

**Sub-Committee of Experts on the
Transport of Dangerous Goods**
(Eighteenth session,
Geneva, 3 - 12 July 2000
agenda item 5(h))

MISCELLANEOUS DRAFT AMENDMENTS TO THE RECOMMENDATIONS ON THE TRANSPORT OF DANGEROUS GOODS, MODEL REGULATIONS

**Transport of materials capable of undergoing uncontrolled polymerization -
Stabilization by means of temperature control**

Transmitted by the Expert from the United Kingdom

Introduction

1. At its Seventeenth Session the Sub-Committee adopted, in principle, the proposal from the Expert from the United Kingdom on the transport of materials capable of undergoing uncontrolled polymerization (ST/SG/AC.10/C.3/34, para. 57). The paper (ST/SG/AC.10/C.3/1999/81). was prompted by the decision at the twentieth session of the Committee of Experts on the Transport of Dangerous Goods (Geneva, 7 - 16 December 1998) to use, in the English text in the Dangerous Goods List in Chapter 3.2 of the Eleventh Edition of the Model Regulations, the term "stabilized" instead of "inhibited" in the proper shipping name of reactive monomers.
2. When the proposal to change the wording was made by the Expert from the United States of America (in ST/SG/AC.10/1998/10) it was stated that the change was to 'clarify' that temperature control is also an acceptable means of stabilizing reactive chemicals. Whilst many of the substances affected by the change in the proper shipping name are, and will generally continue to be stabilized by the preferred method of addition of chemical inhibitors, the Expert from the United Kingdom considered it was necessary to ensure that when temperature control is used, the Model Regulations should contain appropriate provisions to ensure that such transport operations are undertaken in an appropriate safe manner. Currently the Model Regulations contain provisions for the transport of self-reactive substances of Division 4.1 and organic peroxides of Division 5.2 that are only allowed for transport under temperature control, but no provision is made for other reactive chemicals when they are stabilized in this way.

3. In the discussion on ST/SG/AC.10/C.3/1999/81 a number of issues were raised that are addressed in this revised paper. Amongst the points raised were:

- (i) the desirability of addressing this issue in general terms, rather than in the substance specific way proposed in 1999/81;
- (ii) not all of the substances listed in the paper would require temperature control;
- (iii) some of the substances are prohibited from movement under conditions of temperature control in some modes;
- (iv) the criteria for determining the need for temperature control should be based on self-accelerating decomposition temperature (SADT);
- (v) methods other than temperature control are more commonly used to stabilize reactive polymers; and
- (vi) there should be more detail concerning the effect on the Packing (particularly IBC) and Portable Tank Instructions.

4. In view of the fact that the listed substances affected by the change in the proper shipping name are classified in a number of Classes and Divisions, and in order to accommodate all Classes and Divisions, it is necessary to incorporate special requirements by inserting new sections using, as far as possible, existing principles and text. This revised paper provides text, some in square brackets, for consideration by the Sub-committee. The proposal primarily comprises the introduction of a new short section (7.1.5) which gives the transport requirements for these substances, cross referenced to the equivalent requirements for self-reactive liquids, and the necessary consequential amendments.

5. Two alternatives are given, in the first alternative where there is a simple reference to the requirements for temperature controlled self-reactive liquids, in the second alternative specific additional text has been introduced.

Proposal

6. Alternative 1

6.1 Insert a new section 7.1.5 and renumber subsequent sections:

7.1.5 Special provisions applicable to the transport of substances stabilized by temperature control (other than self-reactive substances and organic peroxides)

7.1.5.1 These requirements apply to the transport of substances:

- (a) which contains the word "STABILIZED" in the proper shipping name; and
- (b) for which the SADT (see 7.1.4.3.1.3) as presented for transport in the package, IBC or tank is 50 °C or lower.

When chemical inhibition is not used to stabilize a reactive substance which may generate dangerous amounts of heat and gas, or vapour, under normal transport conditions, these substances need to be transported under temperature control. The requirements do not

apply to substances which are stabilized by the addition of chemical inhibitors [such that the SADT is greater than 50 °C].

Note: Some substances which are transported under temperature control are prohibited from transport in some modes.

7.1.5.2 The requirements in 7.1.4.3.1.1 to 7.1.4.3.1.3 and 7.1.4.3.2 shall apply to substances meeting criteria (a) and (b) in 7.1.5.1.

7.1.5.3 The actual transport temperature may be lower than the control temperature (see 7.1.4.3.1.1) but shall be selected so as to avoid dangerous separation of phases.

7.1.5.4 When these substances are transported in IBCs or portable tanks the requirements for a SELF-REACTIVE LIQUID TYPE F TEMPERATURE CONTROLLED shall apply. For transport in IBCs see the special provisions in 4.1.7.2 and the "Additional requirements" in Packing Instruction IBC 520; for transport in portable tanks see the additional provisions in 4.2.1.13.

7.1.5.5 If a substance which contains the word "STABILIZED" in the proper shipping name, which is not normally required to be transported under temperature control is transported under conditions where the temperature may exceed 55 °C, it may require temperature control.

6.2 In Chapter 5.4, insert a new paragraph 5.4.1.1.5 as follows:

"5.4.1.1.5 Special provisions for reactive substances stabilized by temperature control

For substances that contain the term "STABILIZED" in the proper shipping name, that require temperature control during transport, the control and emergency temperatures shall be indicated in the transport document."

Renumber the current paragraph 5.4.1.1.5 as 5.4.1.1.6 and subsequent paragraphs accordingly.

7. Alternative 2

7.1 Insert a new section 7.1.5 and renumber subsequent sections:

7.1.5 Special provisions applicable to the transport of substances stabilized by temperature control (other than self-reactives and organic peroxides)

7.1.5.1 These requirements [] apply to the transport of substances:

- (a) which contains the word "STABILIZED" in the proper shipping name; and
- (b) for which the SADT (see 7.1.4.3.1.3) as presented for transport in the package, IBC or tank is 50 °C or lower.

When chemical inhibition is not used to stabilize a reactive substance which may generate dangerous amounts of heat and gas, or vapour, under normal transport conditions, these substances need to be transported under temperature control. The requirements do not apply to substances which are stabilized by the addition of chemical inhibitors [such that the SADT is greater than 50 °C].

Note: Some substances which are transported under temperature control are prohibited from transport in some modes.

7.1.5.2 The requirements in 7.1.4.3.1.1 to 7.1.4.3.1.3 and 7.1.4.3.2 shall apply to substances meeting criteria (a) and (b) in 7.1.5.1.

7.1.5.3 The actual transport temperature may be lower than the control temperature (see 7.1.4.3.1.1) but shall be selected so as to avoid dangerous separation of phases.

7.1.5.4 When these substances are transported in IBCs the requirements of 4.1.9 [shall] apply; when they are transported in portable tanks the requirements of 4.2.1.13.4 to 4.2.1.13.13 shall apply.

7.1.5.5 If a substance which contains the word “STABILIZED” in the proper shipping name, which is not normally required to be transported under temperature control, is transported under conditions where the temperature may exceed 55 °C, it may require temperature control.

7.3 Insert text into IBC packing instructions:

In 4.1.4.2 under “Additional requirements:” in IBC01, IBC02 and IBC03 add:

Substances stabilized by temperature control are only authorized if the requirements of 4.1.9.1 are met.

Add a new section 4.1.9 for special packing provisions for substances stabilized by temperature control:

4.1.9 Special packing provisions for substances stabilized by temperature control (other than self-reactive substances and organic peroxides)

4.1.9.1 Use of intermediate bulk containers

4.1.9.1.1 Temperature stabilized substances may be transported in IBCs under conditions established [by the competent authority of the country of origin when], on the basis of appropriate tests, [that competent authority is satisfied] that such transport may be safely conducted. The tests undertaken shall include those necessary:

- (a) To determine the control and emergency temperatures associated with the transport of the product in the IBC concerned as derived from the SADT;

- (b) To prove the compatibility of all materials normally in contact with the substance during the transport;
- (c) To design, when applicable, pressure and emergency relief devices; and
- (d) To determine if any special provisions are necessary for safe transport of the substance.

4.1.9.1.2 To prevent explosive rupture of metal IBCs or composite IBCs with complete metal casing, these IBCs shall be provided with a device to allow venting during transport. The inlet to the pressure-relief device shall be sited in the vapour space of the IBC under maximum filling conditions during transport. The emergency-relief devices shall be designed to vent all the decomposition products and vapours evolved during self-accelerating decomposition (polymerization) or during a period of not less than one hour of complete fire engulfment as calculated by the formula in 4.2.1.13.8. The control and emergency temperatures specified are based on a non-insulated IBC. When consigning a temperature stabilized reactive monomer in an IBC, it is the responsibility of the consignor to ensure that:

- (a) the pressure and emergency relief devices installed on the IBC are designed to take appropriate account of the self-accelerating decomposition (polymerization) reaction and of fire engulfment; and
- (b) the control and emergency temperatures indicated are appropriate, taking into account the design (e.g. insulation) of the IBC to be used.

7.3. Add text for special provisions for temperature stabilized substances in Class 3, Division 6.1 and Class 8 into Chapter 3.2:

Insert new 4.2.1.10.1.2:

4.2.1.10.1.2 [Transport of substances stabilized by means of temperature control is allowed only with the permission of the competent authority of the country of origin]. For additional provisions for substances which are stabilized by temperature control (7.1.5.1) see 4.2.1.13.4 to 4.2.1.13.13. In case of conflict, these requirements prevail over those specified in section 6.7.2. Emergencies to be taken into account are self-accelerating decomposition (polymerization) and fire engulfment as described in 4.2.1.13.8.8.

Insert new 4.2.1.14:

4.2.1.14.1 [Transport of substances stabilized by means of temperature control is allowed only with the permission of the competent authority of the country of origin]. For provisions for substances which are stabilized by temperature control (7.1.5.1) see 4.2.1.13.4 to 4.2.1.13.13. In case of conflict, these requirements prevail over those specified in section 6.7.2. Emergencies to be taken into account are self-accelerating decomposition (polymerization) and fire engulfment as described in 4.2.1.13.8.

Insert new 4.2.1.16:

4.2.1.16.2 [Transport of substances stabilized by means of temperature control is allowed only with the permission of the competent authority of the country of origin]. For additional provisions for substances which are stabilized by temperature control (7.1.5.1) see 4.2.1.13.4 to 4.2.1.13.13. In case of conflict, these requirements prevail over those specified in section 6.7.2. Emergencies to be taken into account are self-accelerating decomposition (polymerization) and fire engulfment as described in 4.2.1.13.8.8.

7.4 In Chapter 5.4, insert a new paragraph 5.4.1.1.5 as follows:

"5.4.1.1.5 *Special provisions for reactive substances stabilized by temperature control*

For substances that contain the term "STABILIZED" in the proper shipping name, that require temperature control during transport, the control and emergency temperatures shall be indicated in the transport document."

Renumber the current paragraph 5.4.1.1.5 as 5.4.1.1.6 and subsequent paragraphs accordingly.

Justification

8. Section 7.1.5 applies the same general requirements for reactive monomers, when they are transported under temperature control, as are in place for the transport of temperature controlled self-reactive liquids. It limits the application of these requirements to reactive substances that have "STABILIZED" in the proper shipping name and whose SADT, as presented for transport, is 50 °C or less (issues (i), (ii) and (iv) in para 3 in the Introduction). The note in the proposed text satisfies the requirement of item (iii) of paragraph 3, and the exclusion of reactive substances stabilized by means of chemical inhibitors addresses item (v).

9. The new text in Chapter 5.4 ensures that the transport documentation contains details of the control and emergency temperatures.

10. The introduction of text in Chapters 4.1 and 4.2 detail the requirements for appropriate venting when transport under temperature control is in an IBC or portable tank, these are based on the requirements for organic peroxides/self-reactive substances. In 4.1.9.1.1 and Chapter 4.2 the text in square brackets allows the option of either competent authority approval, or self approval provided appropriate tests have been made.
