Scope

This Regulation applies to special warning lamps for vehicles of Categories L, M, N, O, and T[1] and for mobile machinery.

1. Definitions

In general the definitions given in Regulation No. 48 and its series of amendments in force at the time of application for type approval shall apply to this Regulation and in addition for the purpose of this Regulation:

1.1. "*Special warning lamp*" means a lamp emitting blue or amber light intermittently for use on vehicles[2].

1.1.1. "*Rotating or stationary flashing lamp*" means a special warning lamp emitting light intermittently all around its vertical axis (Category T or HT).

1.1.2. "*Directional flashing lamp*" means a special warning lamp emitting light intermittently in a limited angular area (Category X).

1.1.3. "*Complete bar*" means a special warning lamp with two or more optical systems emitting light intermittently all around its vertical axis.

1.1.4. "*Half bar*" means a special warning lamp with one or more optical systems emitting light intermittently from 135° left to 135° right relative to its horizontal reference axis, which is intended to be mounted on the vehicle either to the front or to the rear of the vehicle.

1.2. Special warning lamps of different types, mean special warning lamps which differ intrinsically in such matters as:

1.2.1. The trade name or mark;

(a) Lamps bearing the same trade name or mark but produced by different manufacturers are considered as being of different types.

(b) Lamps produced by the same manufacturer differing only by the trade name or mark may be considered to be of the same type,

1.2.2. The size and form of the coloured cover,

1.2.3. The optical system,

1.2.4. The nature of the beam (e.g. rotating or stationary flashing),

1.2.5. The colour of the light emitted,

1.2.6. The colour and/or type of the light source,

1.2.7. The colour and construction of the light source module,

1.2.8. Whether the special warning lamp has one level (class1) or two levels (class 2) of intensity,

1.3. The frequency f is the number of flashes or groups of flashes (see Annex 5, para. 6) within one second,

1.4. The *"on" time* t_H means the period of time within which the luminous

[1] As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3.), document ECE/TRANS/WP.29/78/Rev.2, para. 2.

[2] Nothing in this Regulation shall preclude the national authorities to prohibit the use of special warning lamps emitting red light intermittently for use on vehicles as defined in paragraph 2.1. of this Regulation

intensity of the flashing light is superior to 1/10 of the maximum value (peak value) J_m. In case of groups of several flashes the “on” time shall be measured from the beginning of the first flash of the group to the end of the last flash of the same group,

1.5. The "off" time tD means the period of time within which the luminous intensity of the flashing light is less than 1/100 of the maximum value (peak value) Jm, but not more than 10 cd. In the case of groups of several flashes the "off" time shall be measured from the end of the last flash of the group to the beginning of the first flash of the next group;

1.6. The "*effective intensity*" J_e in a fixed direction for both rotating and stationary flashing type is given by:

$$J_e = \frac{J_m}{1 + \frac{C}{FT}}$$

Where:

J_m: peak intensity (cd)

C: time constant, C = 0 .2 sec

F: form factor $F = \frac{\int_0^T Jdt}{J_m T}$

T: time of period

J: instantaneous intensity (cd)

1.7. "*Reference centre of the special warning lamp*" means:

(a) For a rotating or stationary flashing lamp (Category T), and for a directional flashing lamp (Category X), the intersection of the axis of reference with the exterior light-emitting surface: it is specified by the manufacturer of the special warning lamp. In the absence of such specification, it means

(i) The optical centre of the light source; or

(ii) The geometric centre of the external optical surface; or

(iii) In case of an array of light sources in the optical system, the geometric centre of the array;

shall be considered as the reference centre.

1.7. *Reference axis of the special warning lamp* means:

For a rotating or stationary flashing lamp (Category T), a vertical axis passing through the reference centre of the lamp;

For a directional flashing lamp (Category X) or a half bar (Category HT), a horizontal axis parallel to the median longitudinal plane of the vehicle.

The manufacturer of the special warning lamp shall indicate the position of the special warning lamp in relation to the reference axis.

1.8. Measuring directions

1.8.1. The effective intensities of rotating or stationary (Category T) lamps shall be determined in the directions within an angle of 360 deg around the reference

axis of the special warning lamp:

1.9. In a horizontal plane perpendicular to the reference axis and passing through the reference centre of the special warning lamp;

1.9.1.1. In cones, the generating lines of which produce with the above-mentioned horizontal plane angles, the values of which are indicated in the table in Annex 5 to this Regulation.

1.9.1.2. In cones, the generating lines of which produce with the above-mentioned horizontal plane angles, starting at a point where the effective intensity is minimum, the values which are indicated in the table of Annex 5 to this Regulation

1.9.1.3. The effective intensities of directional flashing lamps (Category X) shall be measured in the directions indicated in paragraph 7.3.1. of Annex 5 to this Regulation.

2. Application for approval

2.1. The application for approval of a special warning lamp shall be submitted by the owner of the trade name or mark or by his duly accredited representative.

It shall specify whether the special warning lamp is intended to emit amber (A), red (R) or blue (B) light, whether it falls within the directional flashing lamp (X) category, or whether it falls within the rotating or stationary flashing lamp (T) category, and whether it has one level of intensity (class 1), or two levels of intensity (class 2).

2.2. For each type of special warning lamp, the application shall be accompanied by:

2.2.1. Drawing, in triplicate, in sufficient detail to permit identification of the type of the special warning lamp and showing in what geometrical position the special warning lamp shall be mounted on the vehicle,

2.2.2. A brief technical description stating in particular the light source provided by the manufacturer of the special warning lamp and including, where applicable, the electronic control unit(s), the ballast(s) or the light control gear(s) or the light source module and the light source module specific identification code. In case the light source is a Light Emitting Diode (LED), trade name and the type name.

2.2.3. For a special warning lamp having two levels of intensity, an arrangement diagram and a specification of the characteristics of the system ensuring two levels of intensity,

2.2.4. For a special warning lamp device which is comprised of more than one separate unit, the intended geometrical arrangement when installed on the vehicle including the specification of each unit and the maximum distance between the units.

2.2.5. Two samples, in principle for a rated voltage of 12 volts and for only one colour, and eventually two other samples for any other rated voltage in the case where an application is submitted simultaneously or subsequently for approval of special warning lamps of other rated voltages. In this case, it is sufficient to carry out tests according to paragraph 5.6. below,

2.2.6. Two samples of the outer lens, provided that the construction of the special warning lamp with exception of the colour of the outer lens remains unchanged and the approval may be extended simultaneously or subsequently

for special warning lamps of another colour. In this case, it is sufficient to carry out the photometric and colorimetric tests.

2.2.7. Approvals may be extended simultaneously or subsequently for special warning lamps of another colour provided that the only difference is the colour of the outer lens. In this case, it is sufficient to carry out the photometric and colorimetric tests. Such extensions are not applicable to approvals of specials warning lamps samples with light sources of different colour.

2.3. The competent authority shall verify the existence of satisfactory arrangements for ensuring effective control on conformity of production before type approval is granted.

2.4. In the case of a type of a special warning lamp differing only by the trade name or mark from a type that has already been approved it shall be sufficient to submit:

2.4.1. A declaration by the lamp manufacturer that the type submitted is identical (except in the trade name or mark) with and has been produced by the same manufacturer as the type already approved, the latter being identified by its approval code;

2.4.2. Two samples bearing the new trade name or mark or equivalent documentation.

3. Markings

3.1. Special warning lamps submitted for approval shall bear the trade name or mark of the applicant, this marking shall be clearly legible and indelible.

3.2. Each base, each cover and any external components of a special warning lamp which are necessary for its required performance shall include a space of sufficient size for the approval marking, these spaces shall be shown in the drawings mentioned in paragraph 2.2.1. above.

3.3. Each special warning lamp shall be marked, legibly and indelibly, with the following information:

i) The rated voltage of the special warning lamp, and:

ii) In the case of a special warning lamp device which is comprised of more than one separate unit, in brackets an identification mark for the specification of the individual separate unit followed by a "/" and the indication of the total number of separate units to meet the requirements;

And either

iii) In the case of a lamp with a replaceable light source, the category of light source according to the relevant ECE Regulation; or

iv) In the case of a lamp with a non-replaceable light source or a light source module, the rated wattage.

3.4. Directional flashing lamps having a "wide angle effect" (see definition of paragraph 7.3.1. in Annex 5) shall bear an arrow indicating the "wide angle" side and the mounting position. The arrow showing in which position the device has to be installed shall be directed outwards from the vehicle when correctly installed

4. Approval

4.1. If the samples of a type of special warning lamp which are submitted in pursuance of paragraph 2. above, satisfy the provisions of paragraphs 5., 6. and 7. this Regulation, approval shall be granted.

4.2. An approval number shall be assigned to each type approved. Its first two digits (at present 00 for the Regulation in its original form) shall indicate the series of amendments incorporating the most recent major technical amendments made to the Regulation at the time of issue of the approval. The same Contracting Party shall not assign the same number to another type of special warning lamp, except in the cases provided for in paragraph 2.2.4. above.

4.3. Notice of approval or of extension or of refusal of approval of type of special warning lamp pursuant to this Regulation shall be communicated to the Parties to the Agreement which apply this Regulation by means of a form conforming to the model in Annex 1 to this Regulation.

4.4. Every special warning lamp conforming to a special warning lamp approved under this Regulation shall bear, in the spaces referred to in paragraph 3.2. above and in addition to the markings prescribed in paragraphs 3.1. and 3.3., the following:

4.4.1. An international approval mark consisting of:

4.4.1.1. A circle surrounding the letter "E" followed by the distinguishing number of the country which has granted the approval[33],

4.4.1.2. An approval number,

4.4.1.3. "T", "HT" or "X" according to the category of the unit, followed by "A" or "B" or "R" according to the colour of the unit (see paragraph 2.1. above).

4.4.1.4. "1" or "2" according to the class of the unit (see paragraph 2.1. above).

4.5. In the case of lamps with light source module(s), the light source module(s) shall bear:

4.5.1. The trade name or mark of the applicant; this marking must be clearly legible and indelible;

4.5.2. The specific identification code of the module; this marking must be clearly legible and indelible.

This specific identification code shall comprise the starting letters "MD" for "MODULE" followed by the approval marking without the circle as prescribed in paragraph 4.4.1.1; this specific identification code shall be shown in the drawings mentioned in paragraph 3.2.2. above. The approval marking does not have to be the same as the one on the lamp in which the module is used, but both markings shall be from the same applicant.

4.5.3. The marking of the rated voltage.

4.6. The base, the cover and any external components of the special warning lamp referred to in paragraph 3.3. may bear one or more additional approval marks.

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[3] The distinguished numbers of the Contracting Parties to the 1958 Agreement are reproduced in Annex 3 to Consolidated Resolution on the Construction of Vehicles (R.E.3), document TRANS/WP.29/78/Rev.2.

In addition, where the same lens is used, the later may bear the different approval marks relating to the different types of special warning lamps or units of lamps, provided that the main body of the special warning lamp also comprises the space described in paragraph 3.2. above and bears the approval marks of the actual functions.

If different types of special warning lamps comprise the same main body, it is acceptable, if an inner part of the optical arrangements also comprises the space described in paragraph 3.2. above and bears the approval marks of the actual functions in such a way that it will be clearly visible from the outside of the lens.

4.7. The approval mark and the markings referred to in paragraph 3. above shall be clearly legible and indelible even when the special warning lamp is mounted on the vehicle.

4.8. Annex 2 to this Regulation gives an example of the approval mark.

5. General specifications

5.1. The special warning lamps must be so designed and constructed that in normal conditions of use, and notwithstanding the vibrations to which they may be subjected in such use, their satisfactory operation remains assured and they retain the characteristics prescribed by this Regulation.

The special warning lamps must be so designed and constructed that the relevant requirements with regard to internal voltage higher than 60 V DC are fulfilled; e.g. by marking the device, as defined in paragraph 5.1.1.5. in Regulation No. 100.

5.2. The special warning lamp shall be so designed that after it has been mounted correctly on the vehicle, no maladjustment is possible.

5.2.1 The special warning lamp shall be powered directly from the voltage supply network of the vehicle by direct connection or usual connectors (e.g. cigarette lighter plug).

5.3. When a non-replaceable light source is used it shall be permanently fixed to the special warning lamp.

5.4. Light source module

5.4.1. The design of the light source module(s) shall be such that even in darkness the light source module(s) can be fitted in no other position, but the correct one.

5.4.2. The light source module(s) shall be tamperproof.

5.5. In the case of a system that uses a special power supply, or a dedicated power supply, or light source control gear shall be part of special warning lamp.

5.6. The frequency f, the "on" time t_H and the "off" time t_D shall correspond to the values indicated in the table in Annex 5 to this Regulation. They shall be measured at an ambient temperature of + 23º C ± 5º C and with voltages at the terminals of the device which are between 90 per cent and 115 per cent of the rated voltage. Moreover, starting and correct functioning of the special warning lamp shall remain assured at temperatures between – 20º C and + 50º C or if the special warning lamp is exposed to heavy rain, in accordance with the procedure described in Annex 4 to this Regulation. Under those conditions, one

minute after a voltage equal to 90 per cent of the rated voltage has been applied; the frequency shall remain between 2.0 and 4.0 Hz.

5.7. A rotating or flashing special warning lamp device of Category T or of Category HT may consist of more than one optical system. In this case the requirements of Annex 5, paragraph 8. must be met. The lamp manufacturer must supply mounting information to ensure that the various units are correctly mounted on a vehicle.

5.8. A rotating or flashing special warning lamp device of Category T may emit light of several colours.

In this case all the requirements shall be met for each colour separately over the full angular range specified.

The activation of more than one colour at the same time shall be prohibited.

The lamp manufacturer shall supply mounting information, for correct mounting on a vehicle, to ensure that only one colour of the special warning lamp is activated at the same time.

5.9. In the case of special warning lamps approved under this Regulation, it shall be not possible for the user to activate groups of several flashes (flash patterns), which do not conform to the requirements in paragraph 6 of Annex 5.

5.10. In case of a magnetic attachment the special warning lamp shall be exposed to the test described in Annex 9 to this regulation. During the test the magnetic base mounting shall not move by more than 200 mm from the original position.[1]

6. Photometric specifications

The special warning lamps shall comply with the conditions prescribed in Annex 5 to this Regulation.

7. Checking the colour of the special warning lamp

The colour shall comply with the colorimetric boundaries prescribed in Annex 3 to this Regulation.

The colorimetric characteristics of the light emitted, expressed in CIE chromaticity co-ordinates, shall be evaluated using the light source as designed, working at the voltage as specified in paragraph 4.2. in Annex 5 of this Regulation.

In case of a special warning lamp employing a Xenon flash tube, as an alternative the chromaticity co-ordinates may be deduced from the spectral distribution of the transmission of the cover and the transmission or reflection of any other optical effective elements which could impair the colour of the special warning lamp. The calculation then shall be based on a luminous source with a relative spectral distribution as listed in Annex 6.

1 The manufacturer shall inform the user, that an attachment is only possible for a roof of adequate steel or a steel mounting plate.

8. Modification of a type of special warning light for motor vehicles and extension of approval

8.1. Every modification of a type of special warning lamp shall be notified to the Type Approval Authority which granted the type approval. The department may then either,

8.1.1. Consider that the modifications made are unlikely to have appreciable adverse effects and that in any event the special warning lamp still complies with the requirements, or

8.1.2. Require a further test report from the technical services responsible for conducting the tests.

8.2. Confirmation or refusal of approval, specifying the alterations, shall be notified by the procedure specified in paragraph 4.3. above to the Parties to the Agreement applying this Regulation.

8.3. The competent authority issuing the extension of approval shall assign a series number to each communication form drawn up for such an extension.

9. Conformity of production

9.1. The Conformity of Production procedures shall comply with those set out in the Agreement, Appendix 2 (E/ECE/TRANS/505/Rev.2), with the following requirements:

9.1.1. Special warning lamps approved under this Regulation shall be so manufactured as to conform to the type approved by meeting the requirements set forth in paragraphs 5., 6. and 7. above.

9.1.2. In order to verify that the requirements of paragraph 9.1.1. are met, suitable controls of the production shall be carried out.

9.1.3. The holder of the approval shall in particular:

9.1.3.1. Ensure the existence of procedures for the effective control of the quality of products;

9.1.3.2. Have access to the control equipment necessary for checking the conformity to each approved type;

9.1.3.3. Ensure that data of test results are recorded and that related documents shall remain available for a period to be determined in accordance with the administrative service;

9.1.3.4. Analyze the results of each type of test in order to verify and ensure the stability of the product characteristics making allowance for variation of an industrial production;

9.1.3.5. Ensure that for each type of product at least the tests prescribed in Annex 7 to this Regulation are carried out;

9.1.3.6. Ensure that any collecting of samples giving evidence of non-conformity with the type of test considered shall give rise to another sampling and another test. All the necessary steps shall be taken to re-establish the conformity of the corresponding production.

9.1.4. The competent authority which has granted type approval may at any time verify the conformity control methods applicable to each production unit.

9.1.4.1. In every inspection, the test books and production survey records shall be presented to the visiting inspector.

9.1.4.2. The inspector may take samples at random to be tested in the manufacturer's laboratory. The minimum number of samples may be determined in the light of results of the manufacturer's own checks.

9.1.4.3. When the quality level appears unsatisfactory or when it seems necessary to verify the validity of the tests carried out in the application of paragraph 9.1.4.2. above, the inspector shall select samples, to be sent to the technical service which has conducted the type approval tests, using the criteria of Annex 8.

9.1.4.4. The competent authority may carry out any test prescribed in this Regulation. These tests will be on samples selected at random without causing distortion of the manufacturer's delivery commitments and in accordance with the criteria of Annex 8.

9.1.4.5. The competent authority shall strive to obtain a frequency of inspection of once every two years. However, this is at the discretion of the competent authority and their confidence in the arrangements for ensuring effective control of the conformity of production. In the case where negative results are recorded, the competent authority shall ensure that all necessary steps are taken to re-establish the conformity of production as rapidly as possible.

9.2. Special warning lamps with apparent defects are disregarded.

9.3. The reference mark is disregarded.

10. Penalties for non-conformity of production

10.1. The approval granted for a type of special warning lamp pursuant to this Regulation may be withdrawn if the foregoing conditions are not observed.

10.2. If a Contracting Party to the 1958 Agreement applying this Regulation, by means of a communication form conforming to the model in Annex 1 to this Regulation.

11. Production definitively discontinued

If the holder of the approval completely ceases to manufacture a special warning lamp approved in accordance with this Regulation, he shall so inform the authority which granted the approval. Upon receiving the relevant communication that authority shall inform thereof the other Contracting Parties to the 1958 Agreement applying this Regulation by means of a communication form conforming to the model in Annex 1 to this Regulation.

12. Special provision

12.1. Special warning lamps approved before the introduction of this supplement without the category number "1" or "2" in their approval mark may be used also in future without time limitation.

13. Transitional provisions

13.1. As from the official date of entry into force of Supplement 4, no Contracting Party applying this Regulation shall refuse to grant approvals under this Regulation as amended.

13.2. As from 24 months after the date of entry into force of Supplement 4, Contracting Parties applying this Regulation shall grant approvals only if the type of special warning lamps to be approved meets the requirements of this Regulation as amended.

13.3. Contracting Parties applying this Regulation shall not refuse to grant extensions of approval to a preceding version of this Regulation, up to Supplement 3.

13.4. Approvals granted under this Regulation earlier than 24 months after the date of entry into force of Supplement 4 and all extensions of approvals, granted subsequently, shall remain valid indefinitely. When the type of special warning lamps approved to a preceding version of the Regulation up to its Supplement 3 meets the requirements of this Regulation as amended by Supplement 4, the Contracting Party which granted the approval shall notify the other Contracting Parties applying this Regulation thereof.

13.5. No Contracting Party applying this Regulation shall refuse a type of special warning lamps approved under this Regulation as amended.

13.6. As from the official date of entry into force of Supplement 4, no Contracting Party applying this Regulation shall prohibit the fitting on a vehicle of special warning lamps approved under this Regulation as amended.

13.7. Contracting Parties applying this Regulation shall continue to allow the fitting on a vehicle of special warning lamps approved under the preceding version of the Regulation up to its Supplement 3 during the 48 months period which follows the date of entry into force of Supplement 4.

13.8. Upon the expiration of a period of 48 months after the date of entry into force of Supplement 4, Contracting Parties applying this Regulation may prohibit the fitting of special warning lamps, which do not meet the requirements of this Regulation as amended by Supplement 4, on a new vehicle for which national type or individual approval was granted more than 24 months after the entry into force of Supplement 4 to this Regulation.

14. Names and addresses of Technical Services responsible for conducting approval tests, and of Type Approval Authorities

The Parties to the Agreement which apply this Regulation shall communicate to the United Nations Secretariat the names and addresses of the Technical Services responsible for conducting approval tests and of the Type Approval Authorities which grant approval and to which forms certifying approval or extension or refusal or withdrawal of approval, issued in other countries, are to be sent.

Annex 1

Communication

(Maximum format: A4 (210 x 297 mm))

issued by : Name of administration:
.....
.....
.....

concerning[2] Approval granted

Approval extended

Approval refused

Approval withdrawn

Production definitively discontinued

of a type of special warning lamp for motor vehicles, pursuant to Regulation No. 65

Approval No.: …… Extension No.: ……..

1. Special warning lamp/rotating/stationary flashing lamp/directional flashing lamp/complete bar/half bar/blue/amber/red[2]
2. Special warning lamp has one/ two levels of intensity[2]

   Special warning lamp consists of..... separate units.
3. For special warning lamps having two levels of intensity, indicate the system used to obtain increased intensity at daytime
4. Used light source,

   - category of filament lamp or;
   - gas discharge light source or;
   - LED yes/no[2] or;

   Light source module: yes /no[2]

   Light source module specific identification code: .....
5. Rated voltage of special warning lamp .....
6. Trade name or mark .....
7. Manufacturer's name and address .....

[1] Distinguishing number of the country which has granted/extended/refused/withdrawn approval (see approval provisions in the Regulation).

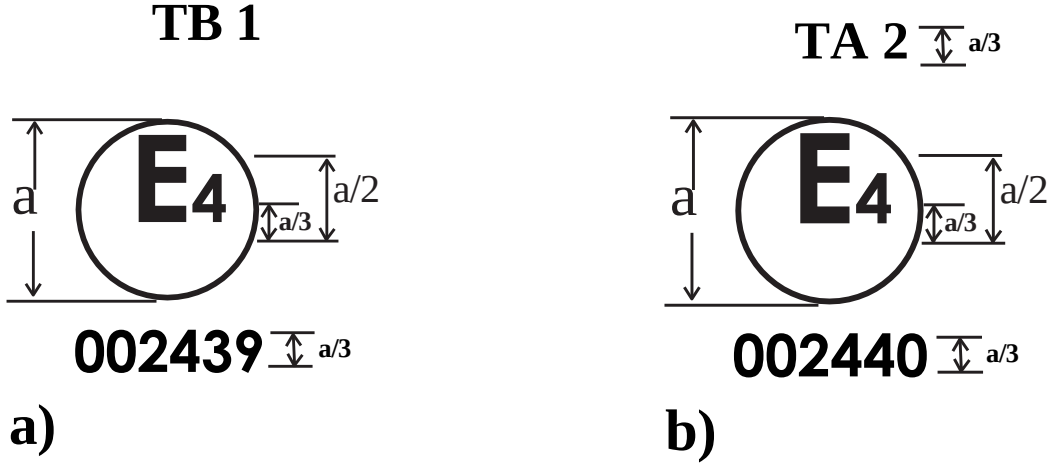
[2] Strike out what does not apply.

Annex 1

8. If applicable, name and address of manufacturer's representative .....
9. Submitted for approval on .....
10. Technical Service responsible for approval tests .....
11. Date of report issued by that service .....
12. Number of report issued by that service .....
13. Approval granted/refused/extended/withdrawn[2].....
14. Reason(s) of extension (if applicable) .....
15. Place .....
16. Date .....
17. Signature .....
18. The list of documents filed with the administration service which has granted approval and available on request is annexed to this communication

Annex 2

Examples of approval marks

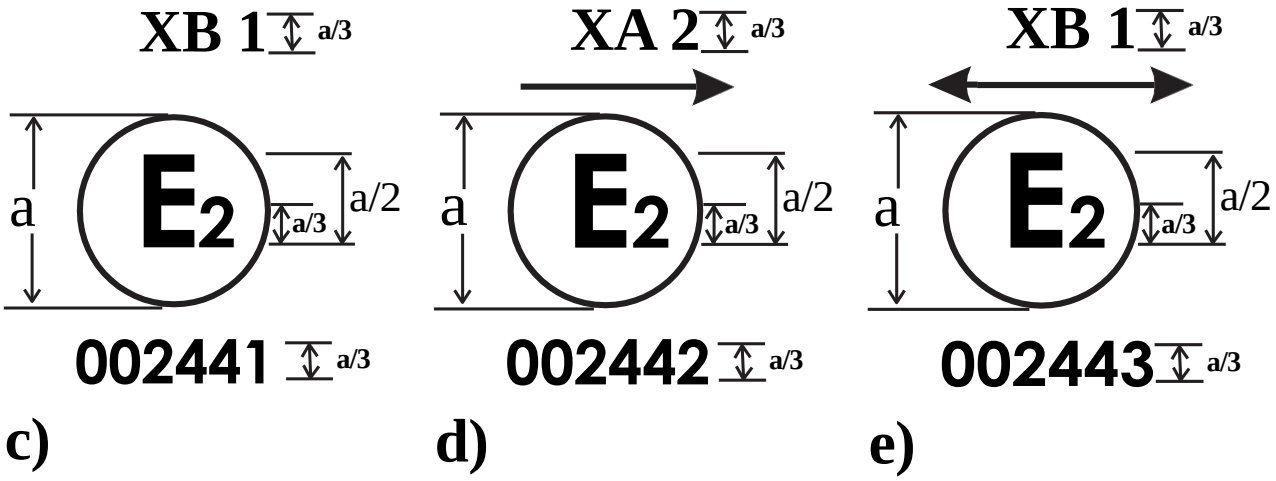


a ≥ 8 mm

The above approval mark affixed to:

a) A special warning lamp indicates that it has been approved in the Netherlands (E4) under approval number 002439. The approval number shows that the approval was granted in accordance with the requirements of the Regulation in its original form and that it is a blue rotating or stationary flashing special warning lamp of class 1 (TB 1).

b) A directional flashing lamp indicates that it has been approved in the Netherlands (E4) under approval number 002440. The approval number shows that the approval was granted in accordance with the requirements of the Regulation in its original form and that it is a amber rotating or stationary flashing special warning lamp of class 2 (TA 2).



a ≥ 8 mm

c) A directional flashing lamp indicates that it has been approved in France (E2) under approval number 002441. The approval number shows that the approval was granted in accordance with the requirements of the Regulation in its original form and that it is a blue directional flashing lamp of class 1 (XB 1).

The marking without an arrow indicates that the lamp has a narrow angle effect.

d) A directional flashing lamp indicates that it has been approved in France (E2) under approval number 002442. The approval number shows that the approval was granted in accordance with the requirements of the Regulation in its original form and that it is a amber directional flashing lamp of class 2 (XA 2).

The arrow indicates that the lamp has a wide-angle effect on the side indicated by the direction in which the arrow is pointing, which also indicates the side of the vehicle on which the device is to be mounted.

e) A directional flashing lamp indicates that it has been approved in France (E2) under approval number 002443. The approval number shows that the approval was granted in accordance with the requirements of the Regulation in its original form and that it is a blue directional flashing lamp of class 1 (XB 1).

The double side arrow indicates that the lamp has a wide-angle effect to both sides, which also indicates that the lamp could be mounted on both side of the vehicle.

f) Light source modules

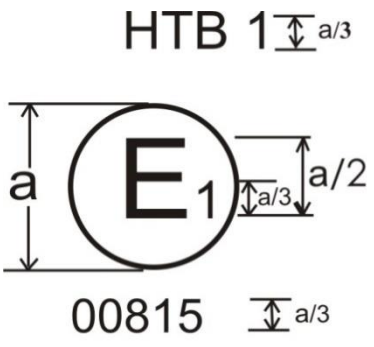
MD E3 17325

The light source module bearing the identification code shown above has been approved together with a lamp approved in Italy (E3) under approval number 17325.

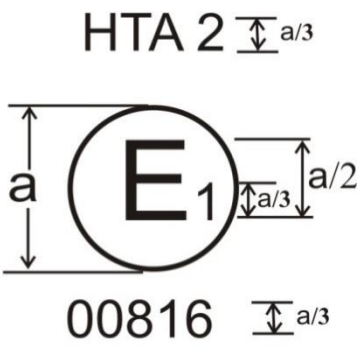
g) Example for the specification of individual separate units comprising a special warning lamp of (Category T) "Rotating or stationary flashing lamp".

("identification mark" / n)

in a case of four units e.g.: (1/4) or (front left/4)



(h)



(i)

(h) A half bar of a special warning lamp indicates that it has been approved in Germany (E1) under approval number 00815. The approval number shows that the approval was granted in accordance with the requirements of the Regulation in its original form and that it is a blue rotating or stationary flashing special warning lamp of class 1 (HTB 1).

(i) A half bar of a special warning lamp indicates that it has been approved in Germany (E1) under approval number 00816. The approval number shows that the approval was granted in accordance with the requirements of the Regulation in its original form and that it is a amber rotating or stationary flashing special warning lamp of class 2 (HTA 2).

Annex 3

Trichromatic co-ordinates for the light emitted through the amber or blue filters constituting the covers of special warning lamps

Under the conditions of paragraph 7. of this Regulation, the trichromatic co-ordinates of light emitted through the lens(es) used for special warning lamps shall lie within the following boundaries:

1. Amber

limit towards green	:	$y \leq x - 0.120$
limit towards red	:	$y \geq 0.390$
limit towards white	:	$y \geq 0.790 - 0.670\ x$

2. Blue

limit towards green	:	$y = 0.065 + 0.805\ x$
limit towards white	:	$y = 0.400 - x$
limit towards purple	:	$y = 1.667x - 0.222$

3. Red

limit towards purple	:	$y \geq 0.980\text{-}x$
limit towards yellow	:	**$y \leq 0.335$**

Colorimetric data shall be measured in the steady state condition.

[1] Corresponds to a specific part of the "yellow" zone of the triangle of CIE colours.

Annex 3

Annex 4

Procedure for the rain test

A sample of the special warning lamp, fitted in its normal operating position, with all the drainage apertures open if they exist, shall be subjected to a precipitation of 2.5 mm of water per minute, the water being directed at an angle of 45º and from a single nozzle producing a full conical jet.

During the test, the device shall turn on its vertical axis at a rate of 4 turns per minute. However, if the water is simultaneously directed to the device under test from all directions in the horizontal plane using a multitude of nozzles, there is no need to rotate the device during the test. In this latter case the water flow specified above shall be adjusted accordingly to achieve even distribution and the correct precipitation.

The test shall last for 12 hours continuously after which the water jet shall be stopped.

One hour later, the sample shall be examined and shall be regarded as having passed the test if the accumulated volume of water does not exceed 2 cm^3

Annex 5

Photometric specifications

1. Measurements of the photometric characteristics shall be taken at a distance of at least 25 m..

   The angular diameter of the photoelectric receiver as seen from the special warning lamp shall be 10 minutes of arc maximum.

   However, the distance of the sensor from the special warning lamp should be adjusted to a longer distance, such that the aperture through which the sensor is receiving the light allows full view of the special warning lamp for the sensor.

   The response time of the photometric system shall be adequate to the rising time of the signal to be measured

2. For special warning lamps having one level of intensity (class 1), the "by night" level shall apply.

   For special warning lamps having two levels of intensity (class 2) measurements shall be carried out for each of the two levels.

   The effective luminous intensities in various directions shall be as specified in the tables below, and shall be measured after the light output from the special warning lamp has reached photometric stability as specified in paragraph 5 below.

3. If a filament lamp is used that shall be a standard filament lamp as provided for in Regulation No. 37 corresponding to a lamp of the category specified for the special warning lamp.

4. Light source conditions for test:

4.1. In the case of replaceable light sources a standard lamp shall be used.

4.2. All measurements on lamps equipped with replaceable or non-replaceable light sources (filament lamps, gas discharge light sources and other) shall be made at 6.75 V, 13.5 V or 28.0 V, respectively.

   In the case of a system that uses a special power supply, or a dedicated power supply, or light source control gear, the voltage declared by the manufacturer shall be applied to the input terminals of that power supply. Unless otherwise specified 6.75 V, 13.5 V or 28 V, as applicable shall be used.

4.3. In the case of filament lamps it is allowed to make the measurements with a standard filament lamp at reference flux conditions nearly at 12 V and recalculate the measured values by a factor, which is determined with this standard filament lamp at 13.5 Volt, if applicable.

5. For any lamp, the luminous intensities measured after one minute and after the light output from the special warning lamp has reached photometric stability (deviation of less than ±5 percent in the last 15 minutes of operation) shall comply with the minimum and maximum requirements. The luminous intensity distribution after one minute of operation can be calculated by applying the ratio achieved at HV between one minute and at photometric stability.

6. If the emitted light of a special warning lamp consists of groups of several flashes, the time distance Δ t between the immediately following flashes must be very short.

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If the peak to peak distance Δ t is less or equal to 0.04 s, then the pulses in between are evaluated as one flash. If this distance Δ t is longer only the flash with the highest effective intensity is valid. Moreover, the period is limited depending on the ratio between the effective intensities of the flashes within a group (I_H= max. effective intensity of the highest peak, I_L = max. effective intensity of the lowest peak) as follows:

In case

$$\frac{I_H}{I_L} \rangle\ 10 \qquad \text{then} \qquad \Delta t\,(s) \langle\ \frac{1}{3f}$$

In case

$$1 \langle\ \frac{I_H}{I_L} \langle\ 10 \qquad \text{then} \qquad \Delta t\,(s) \langle\ \frac{1}{f(5.50 - 0.25\frac{I_H}{I_L})}$$

7. Frequency, time and intensity of the emitted light

7.1 The frequency, the "ON" time and the "OFF" time shall be as specified in the table below

		Colour blue, amber or red
		Rotating system or flashing light sources (Categories T and X)
Frequency f (Hz)	max.	4.0
	min.	2.0
"ON" time t_H (s)	max.	0.4/f
"OFF" time t_D (s)	min.	0.1

7.2. The effective luminous intensities (J_e) within the relevant vertical angles for a special warning lamp (Category T) or (Category HT) shall be as specified in the table below:

Annex 5

<table>
<tr><td colspan="5">Category T or Category HT</td></tr>
<tr><td colspan="3"></td><td colspan="3">Colour</td></tr>
<tr><td colspan="3"></td><td>blue</td><td>amber</td><td>red</td></tr>
<tr><td rowspan="6">Minimum value of the effective luminous intensity J_e, within the specified vertical angles and a horizontal angle of 360° around the reference axis

(a) In the case of Category T, a horizontal angle of 360° around the reference axis
(b) In the case of Category HT a horizontal angle of minimum ±135° relative to its horizontal reference axis</td><td rowspan="2">0°</td><td>by day</td><td>120</td><td>230</td><td>120</td></tr>
<tr><td>by night</td><td>50</td><td>100</td><td>50</td></tr>
<tr><td rowspan="2">±4°</td><td>by day</td><td>60</td><td>-</td><td>60</td></tr>
<tr><td>by night</td><td>25</td><td>-</td><td>25</td></tr>
<tr><td rowspan="2">±8°</td><td>by day</td><td>-</td><td>170</td><td>-</td></tr>
<tr><td>by night</td><td>-</td><td>70</td><td>-</td></tr>
<tr><td rowspan="6">Maximum value of the effective luminous intensity J_e</td><td rowspan="2">Inside ±2°</td><td>by day</td><td colspan="3">1 700</td></tr>
<tr><td>by night</td><td colspan="3">700</td></tr>
<tr><td rowspan="2">Inside ±8°</td><td>by day</td><td colspan="3">1 500</td></tr>
<tr><td>by night</td><td colspan="3">600</td></tr>
<tr><td rowspan="2">Outside the above areas</td><td>by day</td><td colspan="3">1 000</td></tr>
<tr><td>by night</td><td colspan="3">300</td></tr>
</table>

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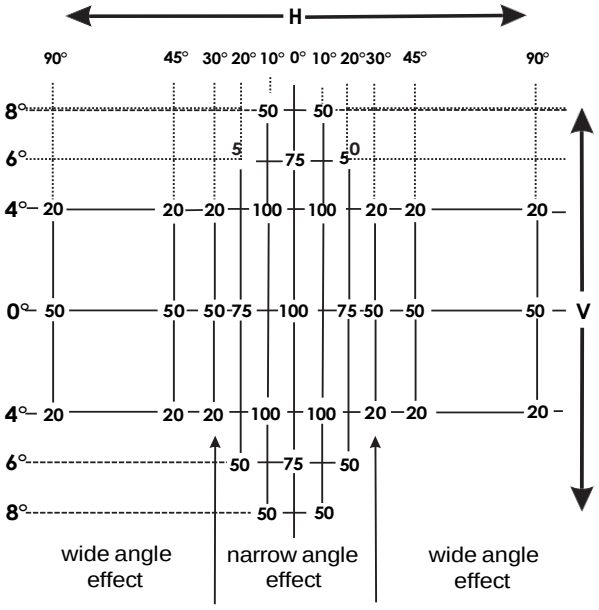
7.2.1. In the case of a special warning lamp device which is comprised of more than one separate unit, the geometrical arrangement(s) as installed at the vehicle seems to be acceptable, if the partial light distribution of each single separate unit is overlapping with each adjacent partial light distribution inside a horizontal angular range of 360° and in a vertical angular range as specified for the relevant category in a geometrical position corresponding to a distance of 20 m, from the vehicle on a vertical plane that is perpendicular to the longitudinal axis of the vehicle and located midway between the lamp units on a side of the vehicle.

7.3. The effective luminous intensities in the reference axis for a directional flashing lamp (Category X) shall be as specified in the table below:

Category X					
			Colour		
			blue	*amber*	*red*
Minimum value of the effective luminous intensity J_e on the reference axis	H = 0° V = 0°	by day	200	400	200
		by night	100	200	100
Maximum value of the effective luminous intensity J_e	inside H = ±10° V = ±4°	by day	3,000	3,000	3,000
		by night	1,500	1,500	1,500
	inside H = ±20° V = ±8°	by day	1,500	1,500	1,500
		by night	600	600	600
	outside the above areas	by day	1,000	1,000	1,000
		by night	300	300	300

7.3.1. Table of standard light distribution for special warning flash lamp (Category X)



Annex 5

Minimum horizontal angular range of category "narrow angle effect" is 30° left to 30° right and for category "wide angle effect" 90° directed outwards the vehicle and 30° to the inside.

7.3.1 The direction H = 0° and V = 0° corresponds to the reference axis. (On the vehicle it is horizontal, parallel to the median longitudinal plane of the vehicle and oriented in the required direction of visibility). It passes through the centre of reference. The values shown in the table give, for the various directions of measurements, the minimum intensities as a percentage of the minimum required in the axis for each lamp (in the direction H = 0° and V = 0°).

7.3.1.1. Within the field of light distribution of paragraph 7.3.1. schematically shown as a grid, the light pattern should be substantially uniform, i.e. the light intensity in each direction of lowest minimum value being shown on the grid lines surrounding the questioned direction as a percentage.

7.3.2 In the case of a special warning lamp device of Category X which comprises of more than one separate unit, the geometrical arrangement(s) as installed on the vehicle, is (are) acceptable when the partial light distribution of each single separate unit is overlapping with each adjacent partial light distribution inside the horizontal and vertical angular range specified for the Category X.

8. If two or more optical systems are integrated in one special warning lamp, this unit has to comply with the following requirements:

8.1. Each optical system shall be in accordance with the requirements of this Annex within the horizontal angle which is not covered by one of the other optical systems. Furthermore, in each required direction at least one optical system shall be effective corresponding to the requirements of this Annex.

8.2. If a special warning lamp contains two or more optical systems, all the optical systems shall work in phase within each half of a complete "bar" which is designed to extend on the width of the vehicle. In such a case, for the purpose of measurement of effective intensity, only one half of the "bar" shall be energized so that the light emission from the side not being measured is not added into the side being measured. The timing measurements as described in paragraph 6.1 of this Annex 5 apply to the operating half of the "bar".

8.3. As long as the efficiency of the special warning lamp is to be secured all around the car a detection of the failure of a part of a special warning system shall exist on the car. If it is designed by the special warning lamp manufacturer this detection shall be checked during the approval procedure.

Annex 6

Xenon relative spectral distribution

λ	$S_e\ \lambda$ rel.	λ	$S_e\ \lambda$ rel.	λ	$S_e\ \lambda$ rel.	λ	$S_e\ \lambda$ rel
380	74.5	480	94.6	580	77.7	680	73.1
385	73.8	485	87.7	585	77.3	685	80.4
390	79.5	490	86.9	590	76.2	690	77.7
395	96.1	495	83.8	595	75.4	695	70.0
400	84.2	500	77.3	600	73.1	700	67.3
405	83.1	505	76.2	605	72.3	705	68.8
410	83.8	510	76.2	610	72.7	710	76.9
415	82.7	515	76.5	615	75.4	715	74.2
420	87.3	520	76.9	620	76.2	720	67.7
425	81.5	525	77.3	625	73.5	725	70.8
430	80.0	530	77.3	630	73.5	730	78.5
435	81.9	535	77.3	635	71.2	735	77.3
440	83.8	540	76.9	640	69.2	740	76.2
445	80.8	545	76.9	645	71.2	745	72.3
450	98.5	550	76.5	650	71.2	750	72.3
455	80.0	555	76.5	655	68.8	755	79.2
460	91.5	560	76.2	660	68.8	760	90.1
465	97.7	565	76.5	665	70.4	765	-
470	100.0	570	76.9	670	70.4	770	-
474	97.7	575	77.3	675	71.2	775	-

Annex 7

Minimum requirements for conformity of production control procedures

1. General

1.1. The conformity requirements shall be considered satisfied from a mechanical and geometric standpoint, if the differences do not exceed inevitable manufacturing deviations within the requirements of this regulation.

1.2. With respect to photometric performances, the conformity of mass-produced special warning lamps shall not be contested if, when testing photometric performances of any special warning lamp chosen at random and in the case of a ECE approved light source equipped with standard light sources of relevant category:

1.2.1. no measured value deviates unfavourably by more than 20 per cent from the minimum values prescribed in this Regulation.

1.2.2. If, in the case of a special warning lamp equipped with a replaceable light source and if results of the test described above do not meet the requirements, tests on special warning lamps shall be repeated using another light source.

1.3. The chromaticity coordinates and the timing characteristics shall be complied with.

2. Minimum requirements for verification of conformity by the manufacturer

For each type of special warning lamp the holder of the approval mark shall carry out at least the following tests, at appropriate intervals. The tests shall be carried out in accordance with the provisions of the Regulation.

If any sampling shows non-conformity with regard to the type of test concerned, further samples shall be taken and tested. The manufacturer shall take steps to ensure the conformity of the production concerned.

2.1. Nature of tests

Tests of conformity in this Regulation shall cover the photometric, timing and colorimetric characteristics.

2.2. Methods used in tests

2.2.1. Tests shall generally be carried out in accordance with the methods set out in this Regulation.

2.2.2. In any test of conformity carried out by the manufacturer, equivalent methods may be used with consent of the competent authority responsible for approval tests. The manufacturer is responsible for proving that the applied methods are equivalent to those laid down in this Regulation.

2.2.3. The application of paragraph 2.2.1. and 2.2.2. requires regular calibration of test apparatus and its correlation with measurements made by a competent authority.

2.2.4. In all cases the reference methods shall be those of this Regulation, particularly for the purpose of administrative verification and sampling.

2.3. Nature of sampling

Annex 7

Samples of special warning lamps shall be selected at random from the production of a uniform batch. A uniform batch means a set of special warning lamps of the same type, defined according to the production methods of the manufacturer.

The assessment shall in general cover series production from individual factories, However, a manufacturer may group together records concerning the same type from several factories, provided these operate under the same quality system and quality management.

2.4. Measured and recorded photometric characteristics

The sampled special warning lamp shall be subjected to photometric measurements for the minimum photometric values, and the timing values according to Annex 5, and the chromaticity coordinates listed in Annex 3, provided for in the Regulation.

2.5. Criteria governing acceptability

The manufacturer is responsible for carrying out a statistical study of the test results and for defining, in agreement with the competent authority, criteria governing the acceptability of his product in order to meet the specifications laid down for verification of conformity of products in paragraph 9.1. of this Regulation.

The criteria governing the acceptability shall be such that, with a confidence level of 95 per cent, the minimum probability of passing a spot check in accordance with Annex 8 (first sampling) would be 0.95.

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Annex 8

Minimum requirements for sampling by an inspector

1. General

1.1. The conformity requirements shall be considered satisfied from a mechanical and a geometric standpoint, in accordance with the requirements of this Regulation, if any, if the differences do not exceed inevitable manufacturing deviations.

1.2. With respect to photometric performance, the conformity of mass-produced special warning lamps shall not be contested if, when testing photometric performances of any special warning lamp chosen at random and in the case of an ECE approved light source equipped with standard light source of relevant category;

1.2.1. No measured value deviates unfavourably by more than 20 per cent from the minimum values prescribed in this Regulation.

1.2.2. If, in the case of a special warning lamp equipped with a replaceable light source and if results of the test described above do not meet the requirements, tests on special warning lamps shall be repeated using another light source.

1.2.3. Special warning lamps with apparent defects are disregarded.

1.3. The chromaticity coordinates and the timing characteristics shall be complied with.

2. First sampling

In the first sampling four special warning lamps are selected at random. The first sample of two is marked A, the second sample of two is marked B.

2.1. The conformity of mass-produced special warning lamps shall not be contested if the deviation of any specimen of samples A and B (all four lamps) is not more than 20 per cent.

In the case that the deviation of both lamps of sample A is not more than 0 per cent the measurement can be closed.

2.2. The conformity of mass-produced special warning lamps shall be contested if the deviation of at least one specimen of samples A or B is more than 20 per cent.

The manufacturer shall be requested to bring their production in line with the requirements (alignment), and a repeated sampling according to paragraph 3. below shall be carried out within two months' time after the notification The samples A and B shall be retained by the Technical Service until the entire COP process is finished.

3. First repeated sampling

A sample of four special warning lamps is selected at random from stock manufactured after alignment.

The first sample of two is marked C, the second sample of two is marked D.

3.1. The conformity of mass-produced special warning lamps shall not be contested if the deviation of any specimen of samples C and D (all four special warning lamps) is not more than 20 per cent.

Annex 8

In the case that the deviation of both special warning lamps of sample C is not more than 0 per cent, the measurement can be closed.

3.2. The conformity of mass-produced special warning lamps shall be contested if the deviation of at least:

3.2.1 One specimen of samples C or D is more than 20 per cent but the deviation of all specimens of these samples is not more than 30 per cent.

The manufacturer shall be requested again to bring their production in line with the requirements (alignment).

A second repeated sampling according to paragraph 4. below shall be carried out within two months' time after the notification. The samples C and D shall be retained by the Technical Service until the entire COP process is finished.

3.2.2 One specimen of samples C or D is more than 30 per cent.

In this case the approval shall be withdrawn and paragraph 5 below shall be applied.

4. Second repeated sample

A sample of four special warning lamps is selected at random from stock manufactured after alignment.

The first sample of two is marked E, the second sample of two is marked F.

4.1. The conformity of mass-produced special warning lamps shall not be contested if the deviation of any specimen of samples E and F (all four special warning lamps) is not more than 20 per cent.

In the case that the deviation of both special warning lamps of sample E is not more than 0 per cent, the measurement can be closed.

4.2. The conformity of mass-produced special warning lamps shall be contested if the deviation of at least one specimen of samples E or F is more than 20 per cent.

In this case the approval shall be withdrawn and paragraph 5 below shall be applied.

5. Approval withdrawn

Approval shall be withdrawn according to paragraph 10. of this Regulation.

6. Rain test

One of the special warning lamps of sample A after sampling procedure in paragraph 2. of this annex shall be tested according to the procedure described in Annex 4 of this Regulation.

The special warning lamp shall be considered as acceptable if the test has passed.

However, if the test on sample A is not complied with, the two special warning lamps of sample B shall be subjected to the same procedure and both shall pass the test

Annex 9

Test for the base mounting of magnetically attached special warning lamps

The tests shall be performed at 23°C ± 5° ambient temperature on a metal surface of sufficient size and the following specifications:

- type of metal: steel with a nominal yield strength of 180 N/mm² - 240 N/mm²;
- thickness of metal surface: 0,7 + 0,1 - 0 mm;
- radius of curvature: ≤ 5000 mm;
- paint thickness: 120 ± 20 µm;
- paint protection: Polyurethane film;
- paint protection thickness: ≥200 µm including glue.
- the metal surface must be >20mm above any other ferrous or magnetic material.

Figure 1
Metal surface with paint and paint protection film

The special warning lamp shall be magnetically attached to the flat metal surface and subjected to a single shock pulse with a minimum acceleration of 16 g during 30 ms.

The direction of the acceleration shall be in horizontal direction.