAM OR BOTH AND EQUIPPED WITH HALOGEN FILAMENT LAMPS (H4 LAMPS)*.

JAPAN, MINISTRY OF TRANSPORT, CHIGI NO. 246 AND CHISIN NO. 1353, 13 DECEMBER 1988.

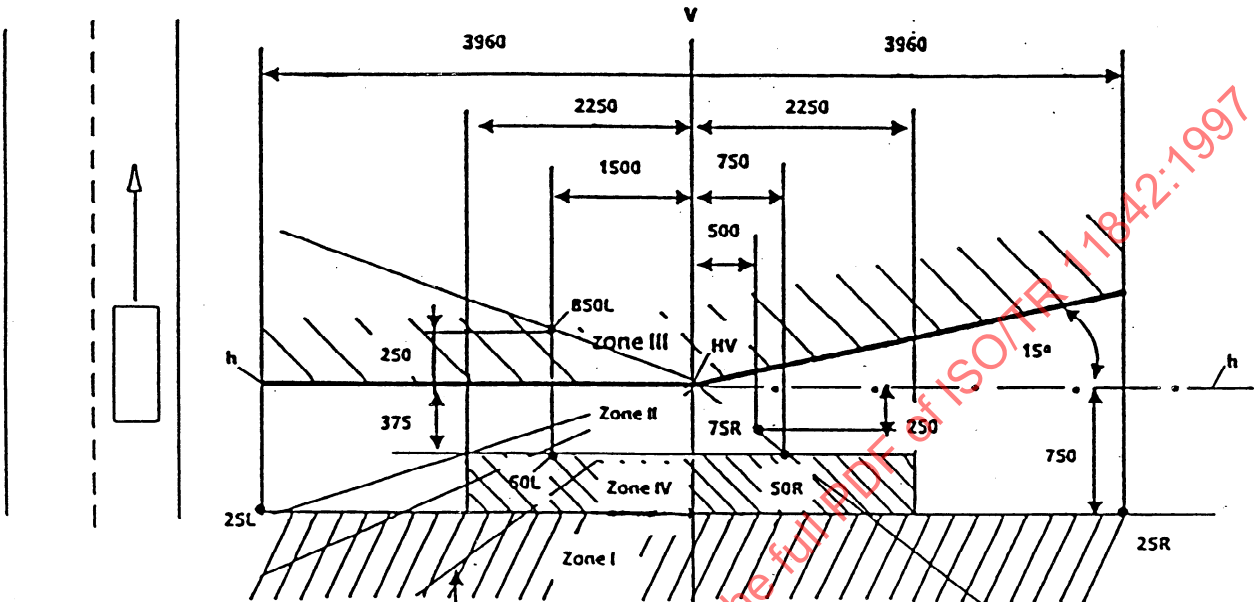
3 Photometric requirements

Sheets No. 1 to 14 of this Technical Report are excerpts from existing provisions established by national or international legislations. They were the current requirements as of October 1991.

Europe: (ECE R1.01, Corrigendum 1, 18MR86)

Sheet No. 1

STANDARD EUROPEAN BEAM



The "cut-off" on the left half of the screen is horizontal and is situated 25 cm below the hh line. The "elbow" of the "cut-off" is on the vv line.

MEASURING SCREEN
HEADLAMP FOR RIGHT HAND TRAFFIC

h-h: horizontal plane) passing through dimensions in mm
v-v: vertical plane) focus of headlamp

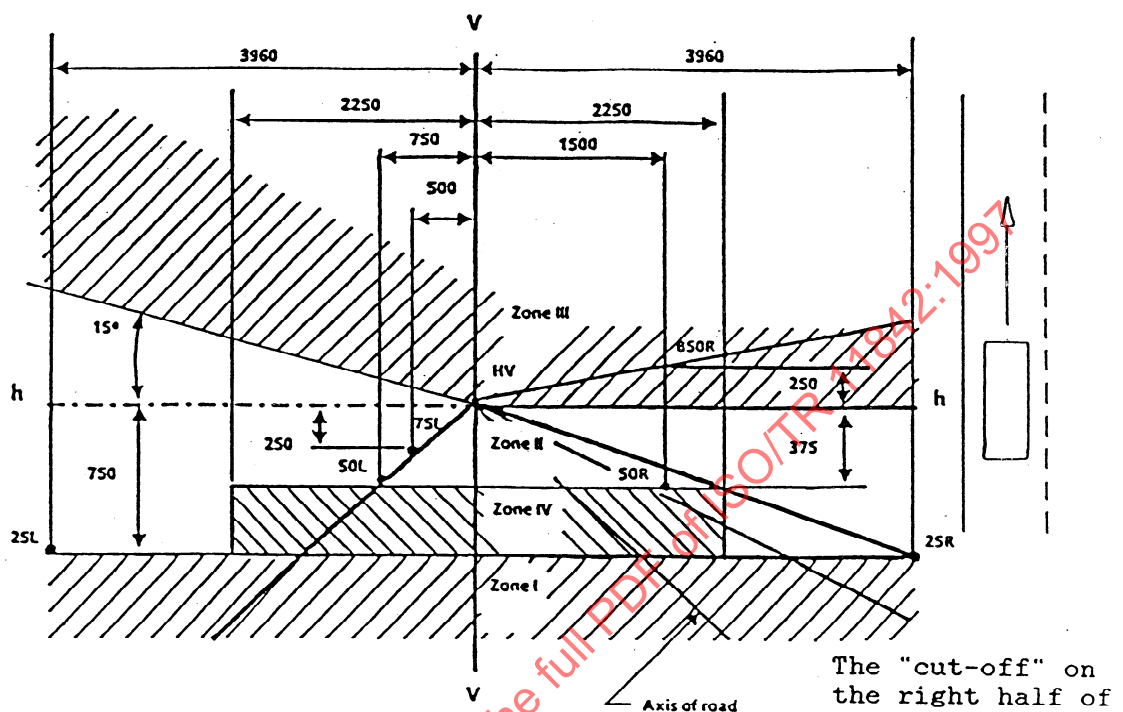
Lux measured at 25m

Point on measuring screen	REQUIRED ILLUMINATION IN LUX
Headlights for right hand traffic	
Point B 50 L	≤0.3
Point 75 R	≥6
Point 50 R	≥6
Point 25 L	≥1.5
Point 25 R	≥1.5
Any point in Zone III	≤0.7
Any point in Zone IV	≥2
Any point in Zone I	≤20

Europe: (ECE R1.01, Corrigendum 1, 18MR86)

Sheet No. 2

STANDARD EUROPEAN BEAM



The "cut-off" on the right half of the screen is horizontal and is situated 25 cm below the hh line. The "elbow" of the "cut-off" is on the vv line.

HEADLAMP FOR LEFT HAND TRAFFIC

h-h: horizontal plane)
v-v: vertical plane)

passing through
focus of headlamp

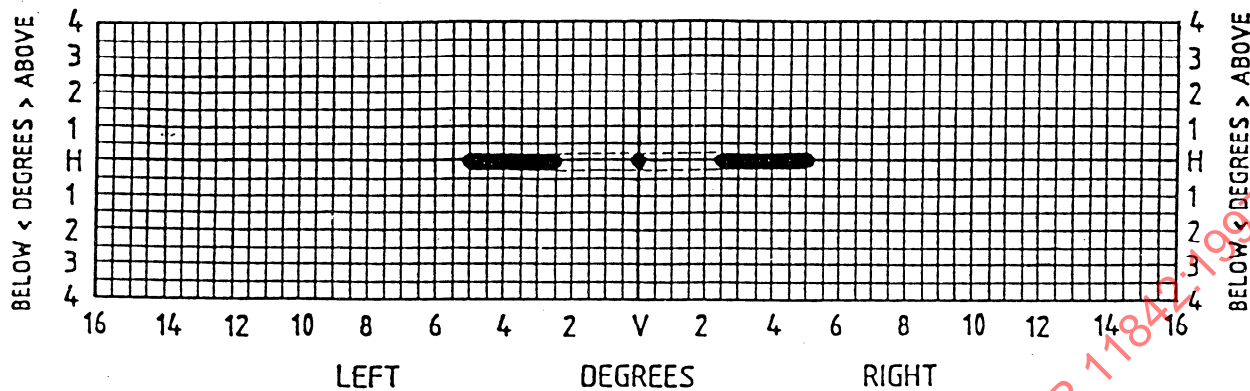
dimensions in mm

Lux measured at 25m

Point on measuring screen	REQUIRED ILLUMINATION IN LUX
Headlights for left hand traffic	
Point B 50 R	≤ 0.3
Point 75 L	≥ 6
Point 50 L	≥ 6
Point 25 R	≥ 1.5
Point 25 L	≥ 1.5
Any point in Zone III	≤ 0.7
Any point in Zone IV	≥ 2
Any point in Zone I	≤ 20

Sheet No. 3

EUROPE: (ECE R101, CORRIGENDUM 1, 18MR86)



Lux measured at 25m

DRIVING BEAM		
TEST POSITION (degrees)		SPECIFIED (lux)
H	5.1L to 2.6L	4
	2.6L to V	16
	V	*32
	V to 2.6R	16
	2.6R to 5.1R	4

The illumination produced on the screen by the driving beam shall meet the following requirements:

The point of intersection HV of the lines hh and vv shall be situated within the isolux 90% of maximum illumination. This maximum value shall not be less than *32 lux.

Starting from point HV, horizontally to the right and left, illumination shall be not less than 16 lux up to a distance of 1.125 m and not less than 4 lux up to a distance of 2.25 m. (Where the flux of the standard filament lamp used for measurements is other than 700 lumens, the measurements as taken must be corrected proportionally to the ratio of the fluxes.)

(e) The screen illumination values mentioned under (c) and (d) shall be measured by means of a photo-electric cell, the useful area of which shall be contained within a square of 65 mm side.

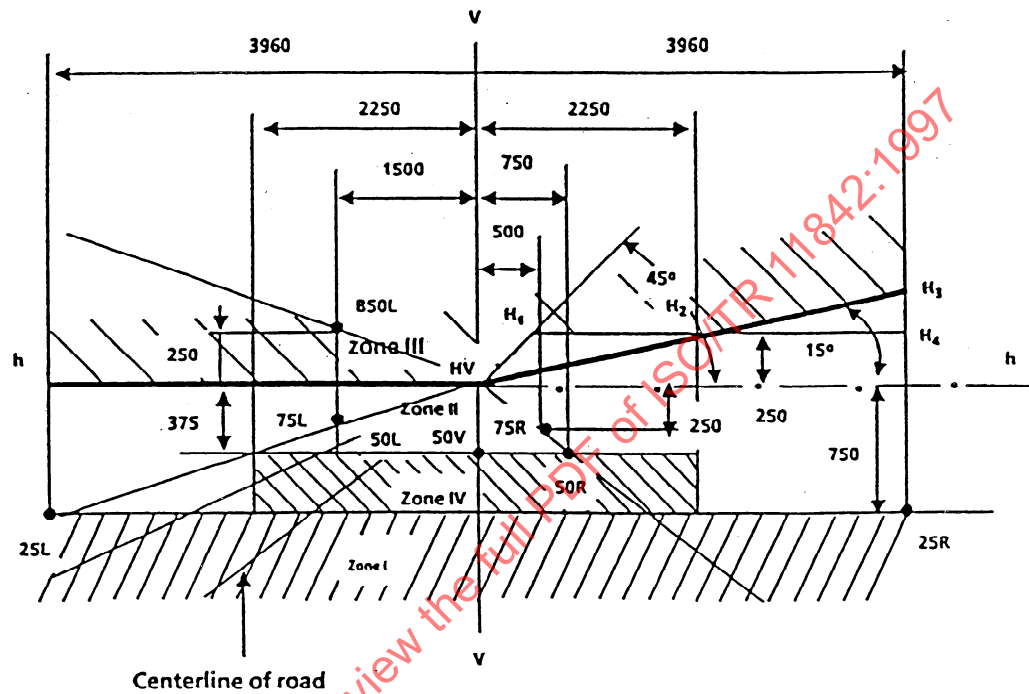
Europe: (ECE R8.02 as amended by R8.04)

Sheet No. 4

MEASURING SCREEN

Headlight for Right-hand Traffic

STANDARD EUROPEAN BEAM



The "cut-off" on the left half of the screen is horizontal and is situated 25 cm below the hh line. The "elbow" of the "cut-off" is on the vv line.

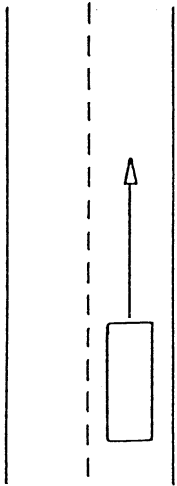
h-h : horizontal plane
v-v : vertical plane

passing through focus of headlight

Dimensions in mm

Lux measured at 25m

POINT ON MEASURING SCREEN		REQUIRED ILLUMINATION IN LUX
HEADLAMPS FOR RIGHT-HAND TRAFFIC		
Point B	50L	≤ 0.3
" 75	R	≥ 12
" 75	L	≤ 12
" 50	L	≤ 15
" 50	R	≥ 12
" 50	V	≥ 6
" 25	L	≥ 2
" 25	R	≥ 2
Any point in Zone III		≤ 0.7
Any point in Zone IV		≥ 3
Any point in Zone I		$\leq 2 \times E_{50R}$
E _{50R} IS THE ILLUMINATION ACUALLY MEASURED.		

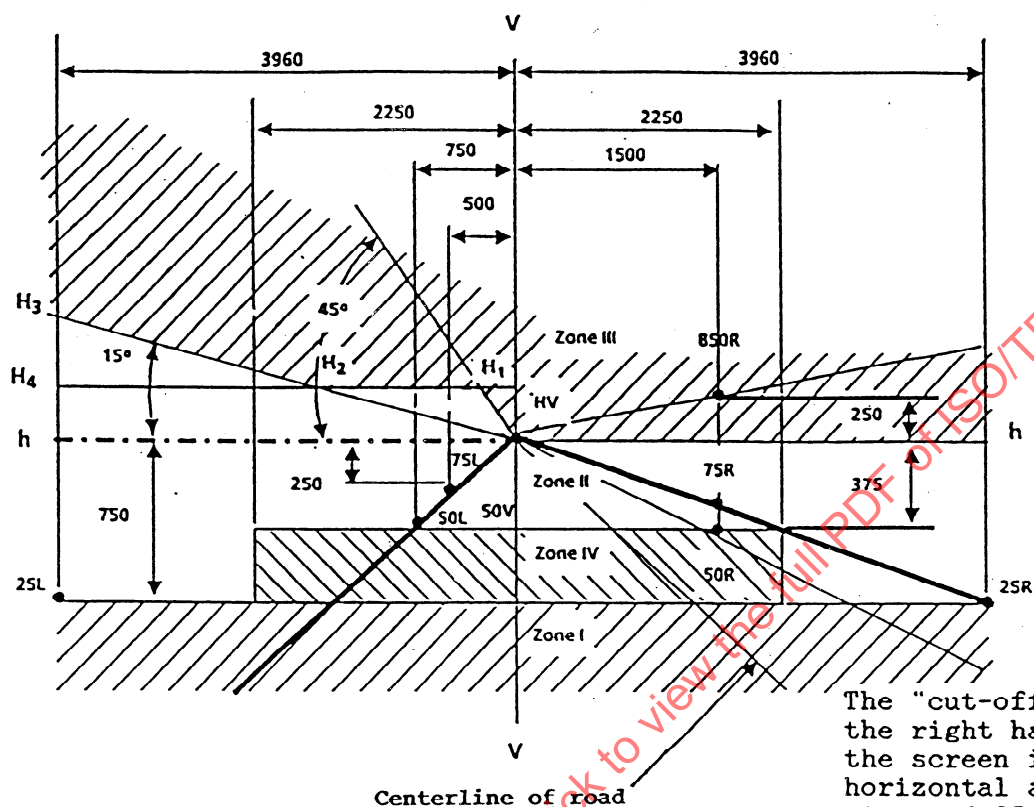


Europe: (ECE R8.02 as amended by R8.04)

Headlight for Left-hand Traffic

Sheet No. 5

STANDARD EUROPEAN BEAM



The "cut-off" on the right half of the screen is horizontal and is situated 25 cm below the hh line. The "elbow" of the "cut-off" is on the vv line.

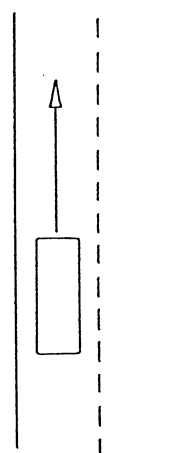
Dimensions in mm

h-h : horizontal plane
v-v : vertical plane

passing through
focus of headlight

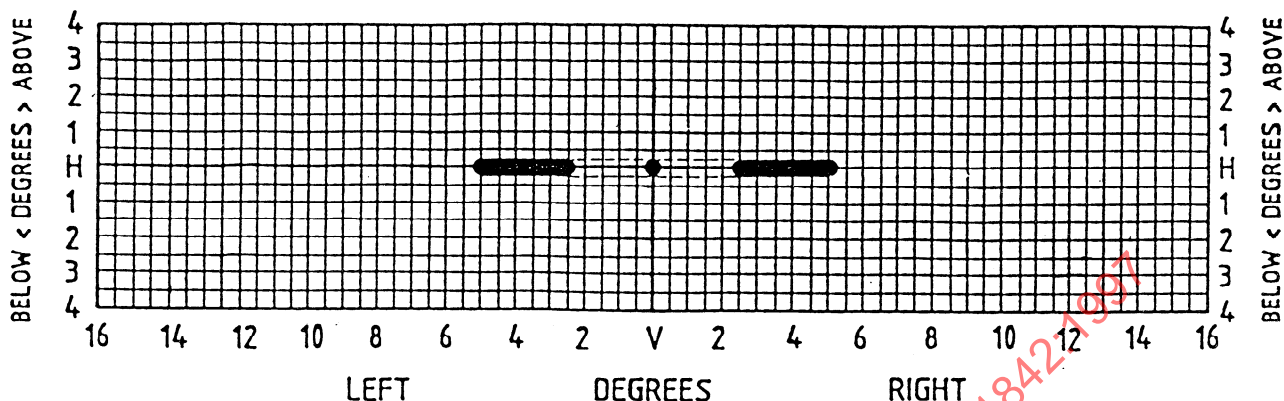
Lux measured at 25m

POINT ON MEASURING SCREEN			REQUIRED ILLUMINATION IN LUX
HEADLAMPS FOR LEFT-HAND TRAFFIC			
Point	B	SOR	≤ 0.3
"	75	L	≥ 12
"	75	R	≤ 12
"	50	R	≤ 15
"	50	L	≥ 12
"	50	V	≥ 6
"	25	R	≥ 2
"	25	L	≥ 2
Any point in Zone III			≤ 0.7
Any point in Zone IV			≥ 3
Any point in Zone I			$\leq 2 \times E_{50L}$
E _{50L} IS THE ILLUMINATION ACTUALLY MEASURED.			



EUROPE:(ECE R8.02 AS AMENDED BY R8.04)

Sheet No. 6



Lux measured at 25m

DRIVING BEAM		
TEST POSITION (degrees)		SPECIFIED (lux)
H	5.1L to 2.6L	6
	2.6L to V	24
	V	*48
	V to 2.6R	24
	2.6R to 5.1R	6
MAXIMUM		240

- 6.3.2.1. The point of intersection (HV) of the lines hh and vv shall be situated within the isolux representing 80 percent of maximum illumination. This maximum value (E_M) shall be not less than *48 lux. The maximum value shall in no case exceed 240 lux; moreover, in the case of a combined passing and driving headlamp this maximum value shall not be more than 16 times the illumination measured for the passing beam at point 75R (or 75L).

- 6.3.2.1.1. The maximum luminous intensity (I_M) of the driving beam expressed in thousands of candelas shall be calculated by means of the formula $I_M = 0.625 E_M$

- 6.3.2.1.2. The reference mark (I'_M) indicating this maximum intensity and referred to in paragraph 4.4.2.6. above shall be obtained by means of the formula $I'_M = \frac{I_M}{3} = 0.208 E_M$ (12)

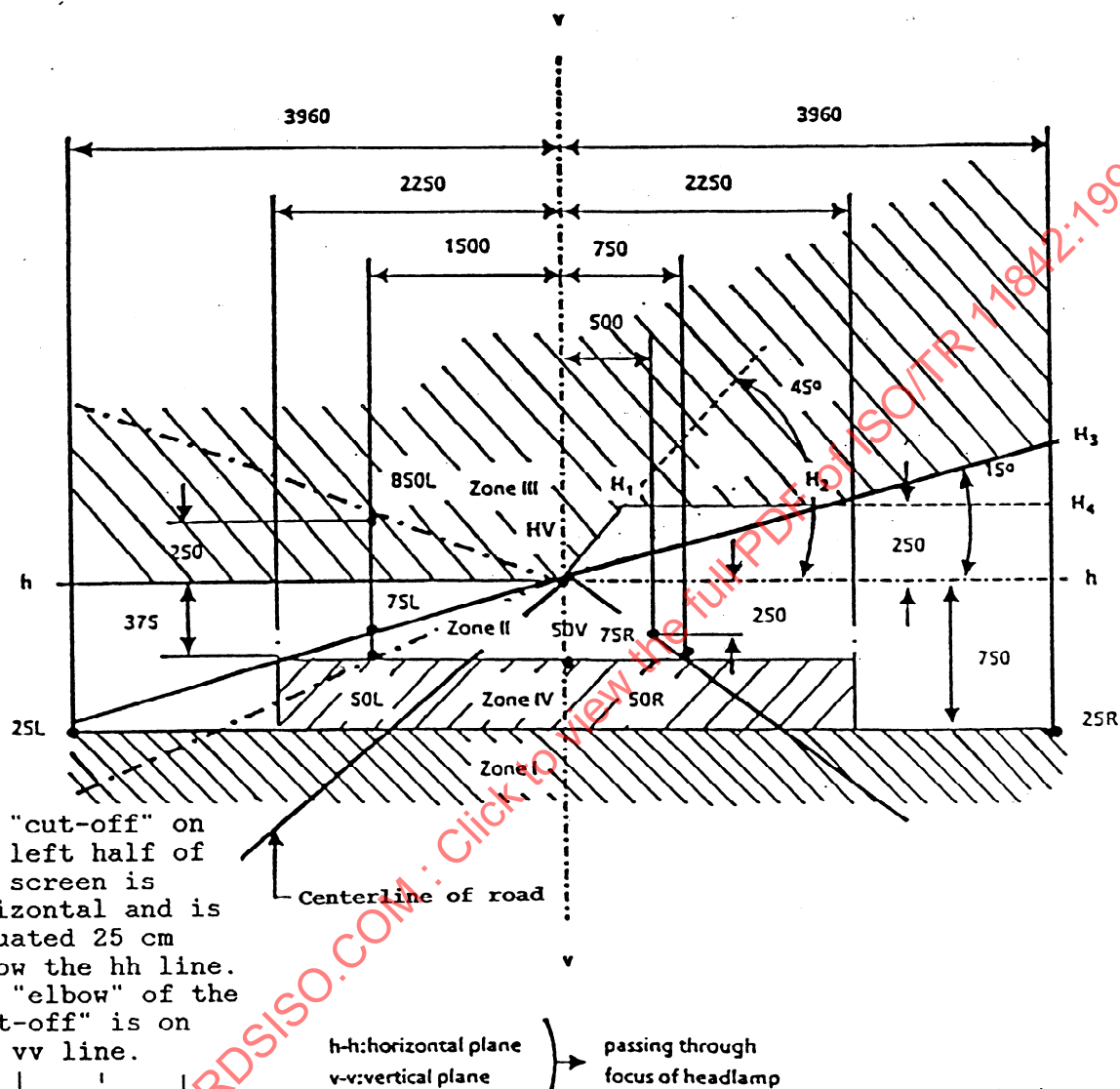
This value shall be rounded to whichever is the nearest of the following: 7.5, 10, 12.5, 17.5, 20, 25, 27.5, 30, 37.5, 40, 45, 50.

- 6.3.2.2. Starting from point HV, horizontally to the right and left the illumination shall be not less than 24 lux up to a distance of 1.125 m and not less than 6 lux up to a distance of 2.25m.

Europe: (ECE R20.01 as amended by R20.02, 03/JL86)

Standard European Beam
Measuring Screen
Headlamp for right-hand traffic

Sheet No. 7



Point of measuring screen Headlights for righthand traffic	REQUIRED ILLUMINATION IN LUX
Point B 50 L	≤ 0.4
Point 75 R	≥ 12
Point 75 L	≤ 12
Point 50 L	≤ 15
Point 50 R	≥ 12
Point 50 V	≥ 6
Point 25 L	≥ 2
Point 25 R	≥ 2
Any point in Zone III	≤ 0.7
Any point in zone IV	≥ 3
Any point in Zone I	$\leq 2 \times E50R$

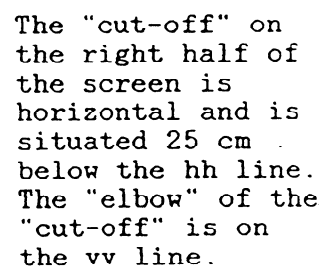
E50R is the illumination actually measured.

Dimensions in mm

Lux measured
at 25m

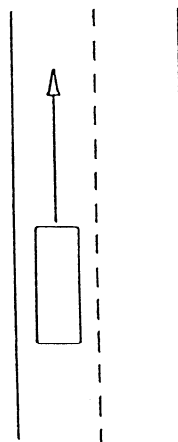
Sheet No. 8

Sheet No. 8



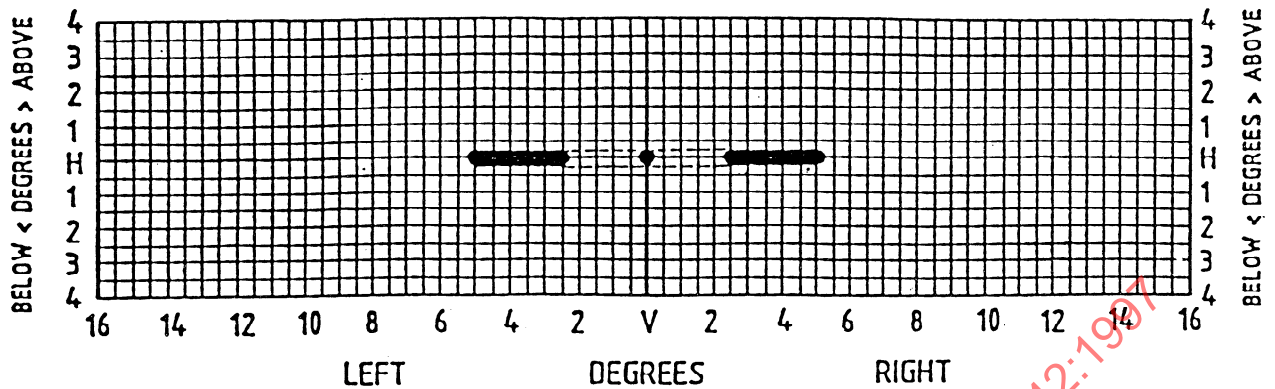
Lux measured at 25m	
Point of measuring screen	REQUIRED ILLUMINATION IN LUX
Headlights for lefthand traffic	
Point B 50 R	≥ 0.4
Point 75 L	≥ 12
Point 75 R	≥ 12
Point 50 R	≥ 15
Point 50 L	≥ 12
Point 50 V	≥ 6
Point 25 R	≥ 2
Point 25 L	≥ 2
Any point in Zone III	≥ 0.7
Any point in Zone IV	≥ 3
Any point in Zone I	< 2 × E50L

E50L is the illumination actually measured



EUROPE:(ECE R20.01 AS AMENDED BY R20.02, 03JL86)

Sheet No. 9



Lux measured at 25m

DRIVING BEAM		
TEST POSITION (degrees)		SPECIFIED (lux)
H	5.1L to 2.6L	6
	2.6L to V	24
	V	*48
	V to 2.6R	24
	2.6R to 5.1R	6
MAXIMUM		240

- 6.3.2.1. The point of intersection (H) of the lines hh and vv shall be situated within the isolux 80 percent of maximum illumination. The maximum value (E_M) shall not be less than *48 lux. The maximum value shall not exceed 240 lux or, in the case of a combined passing and driving headlamp, this maximum value shall not be more than 16 times the illumination measured for the passing beam at Point 75 R (or 75L).

- 6.3.2.1.1. The maximum intensity (I_M) of the driving beam expressed in thousands of candelas shall be calculated by the formula:

$$I_M = 0.625 E_M$$

- 6.3.2.1.2. The reference mark (I'_M) of this maximum intensity, referred to in Paragraph 4.3.2.6., shall be obtained by the ratio:

$$I'_M = \frac{I_M}{3} = 0.208 E_M$$

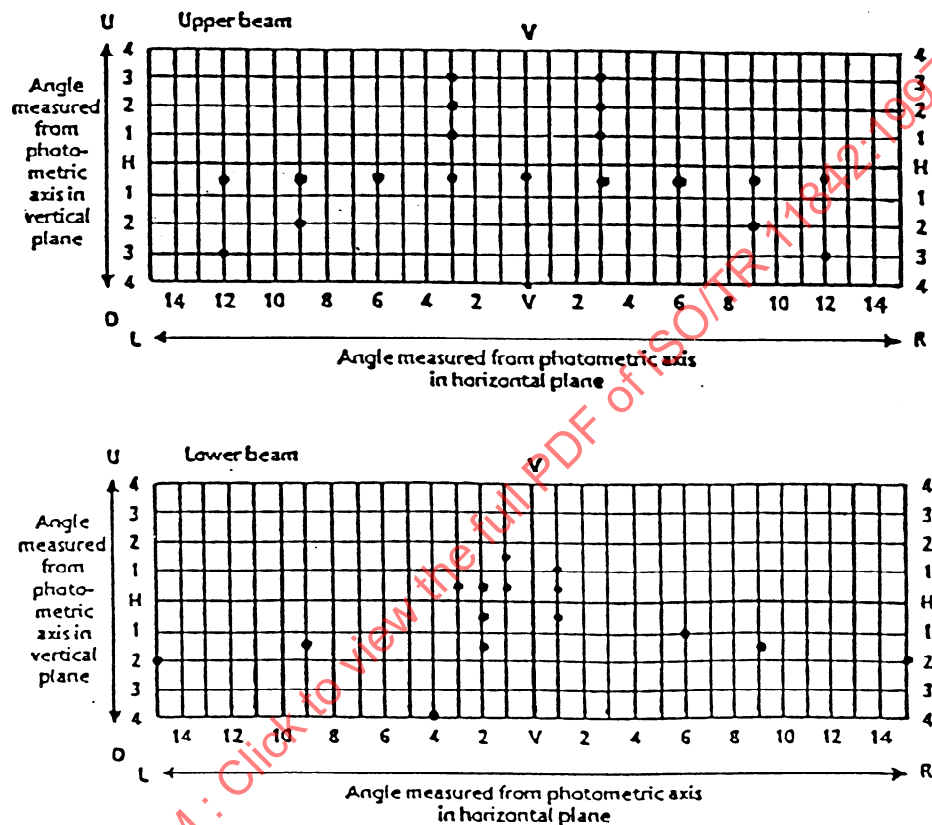
This value shall be rounded off to the nearest 7.5, 10, 12.5, 17.5, 20, 25, 27.5, 30, 37.5, 40, 45, 50.

- 6.3.2.2. Starting from Point H, horizontally to the right and left, the illumination shall be not less than 24 lux up to a distance of 1.125 m and not less than 6 lux up to a distance of 2.25 m.

JAPAN: CHIGI No. 246 AND CHISHIN No. 1353 OF 13 DEC. '88

Measuring method

The light distribution characteristics in Paragraph 1 shall be measured at the points specified in the illustration below at a distance of 10 meters in front of the headlamp with the specified voltage applied to the headlamp. In this case it is permissible to change the measuring position within a range of ± 0.25 degree of each measuring point.



Aiming (Upper beam photometric axis)

Vertical: Downward within 1/5 of headlamp height at a distance of 10m ahead.

Horizontal: Within 20cm to right or left at a distance of 10m ahead. (Provided that right hand headlamp shall not exceed 10cm to right.)

Upper beam							Low beam		
Measuring point (degree)	Type 1		Type 1		Composition		Measuring point (degree)	Max.	Min.
	Max.	Min.	Max.	Min.	Max.	Min.			
3U - 3R & 3L	-	450	-	300	-	750	1 U - 1R - Right	700	-
2U - 3R & 3L	-	750	-	750	-	1 500	½ U - 1R - Right	1 000	-
1U - 3R & 3L	-	3 000	-	2 000	-	5 000	½ D - 1R - Right	2 500	-
½ D - V	(a)	18 000	(a)	7 000	112 500	25 000	1 ½ U - 1L - Left	1 000	-
½ D - 3R & 3L	-	12 000	-	3 000	-	15 000	½ U - 1L - 3L	2 700	-
½ D - 6R & 6L	-	3 000	-	2 000	-	5 000	½ D - 2L	20 000	6 000
½ D - 9R & 9L	-	2 000	-	1 000	-	3 000	1 D - 6R	-	1 000
½ D - 12R & 12L	-	750	-	750	-	1 500	1 ½ D - 2L	-	15 000
2D - V	-	3 000	-	2 000	-	5 000	1 ½ D - 9L & 9R	-	1 000
2D - 9R & 9L	-	1 250	-	750	-	2 000	2D - 15L & 15 R	-	700
3D - V	-	1500	-	1 000	-	2 500	4D - 4L	12 500	-
3D - 12R & 12L	-	600	-	400	-	1 000	10U - 90U (b)	125	-
4D - V	5 000	-	2 500	-	7 500	-			

NOTES

(a) The maximum luminous intensity of the composite light shall not exceed 112.500 cd at a measuring point of ½ D - V

(b) The measurement shall be made of the light from the lens section of the headlamp.

USA FMVSS 108 (FIGURE 15)

Sheet No. 11

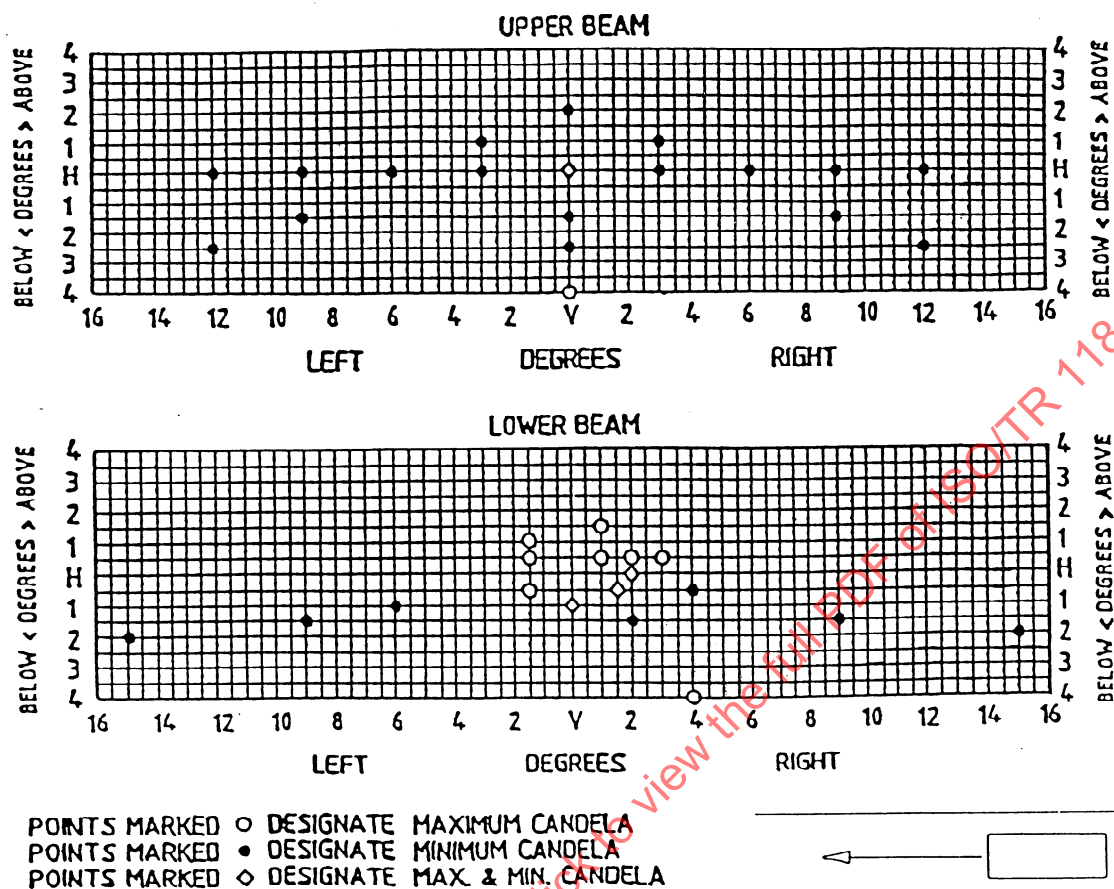


FIG. 15 - PHOTOMETRIC TEST POINT VALUES

Upper beam			Lower beam		
Test points deg.	cd. max.	cd. min.	Test points deg.	cd. max.	cd. min.
2U - V	-	1 500	10U - 90U	125	-
1U - 3R and 3L	-	5 000	1U - 1 - ½ L to L	700	-
H - V	70 000	40 000	½ U - 1 - ½ L to L	1 000	-
H - 3R and 3L	-	15 000	½ D - 1 - ½ L to L	3 000	-
H - 6R and 6L	-	5 000	1 ½ U - 1R to R	1 400	-
H - 9R and 9L	-	3 000	½ U - 1R to 3R	2 700	-
H - 12R and 12L	-	1 500	½ D - 1 - ½ R	20 000	10 000
1 - ½ D - V	-	5 000	1D - 6L	-	1 000
1 - ½ D - 9R and 9L	-	2 000	1 - ½ D - 2R	-	15 000
2 - ½ D - V	-	2 500	1 - ½ D - 9L and 9R	-	1 000
2 - ½ D - 12R and 12L	-	1 000	2D - 15L and 15 R	-	850
4D - V	5 000	-	4D - 4R	12 500	-
			4D - V	7 000	-
			H - V	5 000	-

USA FMVSS 108 (FIGURE 17)

Sheet No. 12

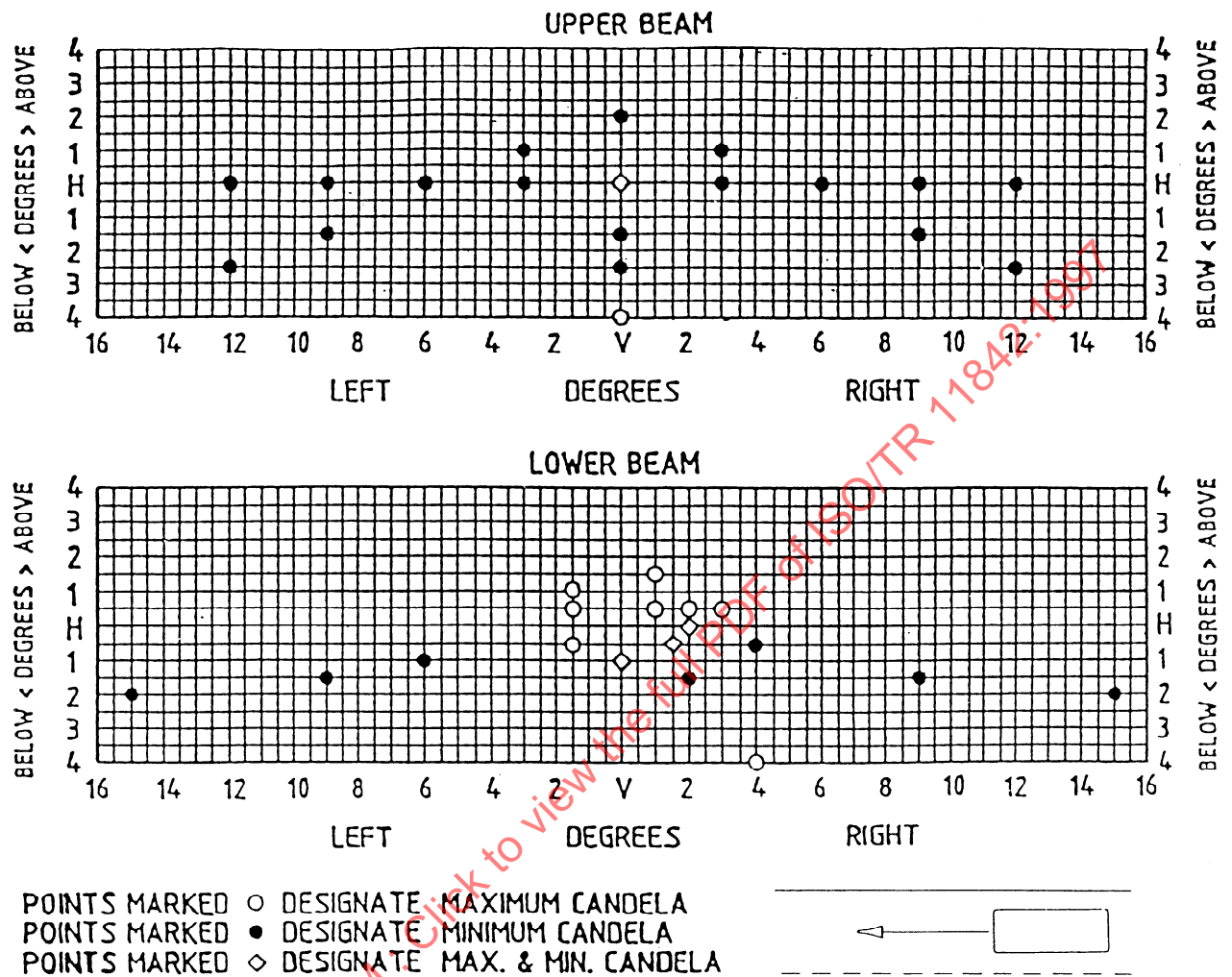
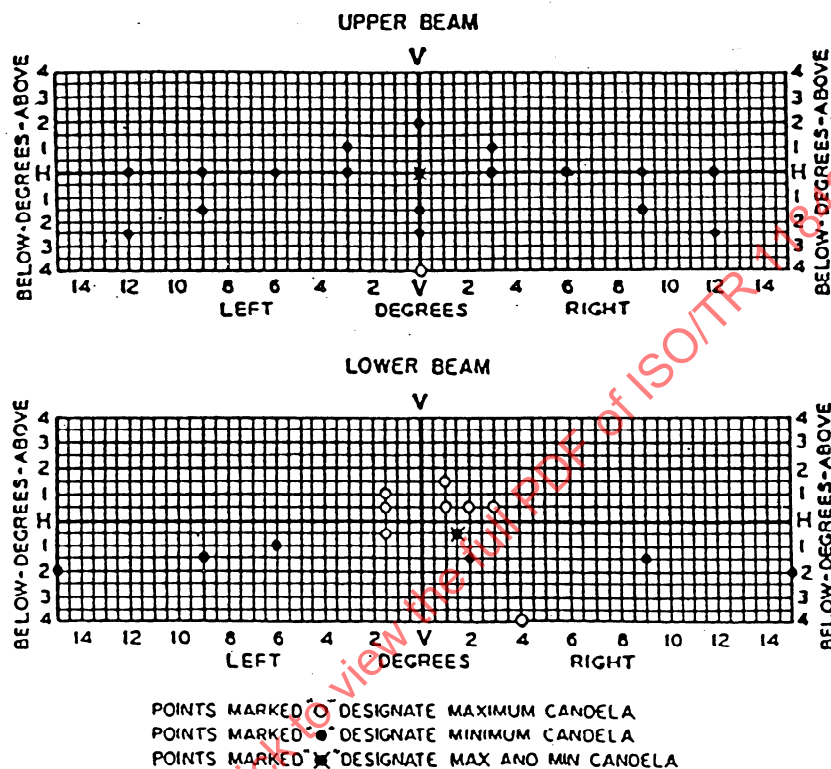
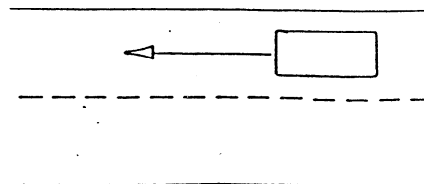


FIG. 17 - PHOTOMETRIC TEST POINT VALUES
2 - Lamp Systems

Upper beam			Lower beam		
Test points deg.	cd. max.	cd. min.	Test points deg.	cd. max.	cd. min.
2U - V	-	1 500	10U - 90U	125	-
1U - 3R and 3L	-	5 000	1U - 1 - ½ L to L	700	-
H - V	75 000	40 000	½ U - 1 - ½ L to L	1 000	-
H - 3R and 3L	-	15 000	½ D - 1 - ½ L to L	3 000	-
H - 6R and 6L	-	5 000	1 ½ U - 1R to R	1 400	-
H - 9R and 9L	-	3 000	½ U - 1R to 3R	2 700	-
H - 12R and 12L	-	1 500	½ D - 1 - ½ R	20 000	10 000
1-½ D - V	-	5 000	1D - 6L	-	1 000
1-½ D - 9R and 9L	-	2 000	1- ½ D - 2R	-	15 000
2-½ D - V	-	2 500	1 - ½ D - 9L and 9R	-	1 000
2-½ D - 12R and 12L	-	1 000	2D - 15L and 15 R	-	850
4D - V	12 000	-	4D - 4R	12 500	-

Sheet No. 13

**USA SEALED BEAM HEADLAMP UNITS FOR MOTOR
VEHICLES—SAE J579 DEC84**
**FIG. 3—PHOTOMETRIC DESIGN TEST POINTS**
**TABLE 1 - TEST POINT VALUES FOR 7 in (178 mm)
TYPE 2 SEALED BEAM UNITS**

Upper beam (One 7 in (178 mm) Unit)			Lower beam		
Test points deg. ^a	cd. max.	cd. min.	Test points deg. ^a	cd. max.	cd. min.
2U - V	-	1 000	10U -to- 90U*	125	-
1U - 3R and 3L	-	2 000	1U - 1 - ½ L to L	700	-
H - V	75 000	20 000	½ U - 1 - ½ L to L	1 000	-
H - 3R and 3L	-	10 000	½ D - 1 - ½ L to L	2 500	-
H - 6R and 6L	-	3 250	1-½ U - 1R to R	1 400	-
H - 9R and 9L	-	1 500	½ U - 1R to 3R	2 700	-
H - 12R and 12L	-	750	½ D - 1 - ½ R	20 000	8 000
1-½ D - V	-	5 000	1D - 6L	-	750
1-½ D - 9R and 9L	-	1 500	1 - ½ D - 2R	-	15 000
2 - ½ D - V	-	2 500	1 - ½ D - 9L and 9R	-	750
2 - ½ D - 12R and 12L	-	750	2D - 15L and 15 R	-	700
4D - V	5 000	-	4D - 4R	12 500	-

^a From the normally exposed surface of the lens.^b A tolerance of $\pm \frac{1}{4}$ deg. in location may be allowed for at any test point.
**TABLE 2 - TEST POINT VALUES FOR 5-3/4 in (146 mm) AND
4 x 6-1/2 in (100 x 165 mm) FOUR-LAMP DUAL SEALED BEAM UNITS**

Upper beam (One Type 1 and One Type 2) or (One Type 1A and One Type 2A)					Lower beam (One Type 2 or 2A Unit)		
Test points deg. ^a	Type 1 or 1A		Type 2 or 2A		Test points deg. ^a	cd. max.	cd. min.
	cd. max.	cd. min.	cd. max.	cd. min.			
2U - V	-	750	-	750	10U -to- 90U*	125	-
1U - 3R and 3L	-	3 000	-	2 000	1U - 1 - ½ L to L	700	-
H - V	60 000	18 000	15 000	7 000	½ U - 1 - ½ L to L	1 000	-
H - 3R and 3L	-	12 000	-	3 000	½ D - 1 - ½ L to L	2 500	-
H - 6R and 6L	-	3 000	-	2 000	1 ½ U - 1R to R	1 400	-
H - 9R and 9L	-	2 000	-	1 000	½ U - 1R to 3R	2 700	-
H - 12R and 12L	-	750	-	750	½ D - 1 - ½ R	20 000	8 000
1-½ D - V	-	3 000	-	2 000	1D - 6L	-	750
1-½ D - 9R and 9L	-	1 250	-	750	1-½ D - 2R	-	15 000
2-½ D - V	-	1 500	-	1 000	1 - ½ D - 9L and 9R	-	750
2-½ D - 12R and 12L	-	600	-	400	2D - 15L and 15 R	-	700
4D - V	5 000	-	2 500	-	4D - 4R	12 500	-

^a From the normally exposed surface of the lens.^b A tolerance of $\pm \frac{1}{4}$ deg. in location may be allowed for at any test point.