

UN R-48 Lamp Installation

The 57th Asia Expert Meeting in Thailand

Date: August 8th – 9th , 2019



JAPAN AUTOMOBILE STANDARDS INTERNATIONALIZATION CENTER

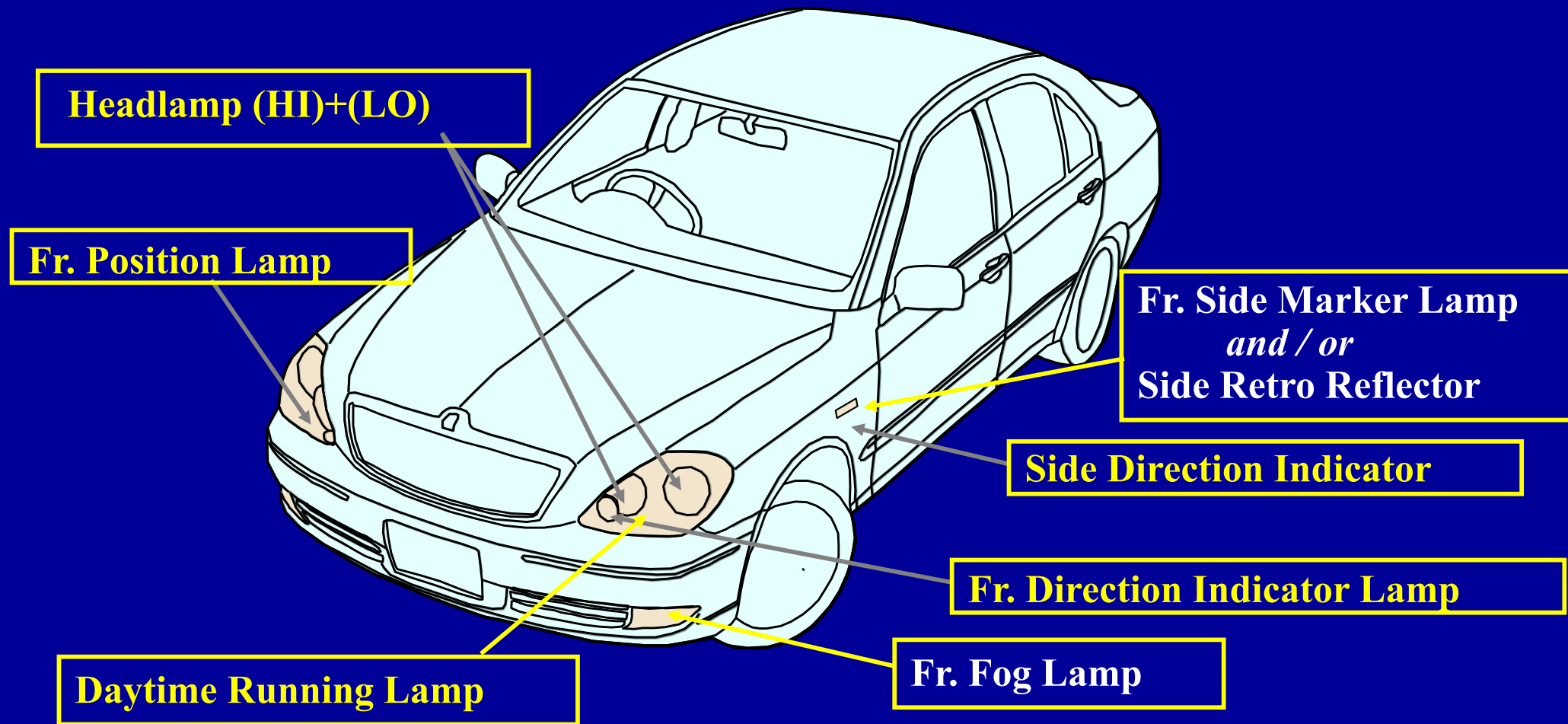
Introduction of the UN R-48

Lamp Location

Front

Yellow: Mandatory

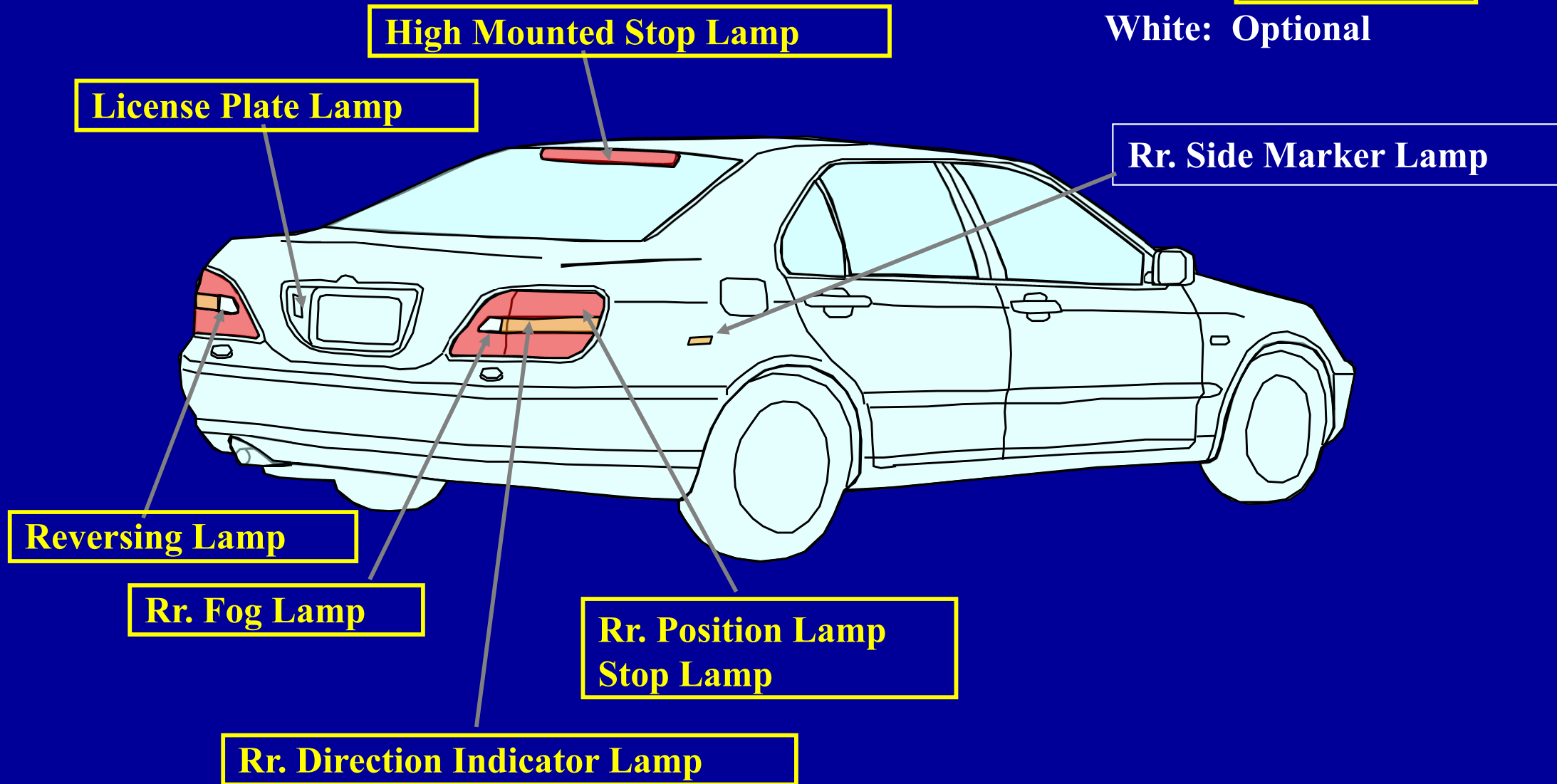
White: Optional



Rear

Yellow: **Mandatory**

White: **Optional**



Contents-1

1. Scope



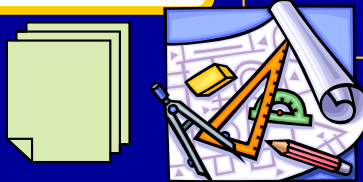
The installation of lighting and light-signalling devices.

2. Definitions



**Meaning of terms which will be used in this Reg.
Around 80 terms were defined**

3. Application for approval



**Documents and drawings which will be submitted
when approval is sought.**

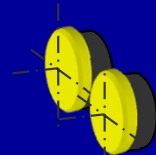
4. Approval



Marking

5. General specifications

Remarks and special requirements for installation



Contents-2

Mandatory

Option

Condition



6. Individual Specifications

Passenger Vehicle

- 6.1. Main-beam headlamp
- 6.2. Dipped-beam headlamp
- 6.3. Front fog lamp
- 6.4. Reversing lamp
- 6.5. Direction-indicator lamp
- 6.6. Hazard warning signal
- 6.7. Stop lamp
- 6.8. Rear registration plate lamp
- 6.9. Front position lamp
- 6.10. Rear position lamp
- 6.11. Rear fog lamp
- 6.12. Parking lamp
- 6.13. End-outline marker lamp
- 6.14. Rear retro-reflector, non-triangular
- 6.15. Rear retro-reflector, triangular
- 6.16. Front retro-reflector, non-triangular
- 6.17. Side retro-reflector, non-triangular
- 6.18. Side-marker lamps
- 6.19. Daytime running lamp
- 6.20. Cornering lamp
- 6.21. Retro-reflective marking by means of side and rear retro reflective lines and contour markings
- 6.22. Adaptive front lighting system (AFS)
- 6.23. Emergency stop lamp (ESS)
- 6.24. Exterior courtesy lamp
- 6.25. Rear-end collision alert signal (RECAS)
- 6.26. Manoeuvring lamps

Contents-3

6.X. Lamp Name

6.X.1. Presence



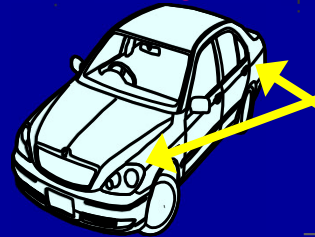
Mandatory or Option or Prohibit

6.X.2. Number



Number of Devices

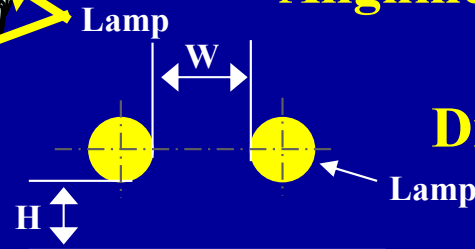
6.X.3. Arrangement



Alignment of Devices

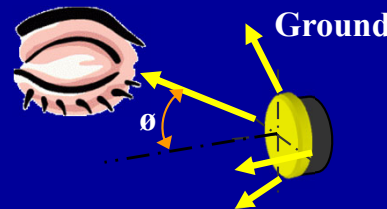
6.X.4. Position

width, height, length



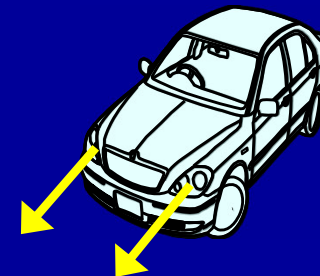
Dimension of Devices on vehicle

6.X.5. Geometric visibility



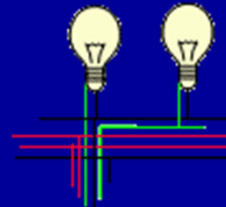
Visibility angles

6.X.6. Orientation



Direction of devices

6.X.7. Electrical connections



Circuit for On-Off

6.X.8. Tell-tale



Indicator (warn & fail & operate)

6.X.9. Other requirements

Special requirement

Contents-4

7. Modifications and extension of approval of the vehicle type or of the installation of its lighting and lightsignalling devices

8. Conformity Of Production

9. Penalties for non-conformity of production

10. Production definitely discontinued

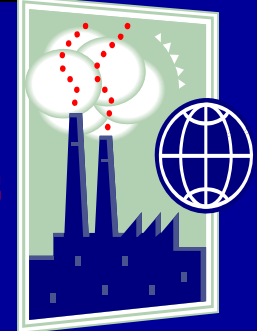
11. Names and addresses of technical services responsible for conducting approval tests and of administrative departments

12. Transitional provisions

Certificate



+ α



~~COP~~



Annex 1 Communication

Annex 2 Arrangements of approval marks

Annex 3 Lamp surfaces, axis and centre of reference, and angles of geometric visibility

Annex 4 Visibility of a red lamp to the front and visibility of a white lamp to the rear

Annex 5 States of loading to be taken into consideration in determining variations in the vertical orientation of the dipped-beam headlamps

Annex 6 Measurement of the variation of dipped-beam inclination as a function of load

Annex 7 Indication of the stated initial adjustment referred to in paragraph 6.2.6.1.1. Of this regulation

Annex 8 The controls for the headlamp-levelling devices referred to in paragraph 6.2.6.2.2. Of this regulation

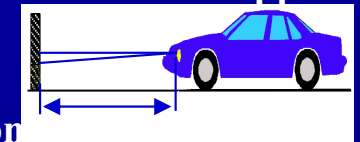
Annex 9 Control of conformity of production

Annex 12 Test drive specifications for the automatic control of the main-beam headlamps

Annex 13 Automatic switching conditions dipped-beam headlamps

Annex 14 Observing area towards the apparent surface of manoeuvring and courtesy lamps

Annex 15 Gonio(photo)meter system used for the photometric measurements as defined in paragraph 2.34. of this Regulation



History

First Issue :
1982/01/01 as [00] Series

§

Latest (at Aug. 2019):
2019/05/28 as [06] Series-Suppl.[11]

UN Regulation No. 48 - Installation of lighting and light-signalling devices – 06 Series

Document reference E/ECE/324/Rev.1/... E/ECE/TRANS/505/Rev.1/...	Status of document	Date of entry into force	Adopted by AC.1				Notes
			Session (date)	Report ECE/TRANS/WP.29/...	Adopted document ECE/TRANS/WP.29/...	Transmitted by	
Add.47/Rev.9	06 series	18.11.12					1
Add.47/Rev.9/Amend.1	Suppl.1 to 06	15.07.13	158 (Nov. 12)	1099, para. 91	2012/73 + para.46 of the report + 2012/73/Corr.1 + 2012/74	AC.1 (52 nd)	
Add.47/Rev.12/Amend.7	Suppl.11 to 06	28.05.19	176 (Nov 18)	1142, para.172	2018/84	AC.1 (70 th)	

When you want to know the history of revision of UN-R48 and latest version, you can get it from UN website
Status of the 1958 Agreement

- **Series** ••• Amendment having a technical impact
- **Supplement** ••• Minor amendment (mainly for clarification)
linked to each series of amendment
- **Corrigendum** ••• Error correction

Explanation of the UN R-48 Lamp Installation

Contents

1. Scope
2. Definitions
3. Application for approval
4. Approval
5. General specifications
6. Individual specifications
7. Modifications and extensions of the approval of the vehicle type or of the installation of its lighting and light-signalling devices
8. Conformity of production
9. Penalties for non-conformity of production
10. Production definitely discontinued
11. Names and addresses of the technical services responsible for conducting approval tests, and of administrative departments
12. Transitional provisions

Presentation Items

- 1. Scope**
- 2. Definitions**
- 5. General specifications**
- 6. Individual specifications**

1. SCOPE

This Regulation applies to vehicles of **categories M, N**, and to their trailers (**category O**) ^{1/} with regard to the installation of lighting and light-signalling devices.

- 1/ As defined in Annex 7 to the Consolidated Resolution on the Construction of Vehicles (R.E.3),
UN website: [Resolutions-Transport-UNECE](#)

Definition of the Vehicle Category

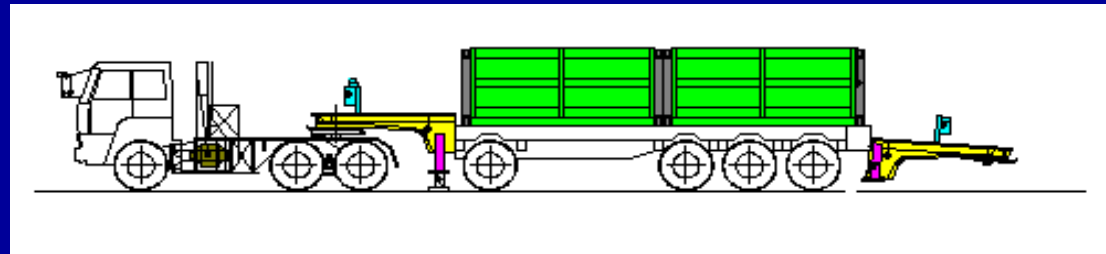
Category **N** Commercial vehicle



Category **M** passenger vehicle



Category **O** Trailer



Category M: Motor vehicles with at least four wheels designed and constructed for the carriage of passengers.

Category	Definitions
M1	Seats ≤ 9
M2	Seats ≥ 10 , Maximum mass ≤ 5 tons
M3	Seats ≥ 10 , Maximum mass > 5 tons

Category N: Motor vehicles with at least four wheels designed and constructed for the carriage of goods.

Category	Definitions
N1	Maximum mass ≤ 3.5 tons
N2	$3.5 \text{ tons} < \text{Maximum mass} \leq 12 \text{ tons}$
N3	Maximum mass > 12 tons

Category O: Trailers. (including semi-trailers)

Category	Definitions
O1	Maximum mass ≤ 0.75 tons
O2	$0.75 \text{ tons} < \text{Maximum mass} \leq 3.5 \text{ tons}$
O3	$3.5 \text{ tons} < \text{Maximum mass} \leq 10 \text{ tons}$
O4	Maximum mass > 10 tons

Presentation Items

1. Scope

2. Definitions

5. General specifications

6. Individual specifications

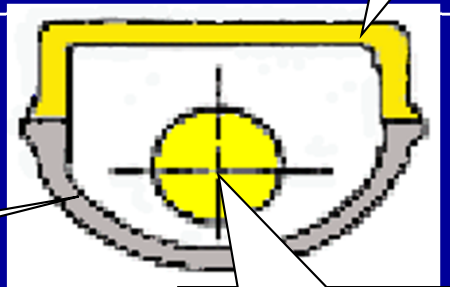

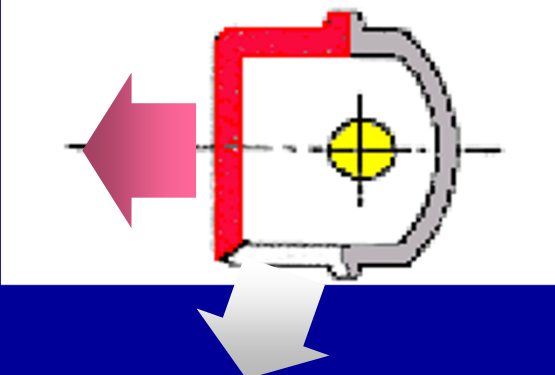
2. Definitions

- 2.7.3. Independent lamps**
- 2.7.4. Grouped lamps**
- 2.7.5. Combined lamps**
- 2.7.6. Reciprocally incorporated lamps**
- 2.8. Light emitting surface**
- 2.9. Illuminating surface**
- 2.10. Apparent surface**
- 2.11. Axis of reference**
- 2.12. Center of reference**
- 2.13. Angle of geometric visibility**
- 2.14. Extreme outer edge**
- 2.16.1. Single lamp**
- 2.17. Distance between Two lamps**
- 2.18, 2.19. Tell-tale**



2.7.3. Independent Lamps

2.7.4. Grouped Lamps

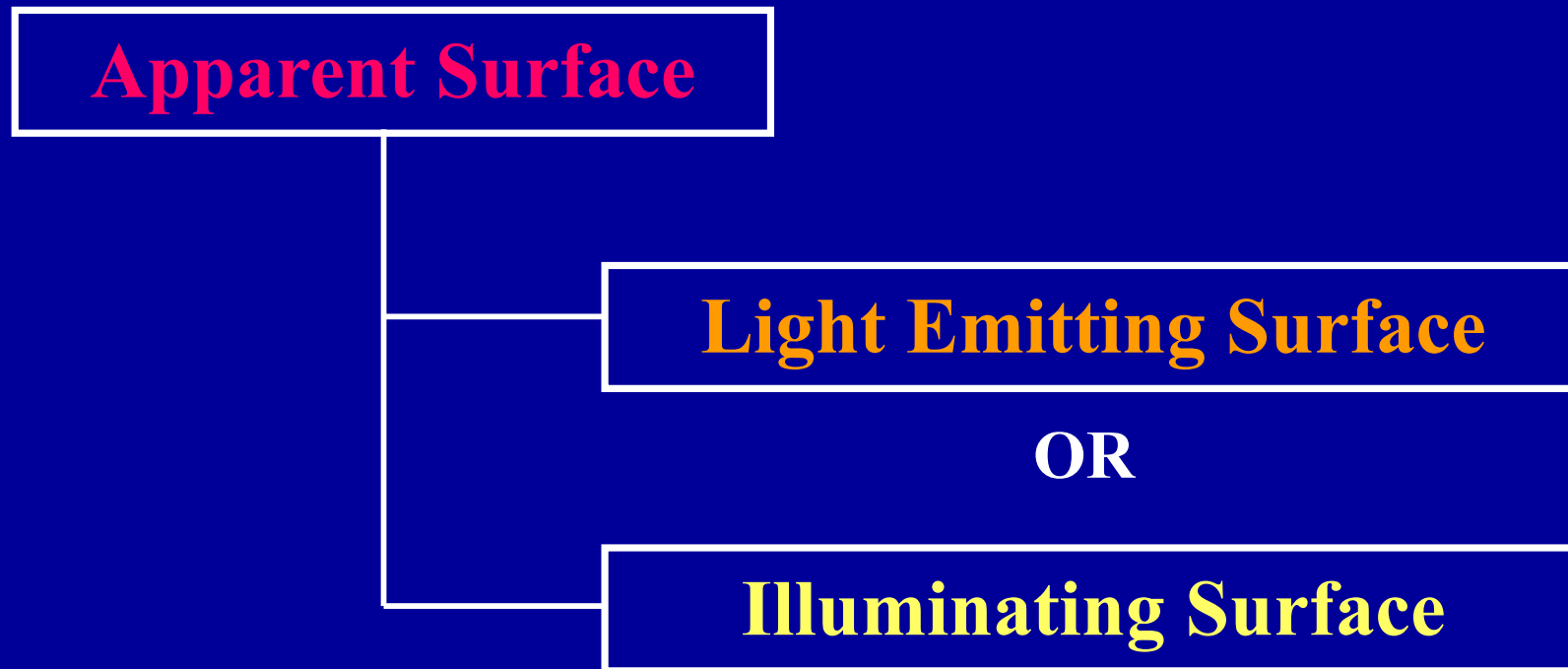
2.7.5. Combined Lamps

	Lens (illuminating surface)	Light source	Housing (Lamp body)	Example
2.7.3. Independent Lamps	Separate	Separate	Separate	
2.7.4. Grouped Lamps	Separate	Separate	Common	
2.7.5. Combined Lamps	Separate	Common	Common	

2.7.6. Reciprocally Incorporated Lamps

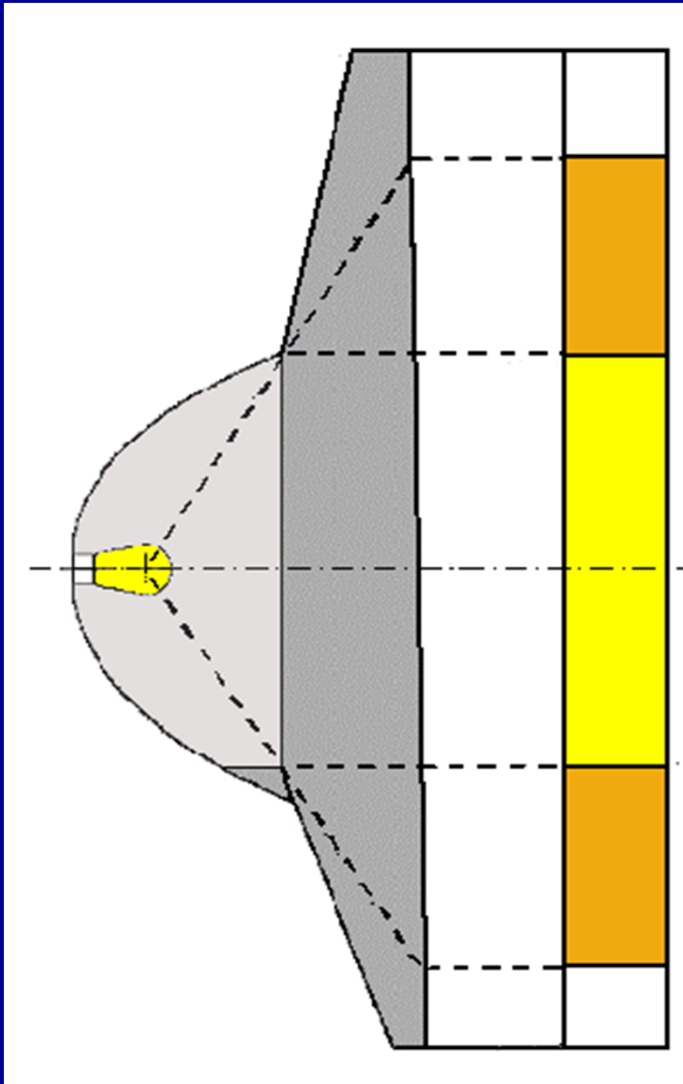
	Lens (illuminating surface)	Light source	Housing (Lamp body)	Example
2.7.6. Reciprocally Incorporated Lamps	Common	Separate	Common	 

2.10. Apparent Surface



Manufactures declare either one Light Emitting Surface or Illuminating Surface as a Apparent Surface.

2.10. Apparent Surface



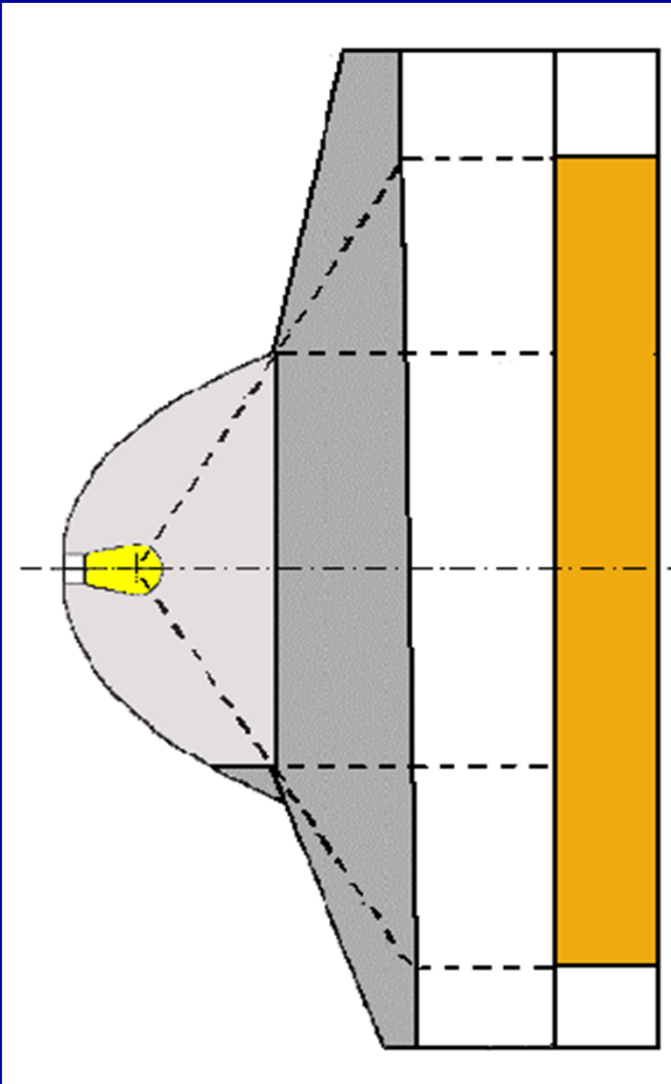
Light Emitting Surface ?

Illuminating Surface ?



Declare by the manufacturer

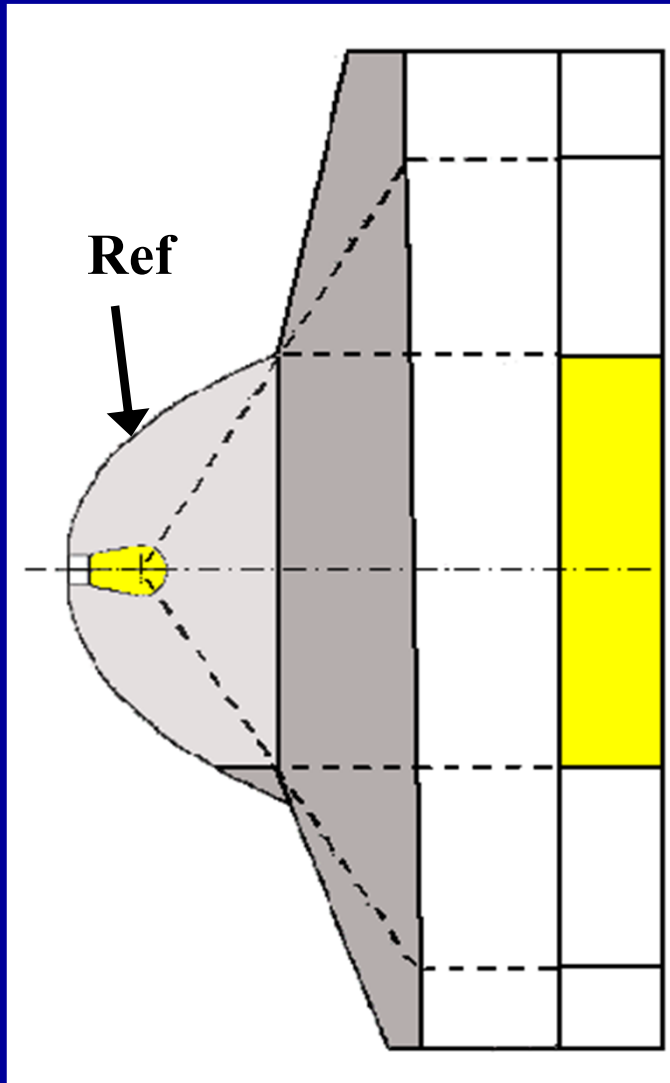
2.8. Light emitting surface



All or part of the **exterior surface of the transparent material (lens)** declared by the design of the manufacturer.

2.9. Illuminating surface

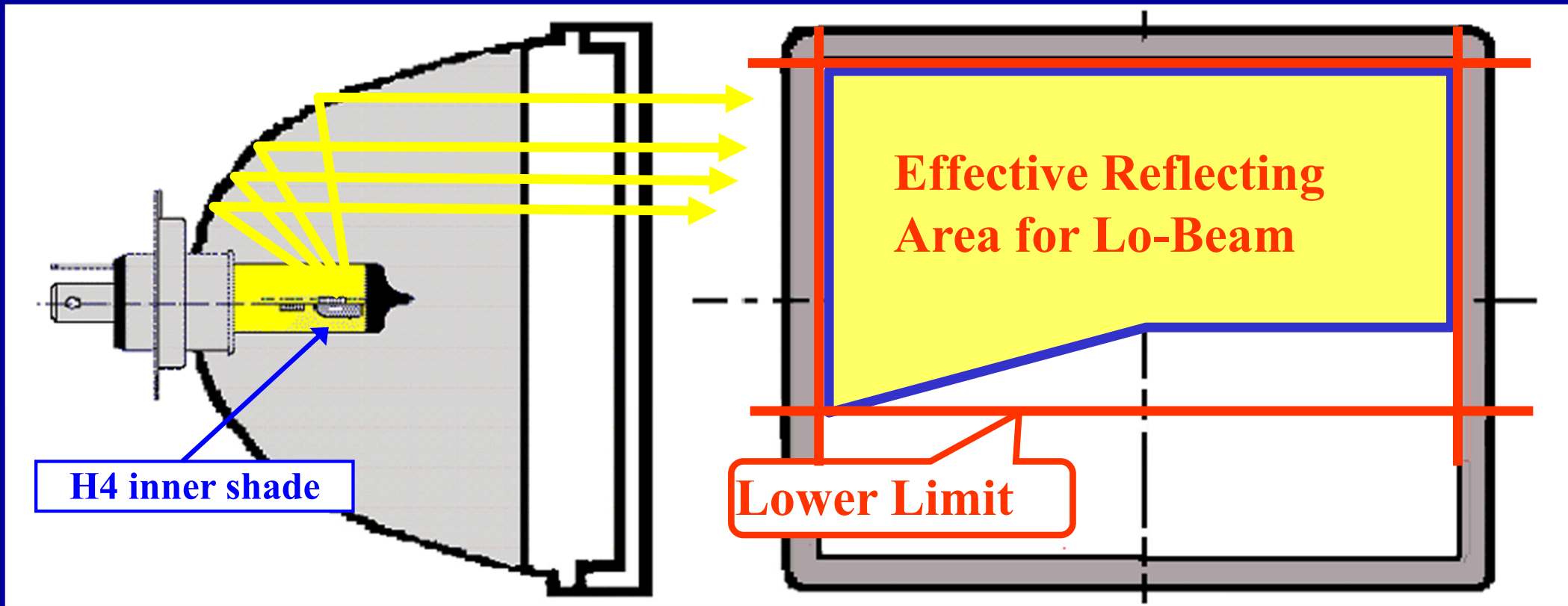
- Head Lamp, Fr. Fog Lamp, Reversing Lamp (2.9.1)



Orthogonal projection of the
full aperture of the reflector.
(lighting devices)

If the lighting device has **no reflector**,
applying a illuminating surface of **signal
lamp** (light-signalling devices)

2.9.1 Illuminating surface of lighting device

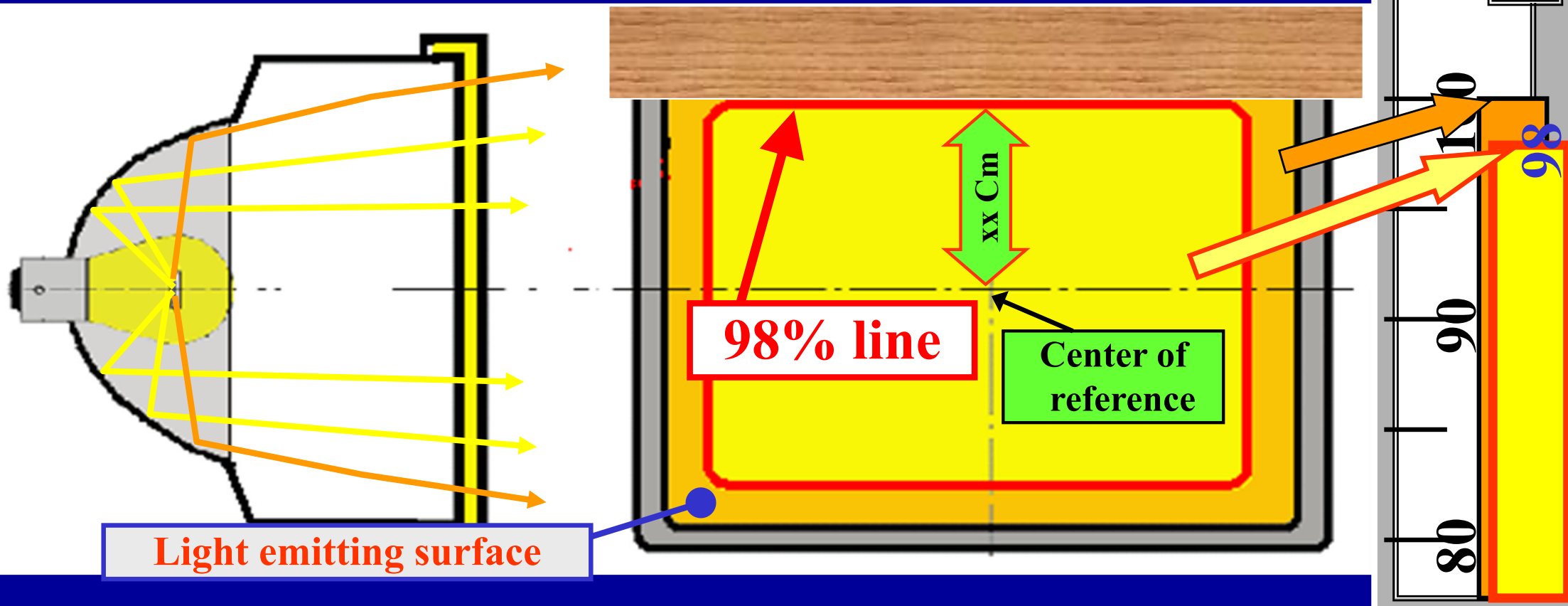


In case of a Lo-beam headlamp, the **illuminating surface** is limited by the apparent projection of the **cut-off on to the lens**.

2.9.2 Illuminating surface of light-signalling device other than RR

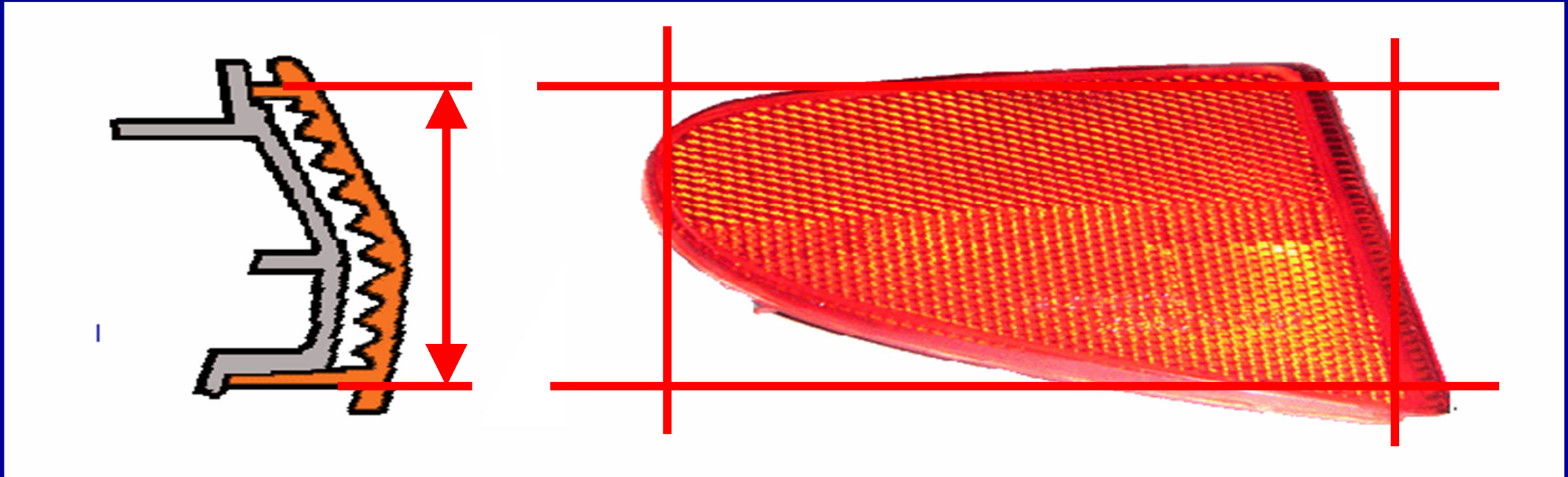
Light Intensity [%]

%



Illuminating surface is that each side of the rectangle of the light emitting surface allowing only **98% of the total luminous intensity** of the light in the direction of the axis of reference.

2.9.3 Illuminating surface of Retro-reflector (RR)



Orthogonal projection of a RR in a plane perpendicular to its axis of reference and **delimited by planes contiguous to the outermost parts of the RR's optical system and parallel to that axis.**

2.11. Axis of Reference or Reference Axis

2.12. Center of Reference

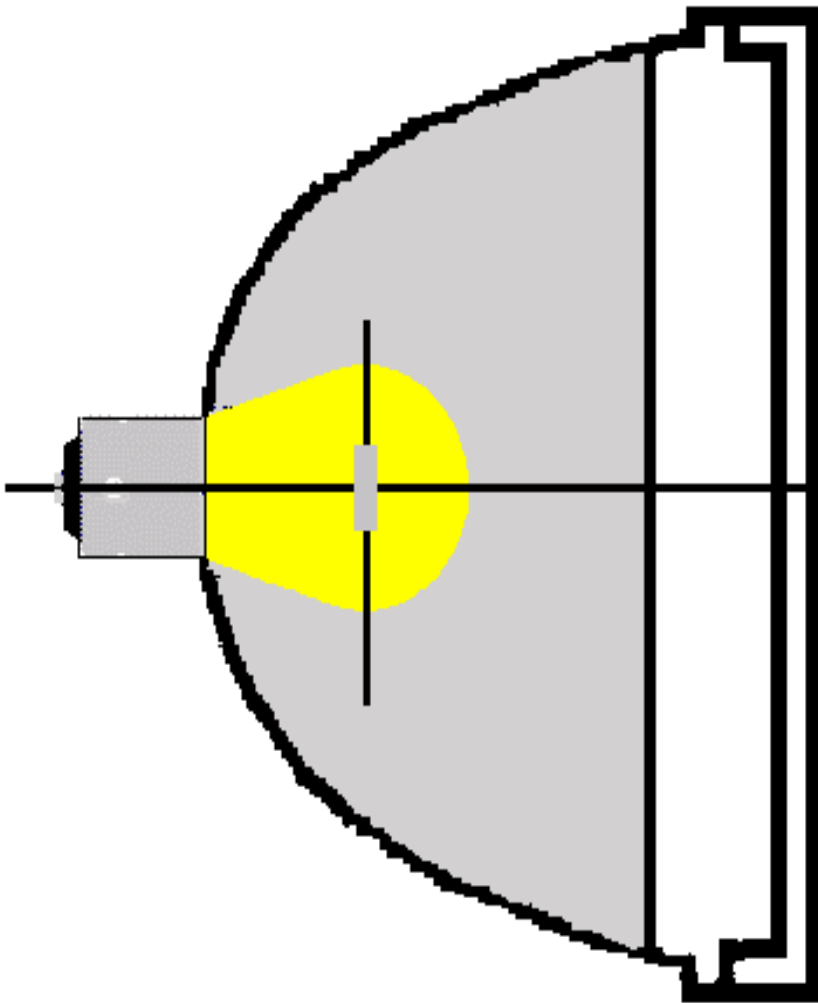
Axis of Reference ($H=0$ $V=0$)

- Photometric measurement
 - Installing the lamp on vehicle
- Use both value as the basic

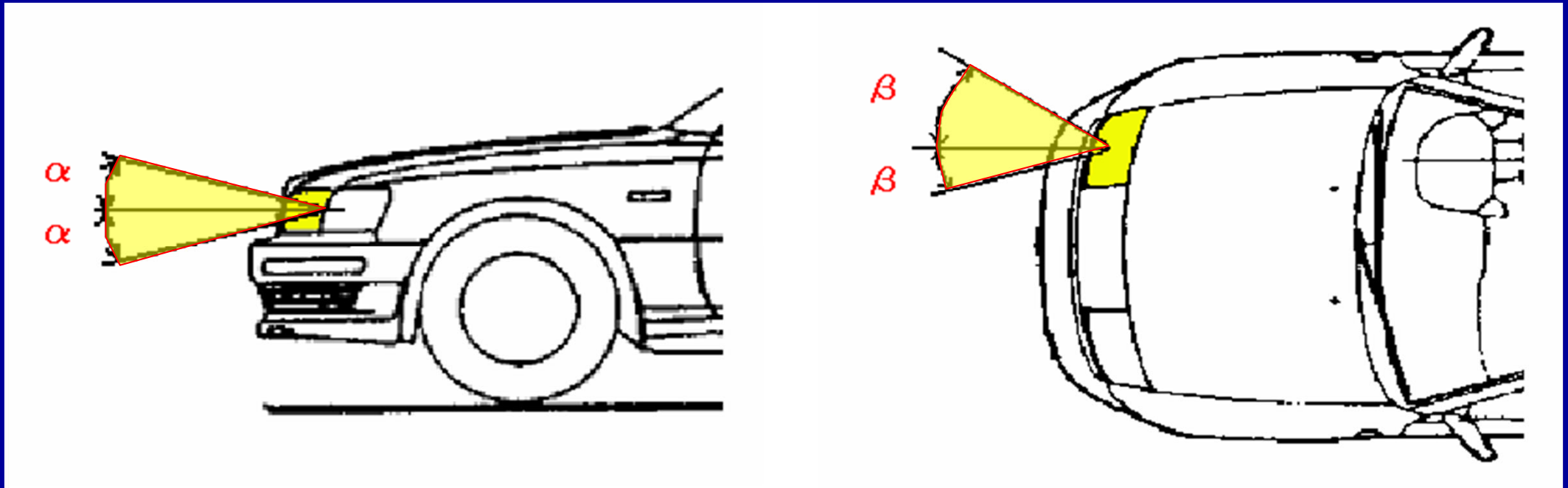
$H=0$ $V=0$

Center of Reference

Intersection of the axis of reference on the lens



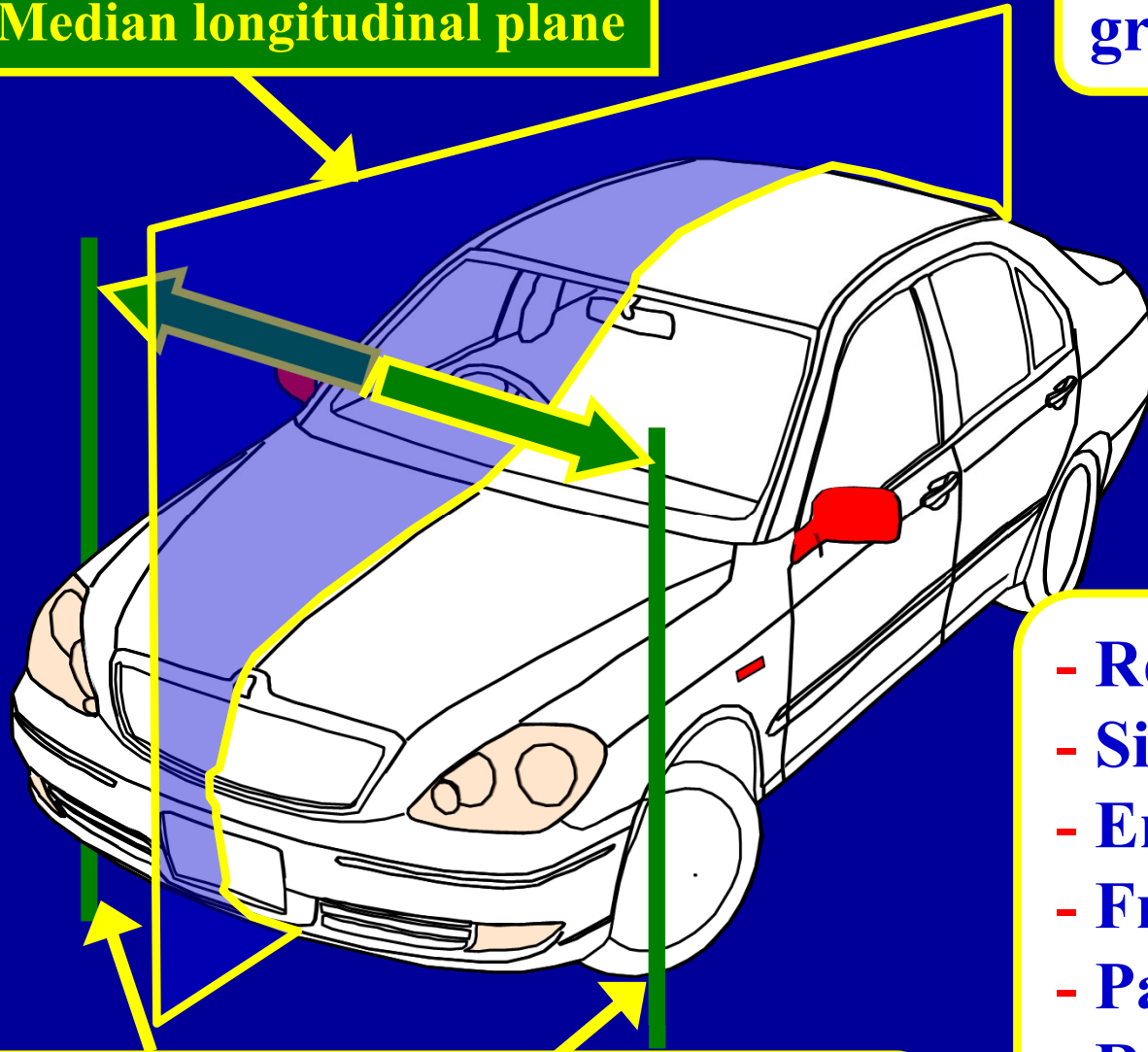
2.13 Angle of Geometric Visibility



- The field of the minimum solid angle in which the apparent surface of the lamp must be visible.
- There must be no obstacle on the inside of the angles of geometric visibility .

2.14. Extreme outer edge

Median longitudinal plane



- Tires contact points with the ground and pressure gauges

These points and parts will be **disregarded** from outer edges

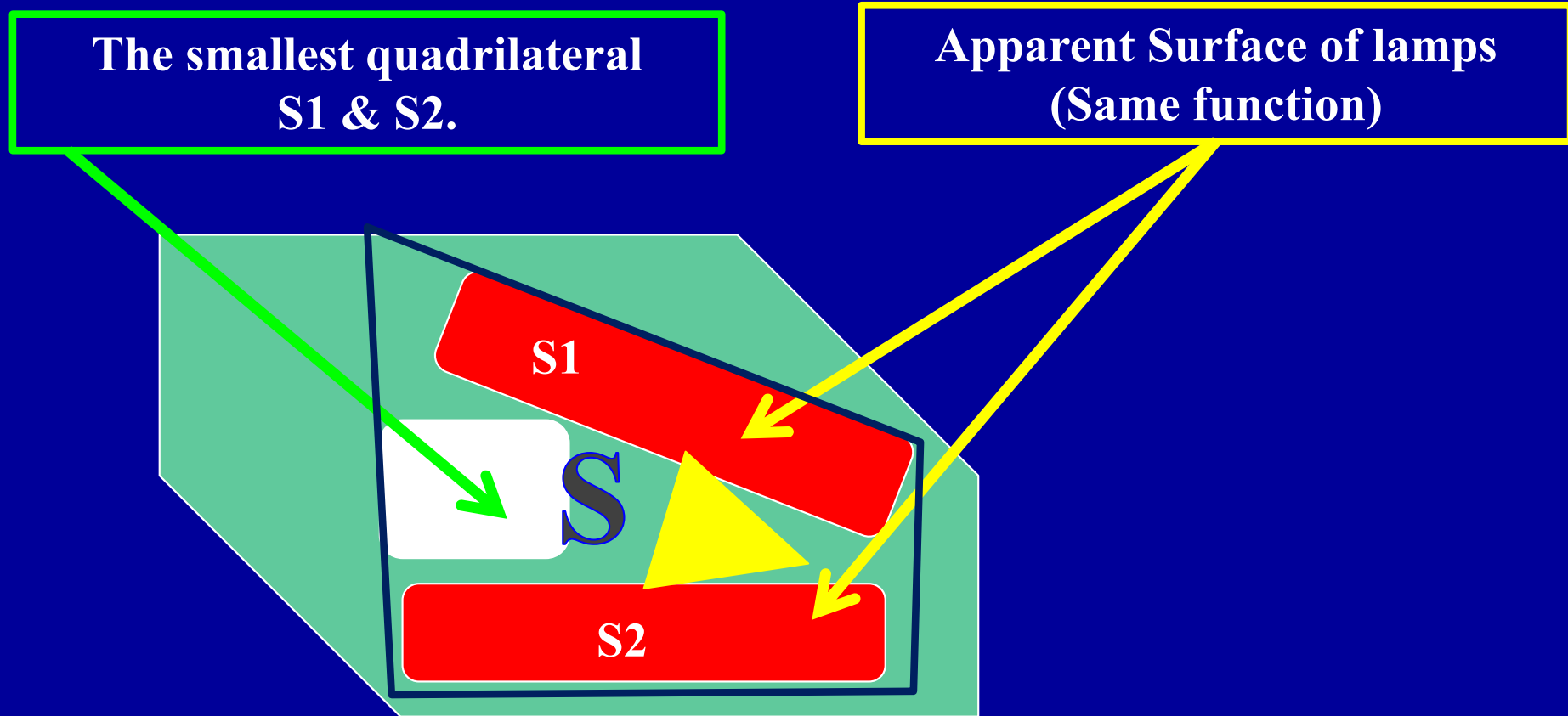
Outer Edge : the plane parallel to the median longitudinal plane

- Rear View Mirrors
- Side Direction-Indicator Lamps
- End Outline Marker Lamps
- Front and Rear Position Lamps
- Parking Lamps
- Retro Reflectors
- Side Marker Lamps

2.16.1 Single Lamp

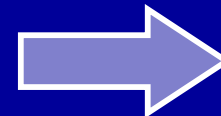
- (a) A device or part of a device having **one function, one or more light source(s) and one apparent surface** in the direction of the reference axis; or
- (b) Any assembly of **two lamps marked "D"**, having the **same function**; or
- (c) Any assembly of **two independent retro-reflectors**, that have been approved separately; or
- (d) Any interdependent lamp system composed of **two or three interdependent lamps marked "Y" approved together** and providing the **same function**.

5.7.2 Single Lamp



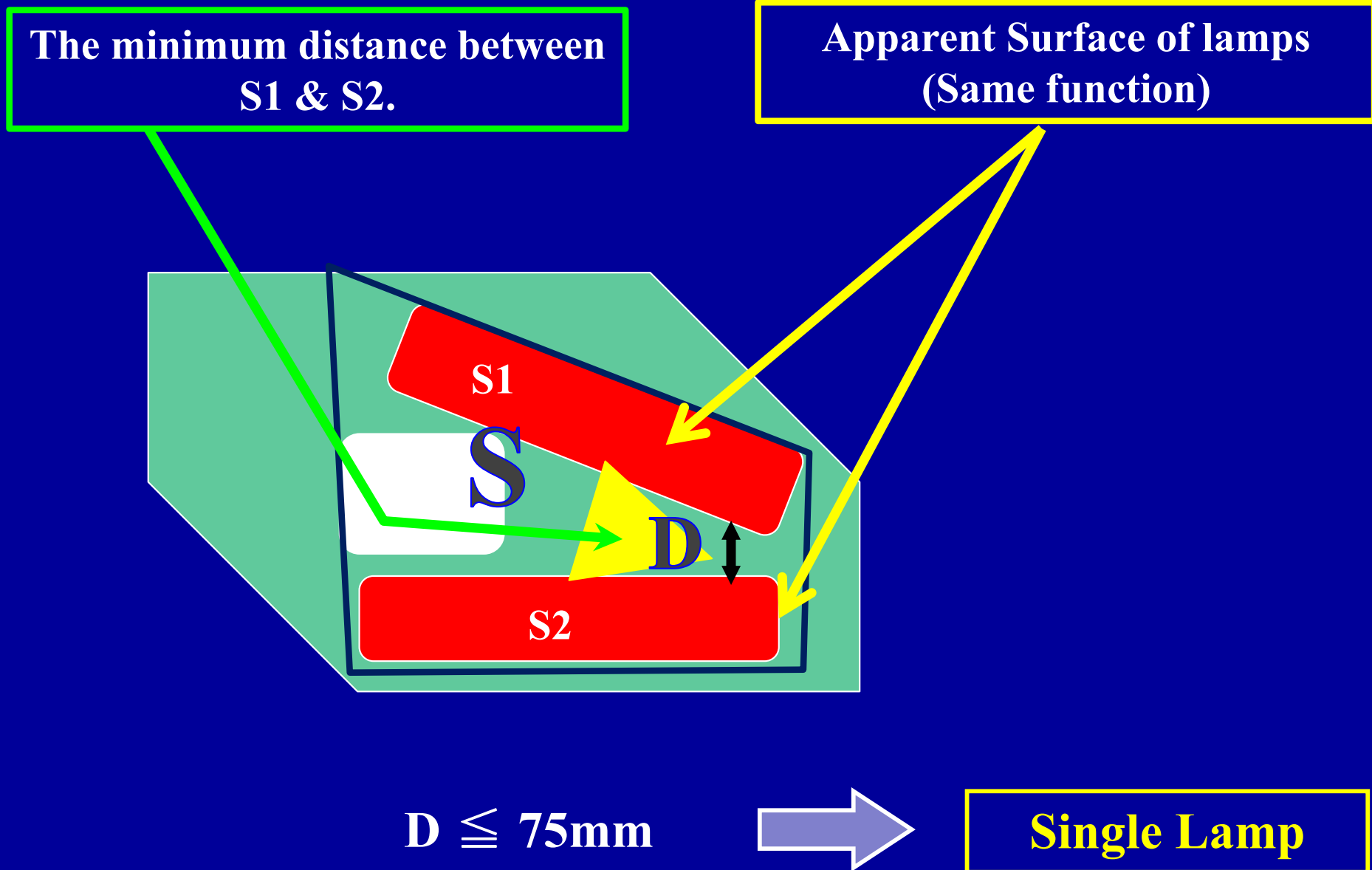
$$\frac{(S1 + S2)}{S} \times 100 \geq 60\%$$

dividing times



Single Lamp

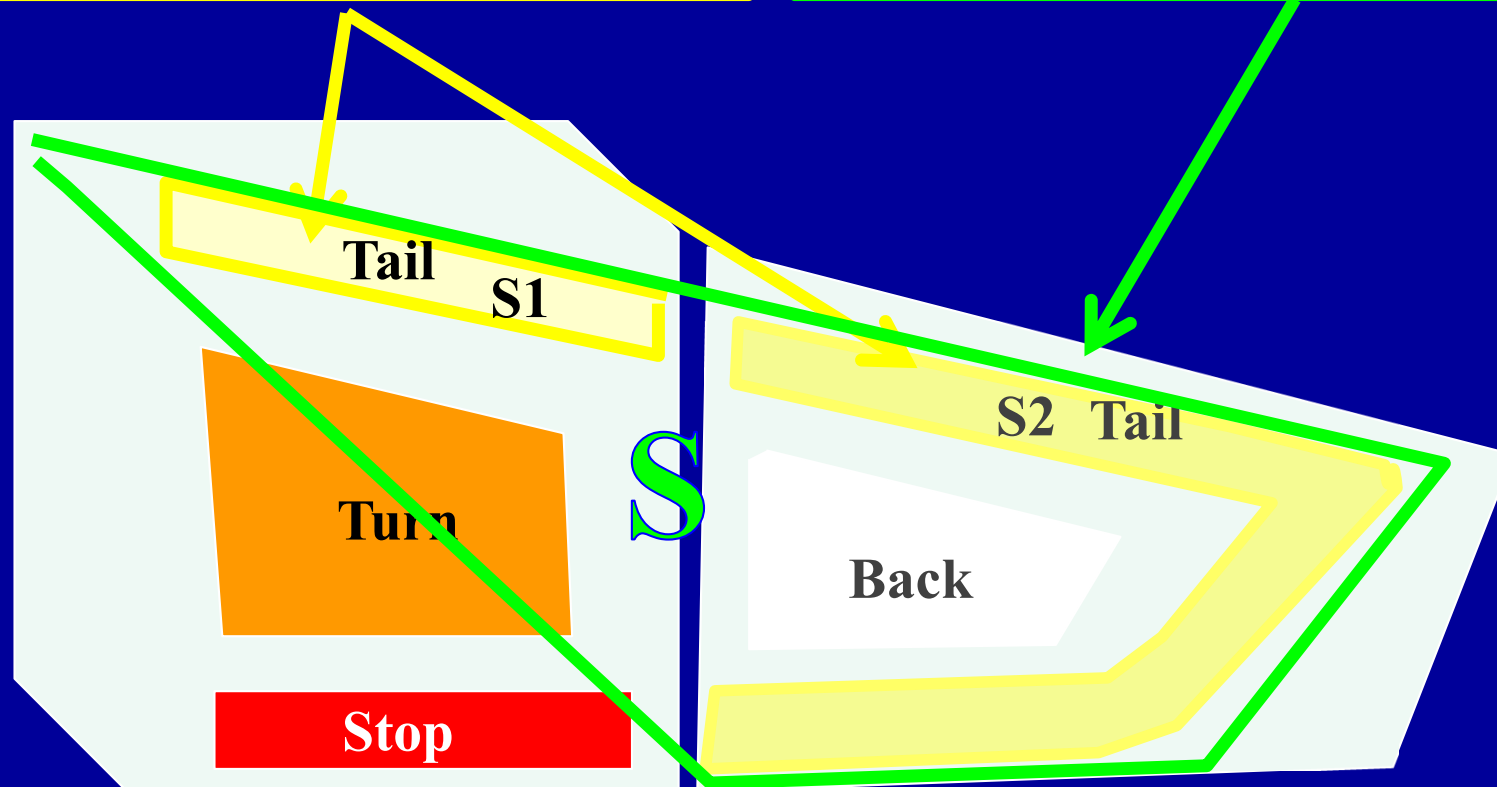
5.7.2 Single Lamp



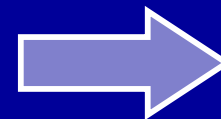
5.7.2 Single Lamp is composed of two or more distinct parts (Type “D” lamp or Type “Y” lamp)

Apparent Surface of lamps
(Same function)

The smallest quadrilateral
S1 & S2.

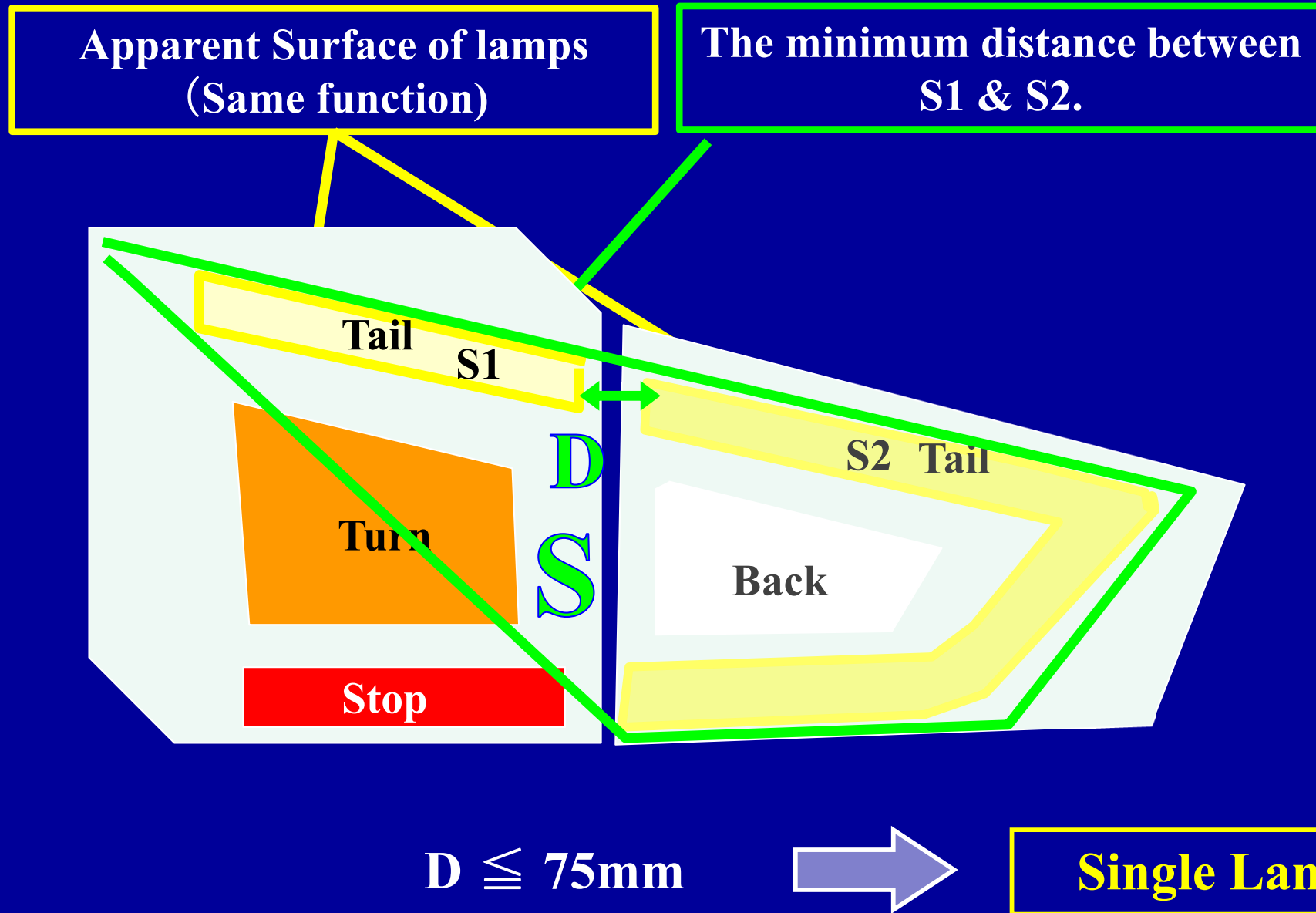


$$\frac{(S1 + S2)}{S} \times 100 \geq 60\%$$

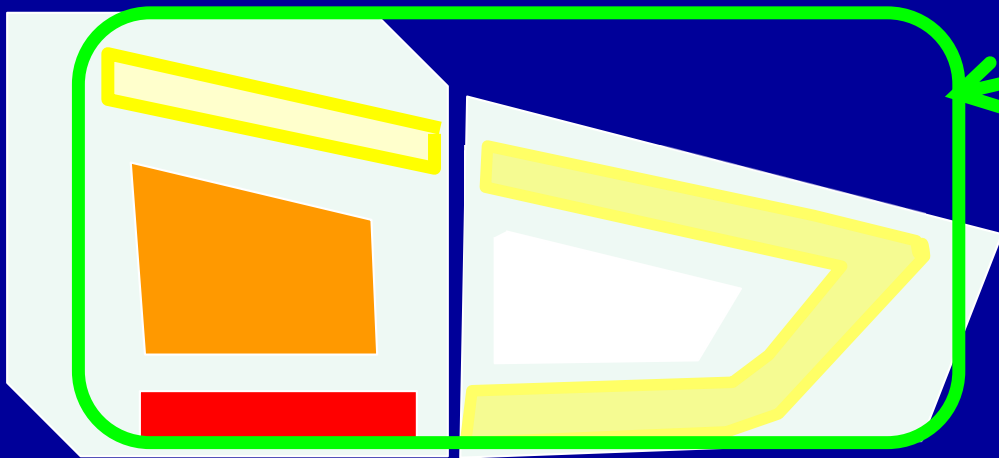


Single Lamp

5.7.2 Single Lamp is composed of two or more distinct parts (Type “D” lamp or Type “Y” lamp)



2.7.30.1 Type “Y” lamp



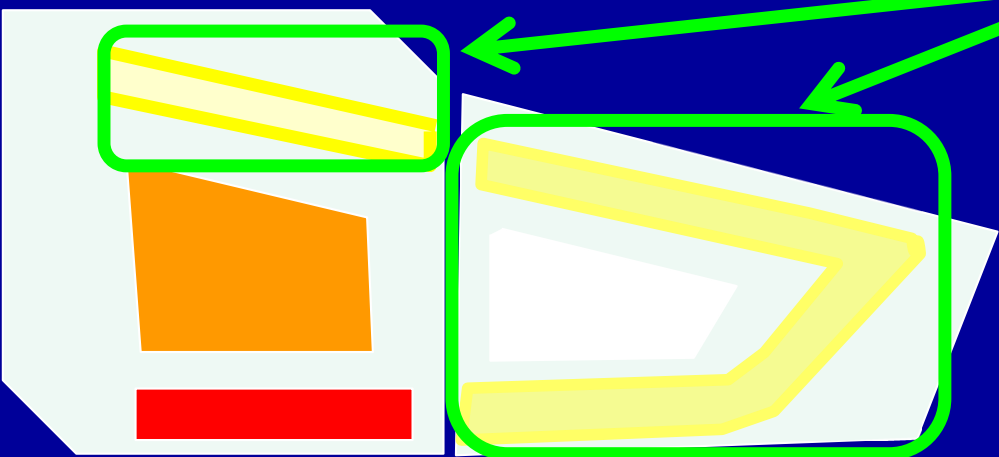
-Separate apparent surfaces

-Separate lamp bodies

-Same function

-Y lamp shall meet the requirements when all lamps are operated together.

2.7.32 Type “D” lamp



-D lamp means independent lamps, approved as separate devices in such a way that they are allowed to be used either independently or in an assembly of two lamps to be considered as a "single lamp".

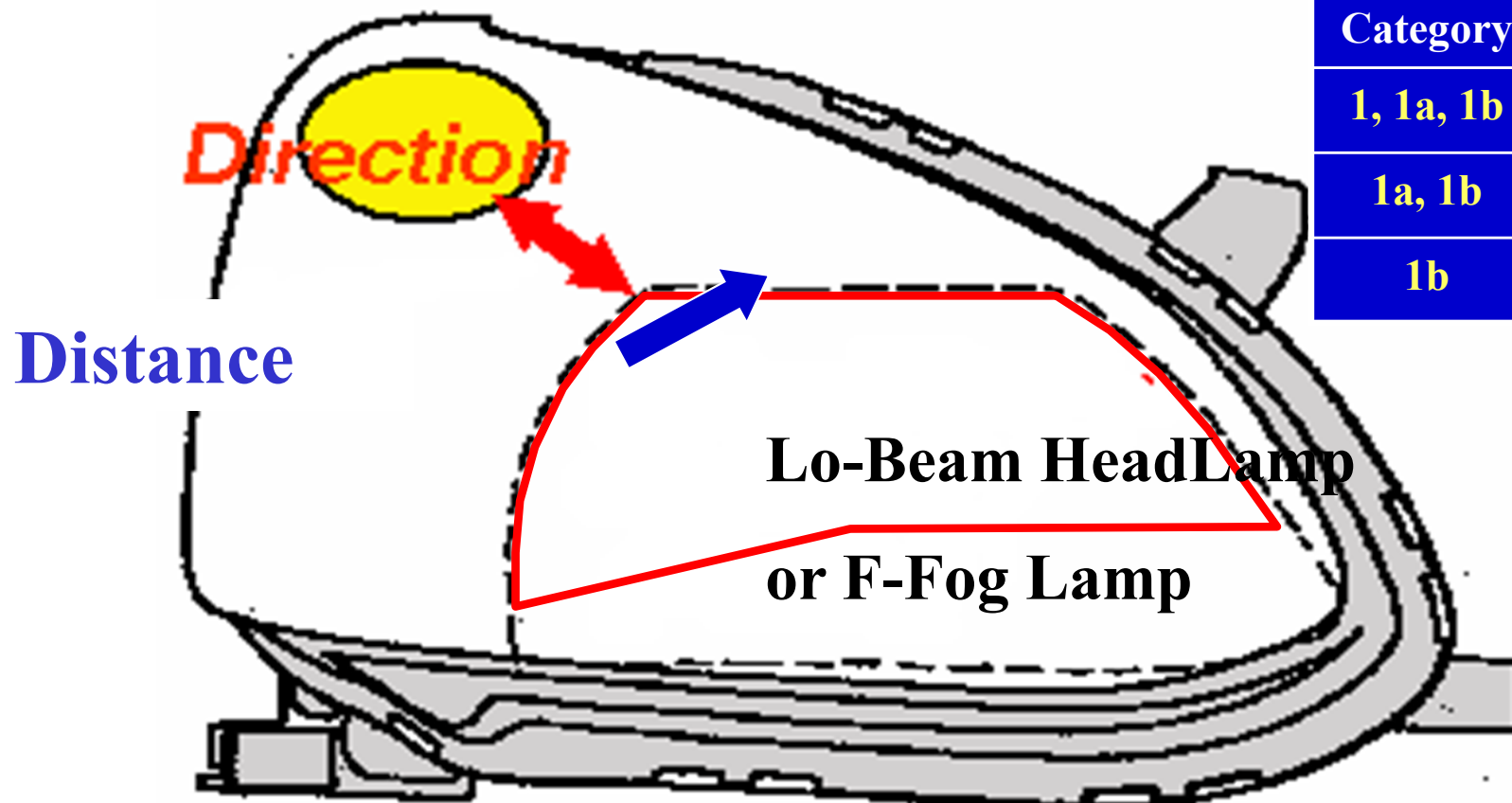
-When an assembly of two independent lamps to be type approved as "D" lamps having the same function is deemed to be a single lamp, it shall comply with the requirements for:

(a) Maximum intensity if all lamps together are lit;

(b) Minimum intensity if either lamp has failed.

2.17. Distance between Two Lamps

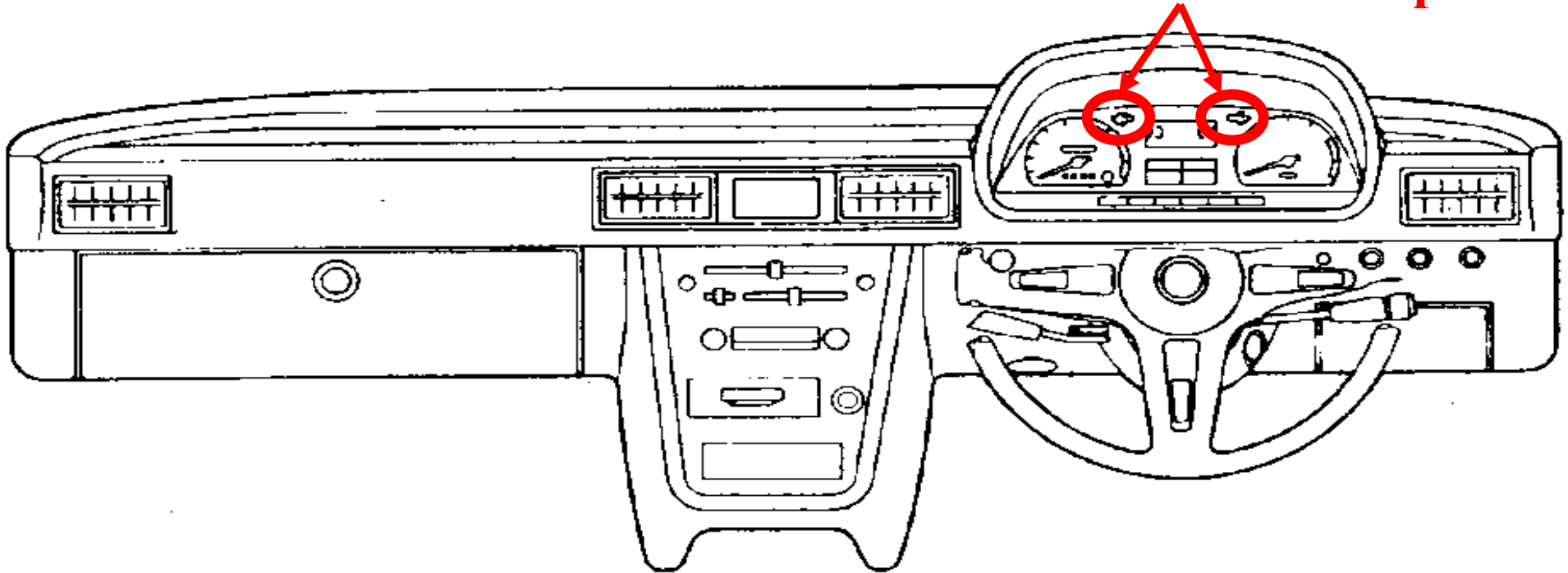
The **shortest distance between the two apparent surfaces** in the direction of the reference axis



Category	Distance
1, 1a, 1b	$D \geq 40 \text{ (mm)}$
1a, 1b	$20 < D < 40 \text{ (mm)}$
1b	$D \leq 20 \text{ (mm)}$

2.18, 2.19. Tell-tale

Tell-tale for direction indicator lamp



A visual indicating that a device has been switch on, but not indicating whether it is operating correctly or not.

Operating tell- tale : Direction indicator

Closed-circuit tell-tale : High Beam

Presentation Items

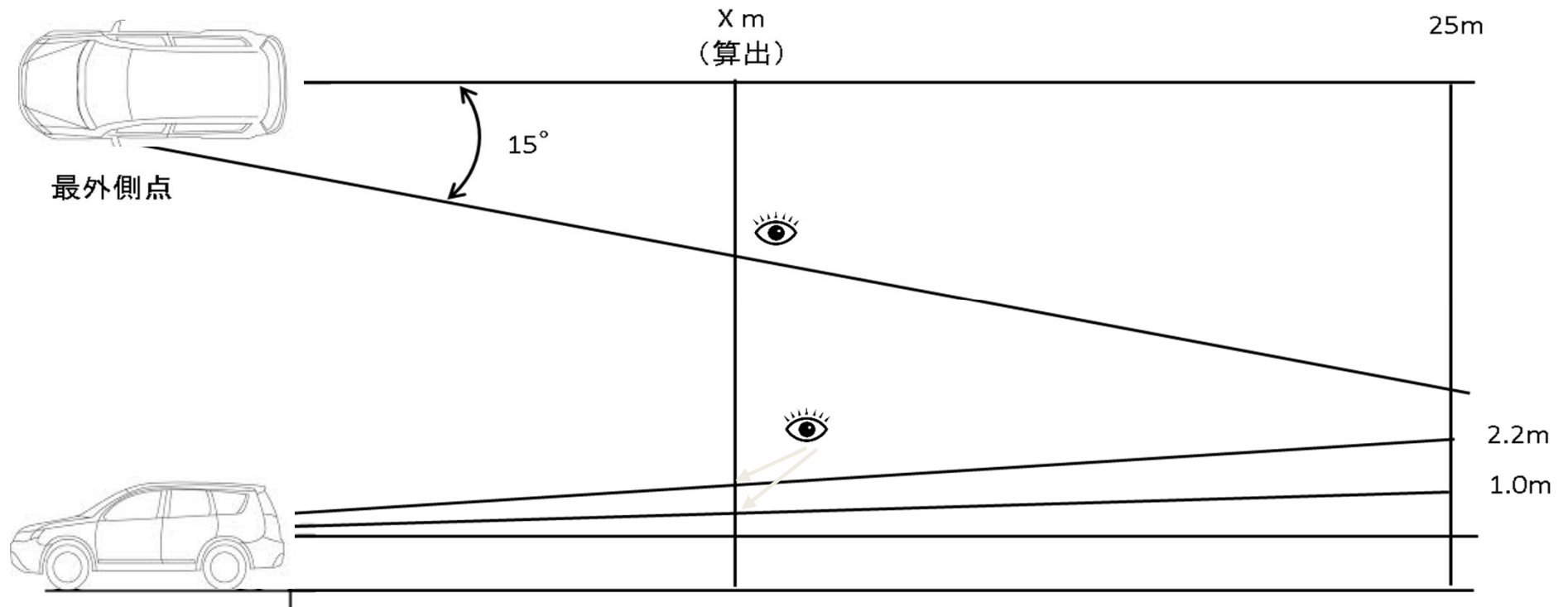
1. Scope

2. Definitions

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5.10.2 No white light visible to the rear



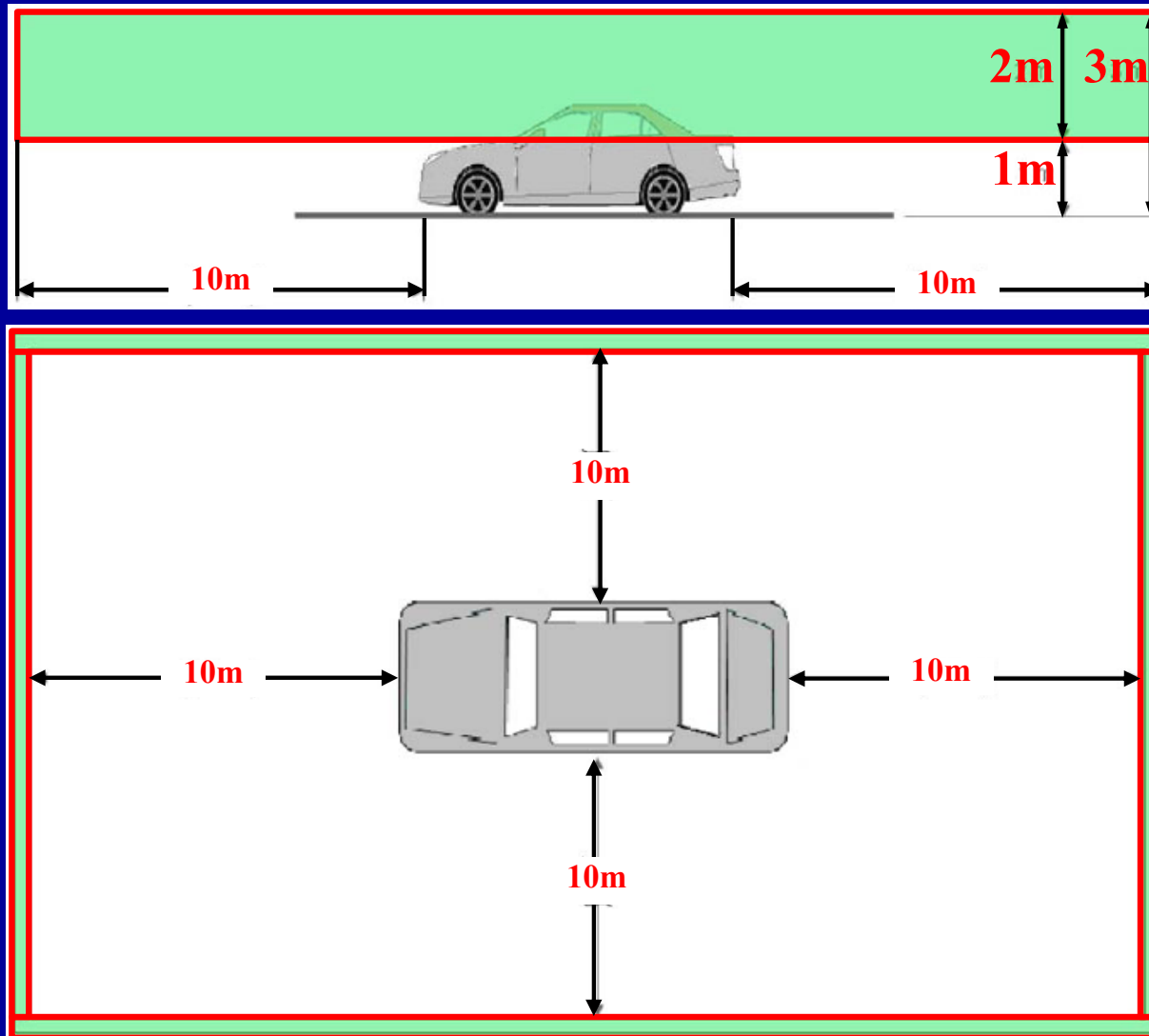
- The Regulation specifies visibility from 25m behind the vehicle; however, visibility distance can be made closer by calculation.

This is also applicable to 5.10.1 "No red light visible to the front."

6.24.9.3, 6.26.9.1

Visibility requirements of Exterior courtesy lamp & Manoeuvring lamp.

There must be no direct visibility of the apparent surface of these lamps from the following four planes (Green Area).



5. General specifications

5.10, 5.10.1~5.10.3.2

Visibility of red lamps from the front and visibility of white lamps from the rear

+ 6.24.9.3., 6.26.9.1.

Visibility requirements of

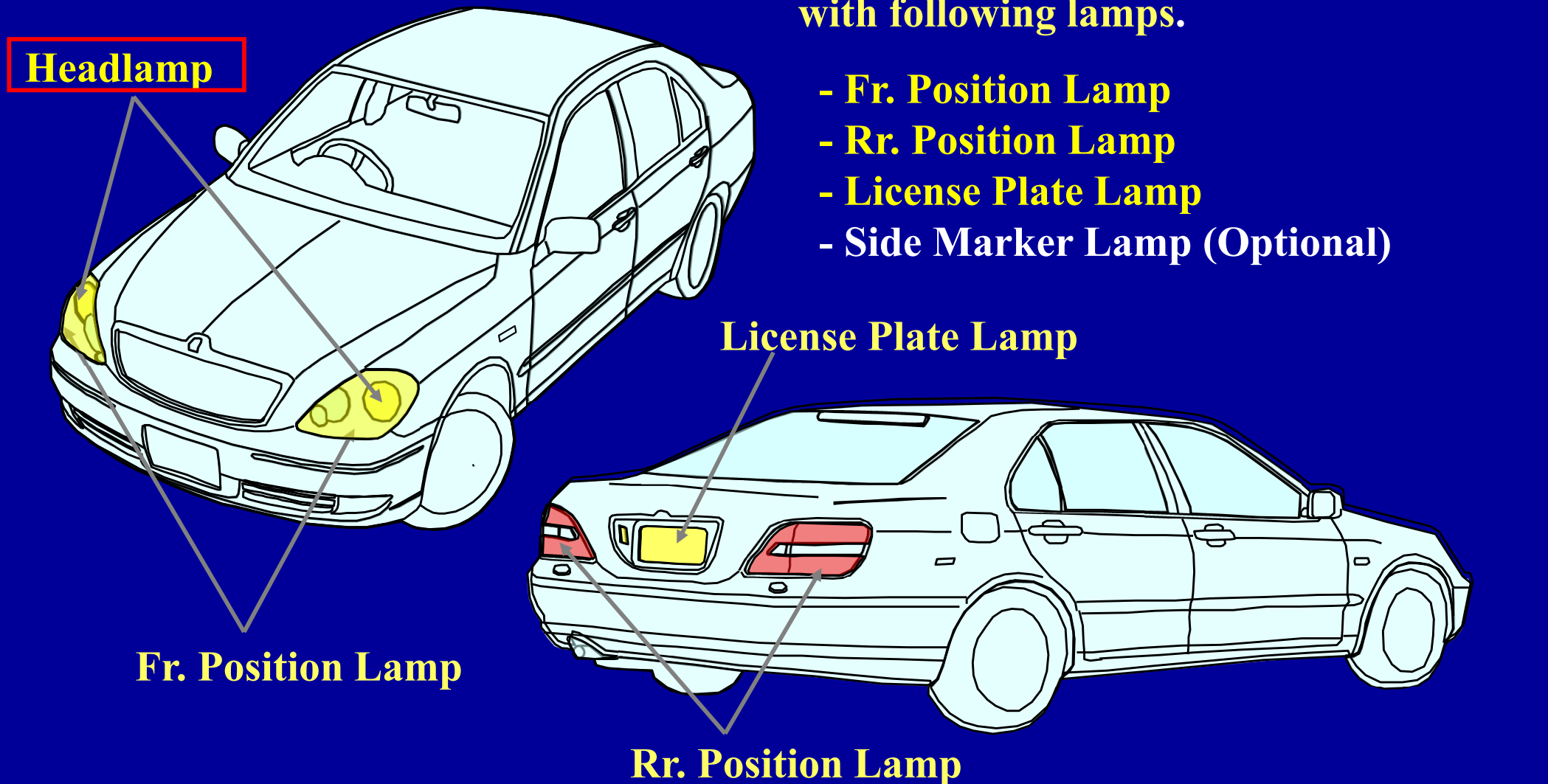
Exterior courtesy lamp & Manoeuvring lamp

5.11, 5.12

General electrical connections

5.15 Colors of the light

5.11, 5.12 General electrical connections



5.15 Colors of the light

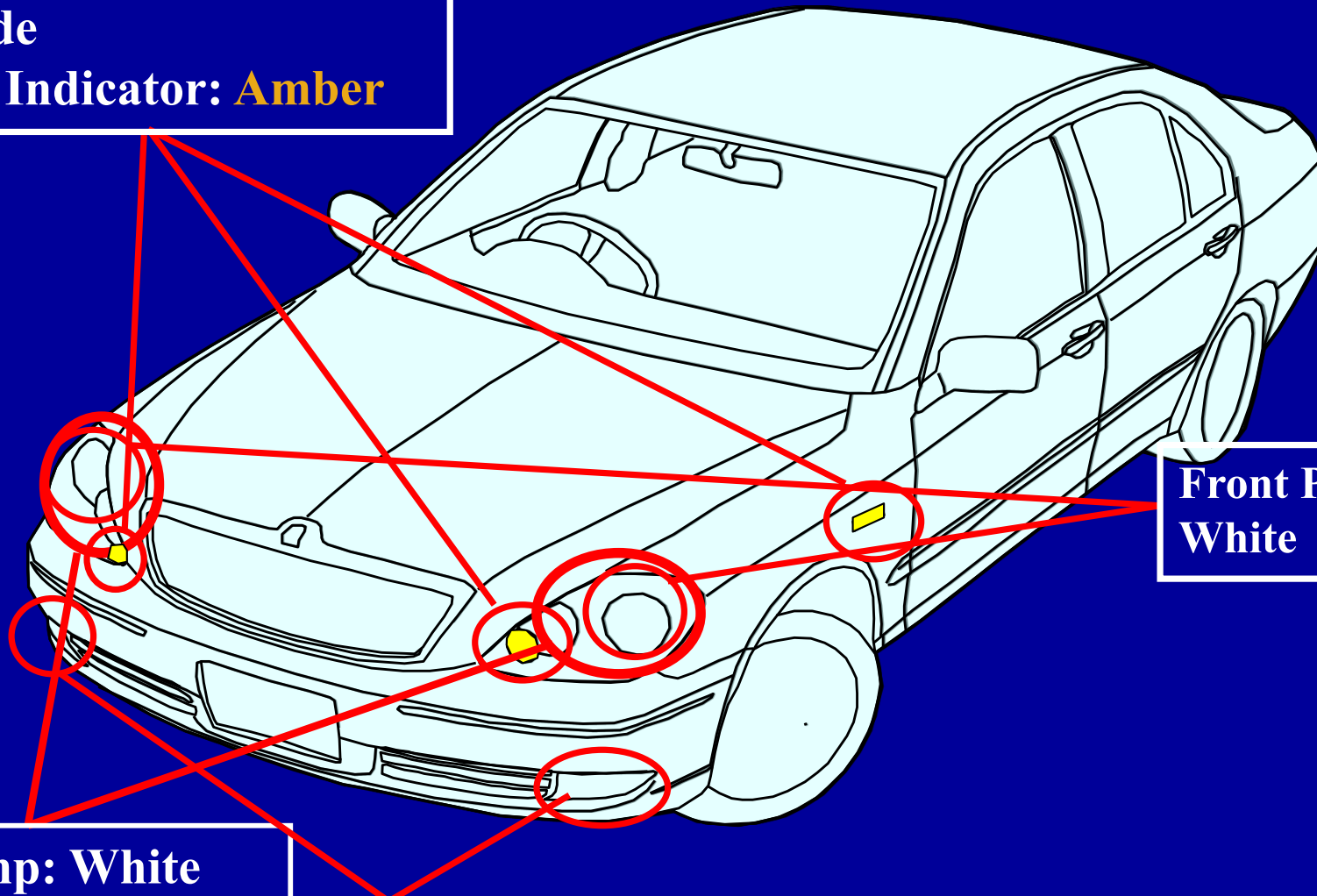
Front and Side
Direction Indicator: **Amber**

Front

Front Position:
White

Headlamp: White

Front Fog Lamp: White or **selective yellow**

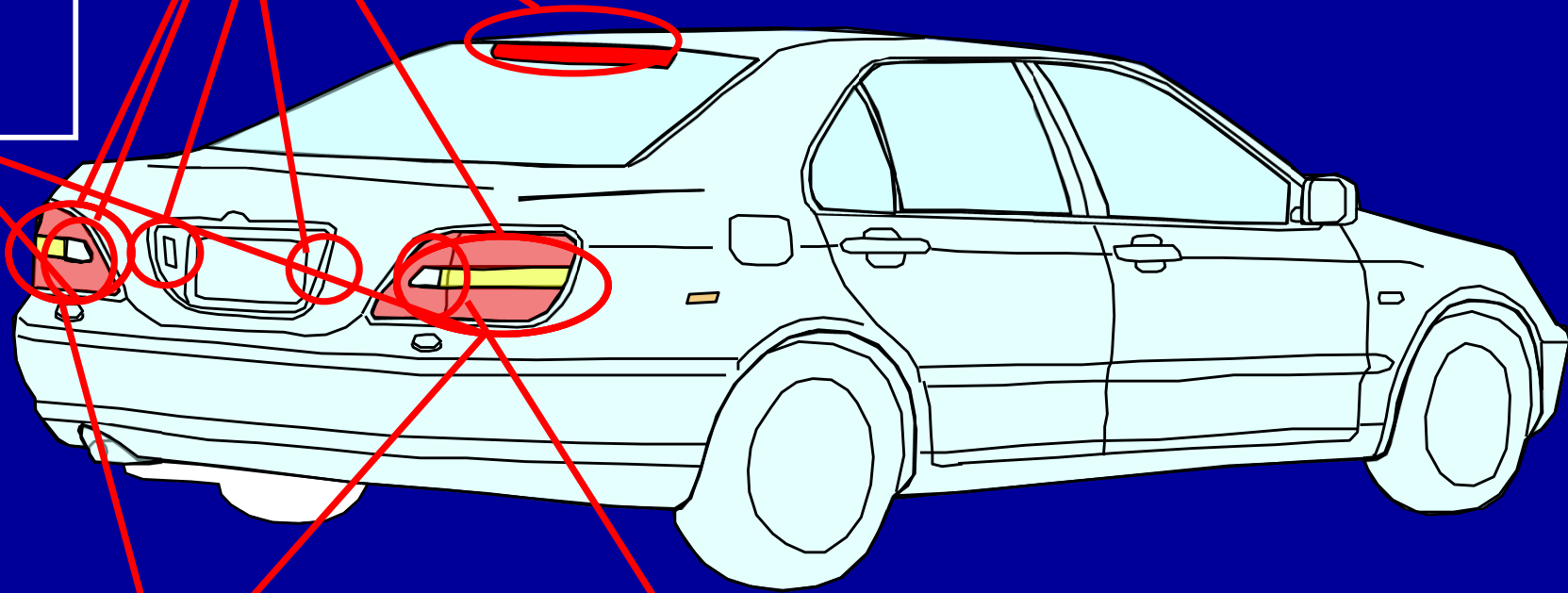


Rear

Stop & HMSL, Rear Fog: **Red**

License Plate Lamp: **White**

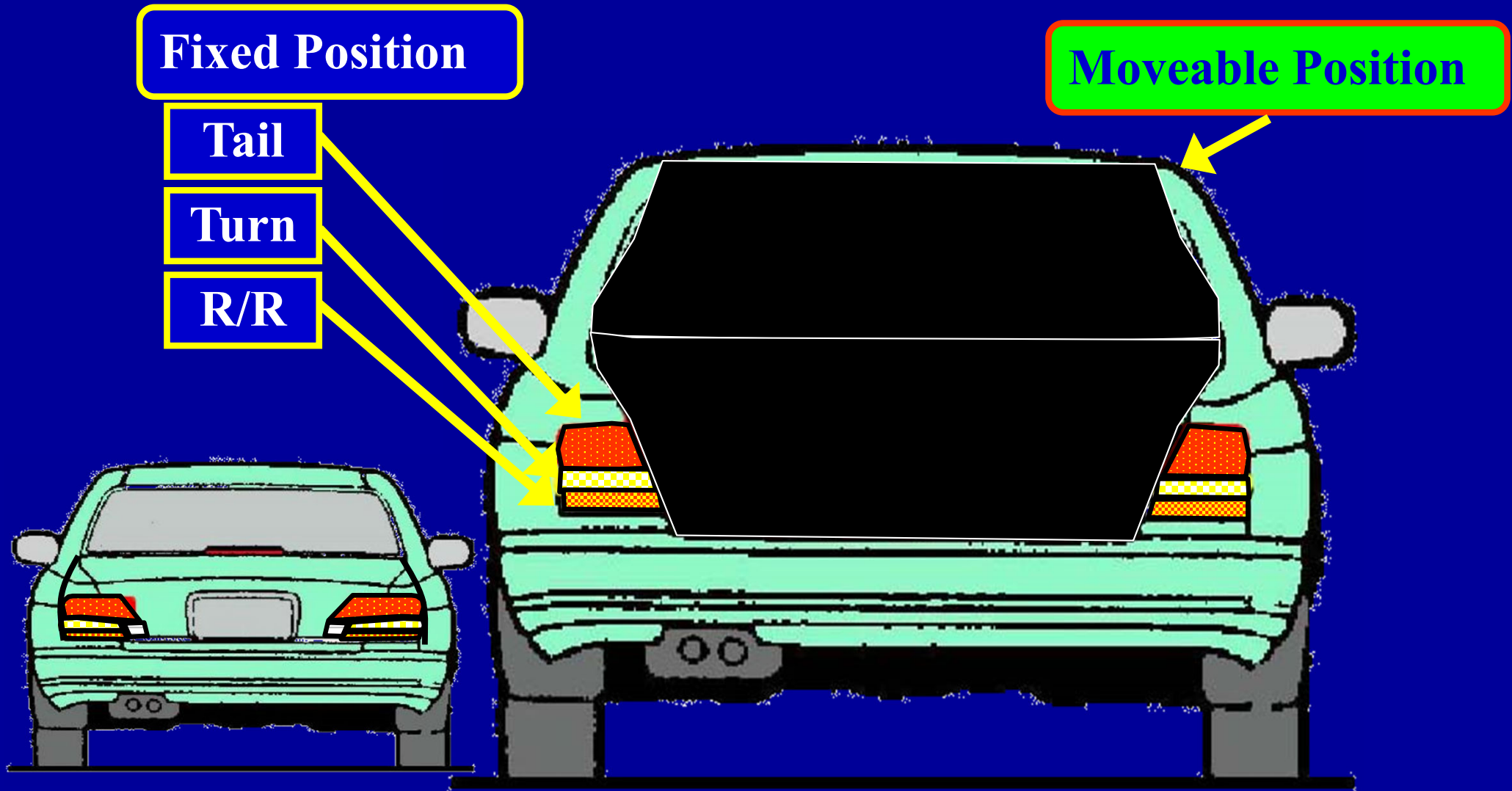
Rear Turn Signal
Lamp: **Amber**



Rear Position Lamp: **Red**

Reversing Lamp: **White**

5.17. Installed on Moveable and Fixed Position



5.17. Installed on Moveable and Fixed Position

**Moveable Position
(On back-gate)**

Turn

Tail



**Substitute lamp
(On the body)**

Turn

Tail /Stop



**Tail & Turn & R/R may be installed on moveable portion
by adopting substitute lamps on fixed position.**

Presentation Items

1. Scope
2. Definitions
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- 6. Individual specifications**

6. Individual specifications

6.2. Lo-Beam Headlamp

Using words [Lo-beam] and [Hi-beam] in these sheets instead of the [passing-beam] and the [driving-beam]

6.5. Direction-Indicator Lamp

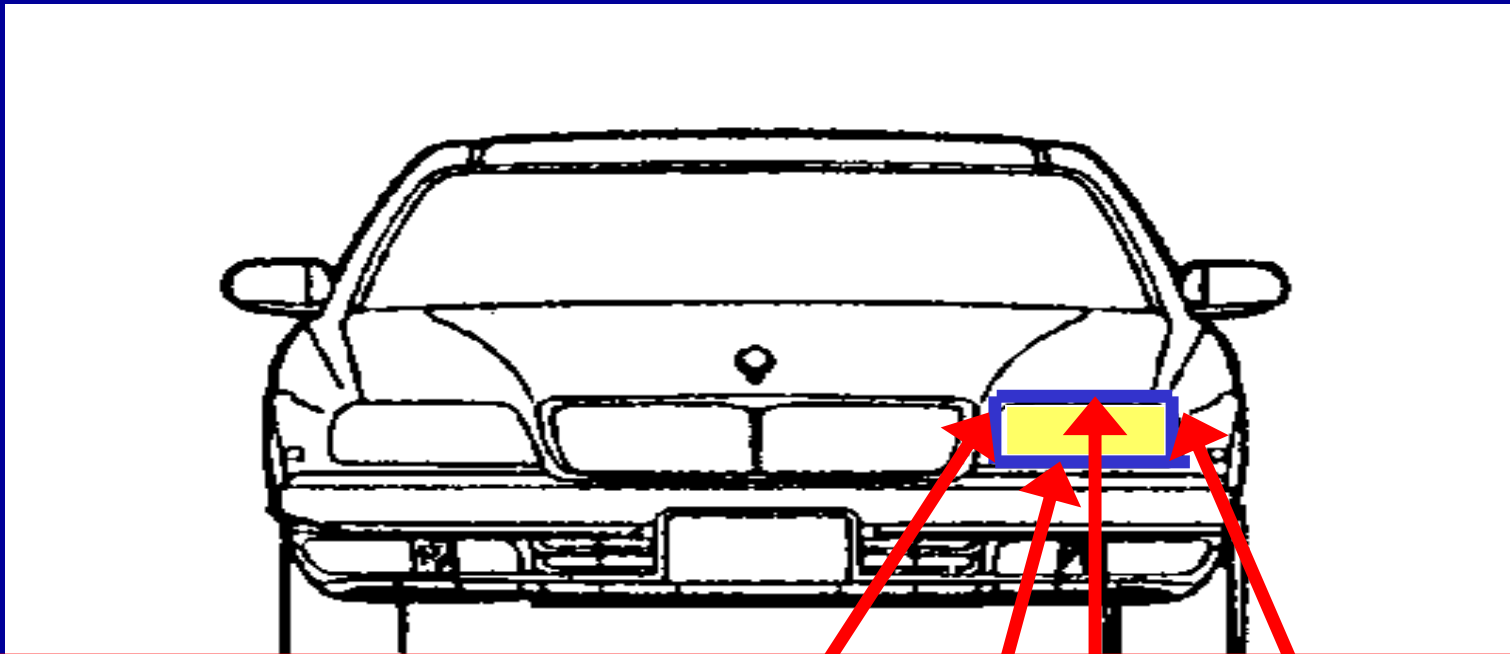
6.7. Stop lamp

6.2. Lo-Beam Headlamp

6.2.1. Presence : Mandatory on motor vehicle.
Prohibited on trailers.

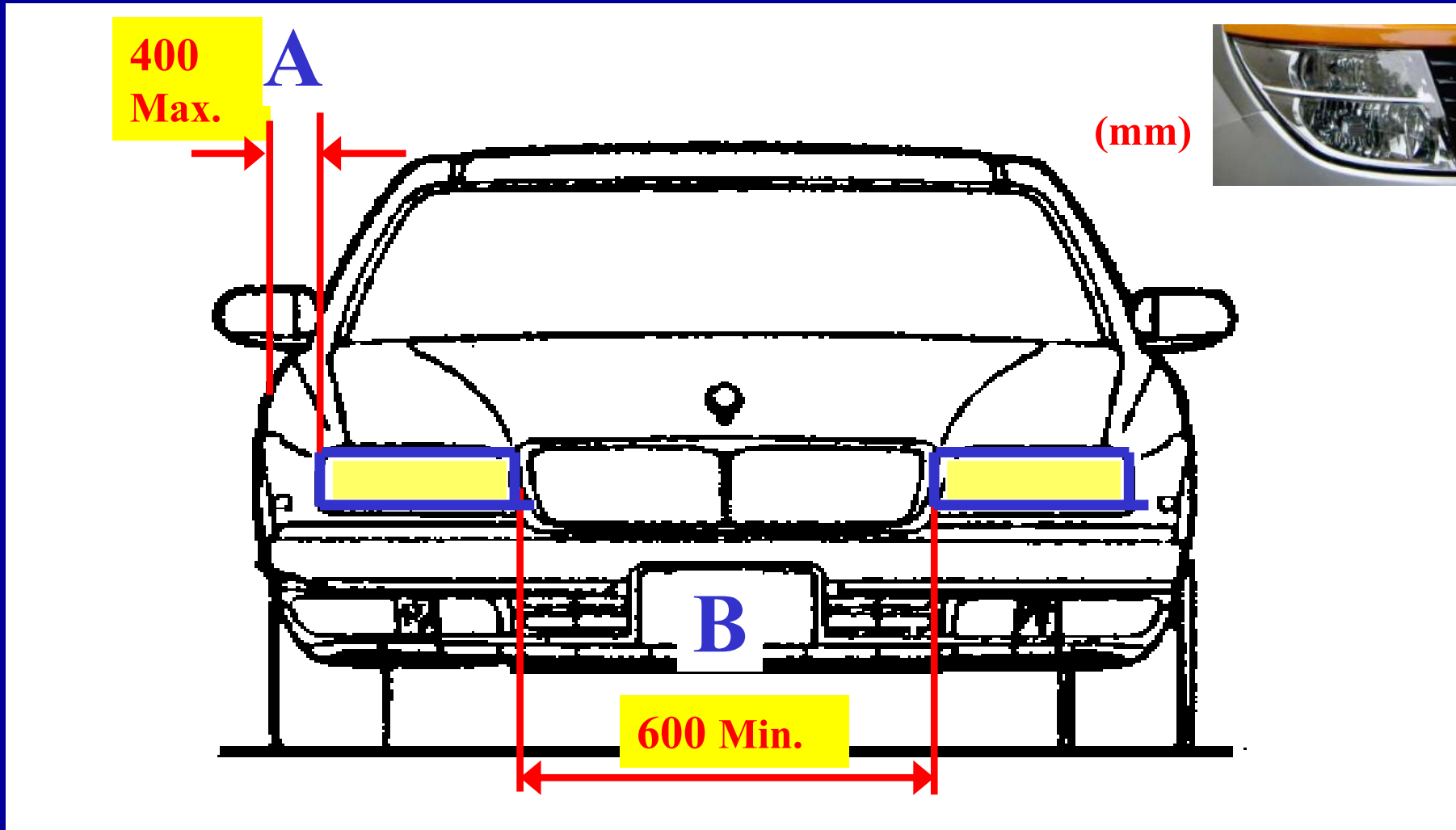
6.2.2. Number : Two

6.2.4. Position :



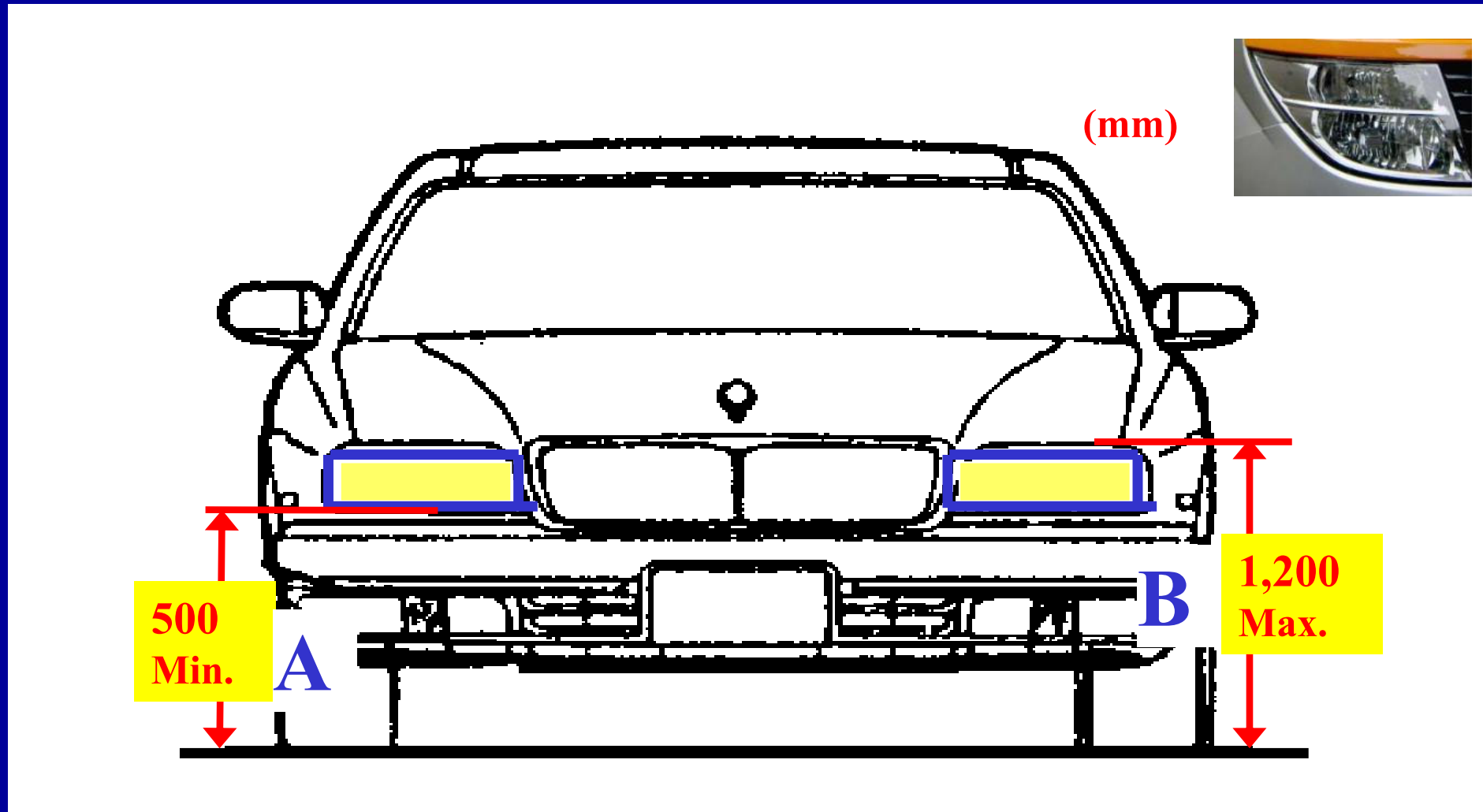
Each side of the edge of the apparent surface is used in the positioning
(Illuminating surface or Light emitting surface)

[Width]



*600 mm Min does not apply for M1 and N1 category

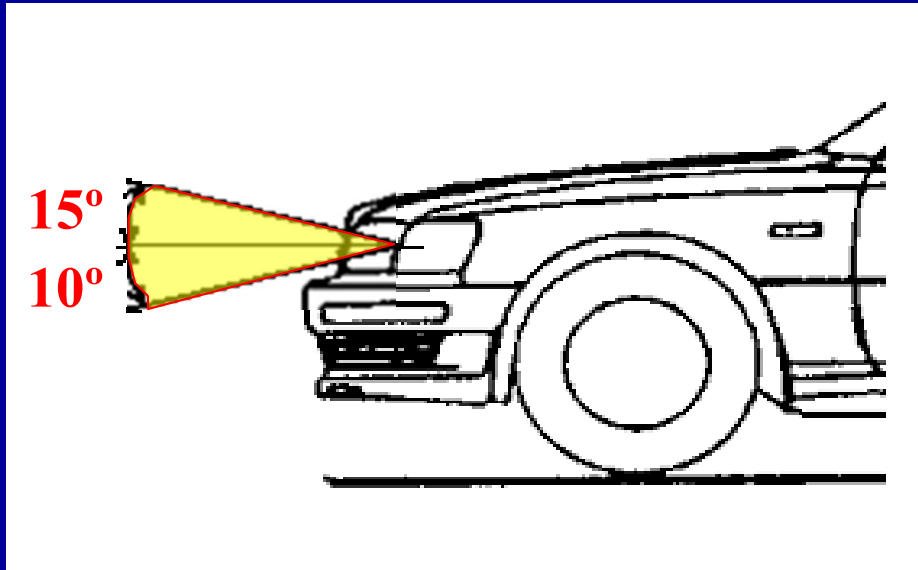
[Height]



*For category N3G (off-road) maximum height may be increased to 1,500

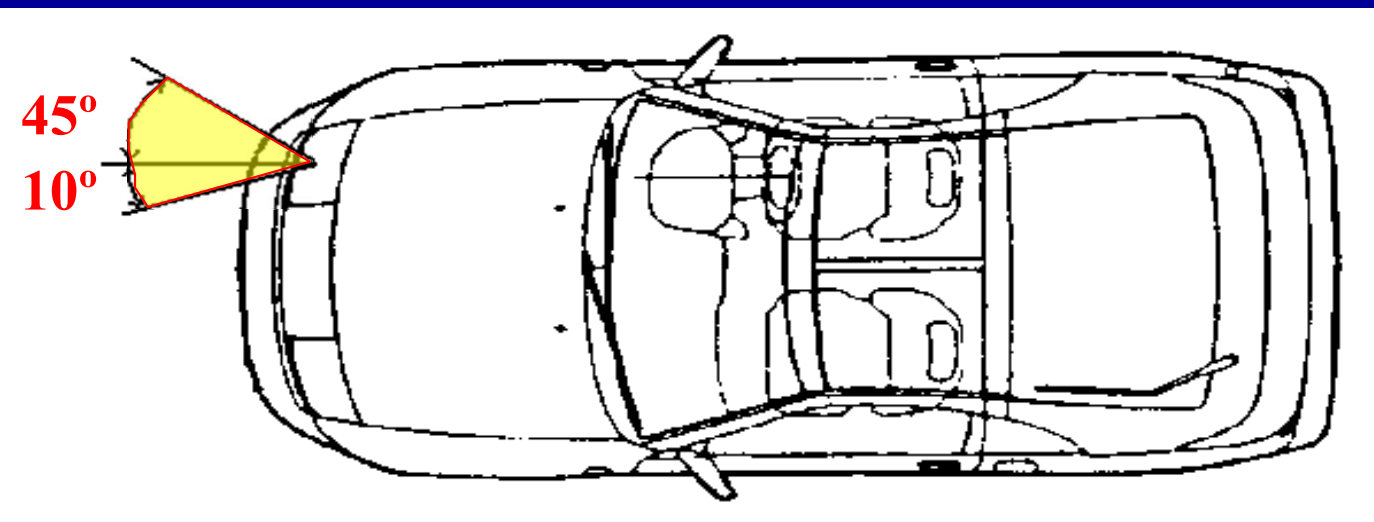
6.2.5. Geometric visibility :

[Vertical angle]



**Minimum value of 1cd
is required in this space.**

[Horizontal angle]



6.2.6 Orientation :

Depending on the mounting height, following are provided.

- (1) Initial aiming of the cut-off of the Lo-beam
(in unladen vehicle state with a driver: **refer the annex 5**)

The initial aiming (initial downward inclination) of the cut-off shall be indicated on the headlamp or vehicle body close to the headlamp by the symbol shown in below.



- (2) Aiming limits of the cut-off of the Lo-beam
(under all the static conditions : **refer to Annex5**)



In case of $H < 0.8\text{m}$,

Limits: between -0.5% and -2.5%

Initial aiming: between -1.0% and -1.5%

In case of $0.8\text{m} < H < 1.0\text{m}$,

Declare by the manufacturer either one from the two alternatives

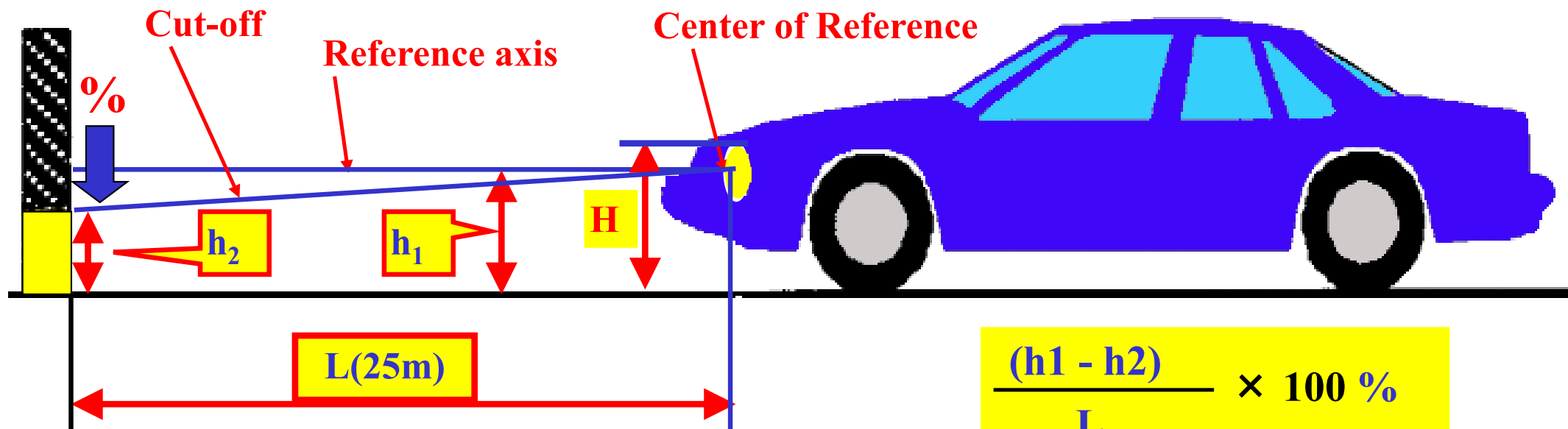
In case of $H > 1.0\text{m}$,

Limits: between -1.0% and -3.0%

Initial aiming: between -1.5% and -2.0%

Distance at 25m(L)
 $1.0\% = 25\text{cm down}$
 $1.5\% = 37.5\text{cm down}$
 $(h_1 - h_2)$

Lo-beam inclination is defined as follows,



$$\frac{(h_1 - h_2)}{L} \times 100 \%$$

6.2.6.2. Headlamp leveling device :

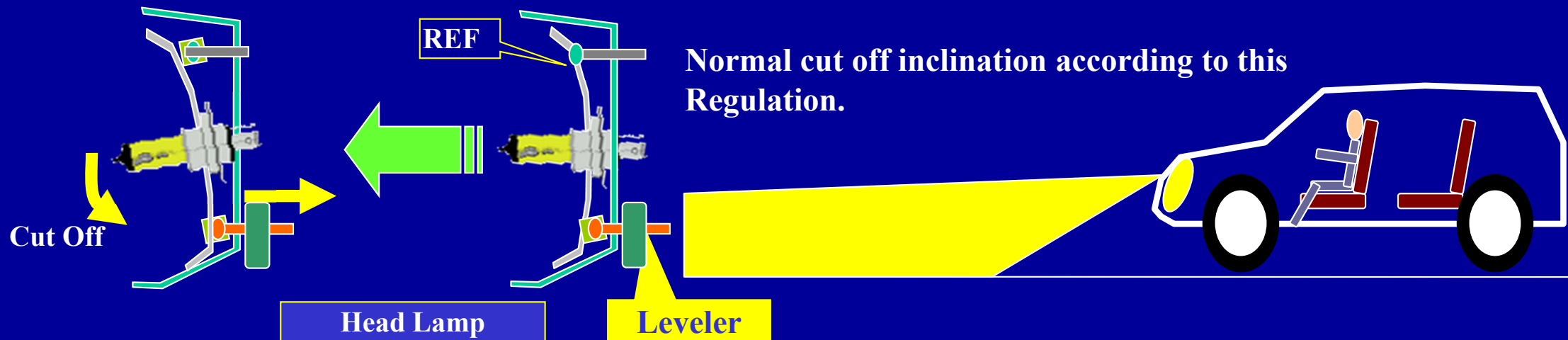
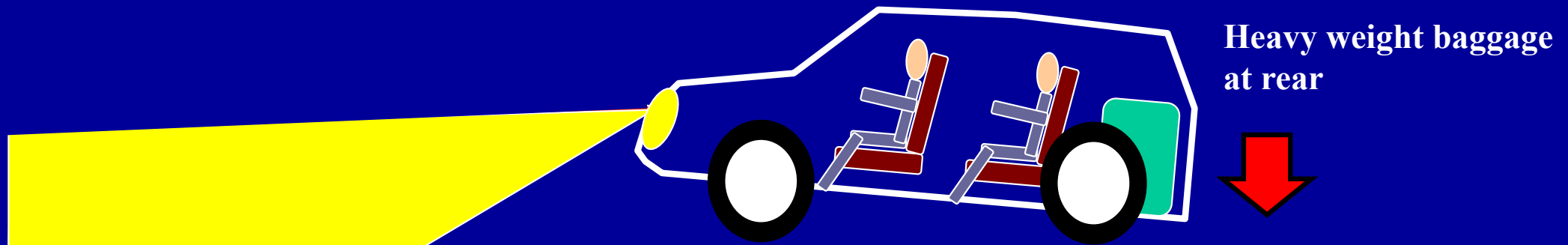


6.2.6.2.1. In the case where a **headlamp leveling device** is necessary to satisfy the aiming requirement,

light source $> 2000 \text{ lm}$: Automatic headlamp leveling

light source $\leq 2000 \text{ lm}$: Automatic or Manual headlamp leveling

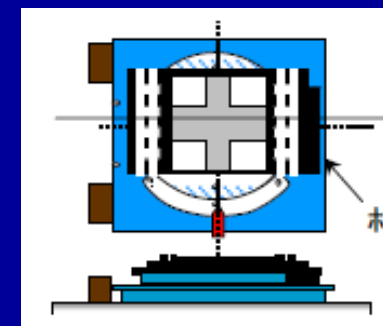
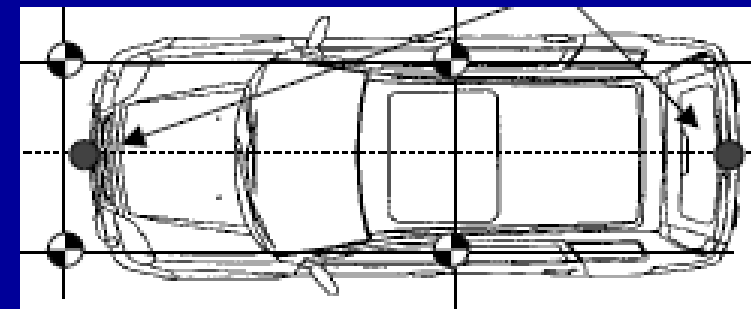
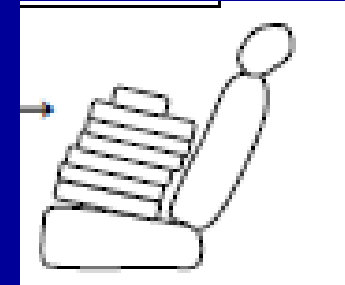
Down the cut off line to reduce the glare



Annex 5;

States of loading to be taken into consideration in determining variations in the vertical orientation of the dipped-beam headlamps

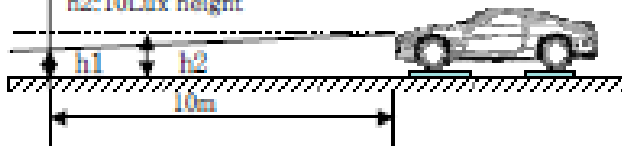
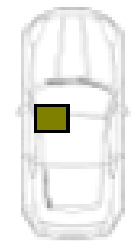

M1カテゴリー				N1カテゴリー
	ケース1	ケース2	ケース3	ケース1
1				
	運転席に1人乗車			
2				
	運転席に1人乗車＋フロント席で一番遠い席に1名乗車			
3				
	上記条件＋最後方の全ての座席に乗車			
4				
	全ての座席に乗車			
5				
	全ての座席に乗車＋トランクルーム			
6				
	運転席1名乗車＋トランクルーム			



Head lamp leveling test (M1 , 4 passenger)

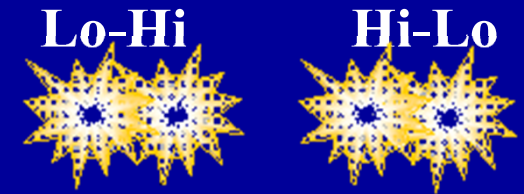
VEC No.		
test vehicle		
chassis No		
Lamp No		
running order condition weight	front	kg
	rear	kg
	total	kg

travel		km
tire size	front	
	rear	
tire pressure	front	kPa
	rear	kPa
temp		

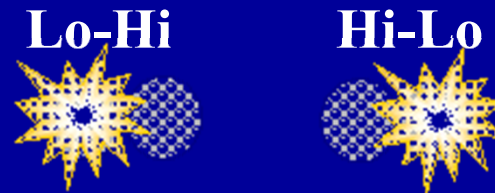
P.A.W.front		P.A.W.rear		P.T.W.		left side			right side		
kg		kg		kg		h2	h1	$\frac{h2-h1}{10m}$	h2	h1	$\frac{h2-h1}{10m}$
<div><div><div>h1:Lamp height</div><div>h2:10Lux height</div></div></div>						initial seating running order condition			initial seating running order condition		
1	front	kg		 driver	1st						
	rear	kg			2nd						
	total	kg			3rd						
			4th								
	SW position				mean	%			%		
	front	kg		 driver	1st						
	rear	kg			2nd						

6.2.7. Electrical connections :

(1) The control for changing over to the **Lo-beam** headlamp must switch off all Hi-beam headlamp **simultaneously**.



(2) The **Lo-beam** may remain switched on at the same time as the **Hi-beam** headlamp.



(3) In the case of **gas-discharge Lo-beam** headlamps, the **gas-discharge light source** shall remain switched on during the **Hi-beam** operation.

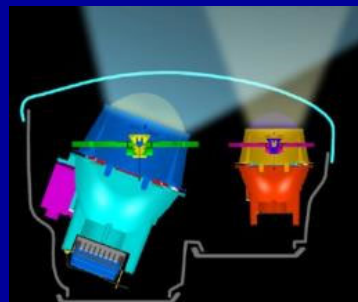
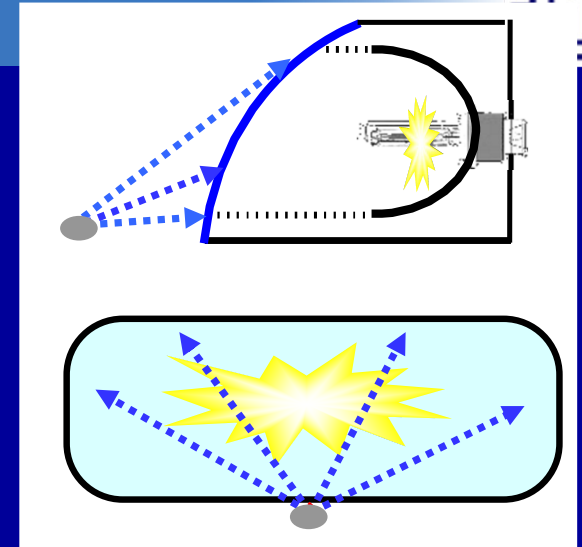


6.2.8. Tell-tale : Optional

However, in the case where the whole beam or the kink of the elbow of the cut-off is moved to produce **bend lighting**, an **operating tell-tale whether flashing or not is mandatory**.

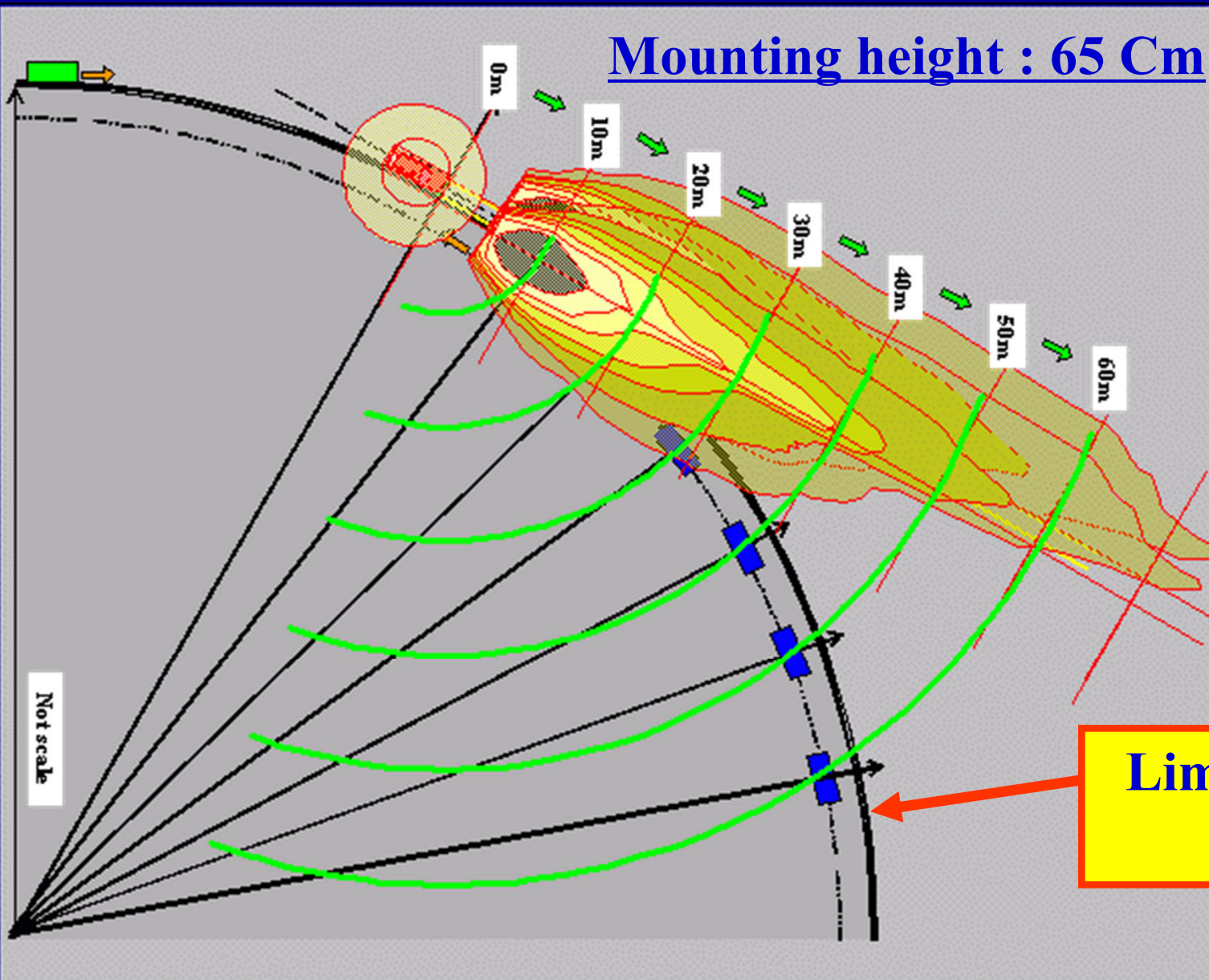
6.2.9. Other requirements :

- (1) Dipped-beam headlamps with a light source or LED module(s) producing the principal dipped-beam and having an objective luminous flux which exceeds 2,000 lumen shall only be installed in conjunction with the installation of headlamp cleaning device(s) according to Regulation No. 45.
- (2) Only Lo-beam headlamps according to UN R98 or 112 may be used to produce bend lighting. If bend lighting is produced by a horizontal movement of the whole beam or the kink of the elbow of the cut-off, it shall be activated only if the vehicle is in forward motion.



6.2.6.4. Horizontal orientation

Mounting height : 65 Cm



A elbow of the cut-off shall not intersect the line of the trajectory of the centre of gravity of the vehicle at distances from the front of the vehicle which are not larger than 100 times the mounting height

Limitation of the Bending
 $65 \text{ cm} \times 100 = 65 \text{ m}$

6. Individual specifications

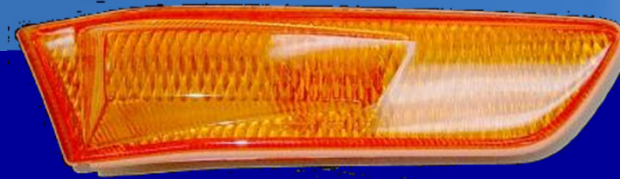
6.2. Lo-Beam Headlamp

Using words [Lo-beam] and [Hi-beam] in these sheets instead of the [passing-beam] and the [driving-beam]

6.5. Direction-Indicator Lamp

6.7. Stop lamp

6.5. Direction-indicator lamp



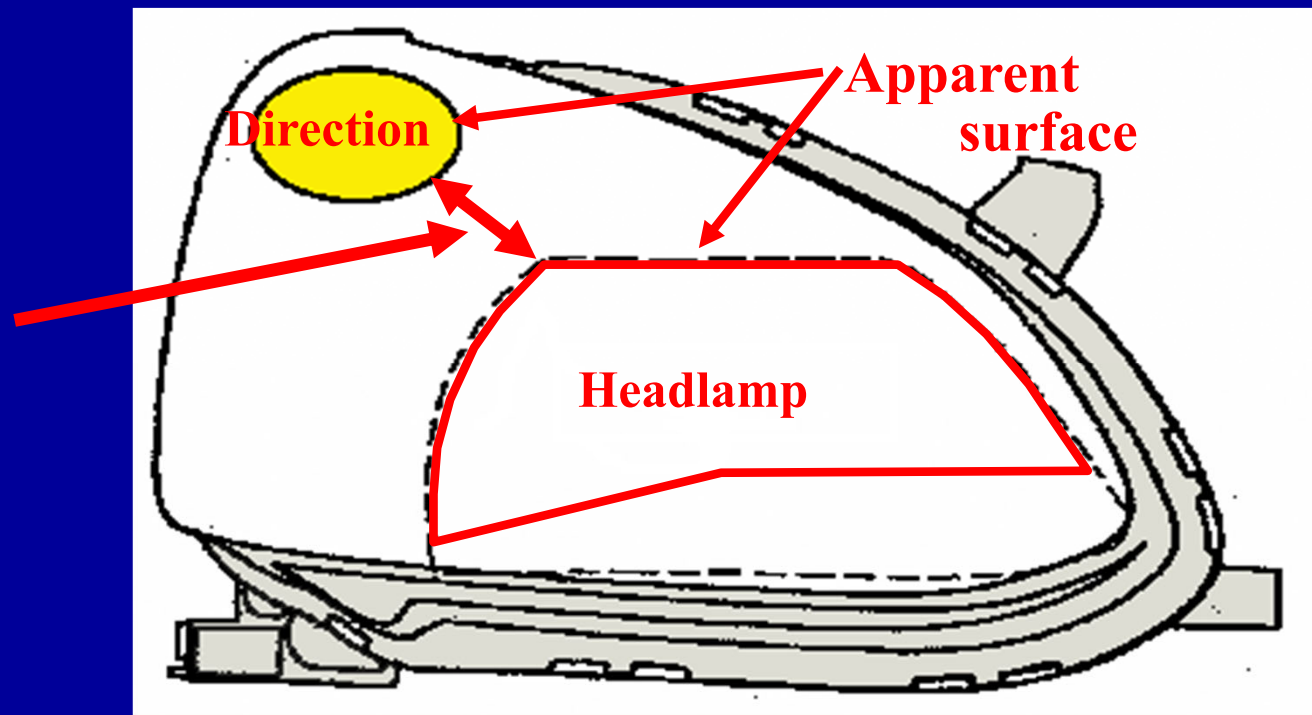
6.5.1. Presence : Mandatory

6.5.2. Number : Front direction-indicator lamps: two

6.5.3. Arrangements :

According to the distance between the **Lo-beam headlamp** (or **front fog lamp**) and **direction-indicator lamp**, category of the front direction-indicator lamps are defined.

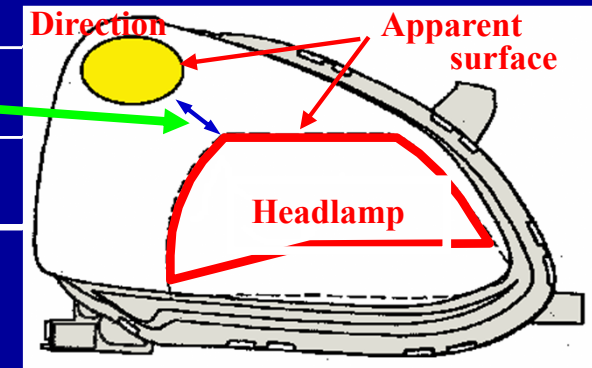
**Minimum distance
between HL and
Direction indicator
lamp.**



Category of the **Front** direction-indicator lamp



Category	Distance between HL (F.FL) and Fr. direction-indicator
1, 1a, 1b	$D \Rightarrow 40 \text{ (mm)}$
1a, 1b	$20 < D < 40 \text{ (mm)}$
1b	$D \leq 20 \text{ (mm)}$

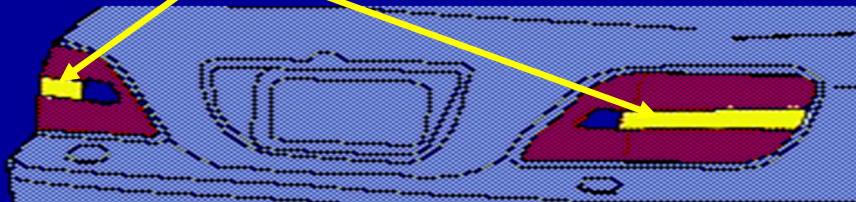


Rear direction-indicator lamps: **two**

Category of the **rear** direction-indicator lamp

Category	Note
2a	Steady luminous intensity
2b	Variable luminous intensity

Rear direction-indicator lamps



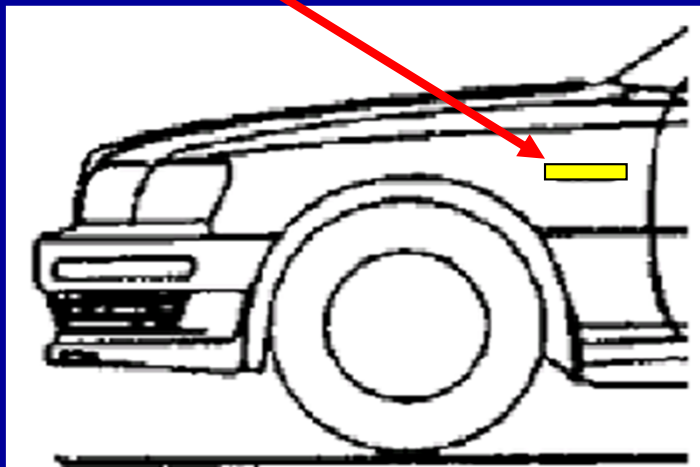
Side direction-indicator lamps: two



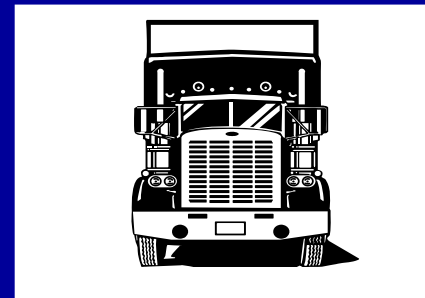
Category of the side direction-indicator lamp

Category	Note
5	For M1 vehicles and N1, M2, M3 vehicles not exceeding 6m in length.
6	For all N2 and N3 vehicles and N1, M2, M3 vehicles exceeding 6m in length.

Side direction-indicator lamps



Category N

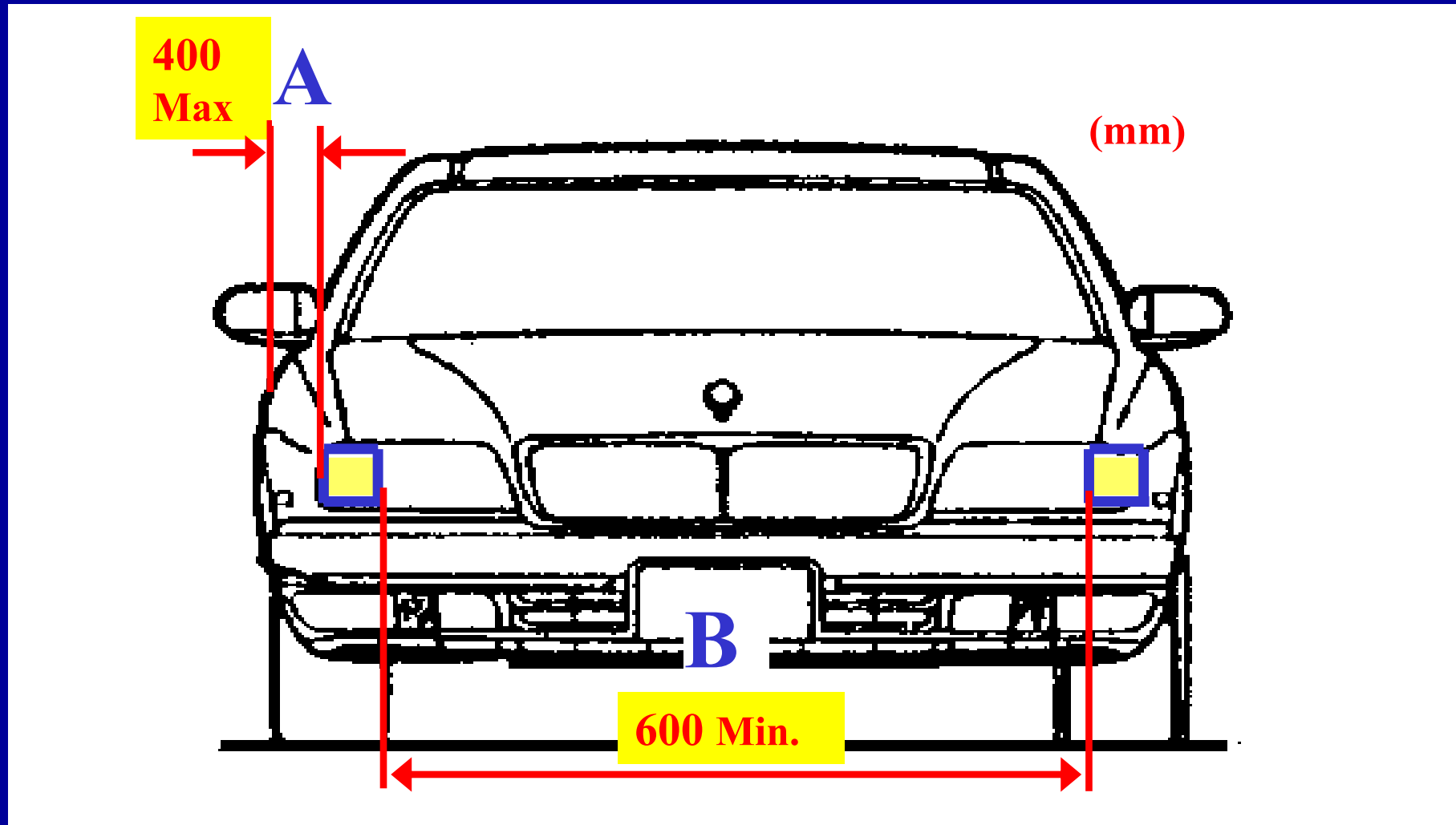
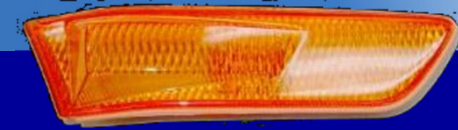


Category M



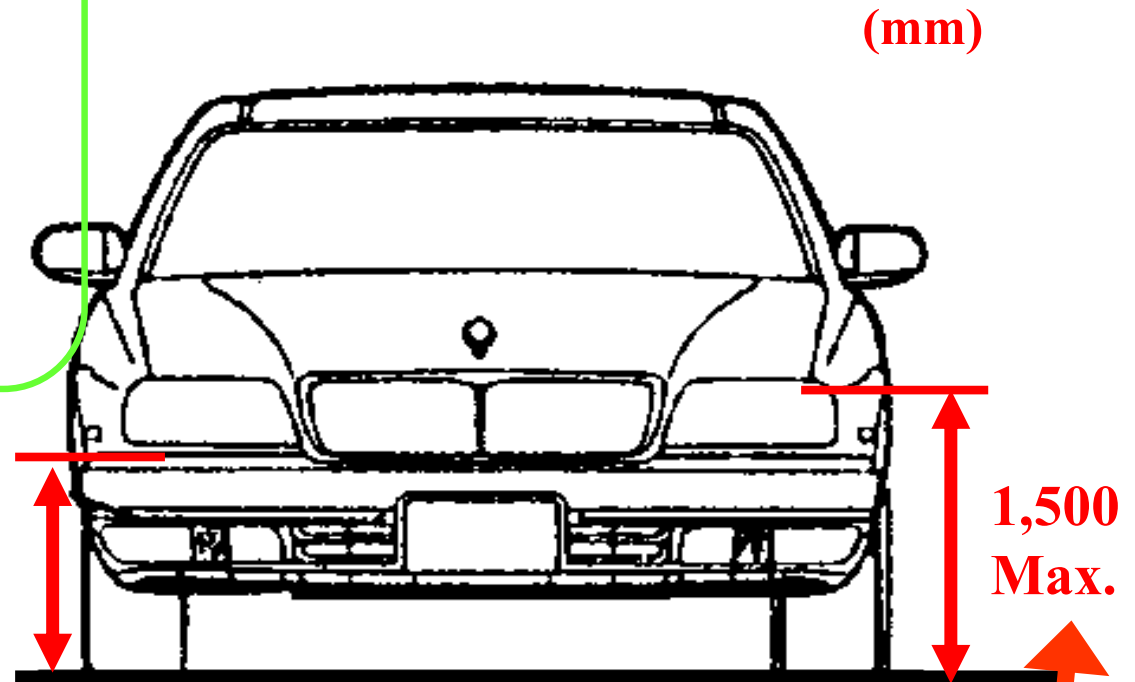
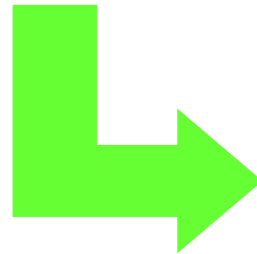
6.5.4. Position :

[Width]



[Height]

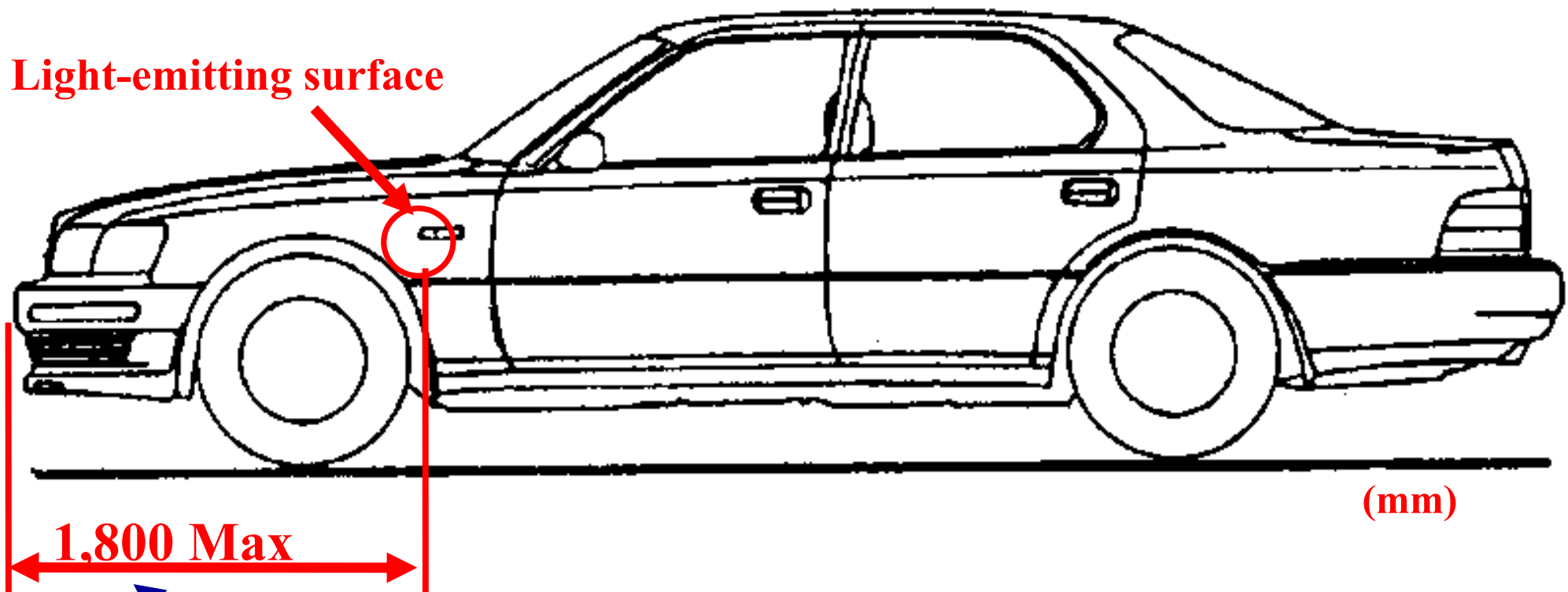
- Category 1, 1a, 1b, 2a and 2b; 350 Min.
- Category 5 or 6;
M1 and N1: 350 Min.
Other: 500 Min.



If it is impossible due to vehicle structure,
For 5 and 6 : 2,300 Max.
For 1, 1a, 1b, 2a and 2b : 2,100 Max



[Length] (Category 5 and 6)



However, for M_1 and N_1 category vehicles, and for all other categories of vehicles if the structure of the vehicle makes it impossible to comply with the minimum angles of visibility, this distance may be increased to 2,500 mm.

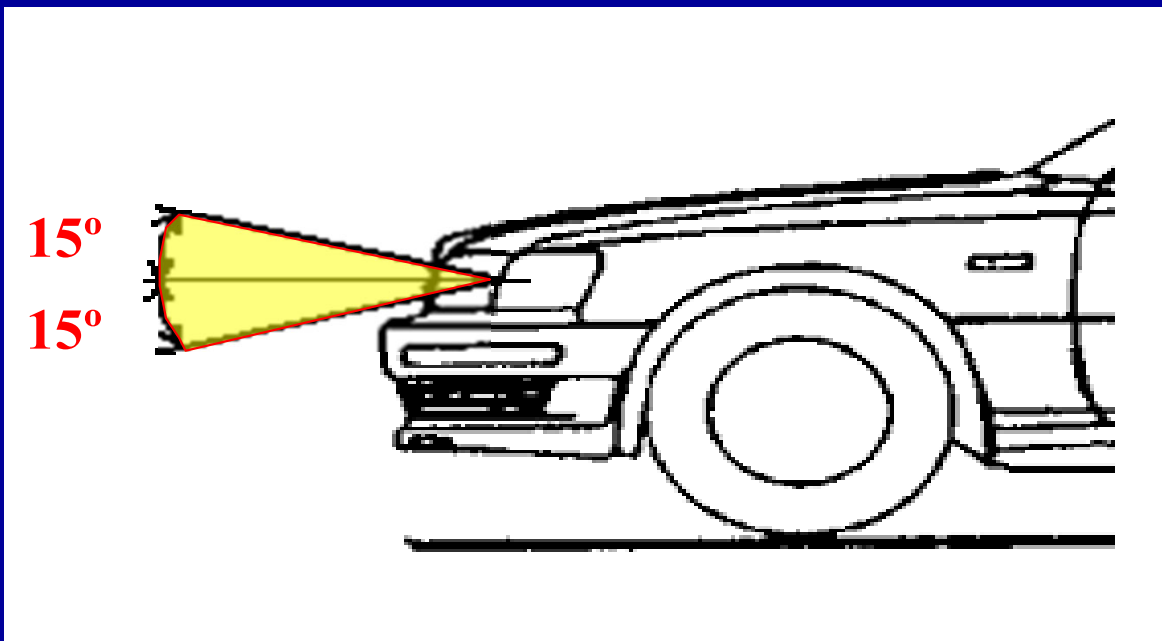


6.5.5. Geometric visibility :

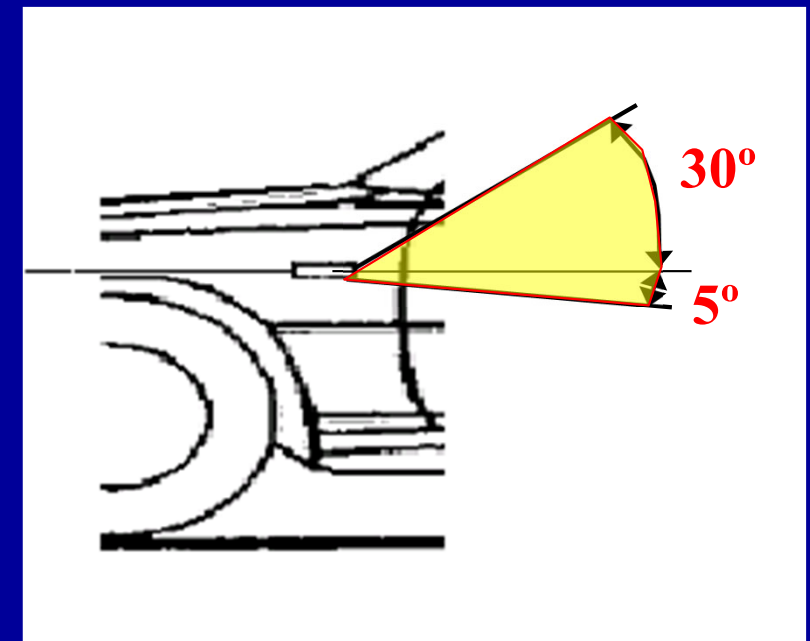
The apparent surface of the direction-indicator lamp **must be visible** in the following area.

[Vertical Angles]

Category 1, 1a, 1b, 2a, 2b, 5 :

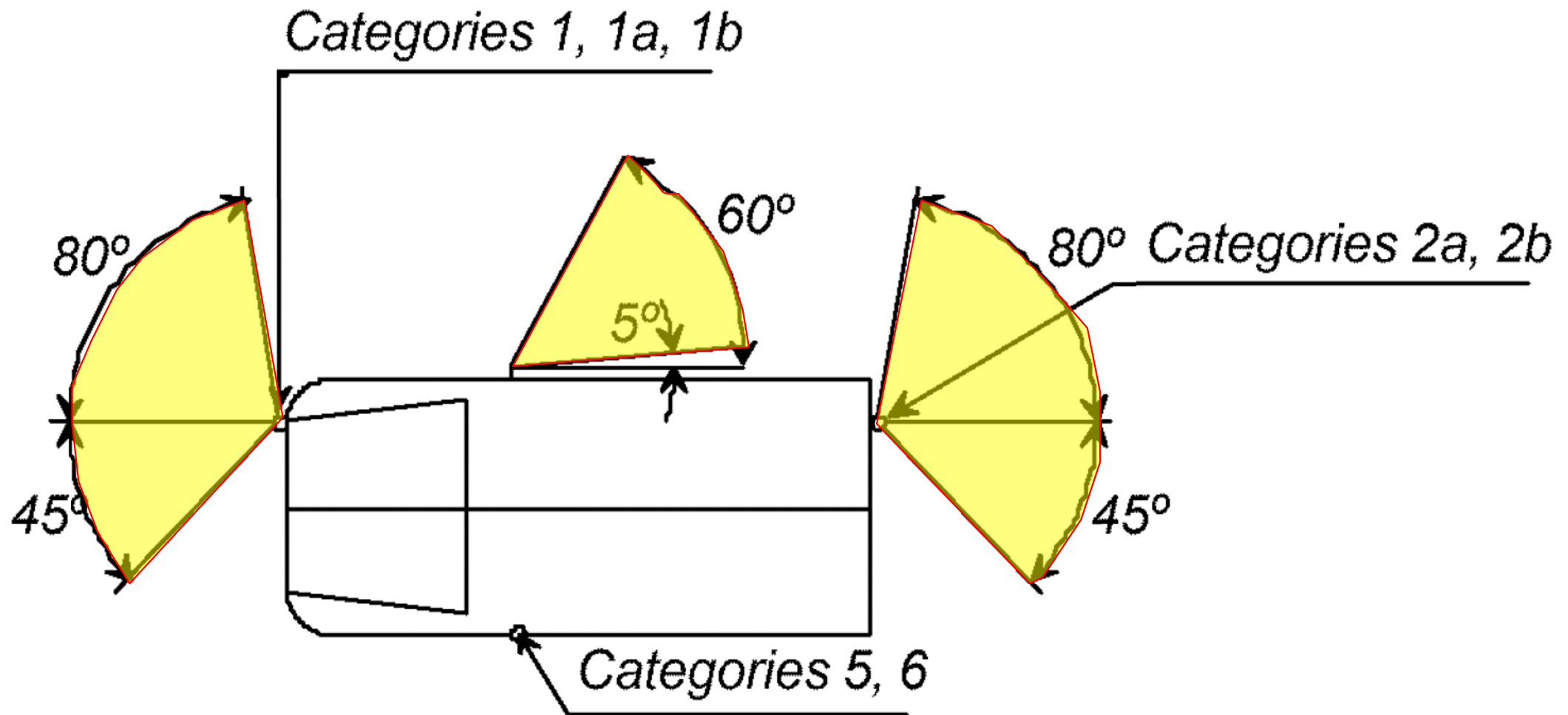
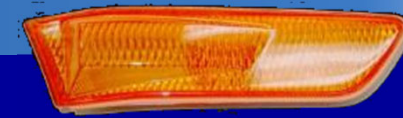


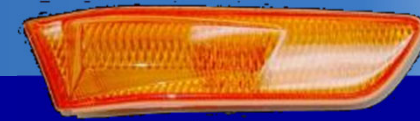
Category 6 :



(If the lamps are installed **less than 750mm** above the ground, **downwards 5 deg.** is permitted.)

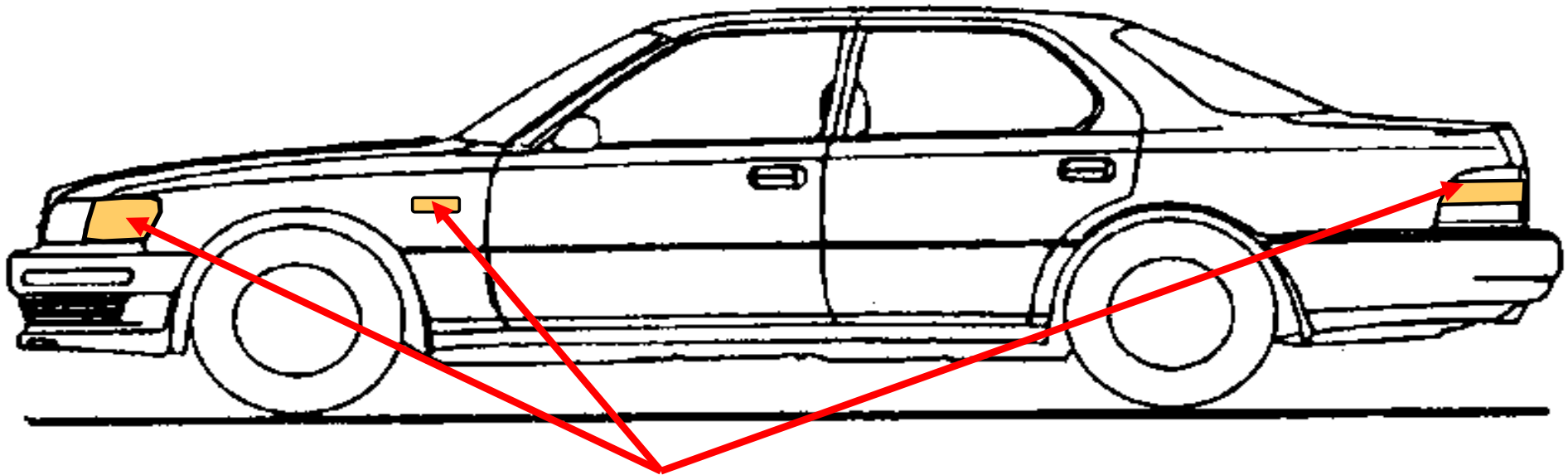
[Horizontal Angles]





6.5.7. Electrical connections :

- Direction-indicator lamps shall **switch on independently** of the other lamps.
- All direction-indicator lamps on the side of a vehicle shall be **switched on and off** by means of one control and shall **flash in phase**(Simultaneously).



Simultaneously

6.5.8. Tell-tale :

- **Operating tell-tale mandatory** for front and rear direction indicator lamps.



Operating tell-tale

Visual tell-tale

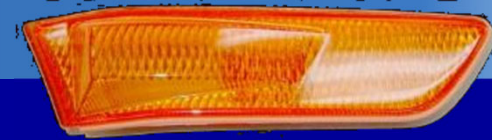
- **extinguish or,**
- **remain alight without flashing or,**
- **show a marked change of frequency.**

Auditory tell-tale

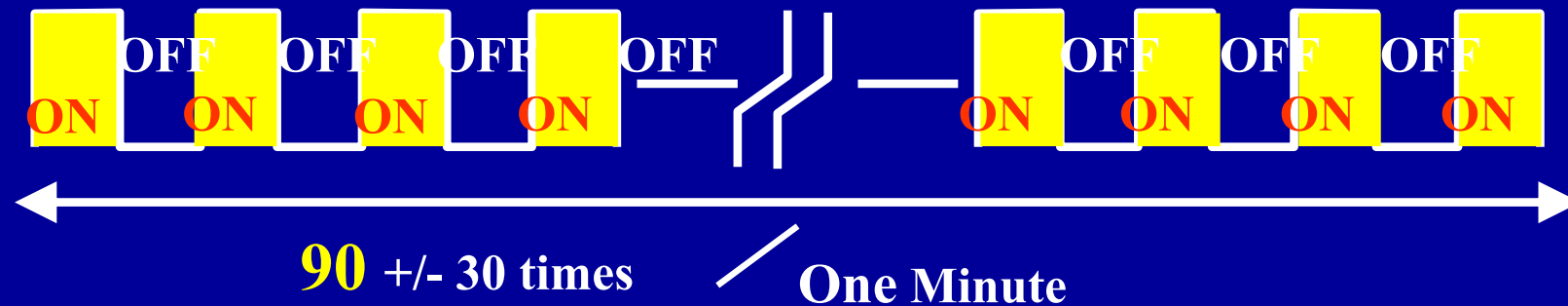
- **clearly audible and show a marked change of frequency.**

In the case of fail

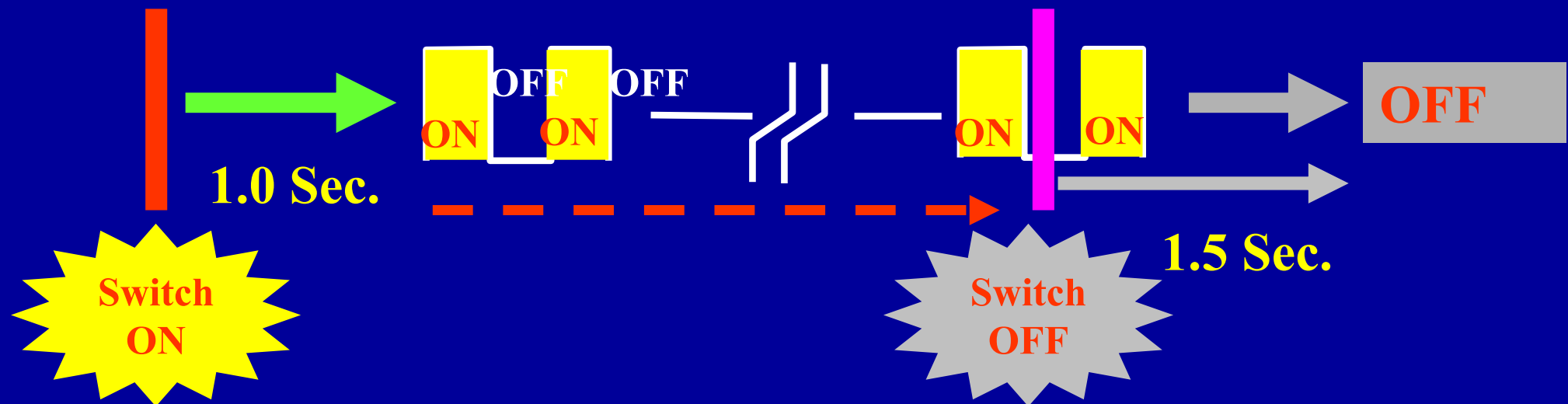
6.5.9. Other requirements :



- The light shall be a **flashing 90 +/- 30 times per minute**.



- Operation of the light-signal control shall be followed within **not more than one second** by the emission of light and within **not more than one-half seconds** by its first extinction.



6. Individual specifications

6.2. Lo-Beam Headlamp

Using words [Lo-beam] and [Hi-beam] in these sheets instead of the [passing-beam] and the [driving-beam]

6.5. Direction-Indicator Lamp

6.7. Stop lamp

6.7. Stop lamp

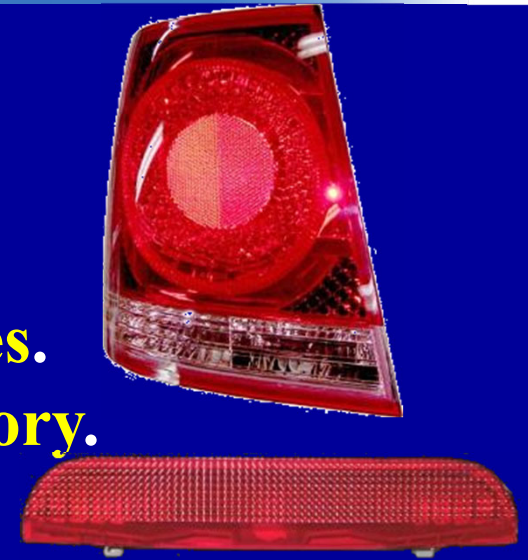
6.7.1. Presence :

S1 or S2 categories :

Mandatory on all categories vehicles.

S3 or S4 category : Mandatory on M1 & N1 category.

Optional on other categories.



Category of the Stop lamp

Category	Note
S1	Stop lamp: Steady luminous intensity
S2	Stop lamp: Variable luminous intensity
S3	High mounted stop lamp : Steady luminous intensity
S4	High mounted stop lamp : Variable luminous intensity

6.7.2. Number :

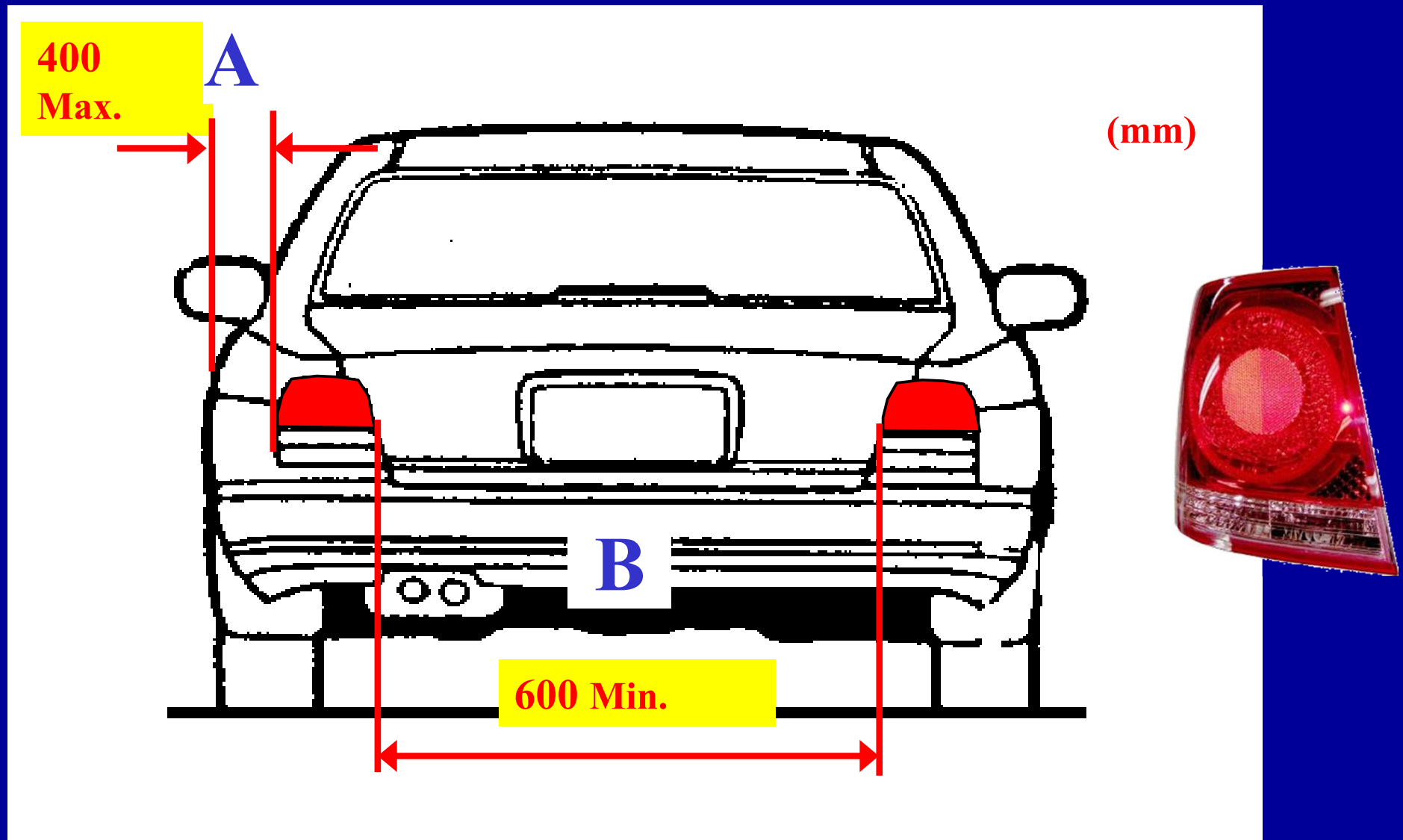
Category S1 and S2 : Two

Category S3 and S4 : One

6.7.4. Position :

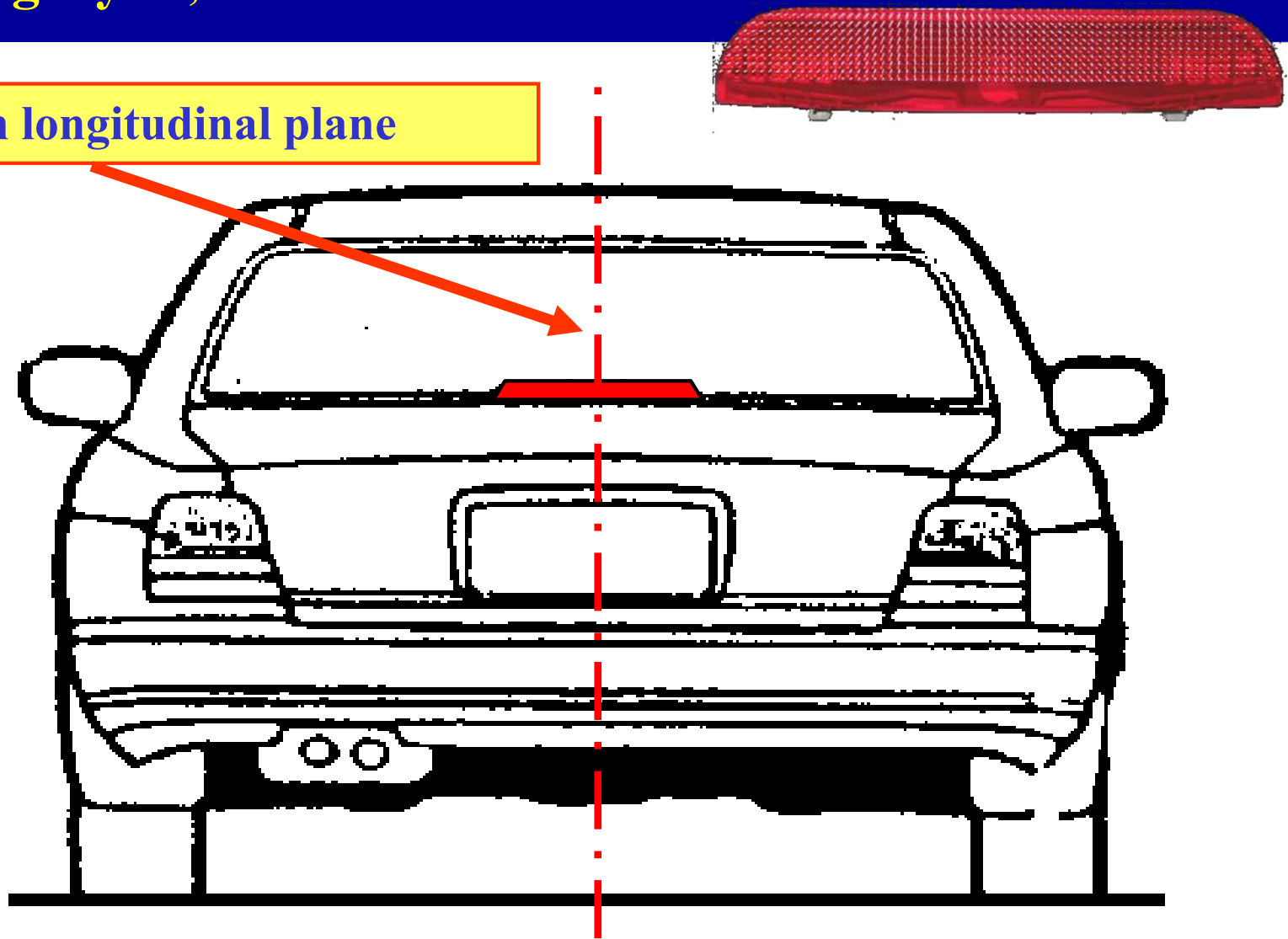
[Width] Category S1, S2

M1 and N1 categories of vehicles

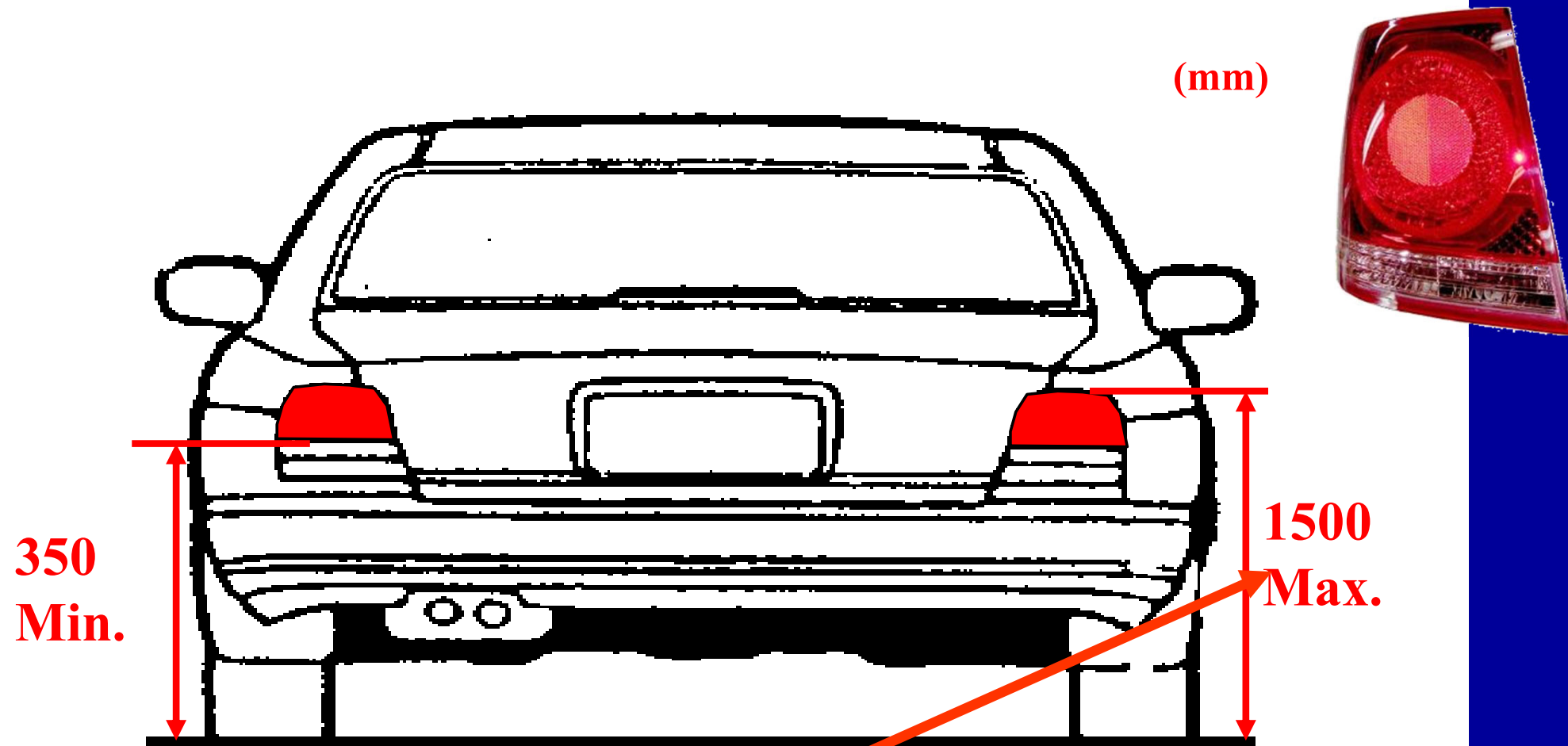


[Width] Category S3, S4

median longitudinal plane

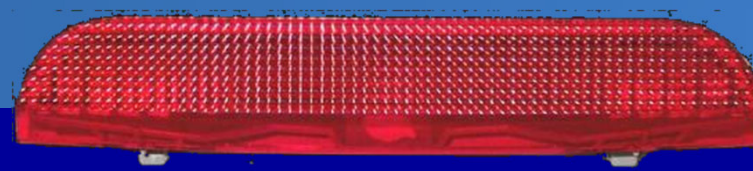


[Height] Category S1, S2

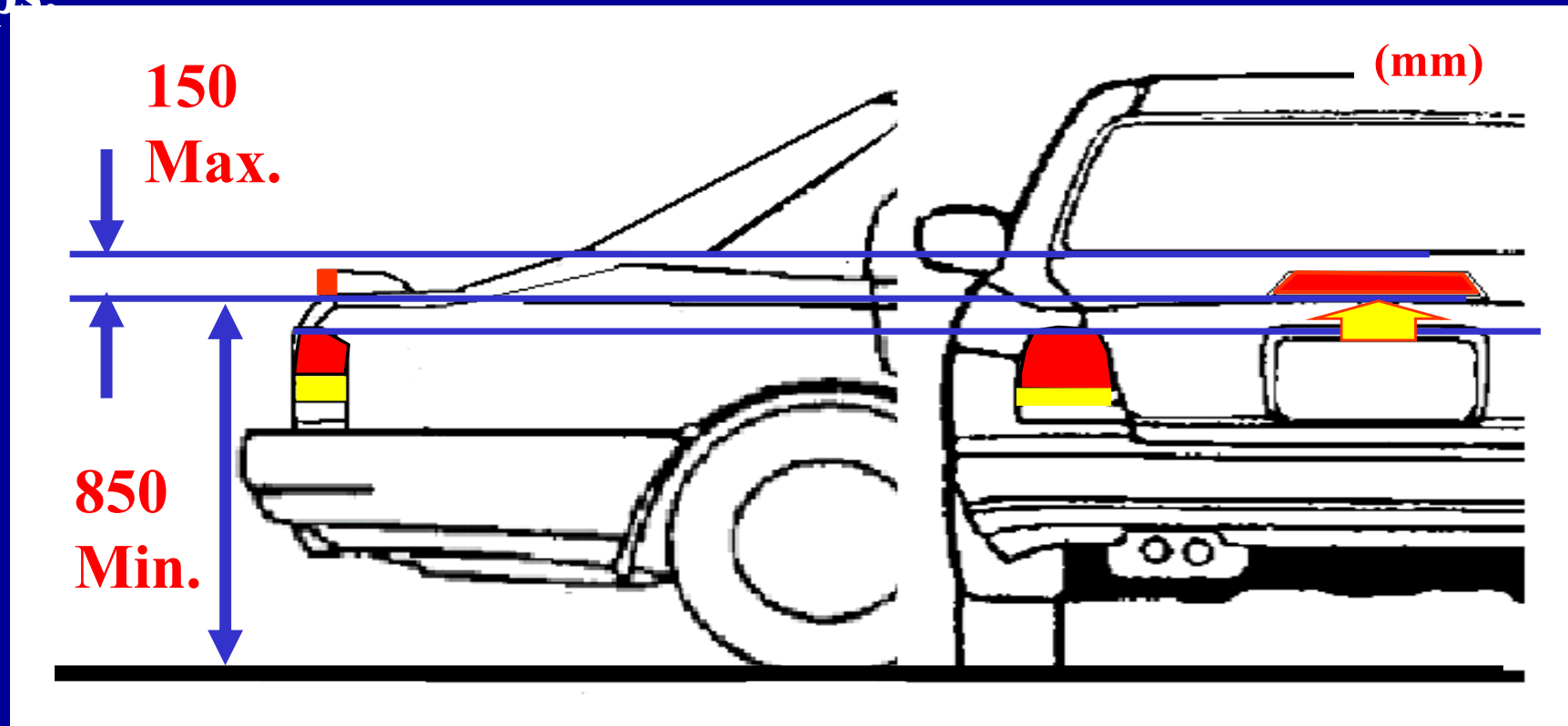


**If it is impossible due to vehicle structure,
2,100 Max is permitted.**

[Height] Category S3, S4



- shall **not be more than 150mm below** the horizontal plane tangential to the **lower edge of the exposed surface of the rear window** or,
- shall **not be less than 850mm** above the ground.
- additionally, **S3 or S4 stop lamp(HMSL)** shall be **higher than S1 or S2** stop lamps.

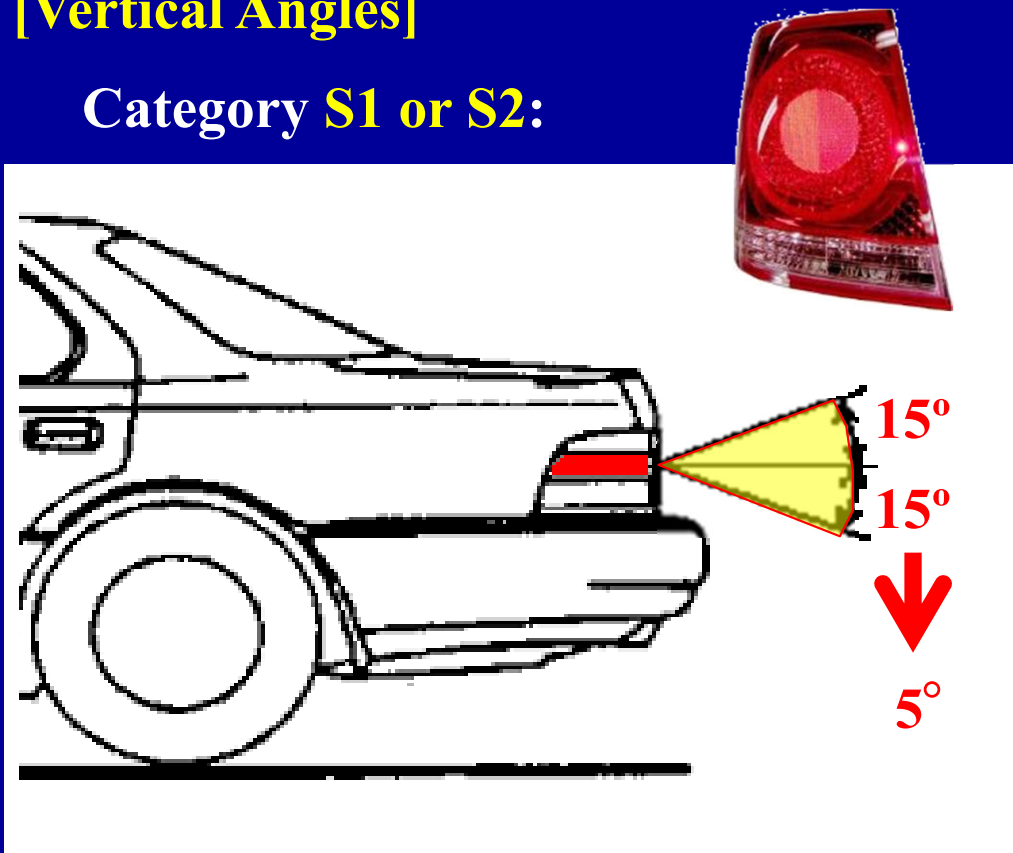


6.7.5. Geometric visibility :

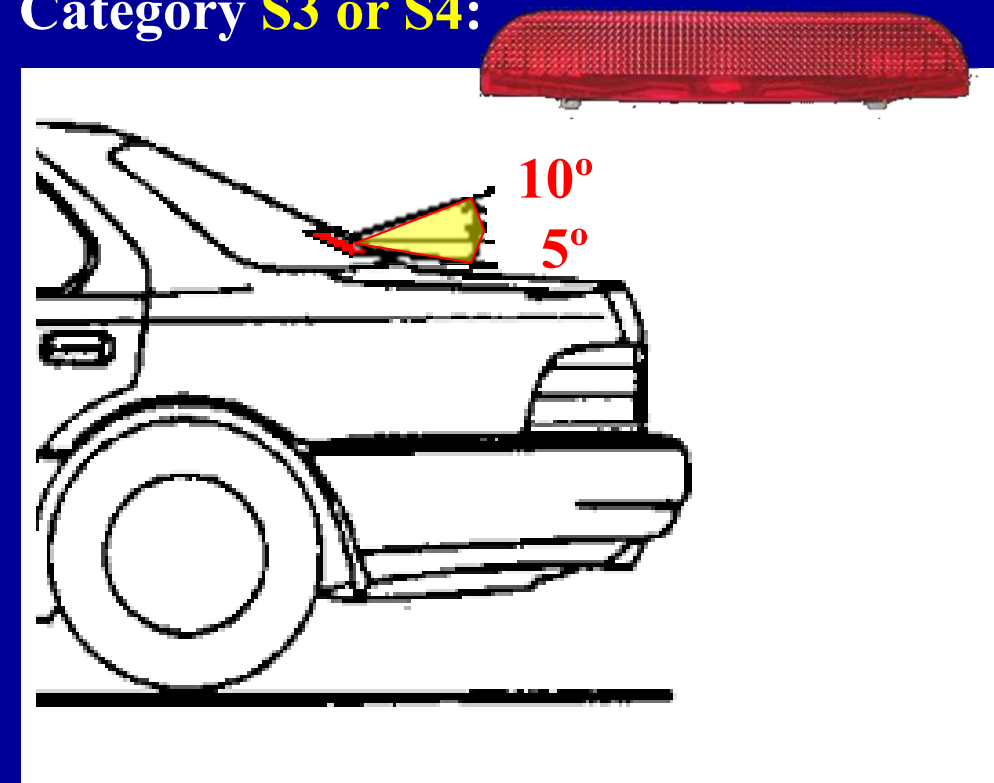
The apparent surface of the **stop lamp** must be **visible in the following area.**

[Vertical Angles]

Category **S1 or S2**:



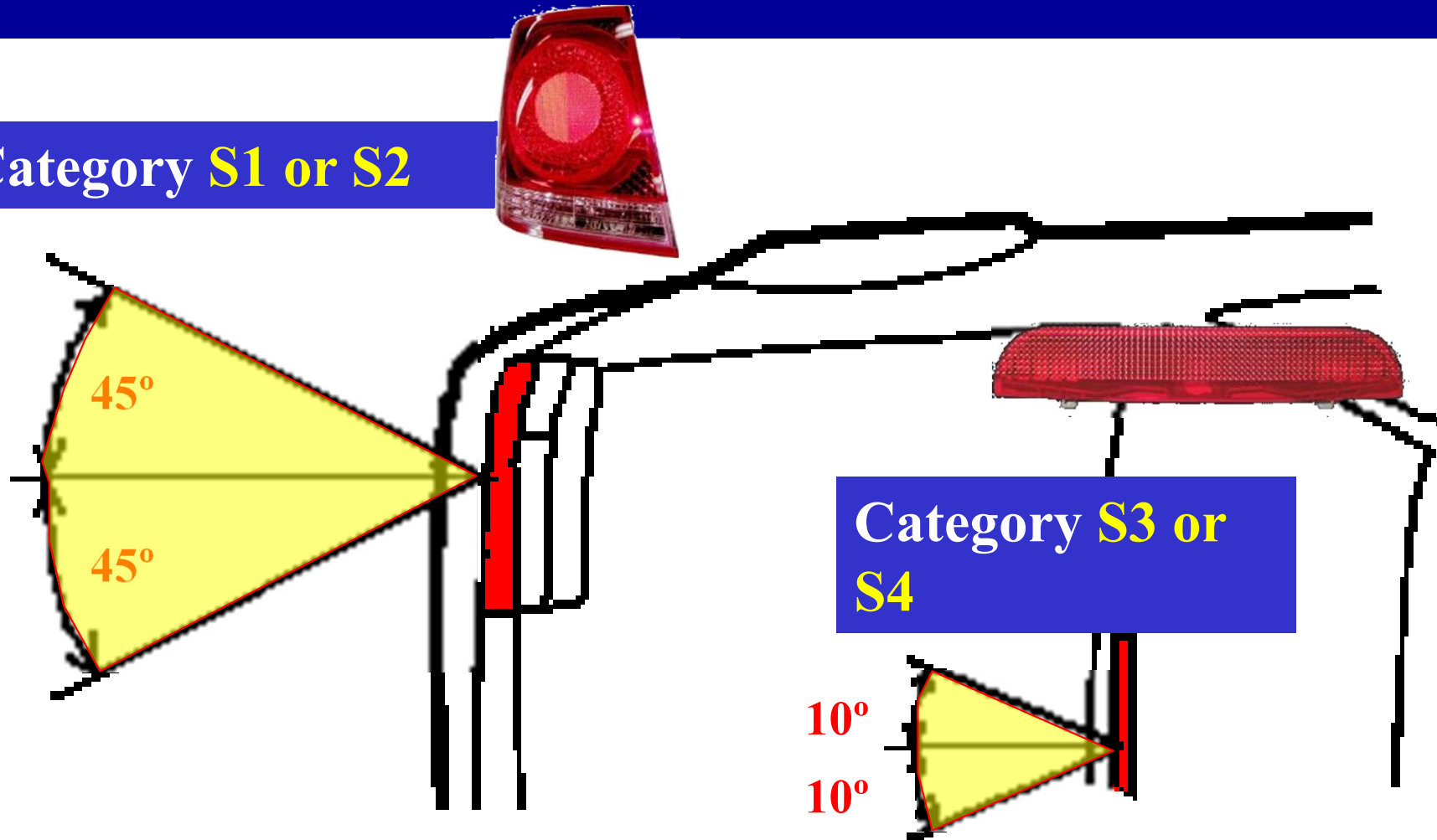
Category **S3 or S4**:



(If the lamps are installed **less than 750mm** above the ground, downwards **5 deg.** Is **permitted.**)

[Horizontal Angles]

Category **S1 or S2**



6.7.7. Electrical Connections :

- Must **light up** when the braking system provides the relevant signal defined in R13 and 13-H.
- In case of the **engine off, stop lamps need not function.**



6.7.8. Tell-tale :

Optional.



However, if tell-tale is fitted, it must be an **operating tell-tale.**


6.7.9. Other requirements :

- The S3 or S4 category device may **not be reciprocally incorporated with any other lamp.**
- The S3 or S4 category device may be **installed outside or inside** the vehicle.





Major Amendments of each series of R48


Item	Requirements (R48-03Series)	
R48-03 Supp. 2	<p>Permission of the adoption of “FULL-AFS” system.</p> <ul style="list-style-type: none"> • FULL-AFS means a lighting device which provides the longitudinal light distribution of passing beam or driving beam with differing characteristics for automatic adaptation to varying conditions of those beams by detecting adverse conditions such as wet road driving and driving environment (town driving, motorway driving). 	
R48-03 Supp. 3	<p>Permission of the adoption of Emergency Stop Signal (ESS) system.</p> <ul style="list-style-type: none"> • ESS means the simultaneous operation of all of the vehicle's direction-indicator lamps, or the flashing of all of the vehicle's stop lamps. 	

Item	Requirements (R48-04 Series)	
R48-04	DRL: Motor Vehicles must be equipped with a Daytime Running Lamp (DRL) complying with R87.	
R48-04 Supp. 5	Establish new provisions for "Y" lamp , which is an assembly of two or three interdependent lamps providing the same function.	
R48-04 Supp. 11	<p>Clarify the provision on manual switching of main-beam headlamps (including AUTO mode).</p> <ul style="list-style-type: none"> • Addition of “simple and immediate manual operation (sub-menus is not allowed*1)” for switching OFF condition *1 e.g.) operation such as using sub-menus in navigation <p>Clarify the provision on automatic switching system of main-beam headlamps and adaptive driving-beam (ADB)..</p>	

Major Amendments of each series of R48

Item	Requirements (R48-04 Series)	
R48-04 Supp. 14	Clarify the single lamp requirement and add definitions for lamps marked "D" and interdependent lamp marked "Y".	
	Align the requirements between lamp marked "D" and those marked "Y".	
	Permission the use of interdependent lamp (Y-lamp) as direction indicator lamp.	
R48-04 Supp. 15	Add a condition where automatic activation of hazard warning signal is allowed. (Limited to only where vehicle is in dangerous situations specified in regulation)	
	Add a switch OFF condition when cornering lamps are activated simultaneously with reversing lamp. New) When reversing lamp is deactivated or when the forward speed of the vehicle exceeds 10 km/h ↑ Old) When reversing lamp is deactivated.	
Item	Requirements (R48-05 Series)	
R48-05	Require the dipped-beam headlamps to be switched ON and OFF automatically for the vehicles fitted with DRL. (i.e. automatic switching of headlamps with DRL)	
R48-05 Supp. 1	Exclude the illumination of telltales for front and rear position lamps in conjunction with DRL activation.	
R48-05 Supp. 4	Same requirement as R48-04 Supp. 11	
R48-05 Supp. 7	Same requirement as R48-04 Supp. 14	
R48-05 Supp. 8	Same requirement as R48-04 Supp. 15	

Major Amendments of each series of R48

Item	Requirements (R48-06 Series)	
R48-06 Supp. 2	Same requirement as R48-04 Supp. 11 and R48-05 Supp. 4	
	<p>Clarify the provision on measuring mounting heights in reduced (relaxed) geometric visibility angles.</p> <p>(New) Ground height of Horizontal plane containing the centre of reference of the lamp</p> <p>↑ (Old) Ground height of Upper Edge of the apparent surface</p>	
R48-06 Supp. 4	<p>Permission the use of Y-lamp (interdependent lamp) as direction indicator lamps.</p> <p>(Same requirement as R48-04 Supp. 14 and R48-05 Supp. 7)</p>	
	<p>Amend the activation criteria for the Class-E passing beam mode (motorway mode) of an AFS system.</p> <p>(1) Change in the minimum speed (60km/h ← 70km/h)</p> <p>(2) (New) Motorway conditions or the vehicle's speed exceeding 110km/h</p> <p>↑ (Old) Motorway condition and vehicle speed > 110km</p>	
R48-06 Supp. 5	<p>Clarify the single lamp requirement and add definitions for lamps marked "D" and interdependent lamp marked "Y".</p> <p>(Same requirement as R48-04 Supp. 14 and R48-05 Supp. 7)</p>	
	<p>Align the requirements between lamp marked "D" and those marked "Y".</p> <p>(Same requirement as R48-04 Supp. 14 and R48-05 Supp. 7)</p>	
	<p>Permission the sequential activation of Fr/Rr direction indicator lamps.</p> <p>(It is not allowed when the direction indicator lamps are operated as emergency stop signal (ESS).)</p>	
R48-06 Supp. 6	(Same requirement as R48-04 Supp. 15 and R48-05 Supp. 8)	
	Mandate the fitment of either side direction-indicator lamp or side marker lamps (simultaneous flash with direction-indicator lamps) for M2/M3/N2/N3 exceeding 9m in length.	

END

Thank you for your attention

Appendix

Additional Functions by adopting Full-AFS.



Conventional Low-beam (Class-C)

1st AFS ••• Bend Lighting



After amendments R48-03 Supp. 2

AFS can be with differing characteristics by detecting such as wet road driving and driving environment (town driving, motorway driving).



Town Light (Class-V)



Motorway Light (Class-E)



Wet road Light (Class-W)

C: The mode when a passing beam is activated if no mode of another passing beam class is activated.

V: Driving in built-up areas (Operating condition: vehicle speed, fixed road illumination, etc.)

E: Motorway driving (Operating condition: vehicle speed > 70km/h or the road characteristics correspond to motorway/vehicle speed)

W: Driving on the wet road (Switching off the front fog lamp or switching on the w/s wiper, detecting the wetness of the road)

Requirements of Emergency Stop Signal (ESS) system

•Lamp requirements (R48-03 “Installation of lighting and light-signaling devices”)

1) Equipment: **Optional**

2) Available lamps which can be used as ESS: **All stop or direction-indicator lamps**

3) Requirements:

• ESS means the **simultaneous flashing** of all of the vehicle's **direction-indicator lamps**, or all of the vehicle's **stop lamps**.

• Color: **amber** or **red**

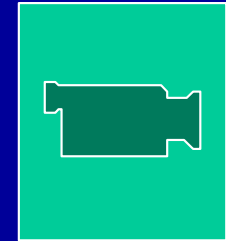
• Frequency of **4.0 +0.0/-1.0Hz**

• Operation condition:

ESS shall be activated automatically only when the vehicle speed is **above 50 km/h** and the braking system is providing the **emergency braking logic signal** defined in R13-10 and R13-H.

• Deactivation condition:

The ESS shall be automatically deactivated if the **hazard warning signal** is activated.



•Braking requirements (R13-10 , R13-H “Braking”)

1) Equipment: **Optional**

2) Requirements:

• ESS shall be activated by the application of the service braking system as follows in such a manner that it would produce a deceleration as follows:

Category	Deceleration
M1,N1	Over 6 m/s²
M2,M3,N2,N3	Over 4 m/s²

• ESS shall be de-activated for all vehicles at the latest when the deceleration has fallen **below 2.5 m/s²**.

• ESS may be activated when the antilock brake system (ABS) is **fully cycling**.



Automatic activation and deactivation of the main-beam headlamps:

6.1.7.2. The control of the main-beam headlamps may be automatic regarding their activation and deactivation, the control signals being produced by a sensor system which is capable of detecting and reacting to each of the following inputs:

- (a) Ambient lighting conditions;
- (b) The light emitted by the front lighting devices and front light-signalling devices of oncoming vehicles;
- (c) The light emitted by the rear light-signalling devices of preceding vehicles.

Additional sensor functions to improve performance are allowed.

6.1.9.3. Automatic activation and deactivation of the main-beam headlamps:

6.1.9.3.1. The sensor system used to control the automatic activation and deactivation of the mainbeam headlamps, shall comply with the following requirements:

6.1.9.3.1.1. Horizontal angles: **15 deg. to the left and 15 deg. to the right.**

Vertical angles:

Upward angle	5 deg.		
Mounting height of the sensor (centre of sensor aperture above the ground)	Less than 2 m	Between 1.5 m and 2.5 m	Greater than 2.0 m
Downward angle	2 deg.	2 deg. to 5 deg.	5 deg.

6.1.9.3.1.2. The sensor system shall be able to detect on a straight level road:

- (a) An oncoming power driven vehicle at a distance extending to at least 400 m;
- (b) A preceding power driven vehicle or a vehicle-trailers combination at a distance extending to at least 100 m;
- (c) An oncoming bicycle at a distance extending to at least 75 m, its illumination represented by a white lamp with a luminous intensity of 150 cd with a light emitting area of 10 cm² +/- 3 cm² and a height above a ground of 0.8 m.

Adaptive driving(main)-beam (ADB)

6.22.7.1.2. **The main-beam may be designed to be adaptive**, subject to the provisions in paragraph 6.22.9.3., the control signals being produced by a sensor system which is capable of detecting and reacting to each of the following inputs:

- (a) Ambient lighting conditions;
- (b) The light emitted by the front lighting devices and front light-signalling devices of oncoming vehicles;
- (c) The light emitted by the rear light-signalling of preceding vehicles;

Additional sensor functions to improve performance are allowed.

For the purpose of this paragraph, "vehicles" means vehicles of categories L, M, N, O, T, as well as bicycles, such vehicles being equipped with retro-reflectors, with lighting and light-signalling devices, which are switched ON.

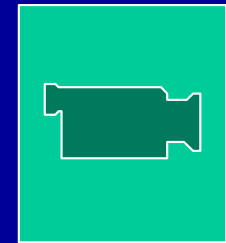
6.22.9.3. Adaptation of the main-beam

6.22.9.3.1. The sensor system used to control the adaptation of the main-beam, as described in paragraph 6.22.7.1.2., shall comply with the following requirements:

6.22.9.3.1.1. The boundaries of the minimum fields in which the sensor is able to detect light emitted from other vehicles as defined in paragraph 6.22.7.1.2. above are given by the angles indicated in paragraph 6.1.9.3.1.1. of this Regulation.

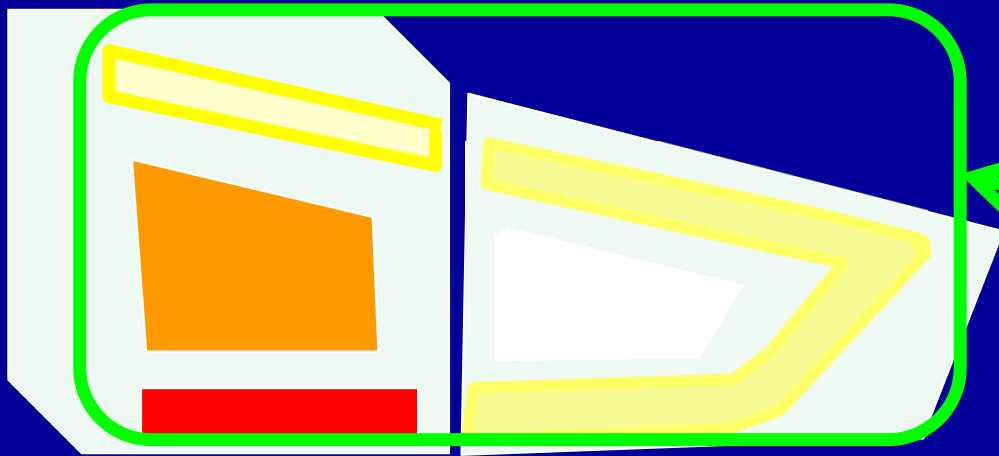
6.22.9.3.1.2. The sensor system sensitivity shall comply with the requirements in paragraph 6.1.9.3.1.2. of this Regulation.

6.22.9.3.1.3. The adaptive main-beam shall be switched off when the illuminance produced by ambient lighting conditions exceeds 7,000 lx.



Compliance with this requirement shall be demonstrated by the applicant, using simulation or other means of verification accepted by the Type Approval Authority. If necessary the illuminance shall be measured on a horizontal surface, with a cosine corrected sensor on the same height as the mounting position of the sensor on the vehicle. This may be demonstrated by the manufacturer by sufficient documentation or by other means accepted by the Type Approval Authority.

Type “Y” lamp



-Separate apparent surfaces

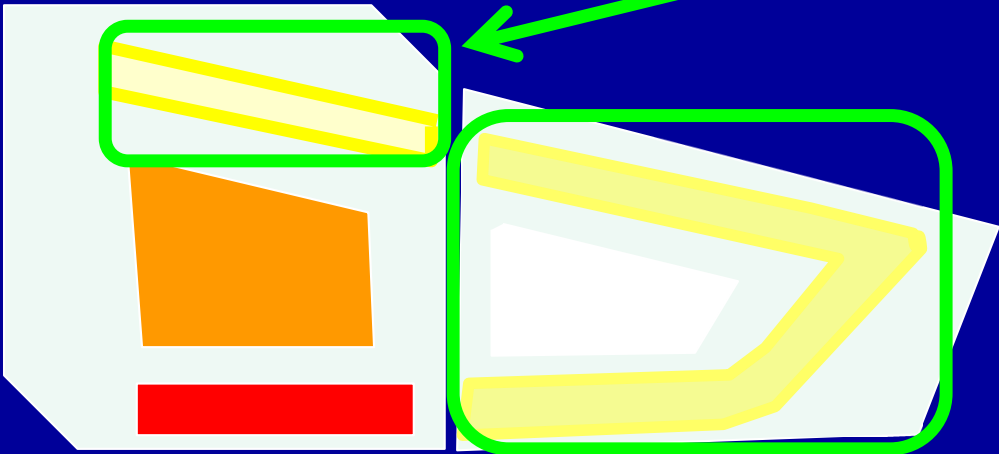
-Separate lamp bodies

-Same function

-Y lamp shall meet the requirements when all lamps are operated together.

“D” lamp

2.7.32 Type “D” lamp



-D lamp means independent lamps, approved as separate devices in such a way that they are allowed to be used either independently or in an assembly of two lamps to be considered as a "single lamp".

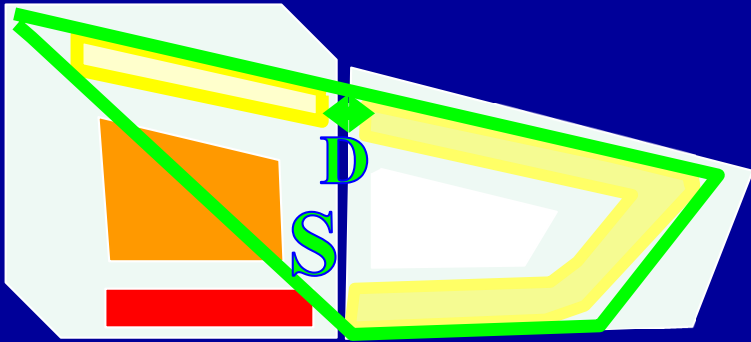
-When an assembly of two independent lamps to be type approved as "D" lamps having the same function is deemed to be a single lamp, it shall comply with the requirements for:

(a) Maximum intensity if all lamps together are lit;

(b) Minimum intensity if either lamp has failed.

After amendments R48-04 Supp. 14

- With either Type “D” lamp and/or Type “Y” lamp



- Single Lamp :

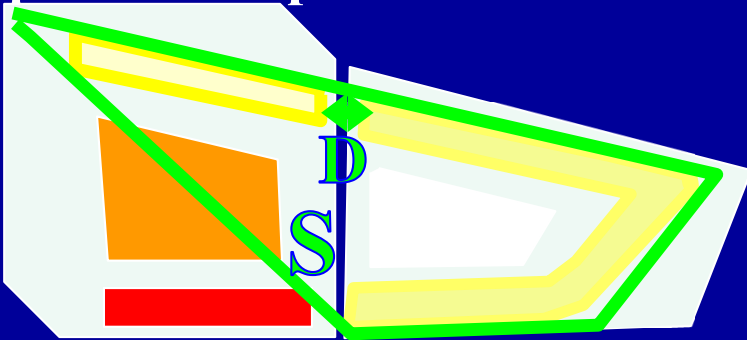
Distance (D) within **75 mm**

or

Area (S1+S1) of **not less than 60% of S.**

Before

- Type “D” lamp



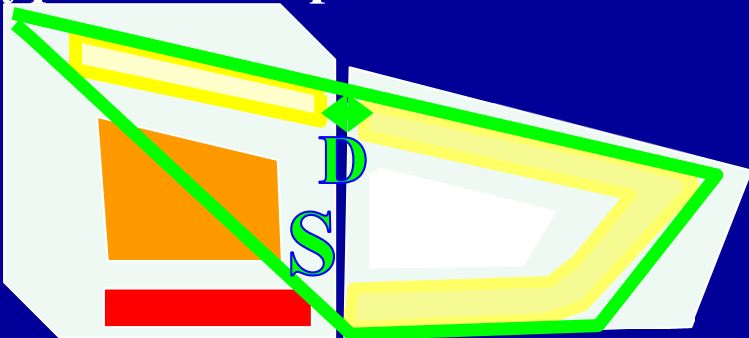
- Single Lamp :

Distance (D) within **15 mm**

or

Area (S1+S1) of **not less than 60% of S.**

- Type “Y” lamp



- Single Lamp :

Distance (D) within **75 mm**

Requirement of DRL+Auto Light

If the vehicle is fitted with DRL, the dipped-beam headlamps shall be switched ON and OFF automatically relative to the ambient light conditions (ambient illuminance and response time) as specified in Annex 13.

Annex 13

Automatic switching conditions dipped-beam headlamps

Ambient light outside the vehicle	Dipped-beam headlamps	Response time
less than 1,000 lux	ON	no more than 2 seconds
between 1,000 lux and 7,000 lux	at manufacturer's discretion	at manufacturer's discretion
more than 7,000 lux	OFF	more than 5 seconds, but no more than 300 seconds



Sequential activation of Fr/Rr direction indicator lamps

