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**Test methods for the hazard
classification of explosives—
Part 4 : Test series 8**

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Foreword

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4-1-24, Akasaka, Minato-ku, Tokyo, 107-8440 JAPAN

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Test methods for the hazard classification of explosives— Part 4 : Test series 8

Introduction This Japanese Industrial Standard has been prepared based on “Recommendations on the Transport of Dangerous Goods, Model Regulation, Thirteenth revised edition” published by the United Nations in 2003.

1 Scope This Standard specifies the test method to judge whether the slurry explosives intermediates (ammonium nitrate emulsion, suspension or gel) (hereafter referred to as “ANEs”) are the substances other than the explosives (assigned to class 1 in the Recommendation on the Transport of Dangerous Goods published by United Nations) or not.

In addition, the test method to judge whether ANEs can be transported by a portable tank (over 450 L in capacity) or not is specified in annex.

2 Normative references The following standards contain provisions which, through reference in this Standard, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

JIS K 4800 *Technical terms for explosives*

JIS K 4806 *Blasting caps and electric blasting caps*

JIS K 4827 *Slurry explosives and emulsion explosives*

JIS K 4828-1 *Test methods for the hazard classification of explosives—Part 1 : Test series 5*

JIS K 4828-2 *Test methods for the hazard classification of explosives—Part 2 : Test series 6*

JIS K 4828-3 *Test methods for the hazard classification of explosives—Part 3 : Test series 7*

3 Definitions For the purposes of this Standard, the definitions given in **JIS K 4800**, **JIS K 4827**, **JIS K 4828-1**, **JIS K 4828-2**, **JIS K 4828-3** and the following definition apply.

- a) **portable tank** the transportation vessel for the purpose of transporting the dangerous goods of class 1 to class 9 based on the recommendation by the United Nations, which is conformed to the requirements of the said recommendation

4 Test code and test name The test code and test name shall be in accordance with table 1.

Table 1 Test code and test name

Test code	Test name
Type 8(a)	ANEs Thermal stability test
Type 8(b)	ANEs Gap test (impact sensitivity test)
Type 8(c)	Koenen est (heat sensitivity test)
Type 8(d)	Vent pipe test ⁽¹⁾

Note ⁽¹⁾ This test is to evaluate the applicability of transportation by tank. The test method is in accordance with annex.

5 Test conditions The test shall be carried out in order of type 8(a), type 8(b) and type 8(c).

6 Test methods

6.1 Type 8(a): ANEs Thermal stability test

6.1.1 Summary This test is to measure the thermal stability of ANEs exposed to high temperature condition and to evaluate whether the transportation is too dangerous or not. This test is to evaluate the thermal stability by using a 500 mL Dewar vessel as the simulation of a vessel to be used for transportation or portable tank (450 L or under).

6.1.2 Apparatus The apparatus shall be as follows:

- Dewar vessel** The Dewar vessel, of 500 mL in volume, equipped with a temperature measuring apparatus and closure. The closure shall be inert substance. The Dewar vessel may be covered with wire gauze. An example is shown in figure 1.
- Test chamber** The test chamber is a sufficient size of automatically temperature controlled drying oven (a fan may be equipped) capable of air-circulating and of resisting flame and overpressure. Further, that may be protected by appropriate steel liner so as to resist flame and overpressure. It is recommended that a pressure-releasing system such as a bursting disc is equipped. The door of drying oven should be covered with magnetic system or thermal insulation cover so as to release the pressure immediately when pressurized inside.
- Automatically temperature controlled apparatus**, capable of controlling at ± 1 °C or lower of temperature variation at the specified temperature for 10 days when inert liquid sample is poured in Dewar vessel.
- Temperature measuring apparatus**, capable of recording the temperature of sample and the temperature in drying oven. The recording apparatus should be placed at different area.

6.1.3 Adjustment of apparatus The heat loss of the system composed of Dewar vessel and closure shall be confirmed before the test is carried out. Since the closure affects greatly the heat loss, the influence can be adjusted to a certain degree by changing the closure. The heat loss characteristic can be determined by measuring the cooling half time of the container filled with the inert material having the similar physical properties. The heat loss, L , per unit mass can be calculated by using the cooling half life, t , and specific heat, C_p , of the material to be used according to the following formula. It is suitable that the heat loss of Dewar vessel is adjusted so as to be 80 mW/kg·K to 100 mW/kg·K under the condition of containing 400 mL of the material.

$$L = \ln 2 \times C_p / t_{1/2}$$

where, L : heat loss (W/kg·K)

C_p : specific heat (J/K)

$t_{1/2}$: cooling half lie (s)

6.1.4 Adjustment of sample The sample shall be filled in Dewar vessel to approximately 80 % in volume. In the case of sample with high viscosity and low fluidity, the sample shall be formed so as to fit the shape of Dewar vessel, and adjusted. The diameter for forming shall be made a little smaller than the inside diameter of Dewar vessel, and inert material may be previously placed in the bottom of Dewar vessel to make it easy to put the cylindrical sample in.

6.1.5 Operation The operation shall be as follows:

- a) Set up the test chamber at the temperature of 20 °C higher than the possible highest temperature during transportation (including the temperature at the time of loading into tank).
- b) Put the sample in Dewar vessel and record the mass of sample. Confirm that the sample is filled up to approximately 80 % of the height of Dewar vessel.
- c) Insert a temperature sensor in the centre of sample.
- d) Confirm that the lid of Dewar vessel is at its regular position, then put Dewar vessel in the test chamber.
- e) Connect the temperature recording apparatus and close the test chamber.
- f) Heat the sample and monitor continuously the temperature of sample and the temperature of test chamber.
- g) Record the time when the temperature of sample becomes 2 degrees lower than the temperature of test chamber, and start the measurement.
- h) Then, continue the test for 7 days or up to the time when the temperature of sample becomes higher by at least 6 degrees than the temperature of the test chamber.
- i) Record the time to reach the maximum temperature from the start of test.
- j) When the sample has remained without decomposition, cool and take out from the test chamber and dispose of it as quickly as possible.