



**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****Fifty-seventh session**

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Item 6 (b) of the provisional agenda

**Miscellaneous proposals for amendments to the Model Regulations
on the Transport of Dangerous Goods: packagings****Increase a water temperature adjustment factor for the
hydraulic test****Transmitted by the expert from China*****Introduction**

1. As the ambient water temperature has significant influence on the internal pressure (hydraulic) test of plastic containers (such as 1H1, 3H1, 31HA1), under the rated constant pressure conditions (such as 250 kPa), test results will differ for containers of equivalent specifications due to different ambient water temperature test conditions (such as in summer).
2. For instance, in the middle of each summer, a routine hydraulic test on the periodic samplings will be performed in laboratories. There is one 210 litres closed plastic container, produced by a well-known foreign-funded enterprise in Shanghai, with model of UN 1H1 / X1.3 / 250 was under test. When the water temperature was controlled at $12\pm 2^{\circ}\text{C}$, under the condition of rated constant pressure of 250 kPa for 30 minutes, the relative deformation of the barrel was small, and no leakage cracking occurred, and the hydraulic test passed. When tap water with an ambient water temperature above 25°C was used during the testing, the barrel body would continue stretching during the process of pressing at a constant pressure of 250 kPa. When lasting more than 20 minutes, the barrel body began to crack, and the test result was judged unqualified.
3. With reference to ISO 16495 Packaging — Transport packaging for dangerous goods — Test methods and ISO 16467 Packaging-Transport packages for dangerous goods-Test methods for IBCs, considering that plastic containers are subject to ambient testing water temperature in the hydraulic test, water temperature adjustment factor method is employed for the plastic packaging and plastic IBCs. It seems to be more objective and operable. Given the consideration that many packaging laboratories do not have a constant temperature hydraulic test system, using the ISO 16495 water temperature adjustment factor method under safety assurance will help improving the accuracy of the test results.

* 2020 (A/74/6 (Sect.20) and Supplementary, Subprogramme 2)

4. In the "Recommendations on the Transport of Dangerous Goods Model Regulations - 6.1.5", no general requirements for hydraulic test water temperature and the adjustment factor of test pressure and water temperature are specified. Containers of the equivalent specifications might have different test results under different water temperature test conditions.

5. ISO 16495 Packaging — Transport packaging for dangerous goods — Test methods specifically define the water temperature adjustment factors, as shown in table 1 below. It is also defined in ISO 16467 Packaging -Transport packages for dangerous goods -Test methods for IBCs, as shown in table 2 below.

Table 1: Water temperature adjustment factors for plastic packagings and plastic IBCs

Water temperature °C	Pressurization factor
12 ± 2	1.000
≥ 14	0.976
15	0.964
16	0.952
17	0.940
18	0.928
19	0.917
≥ 20	0.906

Table 2: Water temperature adjustment factors

Test temperature °C	Pressurization factor
2	1.132
3	1.119
4	1.105
5	1.092
6	1.078
7	1.065
8	1.051
9	1.038
< 10	1.025
12 ± 2	1.000
≥ 14	0.976
15	0.964
16	0.952
17	0.940
18	0.928
19	0.917
≥ 20	0.906

6. The test condition (pressure and water temperature) records can be finally reflected in the test report, which clarifies the conditions of the hydraulic test for regulators.

Necessity of revision

7. Based on section 6.1.5 general requirements of the Model Regulations, there is no specific requirement for the water temperature for hydraulic test. In general, ambient water temperature is used for hydraulic test. Influenced by water temperature, it will result in different testing results for containers of same equivalent specifications under different water temperature conditions. In order to avoid ambiguity, it is necessary in this chapter to specify

the water temperature or give the relationship between the test pressure and the water temperature adjustment factor.

Proposal

8. It is proposed to add the water temperature adjustment factor for hydraulic tests of plastic packaging and plastics IBCs in the Model Regulations as below:

9. Insert new 6.1.5.5.5 to read:

“6.1.5.5.5 When the water temperature for environmental test of plastic containers is greater than or equal to 10 °C, the test pressure used shall be adjusted according to the water temperature adjustment factors specified in ISO 16495 Packaging - Transport packaging for dangerous goods - Test methods.”

Renumber 6.1.5.5.5, 6.1.5.5.6, 6.1.5.5.7 as 6.1.5.5.6, 6.1.5.5.7, 6.1.5.5.8 respectively.

10. Add new 6.5.6.8.4.3 to read:

“6.5.6.8.4.3 When the ambient water temperature for testing of plastic IBCs are greater than or equal to 10 °C, the test pressure used shall be adjusted according to the water temperature adjustment factors specified in ISO 16467 Packaging - Transport packages for dangerous goods - Test methods for IBCs.”
