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**1958 Agreement – Consideration of draft amendments
to existing Regulations submitted by GRSG**

Proposal for the 07 series of amendments to Regulation No. 107 (General construction of buses and coaches)

Submitted by the Working Party on General Safety Provisions*

The text reproduced below was adopted by the Working Party on General Safety Provisions (GRSG) at its 109th session (ECE/TRANS/WP.29/GRSG/88, para. 6). It is mainly based on ECE/TRANS/WP.29/GRSG/2015/32 as reproduced in Annex II to the report. It is submitted to the World Forum for Harmonization of Vehicle Regulations (WP.29) and to the Administrative Committee AC.1 for consideration at their March 2016 sessions.

* In accordance with the programme of work of the Inland Transport Committee for 2014–2018 (ECE/TRANS/240, para. 105 and ECE/TRANS/2014/26, programme activity 02.4), the World Forum will develop, harmonize and update Regulations in order to enhance the performance of vehicles. The present document is submitted in conformity with that mandate.

Insert a new paragraph 2.2.3., to read:

- "2.2.3. "Fire suppression system type" for the purpose of type approval as a component means systems which do not essentially differ in the following aspects:
- (a) Fire suppression system manufacturer;
 - (b) Extinguishing agent;
 - (c) Type of discharge point(s) used (e.g. type of nozzle, extinguishing agent generator or extinguishing agent discharge tube);
 - (d) Type of propellant gas, if applicable."

Paragraph 2.3., amend to read:

- "2.3. "Approval of a vehicle, a separate technical unit or a component" means the approval of a type of vehicle, bodywork or component as defined in paragraph 2.2. with regard to the constructional features specified in this Regulation;"

Paragraph 4.2., replace figure "06" by "07" (2 times).

Paragraph 5.1., amend to read:

- "5.1. All vehicles shall comply with the provisions set out in Annex 3 to this Regulation. Bodywork approved separately shall comply with Annex 10. The approval of a vehicle incorporating bodywork approved in accordance with Annex 10 shall be completed in accordance with Annex 3. Fire suppression systems approved separately shall comply with Annex 13, Part 1. In the case of an approval of a vehicle with a fire suppression system installed in a specific engine compartment, it shall comply with the requirements of Annex 13, Part 2."

Insert new paragraphs 10.13. to 10.17. (Transitional provisions), to read:

- "10.13. As from the official date of entry into force of the 07 series of amendments, no Contracting Party applying this Regulation shall refuse to grant or refuse to accept type approvals under this Regulation as amended by the 07 series of amendments.
- 10.14. As from 1 September 2020, Contracting Parties applying this Regulation shall grant type approvals to vehicle types of Classes I and II, only if the vehicle type to be approved meets the requirements of this Regulation as amended by the 07 series of amendments.
- 10.15. Contracting Parties applying this Regulation shall not refuse to grant extensions of type approvals for existing types which have been granted according to the 06 series of amendments to this Regulation.
- 10.16. As from 1 September 2021, Contracting Parties applying this Regulation shall not be obliged to accept, for the purpose of national or regional type approval, a vehicle of Class I or II type approved to the 06 series of amendments to this Regulation.
- 10.17. Notwithstanding paragraphs 10.14. and 10.16., Contracting Parties applying this Regulation shall continue to accept type approvals granted to the 06 series of amendments to vehicles which are not affected by the 07 series of amendments."

Annex 2,

Model D, replace figure "06" by "07" (3 times).

Annex 3,

Paragraph 7.5.1.5., amend to read:

- "7.5.1.5. In the case of heater is located.

In addition to the alarm system, vehicles of Classes I, II and III shall be equipped with a fire suppression system in the engine compartment and each compartment where a combustion heater is located. Vehicles of Classes A and B, may be equipped with a fire suppression system in the engine compartment and in each compartment where a combustion heater is located."

Paragraph 7.5.1.5.4.2., amend to read:

"7.5.1.5.4.2. An analysis shall be activates. The spray pattern and direction of discharge points, as well as the discharge distance, shall be ensured to cover identified fire hazards. The system shall also be ensured to work properly regardless of the vehicle's attitude.

The fire hazard analysis shall, as a minimum, take into account the following components:

- (a) Those whose surface may reach temperatures above the auto-ignition temperature for fluids, gases or substances that are present within the compartment;
- (b) Electrical components and cables with a current or voltage high enough for an ignition to occur;
- (c) Hoses and containers with flammable liquid or gas (in particular if those are pressurized).

The analysis shall be fully documented."

Paragraph 7.5.1.5.4.3., replace "auxiliary heater" by "combustion heater" (3 times).

Annex 13 — Part 1,

Paragraph 1.1., amend to read:

"1.1. Fire suppression systems shall be tested for high-load fire, low-load fire, high-load fire with fan and re-ignition."

Paragraphs 1.3. and 1.3.1., amend to read:

"1.3. High-load fire

1.3.1. The test shall be conducted ..."

Paragraph 1.3.3., amend to read:

"1.3.3. The fires shall be fully extinguished, at the latest in the minute after activation or before the extinguishing agent has been fully used, whichever happens first."

Paragraphs 1.4. to 1.6.3., amend to read:

"1.4. Low-load fire

1.4.1. The test shall be conducted ...

1.4.2. The fires shall be fully extinguished, at the latest in the minute after activation or before the extinguishing agent has been fully used, whichever happens first.

1.4.3. ...

1.5. High-load fire with fan

1.5.1. The test shall be conducted ...

...

1.6.1. The test shall be conducted ...

1.6.2. Re-ignition shall not occur within 45 seconds of the fire being fully extinguished.

1.6.3. The test is considered ..."

Annex 13 — Part 2,

Paragraphs 1.1. and 1.2., amend to read:

"1.1. A specific engine compartment means engine compartments which do not differ in the following essential aspects:

- (a) The position of the engine compartment;
- (b) Maximum gross volume;
- (c) General layout of components in the compartment (i.e. position of the determined fire hazards).

For compartments where a combustion heater is located items (b) and (c) apply.

1.2. The fire suppression systems shall be tested for high-load fire, low-load fire, high-load fire with fan (to be applied if a fan is fitted in the engine compartment and/or combustion heater compartment) and re-ignition."

Paragraphs 1.4. to 1.7.3., amend to read:

"1.4. High-load fire

1.4.1. The test shall be conducted ...

...

1.5. Low-load fire

1.5.1. The test shall be conducted ...

...

1.6. High-load fire with fan (if a fan is fitted in the engine and/or combustion heater compartment)

1.6.1. The test shall be conducted ...

...

1.7.2. Re-ignition shall not occur within 45 seconds of the fire being fully extinguished.

1.7.3. The test ..."

Annex 13 — Appendix 1,

Paragraphs 1.1. to 3.4.6., amend to read:

"1.1. The test apparatus is ... engine compartment.

Figure 1

Coordinate system for the positioning of objects in the test apparatus (view from front side)

...

Table 1
Test apparatus objects

<i>Objects</i>	<i>Plate thickness</i>
Fan cylinder	1.5 – 2 mm
Obstructions	1.5 – 2 mm
Exhaust manifold mock-up	8 mm
Engine mock-up	2 – 3 mm
Silencer mock-up	2 – 3 mm
Exhaust pipe	2 – 3 mm
Connection pipe	2 – 3 mm
Walls, ceiling and floor	1.5 – 3 mm

1.2. Object locations

1.2.1. All objects ... corner.

Table 2
Coordinates of objects

<i>Objects</i>	<i>Coordinates [x; y; z]</i>
Fan cylinder	[-0.60; 0.40; 0.10]
Obstruction 1	[0.0; 0.26; 0.0]
Obstruction 2	[0.26; 0.05; 0.02]
Exhaust manifold mock-up	[0.76; 0.05; 0.47]
Engine mock-up	[0.87; 0.05; 0.04]
Obstruction 3	[1.44; 0.05; 0.02]
Obstruction 4	[0.82; 1.2; 0.0]
Silencer mock-up	[2.0; 0.28; 0.23]

1.3. Framework

1.3.1. The framework of the test apparatus shall be constructed according to Figure 4. The dimensions of the beams are ... the ground.

...

1.4. Apertures

1.4.1. In addition to the opening for the fan, the test apparatus includes six apertures. The dimensions and positioning of the apertures are according to the coordinates in Table 3. The positions are referenced from two diagonally opposite corners (all apertures are rectangular in shape). The apertures are shown in Figure 4.

...

1.6. Mock-up components

1.6.1. The dimensions of the engine mock-up are 1,000 mm × 650 mm × 500 mm. The dimensions of the silencer mock-up are diameter 400 mm × 800 mm. The exhaust manifold mock-up shall have the inner dimensions of diameter 80 mm × 900 mm. The mock-up components shall be hollow. The exhaust manifold mock-up shall be connected to the silencer mock-up through a pipe with a diameter of 76 mm. A pipe from the silencer mock-up shall also be used to carry the exhaust gases from the pre-warming system out from the test apparatus.

...

1.10. Pool fire trays

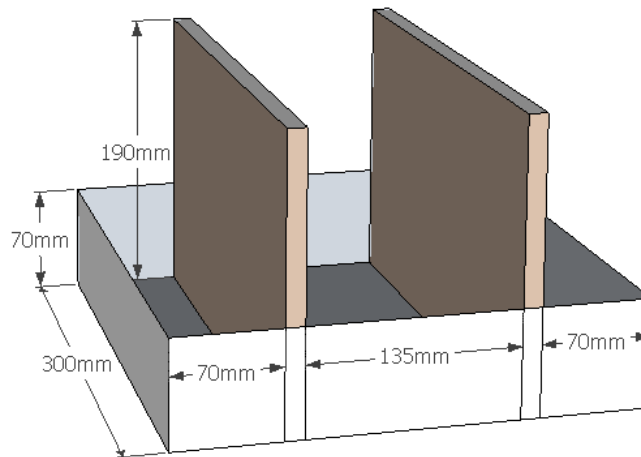
1.10.1. Detailed descriptions of these trays are given in Table 5. Three different types of pool fire trays are applied in Table 6: square, rectangular and circular.

Table 5
Specification of pool fire trays

<i>Dimensions</i>	<i>Rim height</i>	<i>Nominal thickness</i>	<i>Used for test fire No.</i>
300 mm × 300 mm	70 mm	1.5 mm	1, 2
200 mm × 300 mm	70 mm	2 mm	3
Diameter 150 mm	100 mm	1.5 mm	4

1.10.2. The square pool fire trays with fibreboards and the rectangular pool fire trays shall be positioned in its orientation according to the test scenarios in Appendices 2 to 4. Figure 10 shows the dimensions for test fire No. 2. The test fire shall be positioned perpendicular to the long edge of the test apparatus.

Figure 10
Distances for test fire No. 2



2. Test fires

- 2.1. The test fires in Table 6 are to be conducted as described in Appendices 2 to 5. Diesel oil (commercial fuel oil or light diesel oil), heptane (C₇H₁₆) and engine oil 15W-40 with a flash point COC of 230 °C and viscosity at 40 °C of 107 mm²/s shall be used as test fuels.

Table 6
Test fires

<i>Test fire No.</i>	<i>Description</i>	<i>Fuel</i>	<i>Approximate peak Heat Release Rate 60 sec after ignition</i>
1	Pool fire 300 mm × 300 mm	Diesel oil and heptane	60 kW
2	Pool fire 300 mm × 300 mm and 2 fibreboards	Diesel oil and heptane	110 kW
3	Pool fire 200 mm × 300 mm	Diesel oil and heptane	40 kW
4	Pool fire diameter 150 mm	Diesel oil and heptane	7 kW
5	Spray fire (450 kPa, 0.73 kg/min ±10%)	Diesel oil	520 kW
6	Spray fire (450 kPa, 0.19 kg/min ±10%)	Diesel oil	140 kW
7	Dripping oil fire (40 droplets/min ±10)	Engine oil	5 kW

- 2.2. The amount of water, diesel and heptane used in the tests shall be in accordance with Table 7.

Table 7
Amount of fuel used in pool fire trays

<i>Dimensions</i>	<i>Water</i>	<i>Diesel</i>	<i>Heptane</i>	<i>Used for test fire</i>
300 mm × 300 mm	1.0 l	0.5 l	0.2 l	#1, #2,
200 mm × 300 mm	0.5 l	0.5 l	0.2 l	#3
Diameter 150 mm	0.2 l	0.2 l	0.1 l	#4

- 2.3. Test fire No. 2 consists ... the test.
- 2.4. Test fire Nos. 5 and 6 consist ... or an equivalent.
3. Installation of the fire suppression system
- 3.1. To obtain the minimum discharge rate condition, an extinguishing system is to be assembled to its maximum dimensional capability with respect to the number of fittings and size and length of pipe, if relevant. The cylinder is to be used ...
- ...
- 3.4. Test method
- 3.4.1. The pool fire trays are to be filled with diesel and heptane on a base of water according to Table 7. Where fibreboards are required to be used as the fire source, they shall be soaked in diesel oil, prior to the test, according to instructions in paragraph 2.3. above.
- 3.4.2. A pre-burn time based on the information in Appendices 2 to 5 is required. The pre-burn time is measured from the time the first fire is ignited. All pool fires in the test

scenarios shall be ignited within the allowed ignition-time, according to Appendices 2 to 5, using a suitable ignition source. The low-load fire tests in Table 1 in Appendix 3 may be performed either individually or concurrently.

- 3.4.3. A fan is used in some of the test scenarios to obtain a specific air flow rate into the test apparatus. The fan shall be engaged 30 seconds before the suppression system is activated. The fan shall remain active until the test is determined.
- 3.4.4. A diesel spray is used in some of the test scenarios. The diesel spray shall be activated 10 seconds prior to activation of the suppression system. The diesel spray shall remain active until the result of the test is determined.
- 3.4.5. After the stipulated pre-burn time, the suppression system shall be manually or automatically activated.
- 3.4.6. In the test for re-ignition, the exhaust manifold mock-up tube is pre-heated with a burner prior to the test. Pressurized air may be added to the flame for better combustion. ... After 30 seconds the engine oil shall start dripping and the suppression system activated 15 seconds later. The engine oil shall ignite before activation of the suppression system. The oil shall continue to drip on to the tube until the result of the test is determined."

Annex 13 — Appendix 2, amend to read:

"High-load fire

Table 1
Test fires

<i>Test fire No.</i> <i>(see Table 6 in Appendix 1)</i>	<i>Description</i>	<i>Coordinates [x; y; z]</i> <i>(see Figure 1 in Appendix 1)</i>
6	Spray fire (0.45 MPa, 0.19 kg/min)	[1.47; 0.73; 0.46]
3	Pool fire 200 mm × 300 mm	[0.97; 0.85; 0.70]
4	Pool fire diameter 150 mm	[0.97; 1.28; 0.00]
3	Pool fire 200 mm × 300 mm	[1.54; 0.57; 0.36]
2	Pool fire 300 mm × 300 mm and 2 Fibreboards	[1.54; 0.77; 0.36]
3	Pool fire 200 mm × 300 mm	[1.54; 0.13; 0.00]

Note: The fan is not used

Table 2
Test procedure

..."

Annex 13 — Appendix 3, amend to read:

"Low-load fire

Table 1
Test fires

<i>Test fire No.</i> <i>(see Table 6 in Appendix 1)</i>	<i>Description</i>	<i>Coordinates [x; y; z]</i> <i>(see Figure 1 in Appendix 1)</i>
4	Pool fire diameter 150 mm	[0.02; 0.08; 0.00]
3	Pool fire 200 mm × 300 mm	[0.37; 0.57; 0.00]
4	Pool fire diameter 150 mm	[0.45; 1.20; 0.00]
4	Pool fire diameter 150 mm	[0.97; 1.28; 0.00]
4	Pool fire diameter 150 mm	[1.54; 0.57; 0.00]

Note: The fan is required to produce an air flow of 1.5 m³/s.

Table 2
Test procedure

..."

Annex 13 — Appendix 4, amend to read:

"High-load fire with fan

Table 1
Test fires

<i>Test fire No.</i> <i>(see Table 6 in Appendix 1)</i>	<i>Description</i>	<i>Coordinates [x; y; z]</i> <i>(see Figure 1 in Appendix 1)</i>
5	Spray fire (0.45 MPa, 0.73 kg/min)	[0.37; 0.70; 0.46]
1	Pool fire 300 mm × 300 mm	[0.37; 0.47; 0.36]
2	Pool fire 300 mm × 300 mm and 2 fibreboards	[0.37; 0.77; 0.36]
1	Pool fire 300 mm × 300 mm	[0.37; 0.13; 0.00]
1	Pool fire 300 mm × 300 mm	[1.54; 0.13; 0.00]

Note: The fan is required to produce an air flow of 1.5 m³/s.

Table 2
Test procedure

..."

Annex 13 — Appendix 5, amend to read:

"Re-ignition test

Table 1
Test fires

<i>Test fire No.</i> <i>(see Table 6 in Appendix 1)</i>	<i>Description</i>	<i>Coordinates [x; y; z]</i> <i>(see Figure 1 in Appendix 1)</i>
7	Dripping oil fire (0.2 MPa, 0.01 kg/min)	[0.82; 0.28; 1.22]

Note: The fan is not used.

Table 2
Test procedure

<i>Time</i>	<i>Action</i>
Prior to test	Pre-heat tube
00:00	Pre-defined temperatures are reached
00:30	Start oil dripping
00:45	Activate suppression system (the oil shall ignite before activation)

..."
