

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

25 June 2021

Sub-Committee of Experts on the Transport of Dangerous Goods

Fifty-eighth session

Geneva, 28 June-2 July 2021

Item 3 of the provisional agenda

Listing, classification and packing

Comments on document ST/SG/AC.10/C.3/2021/27

Transmitted by the expert from France

1. France would like to recall documents INF.28 and INF.51 of the 56th sessions that are related to the subject. In particular INF.28 presents alternative technologies that relate to the same issue and should be treated the same way.
2. Some elements of these documents annexed to this information documents should be considered again in this discussion.

Annex

Informal documents UN/SCETDG/56/INF.28 and UN/SCETDG/56/INF.51

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

Sub-Committee of Experts on the Transport of Dangerous Goods

27 November 2019

Fifty-sixth session

Geneva, 4-10 December 2019

Item 3 of the provisional agenda

Listing, classification and packing

Comment on document ST/SG/AC.10/C.3/2019/61

Transmitted by the expert of France

Introduction

1. We appreciate the efforts undertaken by the Council on Safe Transportation of Hazardous Articles (COSTHA) in trying to bring this issue concerning fire suppression devices to the knowledge of the sub-committee. Hereafter we would like to provide some comments and amendments to the initial proposal in document ST/SG/AC.10/C.3/2019/61.

Comments

2. The proposal in document ST/SG/AC.10/C.3/2019/61 aims at defining a new entry for fire suppression safety devices based on aerosol generation technology. We recognise the utility of such device and the fact that they are used in many applications either mobile on vehicles or stationary on other equipment.

3. However, we consider that limiting the scope of the proposed new entry only to aerosol generating devices is too restrictive and too technology oriented. There are on the market other fire suppression safety devices which also contain and use a small amount of pyrotechnic materials to dispense fire extinguishing agents (see annex). These devices are neither fitting in the UN 1044 "FIRE EXTINGUISHERS with compressed or liquefied gas" and special provision 255 definition as they don't contain compressed or liquified gas nor in the definition of "CARTRIDGES, POWER DEVICE" as the explosives is built in the whole device.

4. These devices are primarily meant to be used in automotive applications (cars, buses...) and in this case they fully meet the conditions to be assign to UN 3268. However, as a fire extinguishing system it is also envisaged to use them in stationary applications but in these cases they will not comply with the special provision 280 limiting their uses in vehicles, vessels or aircraft.

5. As stated in paragraph 3 of document ST/SG/AC.10/C.3/2019/61 we have understood that this issue has been solved by special authorizations. This is not a long-term satisfactory solution as it creates an unharmonized situation as these systems will be produced in growing numbers.

6. The fire suppression safety device described in the annex of this document contains only a small amount of slow burning composition compare to its total mass (it is essentially using the same pyrotechnic cartridge that is use in airbag and that is exempted when in airbag). It is less reactive than the device presented in the document ST/SG/AC.10/C.3/2019/61 by COSTHA where not only the initiator is a pyrotechnic article but also the aerosol is produced by a pyrotechnic substance. However, we don't see any reason to exclude the more reactive systems as long as they meet the appropriate criteria from test series 6c).

7. The device described in the annex of this document can support electrical or thermal activation systems as similar as the ones illustrated in the document ST/SG/AC.10/C.3/2019/61 by COSTHA.

8. It is also suitable for applications comparable as the ones given in para 5 of the document ST/SG/AC.10/C.3/2019/61 with the same safety benefits.

9. In our view, the provisions concerning these devices should be drafted under the following principles:

(a) It should not be depending on a specific technology but include all fire suppressing devices containing a pyrotechnical actuation.

(b) It shall be driven with the same principles as UN 3268:

(i). It is a device that benefits safety, therefore it is acceptable to grant some flexibility (i.e. class 9). Applications that do not benefit safety should not be included.

(ii) It shall meet the same conditions when tested in accordance with test series 6c) of part I of the Manual of Test and Criteria, with no explosion of the device, no fragmentation of the device casing or pressure receptacle, and no projection hazard nor thermal effect that would significantly hinder fire-fighting or emergency response efforts in the immediate vicinity.

(c) If a new entry is adopted attention should be given to avoid overlapping with the entry No. 3268 (when installed in vehicle, items could also be assigned to 3268)

10. This goal can be met in two ways: the first is to amend the proposal made by COSTHA (see proposal 1) and the second one is to extend the scope of the entry No. 3268 (see proposal 2).

Proposal 1

11. The new entry name could be amended to be more neutral for example "Fire Suppression Dispersing Device, UN 35XX, Class 9" as it was proposed in the initial informal document INF.48 (55th session).

It is proposed that a new entry be added in the Dangerous Goods List as follows:

UN No.	Name and description	Class or division	Subsidiary hazard	UN packing group	Special provisions	Limited and excepted quantities		Packagings and IBCs		Portable tanks and bulk containers	
								Packing instruction	Special packing provisions	Instructions	Special provisions
35XX	Aerosol generating, fire suppression device <u>Fire Suppression Dispersing Devices</u>	9			XYZ	0	EO	P003			

12. A new special provision XYZ is proposed as follows:

~~“XYZ Aerosol generating, fire suppression~~ Fire Suppression Dispersing devices are intended to provide a safety benefit based on their ability to extinguish flames by dispersing ~~micro-particle solids a fire extinguishing agent that when in contact with fire or flame provide a total flooding system.~~ The devices may be either electrically activated or thermally activated and shall be designed to prevent inadvertent activation either by shipping the actuation component separately (e.g. thermally activated head, and the ~~aerosol generator main~~ main unit are shipped separately) or by ensuring that the electrically initiated devices are not electrically connected and there is a secondary means of protection to prevent activation. Devices may contain dangerous goods of Division 1.4, if they have been tested in accordance with Test Series 6(c) of Part 1 of the Manual of Tests and Criteria, with no explosion of the device, no fragmentation of device casing or pressure receptacle, and no projection hazard nor thermal effect which would significantly hinder fire-fighting or emergency response efforts in the immediate vicinity ~~which the exception of the intended generation of a dense fire suppressing cloud of particles that are dispersed from the article and are not combustible “smoke” or fuel that results from a typical pyrotechnic combustion or explosion.~~ This entry does not apply to “SAFETY DEVICES, electrically initiated” described in special provision 280 (UN No 3268).”

13. The entry name in the index could be amended as following:

Name and description	Class	UN Number
Aerosol generating, fire suppression device <u>Fire Suppression Dispersing devices</u>	9	35XX

14. Modify the special provision 280 as following:

“This entry applies to safety devices for vehicles, vessels or aircraft, e.g. air bag inflators, air bag modules, seat-belt pretensioners, and pyromechanical devices, which contain dangerous goods of Class 1 or of other classes, when transported as component parts and if these articles as presented for transport have been tested in accordance with Test Series 6(c) of Part 1 of the Manual of Tests and Criteria, with no explosion of the device, no fragmentation of device casing or pressure receptacle, and no projection hazard nor thermal effect which would significantly hinder fire-fighting or emergency response efforts in the immediate vicinity. This entry does not apply to life saving appliances described in special provision 296 (UN Nos. 2990 and 3072) and Fire Suppression Dispersing devices (UN No.35XX).”

Proposal 2

15. It is proposed to modify the special provision 280 as follows:

“This entry applies to pyrotechnically initiated fire suppression dispersing devices and to safety devices for vehicles, vessels or aircraft, e.g. air bag inflators, air bag modules, seat-belt pretensioners, and pyromechanical devices, which contain dangerous goods of Class 1 or of other classes, when transported as component parts and if these articles as presented for transport have been tested in accordance with Test Series 6(c) of Part 1 of the Manual of Tests and Criteria, with no explosion of the device, no fragmentation of device casing or pressure receptacle, and no projection hazard nor thermal effect which would significantly hinder fire-fighting or emergency response efforts in the immediate vicinity. This entry does not apply to life saving appliances described in special provision 296 (UN Nos. 2990 and 3072).”

Annex

Device description, operation and testing

Features

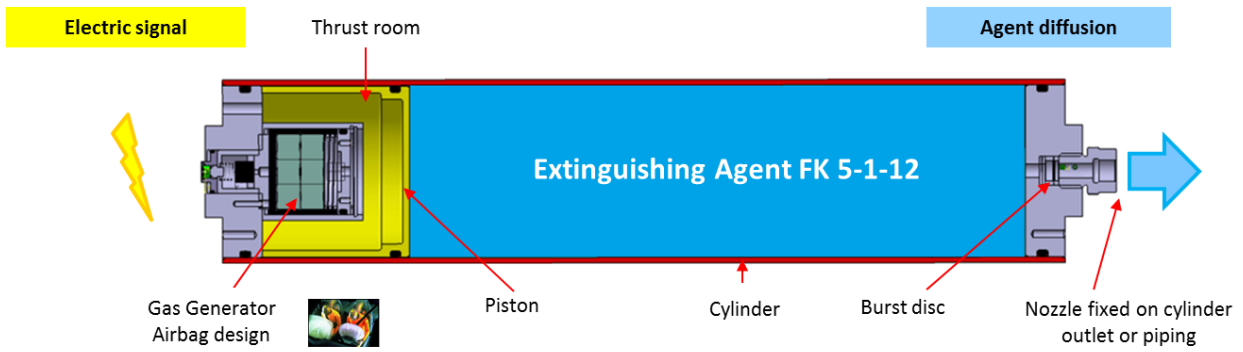
A new-generation FK-5-1-12 gaseous fire suppression system: maintenance-free, environmentally friendly, easy to install

- Non-pressurized cylinder
 - Highly reliable, maintenance-free
 - No periodic inspection required
 - All-in-one design for minimal weight, ease of handling and installation without footprint
- Can be installed in immediate proximity to risk areas with no piping required
- Effective total flooding for Class A, B, C, and Electrical fires
- Protection by one or more devices configured to achieve specified coverage concentration
- FK-5-1-12 is a safe and effective, fast-acting extinguishing agent which is clean, non-toxic, with low environmental impact. It is particularly suitable for use in areas:
 - where people are normally present
 - where there are high-value assets or where clean-up activities would pose additional problems
 - where an electrically non-conductive medium is required

Designation	TYPHOON80-FK5112-1600	TYPHOON80-FK5112-2400	TYPHOON160-FK5112-12800	TYPHOON160-FK5112-16000
Agent volume in liters	1	1.5	8	10
Gross mass when filled with agent in kg	3.2	4.2	26.8	31
Discharge time in seconds	< 10	< 10	< 10	< 10
A: Cylinder length in mm (in)	380.4 (14.98)	474.5 (18.68)	772.5 (30.41)	922.5 (36.32)
B: Distance between fasteners in mm (in)	339 (13.35)	433 (17.05)	818.5 (32.22)	968.5 (38.13)
C: Length including brackets in mm (in)			853 (33.58)	1002 (39.45)

Operation

- Manual activation or automatic actuation on reception of an electrical signal from a suitable approved detection system; discharge in under 10 seconds
- Composed of a cylinder housing:
 - an airbag-type gas generator which delivers a burst of pressure in the thrust chamber at the exact moment of electrical actuation triggering the sliding piston and discharging the FK-5-1-12 agent
 - an FK-5-1-12 agent storage cartridge sealed with a rupture disc valve calibrated to burst when the pressure level provided by the gas generator reaches the specified threshold, for optimal homogeneous agent expulsion
- Operates in any position, vertical or horizontal, for ease of installation in any configuration best adapted for optimum risk-area coverage
 - Standard design: a nozzle is mounted on the cylinder outlet. The Fire Suppression System's low weight and compact dimensions allow it to be installed in immediate proximity to risk areas with no piping required
 - Modular systems: several Fire Suppression Systems can be used in manifold configuration, with piping for agent discharge and one or multiple nozzles directed at the fire zones



Testing

Upon testing according to the UN test 6c) the item successfully meets the criteria. It is not observed any:

- Evidence of a mass explosion;
- Potentially hazardous projections; and
- Thermal effects

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Geneva, 4-10 December 2019

Item 3 of the provisional agenda

Listing, classification and packing

Follow-up to ST/SG/AC.10/C.3/2019/61 from Council on Safe Transportation of Hazardous Articles (COSTHA) and informal document INF.28 from the expert from France

Transmitted by the expert from France and the Council on Safe Transportation of Hazardous Articles (COSTHA)

1. Based on discussion of ST/SG/AC.10/C.3/2019/61 (COSTHA) and informal document INF.28 (France) (56th session), it was agreed to request that the Explosives Working Group be asked to respond to a number of questions related to how to address the assignment of certain fire suppression dispersing devices to Class 9. An informal discussion was held by interested delegates to suggest an approach to present to the Explosives Working Group for technical considerations that might assist the Sub-Committee in determining a specific path forward.

2. The informal discussion was based on the documents from COSTHA and France stating that fire suppression dispersing devices are articles that are designed to disperse a fire extinguishing medium which may be a solid or liquid fire suppressing material. The fire suppression dispersing devices are not manufactured with a view to producing a practical or pyrotechnic effect consistent with the exclusion criteria in 16.6.1.4.7 of the Manual of Tests and Criteria. They are articles that do not cause any effect external to the device by projection, fire, smoke, heat or loud noise when packaged for transport. They are designed or offered for transport in such a way that they will not inadvertently or accidentally initiate. It was also stated the articles provide a safety function.

3. The proposal from the expert from France offered two options one to recognize fire suppression dispersing devices as "Safety Devices, UN 3268 or to create a specific entry with appropriate requirements in a special provision similar to SP 280 but tailored to the unique characteristics of these articles. The Explosives Working Group is requested to consider the following:

- (a) Is there any reason that fire suppression dispersing devices should not be authorized to be assigned to Class 9? Taking into account the current classification scheme, can an article containing an explosive material be tested out of Class 1 and into Class 9? Can testing demonstrate that articles(s) that do not meet the exclusion for Class 1 criteria are less hazardous in transport than 1.4S, thus being appropriately considered for classification as Class 9? What additional testing could be considered to appropriately identify the inherent hazard of the article?
- (b) Recognizing the current requirement in SP 280 where articles can be assigned to Class 9 based on meeting Test Series 6c, was based on testing experience with items that were similar to airbags, inflators, and seat belt pretensioners. That experience considered recognized design perimeters for these articles and a stream-lined testing regime that had proven acceptable over

many years for these known articles, can other articles that are not strictly used in vehicles also be addressed? The intention is not to impact existing provisions for Safety Devices (UN3268 or UN0503) based on years of positive safety experience but to determine if the UN 3268 entry be limited to automotive applications only. Fire suppression dispersing devices generally have vehicle applications but can be used for other purposes (e.g. for suppressing fires in wind turbines or Energy Storage Systems).

- (c) Some fire suppression devices intentionally expel fine particulate to suppress fire. The expelled particles are not combustible smoke but a condensed aerosolized suppressant agent. Is there any reason that these should not be authorized to be reassigned to Class 9 considering the criteria in 2.1.3.6.4(e) that states that no production of dust in such quantities that the visibility in a one cubic metre chamber equipped with appropriately sized blow out panels is reduced more than 50% as measure by a calibrated light meter? The fine particulate cloud generated is intentional and suppresses fires.

4. When considering the option of creating a specific entry for fire suppression devices some experts indicated support for this approach because the proper shipping name would more efficiently describe the articles as opposed to referring to them as safety devices. What if any criteria would be appropriate to apply to fire suppression dispersing devices? Should any additional testing or performance requirements be required (e.g. demonstrating that when an article is initiated in a package the thermal effects are contained and would not present a hazard to adjacent packages)? If the articles are not capable of being initiated in transport or are designed to prevent in advertent activation would this make Class 9 assignment more acceptable?

5. Recognizing there are additional articles that utilize similar technology as safety devices and fire extinguishers (See ST/SG/AC.10/C.3/2018/13 and ST/SG/AC.10/C.3/2018/75) :

- (a) what additional tests may be appropriate to consider such articles for assignment in Class 9?
- (b) Would the same tests identified above be appropriate for articles that are not intended as airbags, seat belt pretensioners or fire extinguishers?
- (c) Are there additional parameters that should be applied when considering assignment to current or future entries in the DG List?
