Submitted by the expert from OICA

Informal document **GRSG-107-14**
(107th GRSG, 30 Sept.-3 Oct., 2014
agenda item 2(a))

OICA comments on ECE/TRANS/WP.29/GRSG/2014/06 Amendments to UN Regulation No. 107 (M2 and M3 vehicles)

I. Comments

OICA is keen on improving the safety of the road user, with the most appropriate measures and wherever there is a need.

Regulation shall remain technology neutral to allow the rise of new technologies and development of competitive solutions to a problem.

Regulation, in order to be applicable shall describe to both vehicle manufacturers and type approval authorities the technical aspects or performances to control at type approval.

Regulation shall stay within ECE regulation type approval scope.

In term of logic proposal GRSG/2014/6:

1. defines how to type approve a fire suppression system principle, in a mock-up engine compartment representative of some class III buses,
2. then only requires an expertise to adapt the principle to each engine compartment.

OICA expresses the following concerns on GRSG/2014/6 proposal:

1. Proposal does not explain how to get installation approval of an approved system
2. There is no guaranty that following these two steps will lead to an efficient result in an engine compartment different from the imposed mock-up when there is:
   - Under-body engines
   - No fan cooling system
   - Transversal engines
   - Ethanol, hybrid, CNG engines
   - Much smaller engines
   - …
3. Proposal is design oriented as it does not take into account other available technologies than “propelled gas systems”.
4. Proposal does not include how to test combustion heater compartments.
5. Proposal does not include any criterions for fire suppression system activation.
6. Proposal request periodic technical inspection provisions, which is not within an UN Regulation scope.
7. Proposal introduces high cost systems that could refrain future CP to join UN Regulation No. 107

II. Proposals

OICA suggests defining the fire suppression system requirements within a new regulation, separate from UN Regulation No. 107.

This regulation shall let vehicle manufacturers give their installation prescriptions, and include installation validation requirements. It should be possible in particular to demonstrate the efficiency of a system on representative engine compartments.

This regulation should include criteria for fire suppression system activation.

This regulation should include tests for combustion heater compartments or remove them from the scope.

As for any regulation, the requirements should not be design restrictive and OICA is keen that the following additional text amendments are taken into account (changes to document GRSG/2014/06 are indicated in red characters highlighted in yellow):

Paragraph 2.2.3., amend to read:

"**2.2.3.** **"*Fire suppression system type*" for the purpose of Type-Approval as a component means a category of systems which does 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 present.**"

Annex 1, Part 2,Appendix 4, amend to read:

Addendum to Type-Approval certificate No.....
concerning the Type-Approval of a fire suppression system as a component
with regard to Regulation No. 107

1. Additional information

1.1. Extinguishing agent (make and type): .....

1.2. Mass of extinguishing agent (needed in a 4 m^3 engine compartment):

1.3. Type of discharge point(s) (e.g. type of nozzles)[1]: .....

1.4. Number of discharge point(s) (needed in a 4 m^3 engine compartment)[1]: .....

1.5. Length of discharge tube (for a 4 m^3 engine compartment) [1], if present:

1.6. Type of propellant gas [1], if present : .....

1.7. Pressure of propellant gas (needed in a 4 m^3 engine compartment) [1], in case of

systems in pressure: .....

1.8. Minimum operating temperature: .....

1.9. Dimensions of pipes and fittings, if present:

Annex 3, paragraph 7.5.1.5.3., amend to read:

"7.5.1.5.3. The ~~alarm~~ **fire suppression** system shall be operational whenever the engine start device is operated, until such time as the engine stop device is operated, regardless of the vehicle's attitude." **It may remain operational after the engine stop device is operated.**

Annex 3, new paragraphs 7.5.1.5.4., amend to read:

7.5.1.5.4. The installation of the fire suppression system shall be validated on a representative engine compartment or comply with the following requirements;

7.5.1.5.4.1. The fire suppression system shall be installed according to the system manufacturer's installation manual.

7.5.1.5.4.2. An analysis shall be conducted prior to the installation in order to determine the location and direction of suppression agent discharge point(s) (e.g. nozzles, extinguishing agent generators or extinguishing agent discharge tube or other distribution points). Potential fire hazards within the engine compartment and each compartment where a combustion heater is located, shall be identified and discharge point(s) located such that the suppression agent will be distributed to cover the fire hazard when the system activates. The spray pattern and direction of discharge points as well as the throwing distance shall be ensured to cover identified fire hazards. The system shall also be ensured to work properly regardless of the vehicle's altitude.

Fire hazards to be taken into account in the analysis shall at least consist of the following: Components whose surface may reach temperatures above the auto-ignition temperature for fluids, gases or substances that are present within the compartment and electrical components and cables with a current or voltage high enough for an ignition to occur as well as hoses and containers with flammable liquid or gas (in particular if those are pressurized). The analysis shall be fully documented.

The suppression system shall not compromise the operation of the electrical components within the compartment.

~~Maintenance instructions shall be part of the analysis.~~

7.5.1.5.4.3. **The suppression system shall be scaled from the tested system, based on the total gross volume of the engine and auxiliary heater compartments where the system is to be installed. When measuring the engine compartment and the auxiliary heater compartment, the gross volume of these compartments shall be measured, i.e. the volume of the engine and its components should not be subtracted.**

If the suppression system contains more than one discharge point and propellant gas is used then t~~T~~he scaling of the system includes the mass of the suppression agent, all discharge points and the mass of the propellant gas container. The system pressure shall remain the same as in the tested system. If the system includes a discharge tube for the extinguishing agent, the length of the tube shall be scaled without nozzles. It is acceptable if the suppression system has more extinguishing agent and/or more discharge points and/or a longer discharge tube for the extinguishing agent and/or more propellant gas than required according to the scaling models found below.

If the gross volume of the engine and auxiliary heater compartments exceed 4 m^3, the suppression system shall be scaled up using the following scaling factor calculated in (1) below. If the gross volume is less than 4 m^3, it is allowed to scale down the suppression system using the scaling factor (2) below. S_x denotes the scaling factor and x denotes the total gross volume including the engine and auxiliary heater compartments [m^3].

$$S_x = 0.1 \cdot x + 0.6 \qquad (1)$$

$$Sx = 0.15 \cdot x + 0.4 \qquad (2)$$

The down-scaled number of nozzles or other discharge points shall be rounded up if less than 8 discharge points are used during testing. Otherwise, the number may be rounded to the closest whole number."

If the suppression system does not comprise cylinders, it shall be scaled to guarantee, as declared by the manufacturer, the extinguishing of the fire and stabilization of the environment for enough time to avoid restarting fire, considering all possible dispersions too.

Annex 13 paragraph 1.3.2 amend to read:

1.3.2. **The test shall be conducted with the extinguishing agent and the propellant gas vessel or the suppression agent generator cooled to the minimum operating temperature for the fire suppression system, as declared by the manufacturer.**

III. Justifications

Annex 3, new paragraphs 7.5.1.5.4.:

As engine compartments architecture may widely differ from the proposed mock-up, vehicle manufaturers should have the possibility to demonstrate the efficiency of their installation without going through the proposed mock-up validation, analysis and system scaling.

Paragraph 2.2.3, Annex 1 Part 2 Appendix 4, Annex 3 new paragraphs 7.5.1.5.4.2 and 7.5.1.5.4.3., Annex 13 paragraph 1.3.2. :

Some systems have only one discharge point so it is better to put the s in brackets. Some systems do not use propellant gas.
Last sentence of 7.5.1.5.4.3 is applicable for systems based on condensed aerosol technology.

Annex 3, paragraph 7.5.1.5.3:

The additional sentence has been inserted to clarify that the system can be operational also with the engine stopped

Annex 3, new paragraphs 7.5.1.5.4.2.:

The additional sentence has been inserted to guarantee the electrical functionality after the intervention of the fire suppression system
The last sentence has been removed as periodic technical inspection is not within 58 agreement scope.