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**ECONOMIC COMMISSION FOR EUROPE**

INLAND TRANSPORT COMMITTEE

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 Norway and Sweden \*/

Note: The text reproduced below was prepared by the experts from Norway and Sweden in order to improve the fire safety level in buses, as agreed during the ninety-fifth session of the Working Party on General Safety Provisions (ECE/TRANS/WP.29/GRSG/74, para. 25.). It is based on GRSG-95-19. The modifications to the existing text of the Regulation are marked in bold characters.

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\*/ 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 list of contents, amend to read:

"Regulation No. 118

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- Annex 8 - Test to determine the vertical burning rate of materials
- Annex 9 - **Test to determine lateral flame spread on transport products in vertical configuration**
- Annex10 - **Test to determine smoke generation and toxicity of smoke gases from a burning material**
- Annex11 - **Test to determine lateral flame spread on transport products in horizontal configuration**
- Annex12 - **Test to determine the behaviour of seats"**

The text of the Regulation.

Insert new paragraphs 6.3 to 6.3.5.5., to read:

**"6.3. Alternative specifications**

**As an alternative to the tests specified in paragraphs 6.2.1. to 6.2.2. the tests specified in paragraphs 6.3.1. to 6.3.4. can be applied.**

**6.3.1. The following materials shall undergo the test described in Annex 9 to this Regulation:**

- (a) material(s) used for the interior lining of the ceiling,**
- (b) material(s) used for the interior lining of the side and rear walls, including separation walls,**
- (c) material(s) with thermal and/or acoustic function,**
- (d) material(s) used for the interior lining of luggage-racks, heating and ventilation pipes.**

**The result of the test in Annex 9 shall be considered satisfactory if the average value of CFE is greater or equal to 20 kW/m<sup>2</sup>.**

**6.3.2. The following materials shall undergo the test described in Annex 10 to this Regulation:**

- (a) material(s) used for the interior lining of the ceiling,
- (b) material(s) used for the interior lining of the side and rear walls, including separation walls,
- (c) material(s) with thermal and/or acoustic function,
- (d) material(s) used for the interior lining of luggage-racks, heating and ventilation pipes,
- (e) material(s) used for the interior lining of the floor.

The result of the test in Annex 10 shall be considered satisfactory if the average value of the maximum smoke density ( $D_m$ ) for materials (a) to (d) does not exceed 200 for material (a) to (d) and 500 for material (e), in any test condition. Gas concentrations measured at each test condition must be less than specified below if the test result shall be considered satisfactory:

CO	1450 ppm	HBr	600 ppm
HC1	600 ppm	HCN	140 ppm
HF	600 ppm	SO <sub>2</sub>	120 ppm
NO <sub>x</sub>	350 ppm		

**6.3.3. The material(s) used for the interior lining of the floor shall undergo the test described in Annex 11 to this Regulation.**

The result of test in Annex 11 shall be considered satisfactory if the average value of CHF is greater or equal to 4.5 kW/m<sup>2</sup>.

**6.3.4. The complete seats shall undergo the test described in Annex 12 to this Regulation.**

The result of test in Annex 12 shall be considered satisfactory if the MARHE index is less than 50 kW.

- 6.3.5. Materials which are not required to undergo the tests described in Annexes 9 to 12 are:**
- 6.3.5.1. parts made of metal or glass;**
  - 6.3.5.2. each individual seat accessory with a mass of non-metallic material less than 200 g. If the total mass of these accessories exceeds 400 g of non-metallic material per seat, then each material must be tested;**
  - 6.3.5.3. elements of which the surface area or the volume does not exceed respectively:**
    - 6.3.5.3.1. 100 cm<sup>2</sup> or 40 cm<sup>3</sup> for the elements which are connected to an individual seating place;**
    - 6.3.5.3.2. 300 cm<sup>2</sup> or 120 cm<sup>3</sup> per seat row and, at a maximum, per linear metre of the interior of the passenger compartment for these elements which are distributed in the vehicle and which are not connected to an individual seating place;**
  - 6.3.5.4. electric cables.**
  - 6.3.5.5. elements for which it is not possible to extract a sample in the prescribed dimensions as referenced sample sizes specified in referenced test standards in Annexes 9 to 12."**

Insert new Annexes 9 to 12, to read:

**"Annex 9**

**TEST TO DETERMINE LATERAL FLAME SPREAD ON TRANSPORT PRODUCTS  
IN VERTICAL CONFIGURATION**

**1. General**

The standard ISO 5658-2 (2006) 1/ evaluates the lateral surface spread of flame of a material subject to thermal radiation.

**2. Sampling and test procedure**

The test shall follow ISO 5658-2 (2006) in all aspects concerning apparatus, calibration, sampling and test procedure.

**3. Test results**

Test results shall be reported according to paragraph 13 in ISO 5658-2.

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

## Annex 10

### **TESTS TO DETERMINE SMOKE GENERATION AND TOXICITY OF SMOKE GASES FROM A BURNING MATERIAL**

#### **1. General**

The standard ISO 5659-2 (2006) 1/ together with toxicity assessment measures the smoke and toxic gas generation from a test sample subject to thermal radiation.

#### **2. Test for smoke opacity**

The test shall follow ISO 5659-2 (2006) in all aspects concerning apparatus, calibration, sampling and test procedure.

##### **2.1. Test conditions**

Three test specimens shall be tested subject to constant irradiation at one of the following test conditions, depending on application:

(a) for materials used for the interior lining of floors (materials (d) in 6.2.1) test at an irradiance of 25 kW/m<sup>2</sup> in the presence of pilot flame.

(b) for all other materials where smoke test is required (materials (a), (b), (c), (e) in 6.2.1) test at an irradiance of 50 kW/m<sup>2</sup> in the absence of pilot flame.

#### **3. Test for toxicity of smoke gases**

A toxicity analysis shall be made during test of the second and third sample in the test condition defined in 2.1. The sampling of smoke gas shall be made continuously from the geometrical centre of the chamber during 3 minutes around the smoke maximum determined in the first test of three. The sampling flow shall not exceed 2 litres/min and suitable measures shall be taken to heat the sampling system to avoid condensation. The analysis method shall be FTIR (Fourier Transformed Infrared) and shall follow the guidelines in ISO 19702 2/

The results for each test shall be expressed as average of the two highest measurements during the 3 minutes.

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1/ ISO 5659-2 Plastics - Smoke generation - Part 2: Determination of optical density by a single chamber test, 2<sup>nd</sup> ed 2006-12-01, International Standardisation Organisation, Geneva, 2006.

2/ ISO 19702, Toxicity testing of fire effluents - Guidance for analysis of gases and vapours in fire effluents using FTIR gas analysis.

**Annex 11**

**TEST TO DETERMINE LATERAL FLAME SPREAD ON TRANSPORT PRODUCTS  
IN HORIZONTAL CONFIGURATION**

**1. General**

The standard ISO 9239-1 (2002) 1/ evaluates the lateral surface spread of flame of a flooring material subject to thermal radiation.

**2. Sampling and test procedure**

The test shall follow ISO 9239-1 (2002) in all aspects concerning apparatus, calibration, sampling and test procedure.

**3. Test results**

Test results shall be reported according to paragraph 9 in ISO 9239-1.

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**1/ ISO 9239-2, Reaction to fire tests for floorings - Part 1: Determination of the burning behaviour using a radiant heat source, International Organisation for Standardization, 2002.**

## Annex 12

### TESTS TO DETERMINE THE BURNING BEHAVIOUR OF SEATS

#### 1. General

Complete seats are tested according to EN 45545-2 1/ where a seat is subjected to a flaming ignition source and the resulting heat release rate is measured.

#### 2. Test for burning behaviour of seats

The test shall follow EN 45545-2 in all aspects concerning apparatus, calibration, sampling and test procedure. Only one specimen needs to be tested.

##### 2.1 Test conditions

The seat shall be tested in a vandalised condition according to Annex A in EN 45545-2.

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1/ EN 45545-2 Railway applications - Fire protection of railway vehicles - Part 2: Requirements for fire behaviour of materials and components, CEN. This standard currently exists as prCEN/TS 45545-2. It is scheduled to be published in 2011. As an alternative the full text of the seat test may be included in Annex 12."



## B. JUSTIFICATION

This proposal aims to facilitate the use of existing materials, which are today approved for ships and trains, for use in the interior construction of buses. These types of material are approved after tests are conducted according to established test methods that ensure a high fire safety level. It would be of great benefit to the bus industry if the use of these materials were allowed. The possibility to use the new methods should come into force promptly, since they are an alternative to the existing test methods. The aim is to allow the use of the proposed new methods in parallel with the existing methods during a certain period. A discussion on when the new methods should replace the existing methods will be held later.

It has been demonstrated earlier in informal documents GRSG 89-33, GRSG 90-32, GRSG 93-15, GRSG 92-18, GRSG 95-19, and GRSG 95-30 that the existing Regulation No. 118 does not guarantee a satisfactory fire safety level on buses. The reason for this is that the test method and criteria in Annex 6 (FMVSS 302) do not properly discriminate between materials that have a high and low fire safety performance. This shortcoming results in that fire safety performance of the interior materials and furnishings of certain bus types may be unacceptably low.

Most public transport applications, except buses, have fire safety requirements that give a satisfactory level of safety. Examples are train transport and passenger ships. Test methods to evaluate ignition, fire spread, smoke and toxic gases have been developed within ISO 1/ and are used in the mentioned areas. Passenger ships (IMO 2/) uses ISO tests for evaluation of flame spread and smoke production and trains in Europe uses ISO tests for ignition, flame spread and smoke. Thus there exist established technical solutions on an international level to the fire safety problems in public transport. This proposal suggests that such established test methods for ships and trains may be applied to buses.

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1/ International Standardisation Organisation, [www.iso.org](http://www.iso.org)

2/ International Maritime Organisation, [www.imo.org](http://www.imo.org)