Submitted by the experts from GRE-IWG SLR

Informal document GRE-94-02
(94th GRE, 27-30 April 2026,
agenda item 4)

This paper provides additional information regarding document GRE/2026/3

I. Proposal

[*Add new paragraph 3.3.2.5.,* to read:

"3.3.2.5. On devices with reduced light distribution, in conformity with paragraph 5.1.4.5. of this Regulation, a vertical arrow starting from a horizontal segment and directed downwards."]

Paragraph 5.1., amend to read:

"5.1. Technical requirements concerning retro-reflectors of the Classes IA**,** ~~and~~ IB**, IIIA, IIIB and IVA** (Symbols "IA"**,** ~~and~~ "IB"**, IIIA, "IIIB" and "IVA"**)

…"

Paragraph 5.1.3.1., amend to read:

"5.1.3.1. After verification of the general specifications (paragraph 4.) and the specifications of shape and dimensions (Annex 5), the ten samples shall be subjected to the heat resistance test described in Part 1 of Annex 6 and at least one hour after this test examined as to their colorimetric characteristics in paragraph 5.1.5. and R_I in paragraph 5.1.4., for an angle of divergence of 20' and an illumination angle $\beta_1 = \beta_2 = 0°$ or if necessary, in the position defined in Part 1 of Annex 4, paragraphs 1.1. and 1.2.

The two retro-reflectors giving the minimum and maximum values shall then be fully tested as shown in paragraph 5.1.4.

These two samples shall be kept by the laboratories for any further checks which may be found necessary.

~~Four samples out of the remaining eight samples shall be selected at random and divided into two groups of two in each group.~~

5.1.3.1.1. Class IA, Class IB, Class IIIA and Class IIIB

The other eight samples shall be divided into four groups of two:

First group: The two samples shall be subjected successively to the water penetration test (Part 2 of Annex 6) and then, if this test is satisfactory, to the tests for resistance to fuels and lubricants (Parts 1 and 2 of Annex 7).

Second group: The two samples shall, if necessary, be subjected to the corrosion test in Part 4 of Annex 6, and then to the abrasive-strength test of the rear face of the retro-reflective device in Part 5 of Annex 6.

Third group: The two samples shall be subjected to the test for stability in time of the optical properties of retro-reflective device in Part 3 of Annex 4.

Fourth group: The two samples shall be subjected to the ~~resistance to weathering~~ **colour-fastness** test (Part ~~6~~**7** of Annex 6).

5.1.3.1.2. Class IVA

Four samples out of the remaining eight samples shall be selected at random and divided into two groups of two in each group.

First group: The two samples shall be subjected successively to the water penetration test (Part 2 of Annex 6) and then, if this test is satisfactory, to the tests for resistance to fuels and lubricants (Parts 1 and 2 of Annex 7).

Second group: The two samples shall, if necessary, be subjected to the corrosion test in Part 4 of Annex 6, and then to the abrasive-strength test of the rear face of the retro-reflective device in Part 5 of Annex 6, these two samples shall also be subjected to the impact test in Part 4 of Annex 8. ”

Paragraph 5.2.5.2.1., delete as follows:

“~~5.2.5.2.1. After performing the test to the resisting to weathering as described in Part 6 of Annex 6, for Classes D and E retroreflective marking materials the maximum values of the coefficient of retro-reflection are shall not exceed the value defined in Table 7 for the measuring geometry for α=0.33°, β_2=5° and β_1=0°.~~”

Paragraph 5.2.6.3., amend to read:

“5.2.6.3. The testing of the day-time colour for retro-reflective device shall be carried out according to the method described in paragraph 4.2.2.

Retroreflective devices of classes 1, 2, 3 and 4 shall be composed of yellow retro-reflective and red retro-reflective or yellow retro-reflective and red fluorescent materials.

The colour of the material in new condition shall be located within the area defined by the chromaticity co-ordinates in Table 8 and comply with the luminance factor.

Table 8
Chromaticity co-ordinates x and y

Colour		1	2	3	4	Luminance factor $\beta_{v,R}$
Yellow	x	0.545	0.487	0.427	0.465	≥ 0.16
	y	0.454	0.423	0.483	0.534	
Red	x	0.690	0.595	0.569	0.655	≥ 0.03
	y	0.310	0.315	0.341	0.345	

”

Paragraph 5.2.6.4., amend to read:

“5.2.6.4. Luminance factor determined in accordance to Part 2 of Annex 4:

for red colour shall be $\beta_{v,R} \geq 0.03$,

for yellow colour shall be $\beta_{v,R} \geq 0.16$,

for white colour, it shall be $\beta_{v,R} \geq 0.25$**,**

except classes C, D, E and D/E ”

Paragraph 5.3.4.2., renumber Table 8 to read Table 9 as follows:

“Table ~~8~~**9**
Minimum values for the R_I
… ”

Paragraph 5.3.5.1.2 renumber Table 9 to read Table 10 as follows:

“Table ~~9~~**10**
Colour coordinates for retro-reflective device (night-time colour)
… ”

Paragraph 5.3.5.2.2, amend to read:

5.3.5.2.2. The testing of the colour of the fluorescent materials (daytime colour) of advance warning triangle of type 1 or type 2 shall be carried out according to the method described in paragraph 4.2.2. and the colour of the material in new condition shall be within an area of which the corner points are determined by the following coordinates as specified in Table ~~10~~**11**:

Table ~~10~~**11**
Colour coordinates of the fluorescent materials (daytime colour)
…”

Annex 1, Item 5., amend to read:

"5. **Submitted for approval on** ~~Date on which the marking material was submitted for approval tests~~: "

Annex 6, Part 4, Paragraph 4.2., amend to read:

"4.2. The coefficient of retro-reflection R_A of the retro-reflective areas, when measured after a recovery period of 48 hours as specified in Part 2 of Annex 6, at an entrance angle of $\beta_2 = 5°$ and an observation angle of $\alpha = 20'$, shall be not less than the value in Table ~~9~~**10** or more than the value in Table ~~10~~**11** respectively. Before measuring, the surface shall be cleaned to remove salt deposits from the saline mist. "

Annex 6, insert a new Part 7 to read:

"Part 7 - Colour-fastness[1] of retro-reflective devices of the Classes IA, IB, IIIA, IIIB and IVA

1. The Type Approval Authority which granted approval shall have the right to check the colour-fastness of a type of retro-reflective device in service.

2. The Type Approval Authorities of countries other than the country in which approval was granted may carry out similar checks in their territory. If a type of retro-reflector in use exhibits a systematic defect, the said authorities shall transmit any components removed for examination to the Type Approval Authority which granted approval, with a request for its opinion.

3. In the absence of other criteria, the concept "systematic defect" of a type of retro-reflector in use shall be interpreted in conformity with the intention of paragraph 3.6.1. of this Regulation. "

II. Justification

General remark

1. The UN Regulation No. 150, original series, had in the first step of the simplification process the same provisions for retroreflective devices of the "frozen" UN Regulations Nos. 3, 27, 69, 70 and 104. In the subsequent step of simplification, while restructuring the chapters and grouping the requirements, some errors occurred, which have been noticed during the type approval process based on the 01 series of UN Regulation No. 150.

[1] Despite the importance of tests to check the colour-fastness of retro-reflective devices, it is in the present state of the art not yet possible to assess colour-fastness by laboratory tests of limited duration.

Specific explanations

2. In paragraph 5 the colour-fastness testing had been applied for the Classes IA, IB, IIIA, IIIB and IVA, but in UN Regulation No. 150, original series, for the class IVA retro-reflector a different grouping for the samples for testing was specified. For the class IVA a colour-fastness test will be not mandatory.

   To indicate this test and how the Type Approval Authority has to deal with it, a new Part 7 is re-inserted in Annex 6 of UN Regulation No. 150, 01 series. This text was already present in UN Regulation No. 150, original series, in Annex 21.

3. In UN Regulation No. 3 and UN Regulation No. 150, original series, the downward arrow is required for RR that is installed at a mounting height less than 750 mm above the ground. However, this requirement is currently inadvertently missing in UN Regulation No. 150, series 01, and shall be reinserted as new Par. 3.3.2.5.

4. For retroreflective marking materials of Classes D and E a maximum limit for the specific coefficient of retroreflection is specified in UN Regulation No. 150, both 00 and 01 series. These marking materials are not safety relevant and are used only for distinctive markings of a limited area (e.g. for logos) or, in case of larger areas, the maximum limit for the specific coefficient of retroreflection is significantly reduced.

   The weathering test is specified for retroreflective markings of Class F, which is used in safety relevant application such as contour marking. Therefore, a weathering test is not necessary to verify the stability of the retroreflection and colour of marking materials of Classes D and E. Since there are no specifications for the colour requirements and any colour can be used, the testing of the colour stability is not necessary for Classes D and E and the paragraph 5.2.5.2.1. can be deleted.

5. The testing of day-time colour is specified in paragraph 5.2.6.3, but for which class of retro-reflective devices the specification of luminance factor requirement will apply got lost. The exception on classes of retro-reflective devices the requirement for the luminance factor will be applied was amended. It was recognized, that the day-time colour specifications for retroreflective devices of Classes 1, 2, 3 and 4 (rear-marking plates) were missing.

   The new text in Par. 5.2.6.3. and the Table 8 have been re-inserted from the “frozen” UN Regulation No. 70, Annex 6. The numbering of the subsequent Tables has been adjusted accordingly, as well as the references to the Tables in the text.

6. The communication form in Annex 1 has been aligned with the same wording used in Regulations 148 and 149.