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## 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

#### Sixty-fourth session

Geneva, 24 June - 3 July 2024

Item 6 (c) of the provisional agenda

#### Miscellaneous proposals for amendments to the Model Regulations on the Transport of Dangerous Goods:

##### Portable tanks

### Modification of the fire resistance test provision contained in 6.9.2.7.1.5.1 of the Model Regulations

#### Transmitted by the expert from Poland\*

## I. Introduction

1. During the sixty-third session of the Sub-Committee, amendments to the regulations relating to fibre reinforced plastics (FRP) portable tanks were adopted to insert section 6.9.2 entitled: "Requirements for the design, construction, inspection and testing of FRP portable tanks".
2. Proposal 8 in document ST/SG/AC.10/C.3/2023/41 (Poland) remained unresolved. In the report from the sixty-third session of the Sub-Committee (ST/SG/AC.10/C.3/126), it was noted in paragraph 71 that the expert from Poland was invited to present a modification of the provision on the fire resistance test contained in 6.9.2.7.1.5.1 of the *Model Regulations*.
3. The expert from Poland proposes a modification of provision 6.9.2.7.1.5.1 in the *Model Regulations* based on the justification below.

## II. Justification

4. Currently applicable text in the *Model Regulations* is as follows:

“6.9.2.7.1.5 Fire resistance test

6.9.2.7.1.5.1 A representative prototype tank with its service and structural equipment in place and filled to 80 % of its maximum capacity with water, shall be exposed to a full engulfment in fire for 30 minutes, caused by an open heating oil pool fire or any other type of fire with the same effect. The fire shall be equivalent to a theoretical fire with a flame temperature of 800 °C, emissivity of 0.9 and to the tank a heat transfer coefficient of 10 W/(m<sup>2</sup>K) and surface absorptivity of 0.8. A minimum

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\* A/78/6 (Sect. 20), table 20.5.

net heat flux of 75 kW/m<sup>2</sup> shall be calibrated according to ISO 21843:2018. The dimensions of the pool shall exceed those of the tank by at least 50 cm to each side and the distance between fuel level and tank shall be between 50 cm and 80 cm. The rest of the tank below liquid level, including openings and closures, shall remain leakproof except for drips.”.

5. The purpose of the modification is to adopt a clear definition of fire resistance test that leads to the same level of safety for FRP portable tanks in accordance with the *Model Regulations*.

6. There is no intention to question the proposed fire parameters such as flame temperature of 800 °C, emissivity of 0.9, heat transfer coefficient of 10 W/(m<sup>2</sup>K), surface absorptivity of 0.8 and minimum net heat flux of 75 kW/m<sup>2</sup>. This topic was intensively discussed in the informal working group during the preparation of chapter 6.9.

7. The basic reservations that arise when reading the current provision in 6.9.2.7.1.5.1 of the *Model Regulations* are:

(a) First, we assume that the FRP portable tank shall be exposed to fire for 30 minutes, caused by an open pool fire of heating oil or other type of fire with the same effect.

(b) We determine the dimensions of the pool, which shall be larger than the dimensions of the FRP portable tank by at least 50 cm on each side, and the distance between the fuel level and the FRP shell should be between 50 cm and 80 cm.

(c) We then impose the condition that an open pool fire of heating oil should be equivalent to a theoretical fire with a flame temperature of 800 °C, emissivity of 0.9 and to the FRP shell a heat transfer coefficient of 10 W/(m<sup>2</sup>K) and surface absorptivity of 0.8, and that the minimum net heat flux of 75 kW/m<sup>2</sup> is calibrated according to the standard ISO 21843:2018.

*Note: ISO 21843:2018 has been replaced by ISO 21843:2023.*

8. From the entry it can be concluded that we first determine the parameters of the pool and the type of fuel used (heating oil).

9. We specify that the dimensions of the pool should exceed the dimensions of the FRP portable tank by at least 50 cm on each side, and the distance between the fuel level and the FRP shell should be between 50 cm and 80 cm.

10. Then we impose the parameters that should be met by a fire caused by heating oil in this pool.

11. If we have precisely defined dimensions of the pool, the type of fuel used and the distance between the fuel level and the FRP shell, at this point we cannot perform any actions to obtain the above-mentioned parameters equivalent to a theoretical fire with a flame temperature of 800 °C, emissivity of 0.9, heat transfer coefficient to the FRP shell of 10 W/(m<sup>2</sup>K) and surface absorptivity 0.8 and a minimum net heat flux of 75 kW/m<sup>2</sup>, calibrated in accordance with standard ISO 21843:2023.

12. The expert from Poland is of the opinion that first the parameters for the fire should be established, which should be equivalent to the proposed theoretical fire with a flame temperature of 800 °C, emissivity of 0.9 and a heat transfer coefficient to the FRP shell of 10 W/(m<sup>2</sup>K) and surface absorptivity of 0.8, and that the minimum net heat flux of 75 kW/m<sup>2</sup> is calibrated according to standard ISO 21843:2023.

13. Then we should assume that the requirements set for a theoretical fire are considered to be met if we use an open pool with heating oil or any other type of fire with the same effect.

14. At the same time, we specify that the dimensions of the pool should exceed the dimensions of the FRP portable tank by at least 50 cm on each side, and the distance between the fuel level and the FRP shell should be from 50 cm to 80 cm.

### III. Proposal

15. Therefore, it is proposed to modify paragraph 6.9.2.7.1.5.1 of the *Model Regulations* as follows (new text **bold** and underlined, deleted text ~~crossed out~~):

“6.9.2.7.1.5.1 A representative prototype **of FRP portable** tank ~~with its service and structural equipment in place and~~ filled to 80 % of its maximum capacity with water, shall be exposed to a full engulfment in fire for 30 minutes, ~~caused by an open heating oil pool fire or any other type of fire with the same effect.~~ The fire shall be equivalent to a theoretical fire with a flame temperature of 800 °C, emissivity of 0.9 and to the ~~tank~~ **FRP shell** a heat transfer coefficient of 10 W/(m<sup>2</sup>K) and surface absorptivity of 0.8. A minimum net heat flux of 75 kW/m<sup>2</sup> shall be calibrated according to ISO 21843:~~2018~~**2023**.

**These requirements shall be deemed to be met if the fire is caused by an open heating oil pool fire or any other type of fire with the same effect.** The dimensions of the pool shall exceed those of the **FRP portable** tank by at least 50 cm to each side and the distance between fuel level and ~~tank~~ **FRP shell** shall be between 50 cm and 80 cm. The rest of the ~~tank~~ **FRP shell** below liquid level, including openings and closures, shall remain leakproof except for drips.”

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