

GTB Proposals to amend Regulations Nos. 7 and 48 to introduce Interdependent Lamp Systems

(ECE/TRANS/WP.29/GRE/2009/62 and ECE/TRANS/WP.29/GRE/2009/63)

Additional Explanation (Revised)

(to complement the justification included with the GTB proposals)

Changing Requirements Influencing Rear Signal lamp Design

CO2 reduction objectives. Aerodynamics for Fuel efficiency lead to greater rear-end curvature

Style is an important factor for vehicle sales and competitiveness

Good lit appearance by increasing lamp size and larger illuminated areas leads to increased safety

Vehicle owners require a wide rear door or trunk entrance. Leads to less space to mount lamps on the fixed part of the vehicle.



Please note: These images are for illustration purposes only and do not relate to specific installations

Wide Tail-gate or Trunk Opening – Implications and Solutions

Narrow lamp mounted on fender

“Wrap-around” curvature makes it difficult to achieve 45° inboard geometric visibility

Geometric Visibility assured to 20° due to the photometric grid



Tail gate or Trunk in open position

Additional lamp mounted on the tail-gate or trunk lid

Provides 45° inboard geometric visibility

Provides enlarged illuminated area and improved appearance when operated in conjunction with the fender mounted lamp.



Tail gate or Trunk in closed position

Please note: These images are for illustration purposes only and do not relate to specific installations

Wide Tail-gate or Trunk Opening – Geometric Visibility Implications



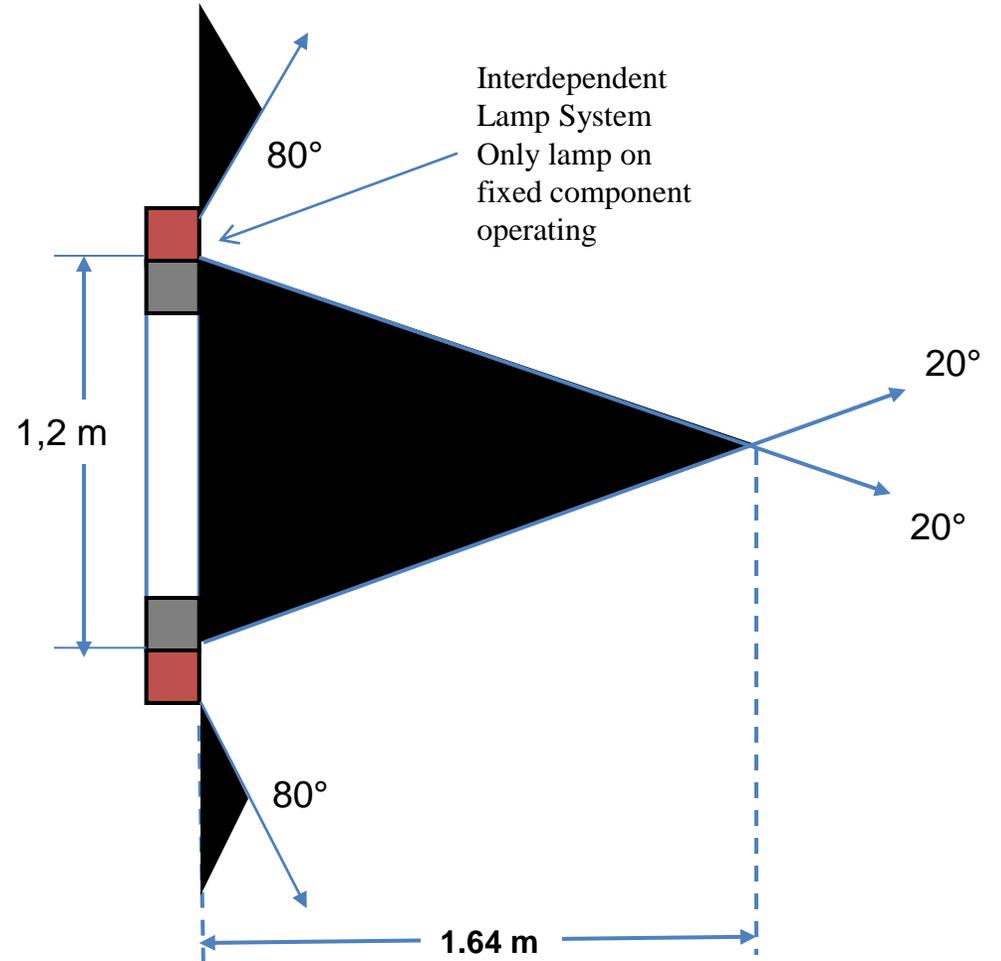
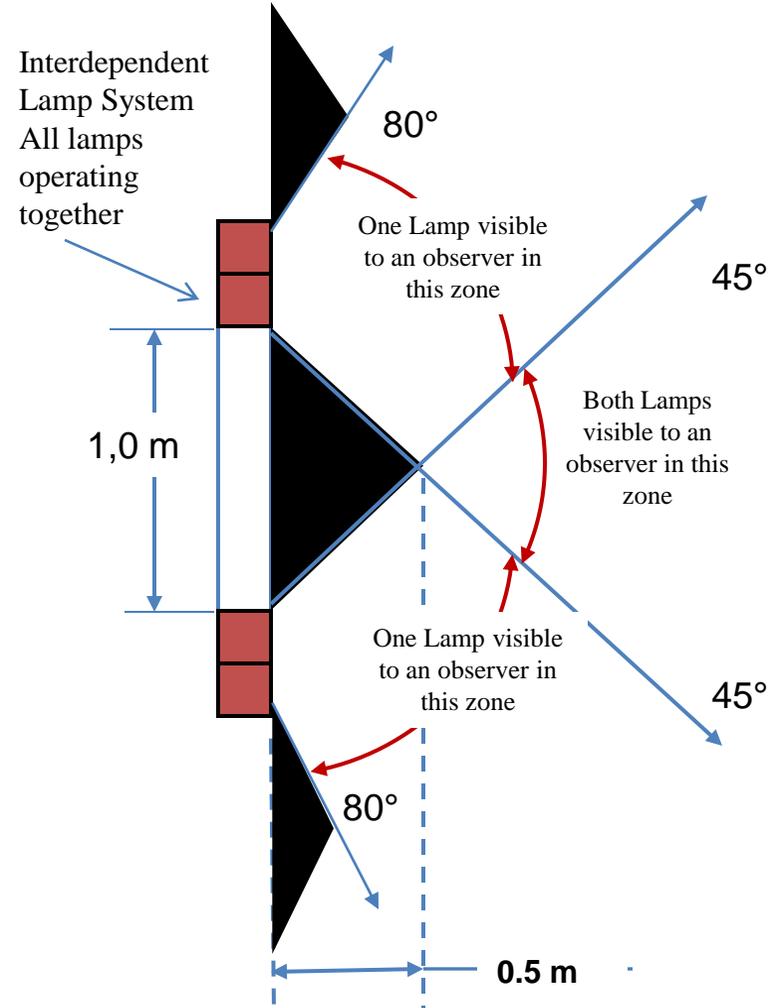
Tail gate or Trunk in normal closed position

All interdependent lamps satisfy the photometric requirements. Geometric visibility assured to 45° inboard



Tail gate or Trunk in fixed open position

The interdependent lamp mounted on the fixed component satisfies photometric requirements. Geometric visibility assured within the photometric grid (20° inboard)



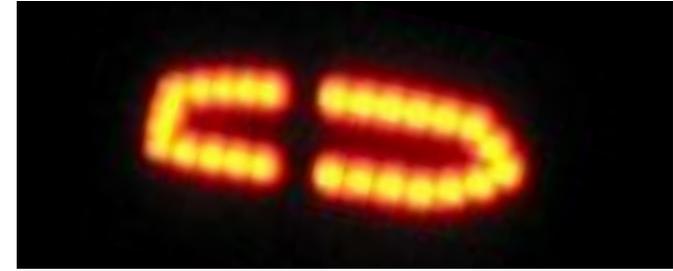
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Proposed Amendment to Regulation 48 Para. 2.13

On the inside of the angles of geometric visibility no account is taken of obstacles, if they were already presented when the lamp was type approved.

If, when the lamp is installed, **any part of the apparent surface of the lamp** is hidden by any further parts of the vehicle, **or is moved out of its normally installed position when a moving component is in any of its fixed open positions**, proof shall be furnished that **the part of the lamp not hidden by obstacles still conforms to the photometric values prescribed for the approval of the device as an optical unit (see Annex 3 of this Regulation)**. Nevertheless, when the vertical angle of geometric visibility below the horizontal may be reduced to 5° (lamp at less than 750 mm above the ground) the photometric field of measurements of the installed optical unit may be reduced to 5° below the horizontal.

Distance Between Adjacent Apparent Surfaces



Edges of adjacent
apparent surfaces

Although the two lamps are installed with a minimum
gap the apparent surfaces are separated due to the
physical limitations of the lamp construction



Vehicle bodywork and sealing
gaskets prevent light emitting
surfaces in this zone

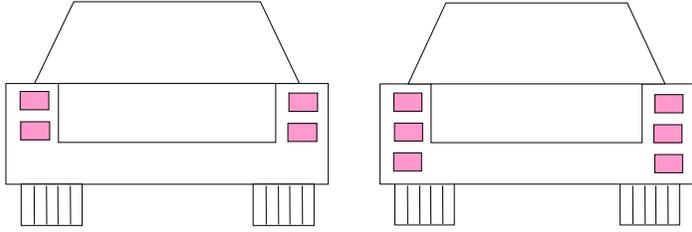
75mm Maximum Proposed

Interdependent Lamp System consisting of two or three Interdependent Lamps

- New Lamp Category
- Characteristics differ from those of “D” Lamps. The complete system is type approved as a “single lamp” with a single applicant
- Up to three separate interdependent lamps assembled and type approved together as a “single lamp”
- May be mounted on fixed or moving components
- All light sources are switched on and off simultaneously.
- Photometric and geometric visibility requirements may be satisfied by one, or a combination of two or three of the interdependent lamps as specified by the applicant.
- Some of the interdependent lamps may not meet any photometric or geometric visibility requirement when operated alone but may be operated to provide an improved visual signal or improved appearance of the complete interdependent lamp system when installed on the vehicle
- Existing safety provisions of Regulations 7 and 48 are maintained.

A summary of the possible installations related to the proposed provisions to be introduced into Regulations 7 and 48 is shown in the following charts:

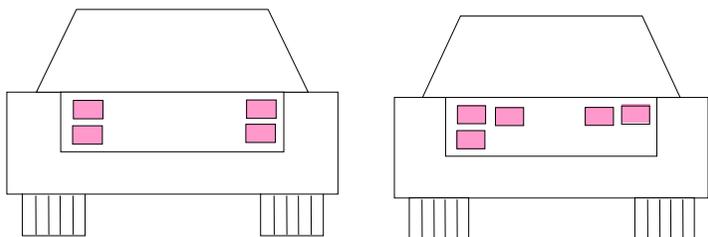
ALL Interdependent Lamps (“Y” Lamps) Mounted on the Fixed Component



- All Interdependent lamps operate together and are type approved as a “single lamp”
- No issues associated with lamps on movable components
- All existing requirements in R48 and R07 apply

Position	R48	Existing requirements unchanged
Photometry	R07	Existing requirements unchanged
Geometric Visibility	R48	Para 2.13In the case of an interdependent lamp system, the above requirements shall be fulfilled when all its Interdependent lamps are operated together. Para5.18 (Revised) Para5.21 (existing)
Failure Provisions	R07	Para 6.1 (a) all light sources which are connected in series are considered to be one light source; (b) the lamp shall comply with the minimum intensity required when any one light source has failed. However, for lamps designed for only two light sources, 50 per cent of the minimum intensity in the axis of reference of the lamp shall be considered sufficient, provided that a note in the communication form states that the lamp is only for use on a vehicle fitted with an operating tell-tale which indicates when any one of these two light sources has failed;
Single Lamp Definitions and Requirements	R48	Para 2.16.1.d added to ensure that the distance between adjacent apparent surfaces does not exceed 75 mm when measured perpendicularly to the reference axis. This replaces the existing provisions with a more stringent requirement that is achievable with an interdependent lamp system to provide an improved lit appearance. Para. 5.7.2.2 amended Para 5.18 amended
Electrical Connections	R48 R07	Para 2.7.29.1 (New definition) Para 5.11.2 amended Para 6.5.7 amended Para 5.9 added

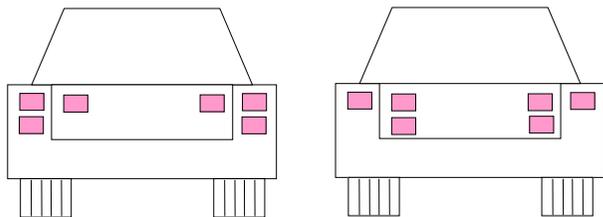
ALL Interdependent Lamps (“Y” Lamps) Mounted on Moving Component(s)



- All Interdependent lamps operate together and are type approved as a “single lamp”
- All existing requirements in R48 and R07 apply including special provisions for lamps mounted on movable components

Position	R48	Existing requirements unchanged
Photometry	R07	Existing requirements unchanged
Geometric Visibility	R48	Para 2.13In the case of an interdependent lamp system, the above requirements shall be fulfilled when all its interdependent lamps are operated together. Para5.18 Revised and amended to ensure that when the moving component is in its open position the geometric visibility is assured within the angles defined by the photometric test points. Para5.21 (existing)
Failure Provisions	R07	Para 6.1 (a) all light sources which are connected in series are considered to be one light source; (b) the lamp shall comply with the minimum intensity required when any one light source has failed. However, for lamps designed for only two light sources, 50 per cent of the minimum intensity in the axis of reference of the lamp shall be considered sufficient, provided that a note in the communication form states that the lamp is only for use on a vehicle fitted with an operating tell-tale which indicates when any one of these two light sources has failed;
Single Lamp Definitions and Requirements	R48	Para 2.16.1.d added to ensure that the distance between adjacent apparent surfaces does not exceed 75 mm when measured perpendicularly to the reference axis. This replaces the existing provisions with a more stringent requirement that is achievable with an interdependent lamp system to provide an improved lit appearance. Para. 5.7.2.2 amended Para 5.18 amended
Electrical Connections	R48 R07	Para 2.7.29.1 (New definition) Para 5.11.2 amended Para 6.5.7 amended Para 5.9 added

Interdependent Lamps (“Y” Lamps) Mounted on Fixed and Moving Component(s)



- All Interdependent lamps operate together and are type approved as a “single lamp”
- All existing requirements in R48 and R07 apply including special provisions for lamps mounted on movable components
- The Applicant shall specify the interdependent lamp or the combination of interdependent lamps that fulfil the photometric requirements. The Geometric Visibility requirements are fulfilled when all interdependent lamps are operated together and the moving parts are in their fixed closed position. When the moving parts are in their fixed open position the geometric visibility is assured within the angles defined by the photometric test points according to the provisions of Para.2.13 in Regulation 48.

Position	R48	Existing requirements unchanged
Photometry	R07	Existing requirements unchanged
Geometric Visibility	R48	<p>Para 2.13In the case of an interdependent lamp system, the above requirements shall be fulfilled when all its interdependent lamps are operated together.If when the lamp is installed, any part of the apparent surface of the lamp is hidden by any further parts of the vehicle, or is moved out of its normally installed position when a moving component is in any of its fixed open positions, proof shall be furnished that the part of the lamp not hidden by obstacles still conforms to the photometric values prescribed for the approval of the device as an optical unit (see Annex 3 of this Regulation).</p> <p>Para5.18 Revised and amended to ensure that when the moving component is in its open position the geometric visibility is assured within the angles defined by the photometric test points.</p> <p>Para5.21 (existing)</p>
Failure Provisions	R07	<p>Para 6.1</p> <p>(a) all light sources which are connected in series are considered to be one light source;</p> <p>(b) the lamp shall comply with the minimum intensity required when any one light source has failed. However, for lamps designed for only two light sources, 50 per cent of the minimum intensity in the axis of reference of the lamp shall be considered sufficient, provided that a note in the communication form states that the lamp is only for use on a vehicle fitted with an operating tell-tale which indicates when any one of these two light sources has failed;</p>
Single Lamp Definitions and Requirements	R48	<p>Para 2.16.1.d added to ensure that the distance between adjacent apparent surfaces does not exceed 75 mm when measured perpendicularly to the reference axis. This replaces the existing provisions with a more stringent requirement that is achievable with an interdependent lamp system to provide an improved lit appearance.</p> <p>Para. 5.7.2.2 amended</p> <p>Para 5.18 amended</p>
Electrical Connections	R48 R07	<p>Para 2.7.29.1 (New definition)</p> <p>Para 5.11.2 amended</p> <p>Para 6.5.7 amended</p> <p>Para 5.9 added</p>

Insertion of Paragraph 2.16.1(d) into Regulation 48

The provisions in Regulation 48, paragraph 2.16.1(b) relate to the special conditions applicable to “D” Lamps providing for the installation of two independent lamps;

- not necessarily identical
- maybe individually type approved
- perhaps produced by different manufacturers.

Interdependent Lamps are:

- specifically designed and produced by one manufacturer
- effectively one continuous (single) lamp divided into two or three parts to facilitate installation onto the vehicle.
- capable of providing improved signalling and visual appearance by controlling, more precisely, the separation of the apparent surfaces.

For these reasons, instead of allowing the use of the “60% rule” a maximum separation of 75mm between adjacent apparent surfaces is prescribed.

Decision to Specify Maximum Separation of the Apparent Surfaces

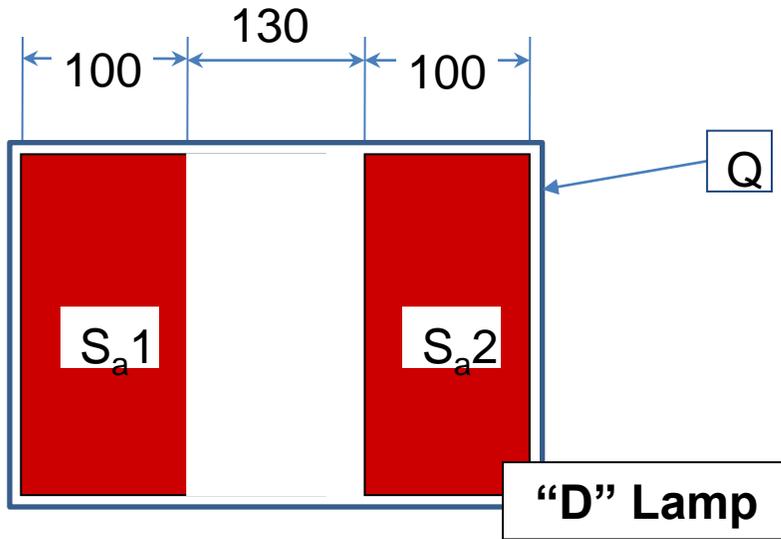
A study commissioned for the AFS Eureka project 1403^{*/} concluded that 2 lamps having a separation of 150 mm are still close enough to be interpreted as one signal.

The 75mm maximum separation has been chosen to ensure a good lit appearance taking into account the two methods allowed to determine the apparent surface in Regulation 48 paragraph 2.10.

The effect of the 75mm separation limit is shown on the following diagram.

^{*/} Soardo, Rossi, Iacomussi, Recognition distance and appearance, IENGF, Milano, 1999

$S_a 1$ = Apparent surface of lamp 1
 $S_a 2$ = Apparent surface of lamp 2
 Q = smallest circumscribing quadrilateral



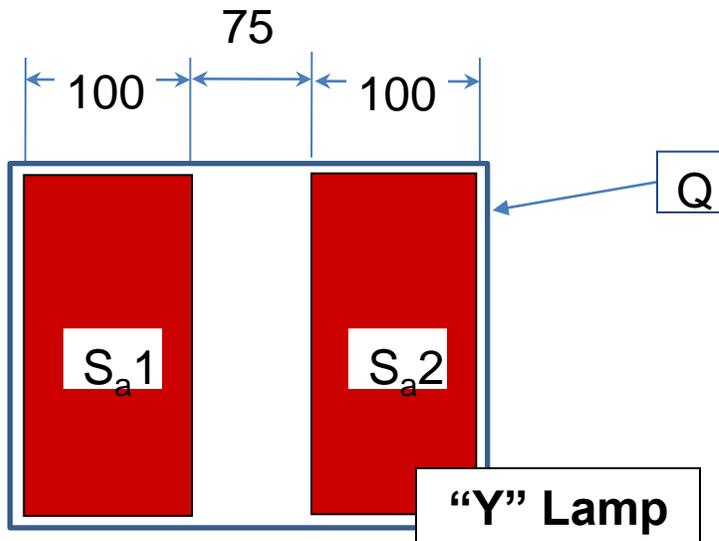
Effect of the Proposed Para. 2.16.1(d)

A Comparison of the effects of the "60%" Rule and the 75mm Separation

Para. 2.16.1(b)

"the projection of their apparent surfaces in the direction of the reference axis occupies not less than 60 per cent of the smallest quadrilateral circumscribing the projections of the said apparent surfaces in the direction of the reference axis"

$$\text{i.e. } \frac{S_1 + S_2}{Q} \geq 60\%$$



Para. 2.16.1(d)

"Any interdependent lamps ("Y" Lamps) in an interdependent lamp system having the same function, approved together as type "Y" and installed so that the distance between adjacent apparent surfaces does not exceed 75 mm when measured perpendicularly to the reference axis"