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World Forum for Harmonization of Vehicle Regulations

Working Party on General Safety Provisions

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Item 5 of the provisional agenda

**REGULATION No. 118
(Burning behaviour of materials)**

Proposal for draft amendments to Regulation No. 118

Submitted by the experts from France, Germany, Norway and Sweden */

The text reproduced below was prepared by the experts from France, Germany, Norway and Sweden in order to improve the fire safety level in buses. It is based on informal document GRSG-96-27 (ECE/TRANS/WP.29/GRSG/75, para. 20). The modifications to the current text of the Regulation are marked in bold or strikethrough characters.

*/ In accordance with the programme of work of the Inland Transport Committee for 2006-2010 (ECE/TRANS/166/Add.1, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance performance of vehicles. The present document is submitted in conformity with that mandate.

A. PROPOSAL

The title of the Regulation, amend to read:

"UNIFORM TECHNICAL PRESCRIPTIONS CONCERNING THE BURNING
BEHAVIOUR **AND/OR THE CAPABILITY TO REPEL FUEL OR LUBRICANT** OF
MATERIALS USED IN THE ~~INTERIOR~~ CONSTRUCTION OF CERTAIN CATEGORIES
OF MOTOR VEHICLES"

The list of contents, amend to read:

"Regulation No. 118

UNIFORM TECHNICAL PRESCRIPTIONS CONCERNING THE BURNING BEHAVIOUR
AND/OR THE CAPABILITY TO REPEL FUEL OR LUBRICANT OF MATERIALS
USED IN THE ~~INTERIOR~~ CONSTRUCTION OF CERTAIN CATEGORIES OF MOTOR
VEHICLES

.....

12. Transitional Provisions

.....

Annex 9- Test to determine the capability of materials to repel fuel or lubricant"

The text of the Regulation,

Paragraphs 1. to 1.3., amend to read:

"1. SCOPE

1.1. This Regulation applies to the burning behaviour (ignitibility, burning rate and melting behaviour) **and to the capability to repel fuel or lubricants** of interior materials used in vehicles of categories M₃, Classes II and III ~~1/-, carrying more than 22 passengers, not being designed for standing passengers and urban use (city buses).~~

Type approvals are granted according to:

1.2. Part I - Approval of a vehicle type with regard to the burning behaviour **and/or the capability to repel fuel or lubricant** of the ~~interior~~ components used in the

1/ As defined in the Consolidated Resolution on the Construction of Vehicles (R.E.3), Annex 7 (document TRANS/WP.29/78/Rev.1/Amend.2).

interior passenger compartment, the engine compartment and any separate heating compartment.

- 1.3. Part II - Approval of a component with regard to its burning behaviour **and/or its capability to repel fuel or lubricant installed in the interior compartment, the engine compartment or any separate heating compartment."**

Paragraph 2.2., amend to read:

- "2.2. **"Interior compartment"** means the passenger compartment (including any space occupied by fixed appliances such as bars, kitchenettes, toilets), crew sleeping compartments and the driver compartment.

~~"Passenger compartment" means the space for occupants' accommodation including bar, kitchen, toilet, etc.), bounded by:~~

- ~~— the roof,~~
- ~~— the floor,~~
- ~~— the side walls,~~
- ~~— the doors,~~
- ~~— the outside glazing,~~
- ~~— the rear compartment bulkhead, or the plane of the rear seat,~~
- ~~— back support,~~
- ~~— at the driver's side of the longitudinal vertical median plane of the vehicle, the vertical transversal plane through the driver's R point as defined in Regulation No. 17.~~
- ~~— at the opposite side of the longitudinal vertical median plane of the vehicle, the front bulkhead."~~

Insert new paragraphs 2.3. and 2.4., to read:

- "2.3. **"Engine compartment"** means the compartment in which the engine is installed and in which a combustion heater may be installed.
- 2.4. **"Separate heating compartment"** means a compartment for a combustion heater located outside the interior compartment and the engine compartment."

Paragraphs 2.3 (former) to 2.6., renumber as paragraphs 2.5. to 2.8.

Insert a new paragraph 2.9., to read:

- "2.9. **"Material installed in a vertical position"** means materials installed in the vehicle such that its slope exceeds 15 per cent from the horizontal when the vehicle is at its mass in running order and it is standing on a smooth and horizontal ground surface."

Paragraphs 3.3.2. to 3.3.3.1., amend to read:

- "3.3.2. In the case of ~~interior~~ components already type approved: a list of the type approval numbers and maker's type designations of the parts concerned, shall be enclosed in the application for the vehicle type approval;
- 3.3.3. In the case of ~~interior~~ components without ECE type approval:
- 3.3.3.1. Samples, the number of which is specified in Annexes 6 to ~~9~~ **8**, of the components used in the vehicles, which are representative of the type to be approved;"

Paragraph 4.2., amend to read:

- "4.2. An approval number... (at present **01 corresponding to the 01 series of amendments**) shall indicate..."

Paragraph 4.4.1., amend footnote 2/ to read:

"2/ 1 for Germany, ... 50 for Malta, ~~and~~ 51 for the Republic of Korea, **52 for Malaysia, 53 for Thailand, 54 and 55 (vacant), 56 for Montenegro, 57 (vacant) and 58 for Tunisia.** Subsequent numbers shall ... the Agreement."

Paragraph 5., amend to read:

- "5. PART I: APPROVAL OF A VEHICLE TYPE WITH REGARD TO THE BURNING BEHAVIOUR OF THE ~~INTERIOR~~ COMPONENTS USED IN THE **INTERIOR PASSENGER COMPARTMENT, THE ENGINE COMPARTMENT AND ANY SEPARATE HEATING COMPARTMENT AND/OR THE CAPABILITY TO REPEL FUEL OR LUBRICANT OF INSULATION MATERIALS USED IN THE ENGINE COMPARTMENT AND ANY SEPARATE HEATING COMPARTMENT**"

Paragraphs 5.2.1. to 5.2.4., amend to read:

- "5.2.1. The ~~interior~~ materials of the **interior passenger compartment, the engine compartment and any separate heating compartment** used in the vehicle to be type approved shall meet the requirements of Part II of this Regulation.
- 5.2.2. The materials and/or equipment used in the ~~interior passenger~~ compartment, **the engine compartment and any separate heating compartment** and/or in devices approved as components shall be so installed as to minimize the risk of flame development and flame propagation.
- 5.2.3. Such ~~interior~~ materials and/or equipment shall only be installed in accordance with their intended purposes and the test(s) which they have undergone (see paragraphs 6.2.1., 6.2.2., ~~and~~ 6.2.3., **6.2.4., 6.2.5. and 6.2.6.**), especially in relation

to their burning and melting behaviour (horizontal/vertical direction) **and/or their capability to repel fuel or lubricant.**

5.2.4. Any adhesive agent used to affix the interior material to its supporting structure shall not, ~~as far as possible,~~ exacerbate the burning behaviour of the material."

Paragraph 6., amend to read:

"6. PART II: APPROVAL OF A COMPONENT WITH REGARD TO ITS BURNING BEHAVIOUR AND/OR ITS CAPABILITY TO REPEL FUEL OR LUBRICANT"

Paragraph 6.1.1.2., amend to read:

"6.1.1.2. the intended use (seat upholstery, roof lining, **insulation**, etc.),"

Paragraph 6.1.4., amend to read:

"6.1.4. "Exposed face" means the side of a material which is facing towards the **interior passenger compartment, the engine compartment and any separate heating compartment** when the material is mounted in the vehicle."

Insert new paragraphs 6.1.7. and 6.1.8., to read:

"6.1.7. "Insulation material(s)" means **material(s) or composite material(s) used to reduce heat transfer by conduction, radiation or convection and for sound-proofing in the engine compartment and any separate heating compartment.**

6.1.8. "Capability to repel fuel or lubricant" means **the capability of materials or composite materials to repel fuel or lubricant when measured according to Annex 9 to this Regulation.**"

Paragraphs 6.2.1. to 6.2.3., amend to read:

"6.2.1. The following materials shall undergo the test described in Annex 6 to this Regulation:

(a) **material(s) and composite material(s) installed in a horizontal position in the interior compartment, used for the upholstery of any seat and its accessories (including the driver's seat),**

(b) **insulation material(s) installed in a horizontal position in the engine compartment and any separate heating compartment.**

~~(b) material(s) used for the interior lining of the roof,~~

- ~~(c) — material(s) used for the interior lining of the side and rear walls, including separation walls,~~
- ~~(d) — material(s) with thermal and/or acoustic function,~~
- ~~(e) — material(s) used for the interior lining of the floor,~~
- ~~(f) — material(s) used for the interior lining of luggage racks, heating and ventilation pipes,~~
- ~~(g) — material(s) used for the light fittings~~

The result of the test shall be considered satisfactory if, taking the worst test results into account, the horizontal burning rate is not more than [75]400 mm/minute or if the flame extinguishes before reaching the last measuring point.

6.2.2. The following materials shall undergo the test described in Annex 7 to this Regulation:

- (a) **material(s) and composite material(s) installed more than 500 mm above the seat cushion and in the roof of the vehicle, used for the interior lining of the roof,**
- (b) **insulation material(s) installed in the engine compartment and any separate heating compartment.**
- ~~(b) — material(s) used for the interior lining of the luggage racks, heating and ventilation pipes situated in the roof,~~
- ~~(c) — material(s) used for the lights situated in the luggage racks and/or roof.~~

The result of the test shall be considered satisfactory if, taking the worst test results into account, no drop is formed which ignites the cotton wool.

6.2.3. The **following** materials ~~used for the curtains and blinds (and/or other hanging materials)~~ shall undergo the test described in Annex 8 **to this Regulation:**

- (a) **material(s) and composite material(s) installed in a vertical position in the interior compartment,**
- (b) **insulation material(s) installed in the engine compartment and any separate heating compartment.**

The result of the test shall be considered satisfactory if, taking the worst test results into account, the vertical burning rate is not more than [75]400 mm/minute."

Insert new paragraphs 6.2.4. (including the insertion of a new footnote 3/) to 6.2.6., to read:

"6.2.4. As an alternative specification to paragraphs 6.2.2. and 6.2.3. ISO 5658-2 3/ may be applied.

The result of the test on flame spread shall be considered satisfactory if the average value of CFE is greater or equal to 20 kW/m².

The result of the test shall be considered satisfactory if, taking the worst test results into account, no burning drops are observed.

3/ ISO 5658-2 Reaction to fire tests - spread of flame - Part 2: Lateral spread on building and transport products in vertical configuration, 2nd ed 2006-09-15, International Standardisation Organisation, Geneva, 2006.

6.2.5. All insulation material(s) and composite material(s) installed in the engine compartment and any separate heating compartment shall undergo the test described in Annex 9 to this Regulation.

The result of the test shall be considered satisfactory if, taking the worst test results into account, the amount of absorbed test liquid is equal or less than [10] g/m².

Recesses necessary for technical reasons, e.g. tubes or structural members that need to pass through the material shall be allowed as long as the protection is maintained (e.g. sealant, tape ...).

6.2.6. Electric cables shall undergo the resistance to flame propagation test described in ISO standard 6722:2006, paragraph 12.

The result of the test shall be considered satisfactory if, taking into account the worst test result, any combustion flame of insulating material shall extinguish within 70 seconds and a minimum of 50 mm insulation at the top of the test sample shall remain unburned."

Paragraphs 6.2.4. to 6.2.4.3.1. (former), renumber as paragraphs 6.2.7. to 6.2.7.3.1.

Paragraph 6.2.4.3.2., renumber as paragraph 6.2.7.3.2. and amend to read:

"6.2.7.3.2. 300 cm² or 120 cm³ per seat row and, at a maximum, per linear metre of the interior ~~of the interior passenger~~ compartment for these elements which are distributed in the vehicle and which are not connected to an individual seating place;"

Paragraph 6.2.4.4., should be deleted.

Paragraph 6.2.4.5., renumber as paragraph 6.2.7.4.

Insert new paragraphs 12. to 12.3., to read:

"12. TRANSITIONAL PROVISIONS

12.1. As from the official date of entry into force of the 01 series of amendments, no Contracting Party applying this Regulation shall refuse to grant ECE approval under this Regulation as amended by the 01 series of amendment.

12.2. As from [24] months after the official date of entry into force of the 01 series of amendments, Contracting Party applying this Regulation shall grant ECE approvals only if the vehicle type or component type to be approved meet the requirements of this Regulation as amended by the 01 series of amendments.

12.3. Starting from [60] months after the official date of entry into force of the 01 series of amendments, Contracting Party applying this Regulation may refuse first national registration (first entry into service) of a vehicle which does not meet the requirements of this Regulation as amended by the 01 series of amendments."

Annex 1.

The title, amend to read:

"INFORMATION DOCUMENT

(in accordance with paragraph 3.2. of this Regulation relating to the ECE Type Approval of a vehicle with regard to the burning behaviour of the interior components used in the interior passenger compartment, the engine compartment and any separate heating compartment and/or the capability to repel fuel or lubricant of insulation materials used in the engine compartment and any separate heating compartment)"

Paragraph 3., amend to read:

**"3. BODYWORK
Interior fittings and/or insulation materials"**

Insert new paragraphs 3.3., 3.3.1., 3.3.1.1., 3.4. and 3.4.1., to read:

"3.3. Capability of materials to repel fuel or lubricant used in the vehicle

3.3.1. Material(s) used for insulation purposes

3.3.1.1. Component type-approval number(s):

3.4. Electric cables

3.4.1. Component type-approval number(s):"

Annex 2

The title, amend to read:

"INFORMATION DOCUMENT

(in accordance with paragraph 3.2. of the Regulation relating to the ECE Type Approval of a component **used in the interior compartment, the engine compartment and any separate heating compartment** with regard to its burning behaviour **and/or the capability to repel fuel or lubricant of insulation materials used in the engine compartment and any separate heating compartment**)"

Insert new paragraphs 3. to 3.6. and paragraphs 4. to 4.6., to read:

- "3. **INSULATION MATERIALS**
- 3.1. **Material(s) used for:**
- 3.2. **Base material(s)/designation: . . . / . . .**
- 3.3. **Composite/single (1/) material, number of layers 1:**
- 3.4. **Type of coating (1):**
- 3.5. **Maximum/minimum thickness**mm
- 3.6. **Type-approval number, if available:**

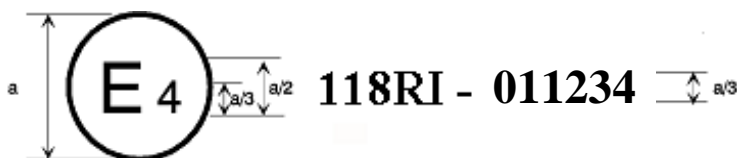
- 4. **ELECTRIC CABLES**
- 4.1. **Material(s) used for:**
- 4.2. **Base material(s)/designation: . . . / . . .**
- 4.3. **Composite/single (1/) material, number of layers 1:**
- 4.4. **Type of coating (1):**
- 4.5. **Maximum/minimum thickness**mm
- 4.6. **Type-approval number, if available:**"

Annex 5, amend to read:

"Annex 5
ARRANGEMENTS OF APPROVAL MARKS

Example 1

(see Part I of this Regulation)

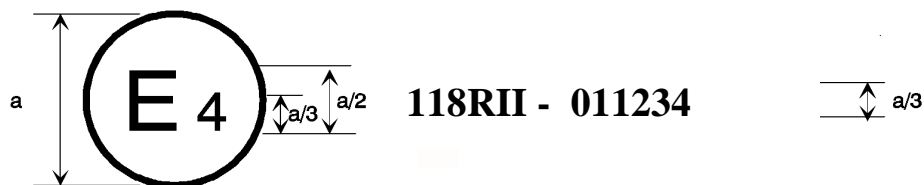


$a = 8 \text{ mm min}$

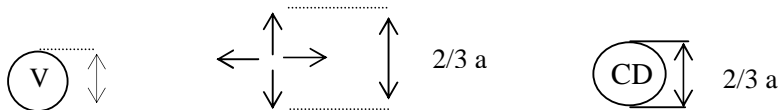
The above approval mark affixed to a vehicle shows that the type concerned was approved in the Netherlands (E4) pursuant to Part I of Regulation No. 118 under approval No. **011234**. The first two digits (**01**) of the approval number indicate that the approval was granted in accordance with the requirements of the **01 series of amendments to Regulation No. 118**.

Example 2

(see part II of this Regulation)



$a = 8 \text{ mm min}$



The above approval mark affixed to a component shows that the type concerned was approved in the Netherlands (E4) pursuant to Part II of Regulation No. 118 under approval number **011234**. The first two digits (**01**) of the approval number indicate that the approval was granted in accordance with the requirements of the **01 series of amendments to Regulation No. 118**.

The additional symbol..."

Annex 8,

Paragraph 3.1., amend to read:

"3.1. The samples dimensions are: 560 x 170 mm. **If it is impossible, the test shall be carried out, in accordance with the Technical Service, on the fitted size of the material which shall be mentioned in the test report.**"

Insert a new Annex 9, to read:

"Annex 9

**TEST TO DETERMINE THE CAPABILITY OF MATERIALS TO REPEL
FUEL OR LUBRICANT**

1. Scope

This annex lists prescriptions to test the capability of insulation materials used in engine compartments and separate heating compartments.

2. Sampling and principle

2.1. The test samples shall measure: 140 mm x 140 mm. The thickness of the sample corresponds to the thickness of the product to be tested.

2.2. Four samples shall undergo the test.

3. Apparatus (see figure 4)

The apparatus shall consist of:

A a base plate with an absorbant surface (e.g. paper);

B a metal cylinder (inner diameter of 120 mm, outer diameter of 130 mm, height of 50 mm), filled with the test medium;

C - C` two screws with wing nuts;

D the test sample;

E a seal plate, with a hardness of 70 Shore D.

4. Procedure

4.1. The test sample and the apparatus shall be conditioned for at least 24 hours at a temperature of $18^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and a relative humidity of 50 ± 5 per cent and shall be maintained under these conditions until immediately prior to testing.

4.2. The test sample shall be weighed.

- 4.3. The test sample, with its exposed face uppermost, shall be placed on the base of the apparatus by fixing the metal cylinder in a centred position with sufficient pressure on the screws. No test liquid shall leak.
- 4.4. Fill the metal cylinder with test liquid (fuel and/or lubricant) to a height of 20 mm and let the system rest for 24 hours.
- 4.5. Remove the test liquid, wipe the surface of the test specimen without pressing.
- 4.6. The test sample shall be weighed.

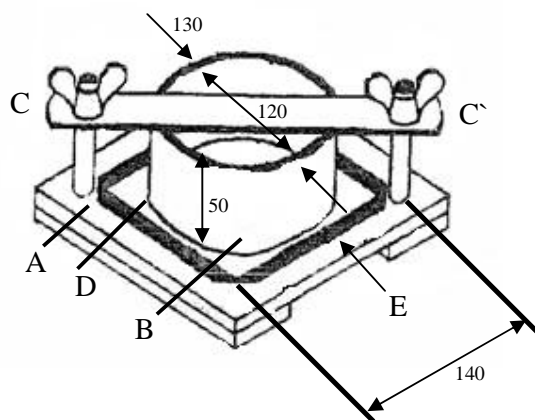


Figure 4
Apparatus for testing the capability to repel fuel or lubricant
(Dimensions in millimeters)"

B. JUSTIFICATION

One way to improve the fire safety of buses and coaches is to extend the time available to evacuate the passengers. As most of the current state of the art materials already achieve lower flame propagation values than the current limit of 100 mm/min set in Regulation No. 118, it seems appropriate to lower this limit to 75 mm/min.

The existing Regulation No. 118 requires testing of the materials in horizontal position independently from their real installation in the vehicle. Only curtains are tested in vertical position. To represent a realistic scenario this draft proposal requires the materials and components to be tested taking into account their real installation situation.

Furthermore, Regulation No. 118 should be modified to take into account insulation materials installed in compartments containing the engine and combustion heating devices. These should also be tested with regard to their burning behaviour but secondly with regard to their capability to repel fuel and lubricant in order to avoid concentration of such liquids. The proposed test method is based on an existing Spanish national standard UNE 53-335-78 Part V.

Also the burning behaviour of electric cables should be included in Regulation No. 118. The resistance of flame propagation should be tested according to ISO 6722:2006, paragraph 12.

This proposal does not include requirements concerning the toxicity or smoke density. Analysis of these issues is still in progress. A further proposal regarding these items will follow.

Furthermore the important issue of fire prevention in separate compartments like toilets, kitchenettes etc. will be subject to a proposal for an amendment to Regulation No. 107.
