



**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****Fiftieth session**

Geneva, 28 November-6 December 2016

Item 2 (f) of the provisional agenda

**Recommendations made by the Sub-Committee
on its forty-seventh, forty-eighth
and forty-ninth sessions and pending issues:
miscellaneous pending issues****Polymerizing substances – information on emergency and
control temperature****Transmitted by the expert from Germany¹**

1. The expert from Germany provided during the forty-seventh session of the Sub-Committee a proposal concerning information on emergency and control temperature for polymerizing substances (ST/SG/AC.10/C.3/2015/38). This proposal was adopted.
2. The members of the Sub-Committee pointed out that other aspects, such as the wording in section 7.1.5 on temperature control during transport, also need to be checked for consequential amendments.
3. Problems with the wording in 7.1.5 and 7.1.6 seem to result from the structure of the text. 7.1.6.2 refers to the provisions on temperature control in 7.1.5.3.11 to 7.1.5.3.1.3 and 7.1.5.3.2. However, the term SAPT and polymerizing substances are not mentioned in 7.1.5 as the scope of this section is limited to self-reactive substances of Division 4.1 and organic peroxides of Division 5.2 only. A review showed that the current differentiation between self-reactive substances of Division 4.1 and organic peroxides of Division 5.2 on the one hand and other temperature controlled substances (including polymerizing substances) on

¹ In accordance with the programme of work of the Sub-Committee for 2015–2016 approved by the Committee at its seventh session (see ST/SG/AC.10/C.3/92, paragraph 95 and ST/SG/AC.10/42, para. 15).

the other hand is not needed as almost the same requirements apply to both groups of substances. The text could be improved by a new structure, combining the provisions under a common heading. In this new structure, the necessary editorial improvements of the wording could be inserted.

4. In this context, it was noted that the provisions on polymerizing substances should apply not only to polymerizing substances of Division 4.1, but also to polymerizing substances of other classes. Therefore also the text as adopted during the forty-seventh session should be amended accordingly.

5. A proposal for a revised text was submitted to the Sub-Committee as informal document INF. 39 at the forty-ninth session. Several experts supported the proposal by Germany and the expert from Germany was invited to submit a formal proposal for the next session, taking into account comments made during the session.

6. The expert from Germany would like to point out, that the texts concerning the SADT/SAPT threshold that triggers temperature control requirements are existing texts. The expert from Germany is of the opinion that the different wording in the temperature control provisions is describing the same requirements. Following the rule that the SADT/SAPT is determined in steps of 5 K “< 50 °C” in fact means “≤ 45 °C”. If the Sub-Committee is of the opinion that it is necessary to harmonize the wording it could be done in a separate proposal.

Proposal

7. It is proposed to reorder the text of 7.1.5 and 7.1.6 as presented in the annex. Consequential amendments are necessary in the table of contents and in several paragraphs referring to 7.1.5 or 7.1.6.

8. The amendments adopted on the basis of ST/SG/AC.10/C.3/2015/38 shall be replaced by the following amendments:

Amend 5.4.1.5.5 of the Model Regulations as follows:

In the heading, after “Self-reactive substances” insert “, polymerizing substances”.

In the text, replace “and for organic peroxides” with “, organic peroxides and polymerizing substances”.

9. Add at the end of 2.4.2.5.2 the following note:

“**NOTE:** Substances meeting the criteria of a polymerizing substance and also for inclusion in Classes 1-8 are subject to the requirements of Special Provision 386.”

Annex

“7.1.5 Special provisions applicable to the transport of self-reactive substances of Division 4.1, organic peroxides of Division 5.2 and substances stabilized by temperature control (other than self-reactive substances and organic peroxides)”

7.1.5.1 All self-reactive substances, organic peroxides and polymerizing substances shall be protected from direct sunlight and all sources of heat, and placed in adequately ventilated areas.

NOTE: Some substances which are transported under temperature control are prohibited from transport by certain modes.

7.1.5.2 *Temperature control provisions*

7.1.5.2.1 These provisions apply to certain self-reactive substances when required by 2.4.2.3.4, and certain organic peroxides when required by 2.5.3.4.1 and certain polymerizing substances when required by 2.4.2.5.2 or special provision 386 which may only be transported under conditions where the temperature is controlled.

7.1.5.2.2 These provisions also apply to the transport of substances for which:

- (a) The proper shipping name as indicated in column 2 of the Dangerous Goods List of Chapter 3.2 or according to 3.1.2.6 contains the word “STABILIZED” and
- (b) The SADT or SAPT¹ determined for the substance (with or without chemical stabilization) as offered for transport is:
 - (i) 50 °C or less for packages and IBCs; or
 - (ii) 45 °C or less for portable tanks.

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. These provisions do not apply to substances which are stabilized by the addition of chemical inhibitors such that the SADT or the SAPT is greater than that prescribed in (b) (i) or (ii), above.

7.1.5.2.3 In addition, if a self-reactive substance or organic peroxide or a substance the proper shipping name of which contains the word “STABILIZED” and 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.

7.1.5.2.4 The “control temperature” is the maximum temperature at which the substance can be safely transported. It is assumed that during transport the temperature of the immediate surroundings of the package does not exceed 55 °C and attains this value for a relatively short time only during each period of 24 hours. In the event of loss of temperature control, it may be necessary to implement emergency procedures. The “emergency temperature” is the temperature at which such procedures shall be implemented.

¹ The self-accelerating polymerization temperature (SAPT) shall be determined in accordance with the Manual of Tests and Criteria. The SADT tests in Section 28, Series H as appropriate may be equally applied to determine a self-accelerating polymerization temperature.

7.1.5.2.5 Derivation of control and emergency temperatures

Type of receptacle	SADT ^a /SAPT ^a	Control temperature	Emergency temperature
Single packagings and IBCs	20 °C or less	20 °C below SADT/SAPT	10 °C below SADT/SAPT
	over 20 °C to 35 °C	15 °C below SADT/SAPT	10 °C below SADT/SAPT
	over 35 °C	10 °C below SADT/SAPT	5 °C below SADT/SAPT
Portable tanks	< 50 °C	10 °C below SADT/SAPT	5 °C below SADT/SAPT

^a i.e. the SADT/SAPT of the substance as packaged for transport.

7.1.5.2.6 The control and emergency temperatures are derived using the table in 7.1.5.2.5 from the self-accelerating decomposition temperature (SADT) or from the self-accelerating polymerization temperature (SAPT) which are defined as the lowest temperatures at which self-accelerating decomposition or self-accelerating polymerization may occur with a substance in the packaging, IBC or portable tank as used in transport. An SADT or SAPT shall be determined in order to decide if a substance shall be subjected to temperature control during transport. Provisions for the determination of the SADT are given in 2.4.2.3.4, 2.5.3.4.2 and 2.4.2.5.2 for self-reactive substances, organic peroxides and polymerizing substances and mixtures, respectively.

7.1.5.2.7 Control and emergency temperatures, where appropriate, are provided for currently assigned self-reactive substances in 2.4.2.3.2.3 and for currently assigned organic peroxide formulations in 2.5.3.2.4.

7.1.5.2.8 The actual transport temperature may be lower than the control temperature but shall be selected so as to avoid dangerous separation of phases.

7.1.5.3 *Transport under temperature control*

NOTE: Since the circumstances to be taken into account differ for the various modes of transport, only general guidance is provided.

7.1.5.3.1 Maintenance of the prescribed temperature is an essential feature of the safe transport of substances stabilized by temperature control. In general, there shall be:

- (a) Thorough inspection of the cargo transport unit prior to loading;
- (b) Instructions to the carrier about the operation of the refrigeration system;
- (c) Procedures to be followed in the event of loss of control;
- (d) Regular monitoring of operating temperatures; and
- (e) Provision of a back-up refrigeration system or spare parts.

7.1.5.3.2 Any control and temperature sensing devices in the refrigeration system shall be readily accessible and all electrical connections weather-proof. The temperature of air space within the cargo transport unit shall be measured by two independent sensors and the output shall be recorded so that temperature changes are readily detectable. The temperature shall be checked every four to six hours and logged. When substances having a control temperature of less than +25 °C are carried, the cargo transport unit shall be equipped with visible and audible alarms, powered independently of the refrigeration system, set to operate at or below the control temperature.

7.1.5.3.3 If during transport the control temperature is exceeded, an alert procedure shall be initiated involving any necessary repairs to the refrigeration equipment or an increase in the cooling capacity (e.g. by adding liquid or solid refrigerants). The temperature shall also be checked frequently and preparations made for implementation of

the emergency procedures. If the emergency temperature is reached, the emergency procedures shall be initiated.

7.1.5.3.4 The suitability of a particular means of temperature control for transport depends on a number of factors. Factors to be considered include:

- (a) The control temperature(s) of the substance(s) to be transported;
- (b) The difference between the control temperature and the anticipated ambient temperature conditions;
- (c) The effectiveness of the thermal insulation;
- (d) The duration of transport; and
- (e) Allowance of a safety margin for delays.

7.1.5.3.5 Suitable methods for preventing the control temperature being exceeded are, in order of increasing control capability:

- (a) Thermal insulation; provided that the initial temperature of the substance(s) to be transported is sufficiently below the control temperature;
- (b) Thermal insulation with coolant system; provided that:
 - (i) An adequate quantity of coolant (e.g. liquid nitrogen or solid carbon dioxide), allowing a reasonable margin for delay, is carried;
 - (ii) Liquid oxygen or air is not used as coolant;
 - (iii) There is a uniform cooling effect even when most of the coolant has been consumed; and
 - (iv) The need to ventilate the unit before entering is clearly indicated by a warning on the door(s) of the unit;
- (c) Single mechanical refrigeration; provided that for substance(s) to be transported with a flash point lower than the sum of the emergency temperature plus 5 °C explosion-proof electrical fittings are used within the cooling compartment to prevent ignition of flammable vapours;
- (d) Combined mechanical refrigeration system with coolant system; provided that:
 - (i) The two systems are independent of one another;
 - (ii) The provisions in (b) and (c) are complied with;
- (e) Dual mechanical refrigeration system; provided that:
 - (i) Apart from the integral power supply unit, the two systems are independent of one another;
 - (ii) Each system alone is capable of maintaining adequate temperature control; and
 - (iii) For substance(s) to be transported with a flash point lower than the sum of the emergency temperature plus 5 °C explosion-proof electrical fittings are used within the cooling compartment to prevent ignition of flammable vapours .

7.1.5.3.6 Where a number of packages are assembled in a freight container, closed road vehicle or unit load, the total quantity of substance, the type and number of packages and the stacking arrangement shall not create an explosion hazard.”.

Consequential amendments

Amend the table of contents accordingly.

Amend references in 2.4.2.3.2.3, 2.4.2.3.5.4, 3.1.2.6, SP 386, 4.1.7.2.3, 5.4.1.5.4, 5.4.1.5.5, 7.1.5.3.1.3, 7.1.6.2 and 7.1.6.3 accordingly.

Amend 7.1.6 to read as follows: “*Reserved*”
