

## Committee of Experts on the Transport of Dangerous Goods and on the Globally Harmonized System of Classification and Labelling of Chemicals

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### Sub-Committee of Experts on the Transport of Dangerous Goods

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Item 2 (i) of the provisional agenda

**Explosives and related matters: miscellaneous**

## Follow-up on a new entry for aerosol generating, fire suppression devices

### Submitted by the Council on the Safe Transport of Hazardous Articles (COSTHA)

#### Introduction

1. There have been numerous documents submitted to the Sub-Committee on the development of a new entry for aerosol generating fire suppression devices, including: ST/SG/AC.10/C.3/2019/61; informal documents INF.28 (56<sup>th</sup> session), INF.51 (56<sup>th</sup> session) and ST/SG/AC.10/C.3/2020/25. Additionally, on Wednesday 15 September 2021 an informal online meeting of the Working Group on Explosives was held. The aim of the meeting was to discuss classification issues related to fire extinguishing devices and, if time allowed, other low hazard articles.

2. Several important issues for consideration have been discussed, potential for actuation, toxicity of expelled products, obscuration, and asphyxiation. Many experts believe that requiring specific tests of these devices could provide an avenue to a distinct entry in the dangerous goods table and a Class 9 designation.

#### Potential testing requirements

3. Here are some existing test regimes that provide evidence of the durability, toxicity, and overall risk of aerosol generating fire suppression devices.

(a) **ANSI / CAN / UL / ULC - 2775:2019 - Standard for Fixed Condensed  
Aerosol Fire Extinguishing Units**

i. This standard covers fire extinguishing performance but also extensive requirements for construction and physical robustness. The following evaluations present some of the requirements in the standard.

ii. In design and construction of the generators, UL mandates that the agent complies with EPA for suitability for the environment and for health and safety. (Further details on EPA evaluations are presented below.)

iii. In the UL evaluation of performance, there are several physical tests that must be passed to obtain a UL listing:

1. Section 21 discharge testing must demonstrate that discharge is constant over a wide temperature range (typically: -40 °C to 54 °C)
2. Section 22 temperature measurement test
3. Section 24 rough usage tests (drop test)

4. Section 25 vibration tests
5. Section 26 pyrotechnic reaction containment test
6. Section 27 fire exposure test
7. Sections 28, 29, 30, 31 corrosion tests (4 different tests are required)
8. Section 32 elevated temperature tests
9. Section 33 temperature cycling tests
10. Section 48 500-cycle tests of actuator and associated devices - with no failure allowed in all 500
11. Section 61 manufacturing and production tests

**(b) ISO 15779: Condensed aerosol fire extinguishing systems - Requirements and test methods for components and system design, installation, and maintenance - General requirements**

- i. The ISO 15779 standard includes requirements that are very similar to those found within UL 2775:2019.

**(c) United States Environmental Protection Agency (EPA), Significant New Alternatives Policy Program, Fire Extinguishing and Explosion Protection Sector, Risk Screen on Substitutes for Total Flooding Systems in Normally Occupied Spaces**

- i. Following the concern of the halon agents due to their impact on the environment, the EPA created their Significant New Alternatives Program (“SNAP”). There are two major evaluations:
  1. atmospheric / environmental assessment
  2. potential health effects due to exposure to the generated agent / toxicity / visibility
- ii. The assessment gives two classifications:
  1. suitable for un-occupied spaces (an environmental approval)
  2. suitable for occupied spaces (a health and safety approval) with the environmental approval for un-occupied spaces as a pre-requisite
- iii. The environmental assessment is performed based on the chemistry of the condensed agent and the analysis of the discharged agent. A general conclusion for most aerosol extinguishing agents, is that they do not present a significant concern for the environment because they produce zero ozone depletion and therefore have negligible impact to global warming.
- iv. The health and safety assessment is extensive and mainly performed in two steps. The first is the chemical analysis of the discharged agent by an independent lab selected by the EPA to determine the chemicals in the discharge and the quantity. The second step is a study based on animal testing where they are exposed to the discharged agent at, or above, the design concentration for 15 minutes. These are medical grade tests performed again by independent labs selected by the EPA. The assessment also considers the effects on eyes, skin, etc. and also the reduced visibility.
- v. The result of the test is to determine if the agent is acceptable for limited human exposure.

## Other considerations

4. As mentioned above, other concerns expressed by experts in previous sessions include: obscuration and asphyxiation.

(a) In regard to obscuration, the US-EPA evaluations considered obscuration in occupied spaces. Although obscuration may be severe if the enclosure or room is very small and closed or sealed, the fact that aerosol agents readily vent if there are openings, are non-toxic and acceptable for limited human exposure and will result in less obscuration in larger rooms means the issue may be less concerning. Further, if there is actuation of the aerosol units because of a localized fire, the aerosol agent will act as an extinguishing agent to reduce the fire and hazardous smoke which is far more dangerous than an aerosol agent discharge.

(b) In regard to asphyxiation, the medical evaluations and testing required by the US-EPA SNAP program confirms that an agent discharge is not toxic and provides for limited human exposure. Since aerosol agents are easily vented, fresh air can be returned to a space quickly.

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