**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
Geneva, 29 June-8 July 2020
Item 2 (c) of the provisional agenda
Explosives and related matters: review of tests in
**parts I, II and III of the Manual of Tests
and Criteria**

**Sub-Committee of Experts on the Globally Harmonized
System of Classification and Labelling of Chemicals**

Thirty-ninth session
Geneva, 8-10 July 2020
Item 2 (a) of the provisional agenda
**Classification and labelling criteria and related hazard
communication: work of the Sub-Committee of Experts on
the Transport of Dangerous Goods (TDG) on matters of
interest to the GHS Sub-Committee**

Manual of Tests and Criteria, review of Test Series H: determination of self-accelerating decomposition temperature

Transmitted by the Chairman of the Working Group on Explosives*

Introduction

1.   This document contains the outcome of the work of the International Group of Experts on the Unstable and Energetic Substances (IGUS), working group Energetic and Oxidizing Substances (EOS), ad-hoc working group on revision of test series H. The information in this document was presented earlier in informal documents INF.31 (fifty-sixth session) and INF.15 (thirty-eighth session).

2.   The program of work of the Working Group of Explosives includes, among others, a longstanding item "Review of tests in parts I, II and III of the Manual of Tests and Criteria" aimed at removing unnecessary detailed description and over- specification of non-critical materials. Test Series 1, 2, A, C and E have already been reviewed in this light in the past. Test Series H has been under review during the past two biennia.

3.   The Working Group on Explosives discussed briefly Test series H in the previous biennium. At that time, only polymerizing substances and self-accelerating polymerization temperature (SAPT) were addressed, as well as amendments to the text of the Manual of Tests and Criteria where there was a need to make it fit both for transport and for non-transport sectors addressed by the GHS.

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

4.   In parallel, for a couple of years, an IGUS-EOS ad-hoc working group discussed the update of test series H. The following aspects were discussed:

(a)   Updating of the current test descriptions and deletion of over-specifications;

(b)   On test series H.2 Adiabatic Storage Test (AST): Making the test description and the description of the equipment to be used more general and introducing a pressure adiabatic storage test (closed system);

(c)   On test series H.3 Isothermal Storage Test (IST): Making the test description and description of the equipment to be used more general

(d)   Introduction of standard heat-loss values, where possible (otherwise to be determined for the specific configuration), for packagings and IBCs.

5.   The list of proposed amendments to the seventh revised edition of the Manual of Tests and Criteria resulting from these discussions are given in the proposal in this document. A marked-up version of the full text of Section 28 of the Manual is circulated separately in information document INF.4 (TDG, fifty-seventh session) – INF.3 (GHS, thirty-ninth session). The TDG and GHS sub-committees are invited to consider the proposed amendments for adoption.

Proposal

6.   Amend Section 28 of the Manual of Tests and Criteria as follows:

28.1   Renumber the first paragraph under 28.1 as 28.1.1 and amend as follows:

Amend the last sentence before the current sub-paragraphs (a) to (c) to read: "To assist in interpreting the results, the following models can be used[1]:"

Replace current sub-paragraphs (a) to (c) with the following:

"(a)   Semenov model, in which the main resistance to heat flow is at the boundary (i.e. packaging). This model is generally applicable to homogeneous liquids but can also be applied to solids in packagings (excluding IBC[2]s);

(b)   Frank-Kamenetskii model, in which the main resistance to heat flow is within the substance. This model is generally applicable to solids in larger packagings, IBCs or tanks;

(c)   Thomas model, in which the resistance to heat flow is from both the boundary and the substance;

(d)   Non-stationary models, e.g. finite element methods (FEM), or computational fluid dynamics (CFD) all combined with thermal kinetic methods.".

The references currently at the end of the paragraph become footnote "1" to read as follows:

"[1] *References: N.N. Semenov, Z. Physik, 48, 1928, 571; D.A. Frank-Kamenetskii, Zhur. Fiz. Khim., 13, 1939, 738; P.H. Thomas, Trans. Faraday Soc., 54, 1958, 60.".*

Renumber the sentence "The text should be used….2.5.3.4 of the Model Regulations" as 28.1.2.

Insert the following new paragraph 28.1.3:

"28.1.3   *Both the SADT and the SAPT may be influenced by factors such as aging of the sample, presence of stabilizers or impurities in the sample (including packaging materials in contact with the substance). These possible influencing factors should be considered when evaluating the results of an SADT or SAPT determination.".*

28.2.2   In table 28.1, replace "(IST)" by "(IST)[b]".

28.2.6   Replace "The results obtained for the largest commercial package" by "The results obtained for larger packages".

28.3.4   Replace "should be used for the actual determination" by "should be used for the final determination".

28.3.5   Insert the following new second sentence:

"For all type of packagings up to 50 kg for solids or 200 kg/225 litres for liquids and for IBCs up to 1250 litres for liquids, a standard heat loss per unit of mass is given in Table 28.4. For other packagings, IBC's or tanks or when there is a need for a heat loss value that deviates from the one as given in Table 28.4, the actual heat loss value per unit of mass has to be determined.".

Amend the sentence currently starting with "The heat loss per unit of mass" as follows:

Amend the beginning to read "In this case, the heat loss per unit of mass of the package…"

Replace "…heat transfer in the substance and the heat transfer through the packaging to the environment)" by "…heat transfer in the substance, the heat transfer through the packaging and heat transfer from the outer wall of the packaging to the environment (see note))…".

Insert a note to read as follows:

"NOTE: For calculations an external heat transfer coefficient (i.e. heat transfer from the outer wall of the packaging to the environment) of 5 W/m²·K can be used.".

28.3.6   In the first sentence, replace "and surroundings" by "and its surroundings".

Insert the following new fourth sentence: "For solids for example, the packaging may be filled with dense soda ash (apparent density greater than 1 g/cm^3) and this is heated to about 80 °C.".

28.3.7   Amend the beginning of the first sentence to read as follows: "Standard heat loss characteristics of packages, IBCs and tanks are given in Table 28.4.". *(The second sentence remains unchanged).*

Replace current table 28.4 and its related notes with the following:

"Table 28.4: Heat loss per unit mass from packages, IBCs and tanks

Type of receptacle	Normal capacity (litres)	Heat loss per unit mass, L (mW/K.kg)
For liquids:		
Packagings	up to 200 kg/225 l	40[b]
Packagings	larger than 200 kg/225 l	no standard value[c]
IBCs	up to 1250 l	30
IBCs	larger than 1250 l	no standard value[c]
Tanks		no standard value[c]
For solids:		
Packagings	up to 50kg	30[b]
Packagings	larger than 50 kg	no standard value[c]
IBCs		no standard value[c]
Tanks		no standard value[c]

 a   *For test series H.4 the heat loss of the Dewar vessel to be used should be as close as possible to the value listed in the table.*

 b   *When determining the SADT for exemption or classification purposes, where the definition of the SADT is connected to a 50 kg package, a value of 60 mW/K.kg for liquids and 30 mW/K.kg for solids should be used. Such is the case when the SADT is used either to exclude a new substance from Division 4.1 as a self-reactive substance (see 20.2.1(e)), or to classify it under Type G as a self-reactive substance (see 20.4.2 (g)), or organic peroxide (see 20.4.3 (g)).*

 c   *Dicyclohexyl phthalate (solid).*

”.

28.4.1.1   In the first sentence, replace "self-accelerating decomposition" by "self-accelerating decomposition or polymerization" and in the last sentence delete "or

28.4.1.2.3   In (c) insert "for all sides" after "distance".

In the paragraph following (c), amend the last sentence to read as follows: "Examples of a suitable small-package and large-package ovens are described below.".

28.4.1.2.4 and 28.4.1.2.5   Amend current paragraphs 28.4.1.2.4 and 28.4.1.2.5 as follows:

 • Current paragraph 28.4.1.2.4 becomes 28.4.1.2.3.1 with the following heading: "28.4.1.2.3.1 Example 1". *(The text of current paragraph 28.4.1.2.4 remains unchanged).*

 • Current paragraph 28.4.1.2.5 becomes 28.4.1.2.3.2 with the following heading: "28.4.1.2.3.2 Example 2". *(The text of current paragraph 28.4.1.2.5 remains unchanged).*

28.4.1.2.3.3 (new)   Insert a new paragraph 28.4.1.2.3.3 to read as follows:

"28.4.1.2.3.3   Example 3

For tests at temperatures up to 75 °C, a double walled metal chamber (minimum separation distance from the package to the wall is 100 mm) may be used with fluid from a temperature-controlled circulating bath passed between the walls at the desired temperature. The test chamber is loosely closed by an insulated lid (e.g. made from 10 mm thick polyvinyl chloride). The temperature control should allow the desired temperature for a liquid inert sample to be maintained with a deviation of not more than ± 2 K for up to 10 days.".

Renumber current paragraphs 28.4.1.2.6 to 28.4.1.2.8 as 28.4.1.2.4 to 28.4.1.2.6.

28.4.1.2.4 (new, former 28.4.1.2.6), in the first sentence insert "or Resistance Temperature Detector (RTD)" after "thermocouple".

28.4.1.3.1   At the beginning of the second sentence insert "or RTD" after "thermocouple".

28.4.1.3.2   Delete the last sentence ("Note the time…. maximum temperature.").

28.4.1.3.4   Amend the end of the third sentence to read as follows: "…to determine if the SADT or SAPT is greater than the applicable temperature specified in Table 28.2.".

28.4.1.5   In the table, insert the following rows at the end:

Substance	Sample mass (kg)	Packaging	SADT/SAPT (°C)
Didecanoylperoxide, technically pure	20	1G	40
2,2´-Azodi-(isobutyronitrile)	50	1G	50

Figure 28.4.1.1   Amend the heading to read: "**Small package oven (Example 1)**"

Figure 28.4.1.2   Amend the heading to read: "**Large package oven (top view and side view) (Example 2)**"

28.4.2.1.1   In the second sentence replace "heat loss data relating to the package" by "heat loss data of the package". Add the following last sentence and its related sub-paragraphs (a) and (b):

"There are two versions of the adiabatic storage test:

(a)   Open version: A Dewar vessel within an oven is used. This set-up uses a capillary to prevent pressure build-up and a cooling system to limit the temperature increase due to a thermal runaway reaction;

(b)   Closed version: A test vessel (e.g. Dewar or thin-walled vessel) is placed within an autoclave in an oven. Here the autoclave prevents the release of pressure to the surroundings during the test.".

28.4.2.1.2   Amend to read as follows:

"28.4.2.1.2   The smallest temperature rise that can be detected with this method depends on the properties of the sample, but generally corresponds to a heat generation rate of 15 mW/kg. The upper limit of the open version is determined by the capacity of the cooling system to safely cool the substance (up to 500 W/kg if water is used as coolant). The closed version can disregard this limit if performed in a high-pressure autoclave. The maximum allowable error in heat generation is 30% at 15 mW/kg and 10% from 100 mW/kg to 10 W/kg. The detection limit of the adiabatic test should be suitable for assessing the heat loss from the package under consideration (e.g. 100 to 500 mW/kg for L=60 mW/kg K). If significant extrapolation of heat production rates derived from adiabatic test data is required, a validation with additional isothermal tests is recommended.".

28.4.2.1.3   Replace the first sentence by the following *(the sentence in bold "The test site (secondary explosion)" remains unchanged)*:

"An explosion may occur in the open version of the test if the cooling system is activated at a stage where the rate of heat generation exceeds the cooling capacity of the apparatus. For the closed version an explosion could lead to a rupture of the autoclave or its fittings.".

28.4.2.2.1   Insert a heading to read as follows: "Open version" and amend the existing paragraph as follows:

• In the first sentence, replace "(1.0 or 1.5 litre)" by "(max. 3 litres) and insert a comma after "sample temperature";

• Amend the fourth sentence to read as follows: "Pressure build-up in the Dewar vessel is prevented by a sufficiently long capillary tube made of an inert substance (e.g. 2 m long PTFE tube) through the insulated lid.".

• In the seventh sentence replace "a secondary safety device is fitted which disconnects the power supply" by "a secondary safety device is used to disconnect the power supply"

• Amend the sentence to read as follows: "A schematic drawing of an open apparatus for the adiabatic storage test is given in Figure 28.4.2.1.".

28.4.2.2.2   Insert the following new paragraphs (current 28.4.2.2.2 becomes 28.4.2.2.3):

"28.4.2.2.2   Closed version

28.4.2.2.2.1   The apparatus consists of a suitable inert vessel (e.g. Dewar or thin-walled test cell) to contain the sample, a high-pressure autoclave and an insulated oven with a differential temperature control system. Thin-walled test cells require the use of a pressure control system to balance the internal and external cell pressure.

28.4.2.2.2.2   The phi-factor (heat capacity of the set-up and the sample divided by heat capacity of the sample) of the system should be known and be considered in evaluating the tests results. Therefore, a suitable combination of phi-factor, insulation, and amount of substance should be chosen. The heat losses from the apparatus and detection limit of the system also have to be taken into consideration. An inert heating coil may be inserted into the sample. In addition to the high-pressure autoclave, a secondary safety device is used to disconnect the power supply to the oven at a pre-set temperature.

28.4.2.2.2.3   The closed version of the test is preferred for substances with a high vapour pressure at the test temperature to prevent mass loss due to evaporation or for substances that decompose with severe pressure rises (which in case of an open version of the test would throw off the insulated lid or eject the sample from the test cell). The weight of the sample should be determined after the measurement to detect mass loss during the test. Leakage from the system and the resulting evaporation cooling can result in a significant loss of sensitivity in the test and a large margin of error in the results. The suitability of a test run in the open version can be evaluated by determining the mass loss of the sample after the test.".

28.4.2.2.3 (new, former 28.4.2.2.2)   Amend as follows:

- In the first sentence, after "platinum resistance sensors" insert "(RTD)";

- In the second sentence, replace "surrounding air" with "surroundings";

- Amend the end of the third sentence to read as follows: "…to monitor the temperature of the substance as well as (the air) in the oven.".

- Amend the last sentence to read as follows: "For substances with an SADT or SAPT below ambient temperature, the test should be performed with sufficient cooling.".

28.4.2.3.1   Amend to read as follows:

"28.4.2.3.1   Validation procedures

(a)   The validation procedure A is as follows:

(i)   Fill the Dewar vessel with a suitable inorganic salt, preferably with similar physical properties to the test substance (e.g. sodium chloride or dense soda ash). Alternatively, an oil of known specific heat capacity at the temperature of interest (e.g. silicone oil, apparent density 0.96 ± 0.02 at 20 °C and heat capacity 1.46 ± 0.02 J/g at 25 °C) may be used;

(ii)   Place the Dewar vessel in the vessel holder of the oven and heat the validation substance in 20 °C steps using the internal heating system at a known power rating, e.g. 0.333 W or 1.000 W, and determine the heat losses at 40 °C, 60 °C, 80 °C and 100 °C;

(iii)   Use the data to determine the heat capacity of the Dewar vessel and the test set-up using the method given in 28.4.2.4.

(b)   The validation procedure B is as follows:

(i)   In order to perform validation procedure B the test set-up should be well characterized (e.g. by performing validation procedure A first);

(ii)   The test set-up must be validated using the method described in 28.4.2.4 with at least two standard substances or mixtures. Suitable choices for these standards are dicumylperoxide in ethylbenzene[1] (40:60% w/w, SADT for a heat loss of 60 mW/kg K should be 90 °C), or any of the substances from the example of results tables in chapter 28.

Add the following footnote 2:

"[2]   *Reference: Dürrstein S., Kappler C., Neuhaus I., Malow M., Michael-Schulz H., Gödde M., 2016, Modell-based prediction of the adiabatic induction*

period and SADT of dicumyl peroxide solution and comparison to large-scale experiments performed using 216.5-liter barrels in the H.1 test, Chemical Engineering Transactions, 48, 475-480.".

28.4.2.3.2   Amend to read as follows:

"28.4.2.3.2   Test procedure

The test procedure is as follows:

(a)   Fill the Dewar vessel/test cell with the weighed sample, including a representative amount of packaging material (if necessary), and place it in the vessel holder of the oven;

(b)   Start the temperature monitoring and then increase the sample temperature to a pre-set temperature at which detectable self-heating may occur. The specific heat of the substance can either be calculated from the temperature rise, heating time and heating power, or be determined by any suitable calorimetric test method beforehand;

(c)   Heat the sample to the set temperature, maintain the oven temperature and monitor the sample temperature. If no temperature rise due to self-heating is observed after temperature equilibration of the system (e.g. 24 h for the open system), increase the oven temperature by 5 °C. Repeat this procedure until self-heating is detected;

For the closed version the apparatus can be heated with <0.5 W/kg until self-heating is detected. The heating power per unit mass should remain below the sensitivity for self-heating detection of the test equipment or autoclave;

(d)   When self-heating is detected, the sample is allowed to heat up under adiabatic conditions to a pre-set temperature, at which point the cooling system is activated or the oven temperature has reached its limit;

For the open version this temperature should be set so that the rate of heat generation does not exceed the cooling capacity of the system;

For the closed version this temperature is usually a pre-set maximum oven temperature. The sample may exceed this temperature under non-adiabatic conditions.".

28.4.2.4.2   For B, M_1 and Cp_1 replace "calibration" by "validation".

28.4.2.4.6   In the first sentence insert "(Q_T)" after "per unit of mass".

28.4.2.5   Insert a reference to note "a" against the name of the substances currently listed in the table and add a new row at the end as follows:
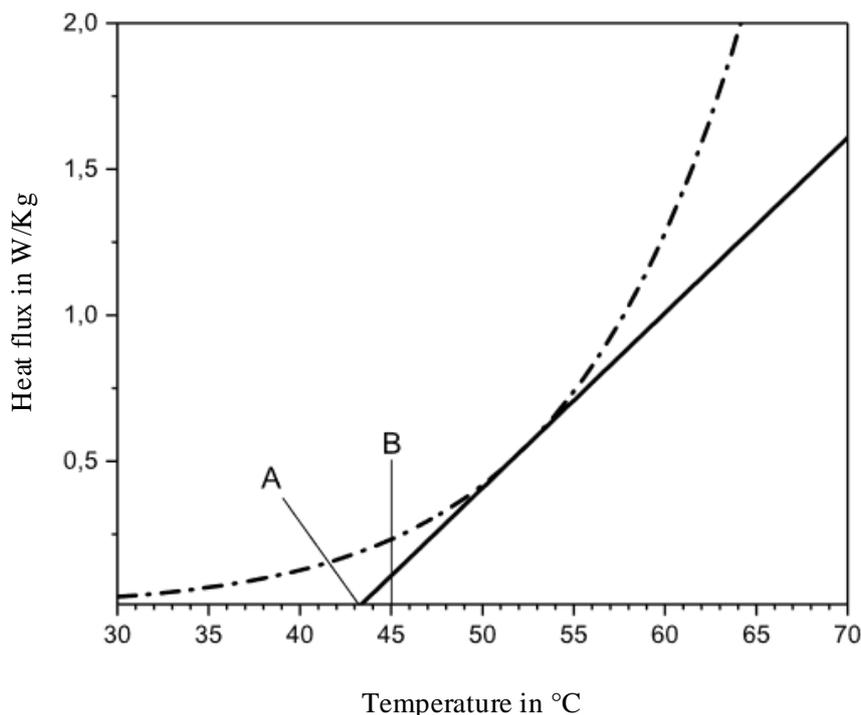
Substance	Mass (kg)	Packaging	Heat loss per unit mass (mW/kg.K)	SADT/SAPT (°C)
N-Vinylformamide	1000	31H1	33	55

Add the following note "a" under the table:

"a   These historical examples were determined using heat losses that are higher than those currently recommended for classification purposes (see table 28.4).".

Figure 28.4.2.2   Replace with the following:

"Figure 28.4.2.2: Example of determination of SADT or SAPT

Temperature in °C

— · — · — Heat generation curve		—— Heat loss curve L = 0.06 W (Kg K)	
(A)	Critical ambient temperature (intercept of heat loss with the abscissa)	(B)	SADT or SAPT (Critical ambient temperature rounded up to next higher multiple of 5°C)

".

28.4.3.1.2   Delete. Current paragraph 28.4.3.1.3 becomes new paragraph 28.4.3.1.2.

28.4.3.1.2 (new, former 28.4.3.1.3) Amend the beginning of the first sentence to read as follows: "The usually robust construction of readily available apparatus, …".

28.4.3.2   Amend to read as follows:

"28.4.3.2   *Apparatus and materials*

28.4.3.2.1   Isothermal calorimetry (IC)

Appropriate isothermal calorimeters can be used. The equipment should be able to measure heat generation values of 1 mW/kg to 1500 mW/kg in a temperature range of -20 °C to 200 °C. The maximum error in the heat generation should be less than 5 %. The equipment should be capable of maintaining the temperature to within 0.2 °C of the set temperature. Sample mass of test material should be at least 200 mg. Closed pressure resistant sample holders should be used and the material of the sample holder should not have catalytic effect on the decomposition behaviour of the test substance. This can be achieved by selecting the appropriate materials for the sample holders or by an appropriate passivation method of the sample holders.

28.4.3.2.2   The sample holder is placed on or around heat flow meter. The amount of substance in the sample holder is at least 200 mg. The material of the holder should be compatible with the sample. If an external reference is used it should be handled identical to the sample.

28.4.3.2.3   The heat flow from the sample is continuously recorded as a function of time (differential measurement) by a recorder or computer.".

28.4.3.3   Amend to read as follows:

"28.4.3.3   *Procedure*

28.4.3.3.1   Calibration procedure

Before a measurement can be performed, the blank signal and the sensitivity of the heat flow meter need to be determined by the applicable calibration procedure for the equipment used covering the temperature range of the measurement.

28.4.3.3.2   Test procedure

The test procedure is as follows:

(a)   Set the apparatus for the desired test temperature. The temperature selected should be sufficient to give a rate of heat generation between 5 mW to 1000 mW per kg of substance or for tanks a maximum heat generation rate between 1 and 100 mW/kg;

(b)   Fill the sample holder with the weighed sample and with a representative quantity of packaging material (if metal) and insert the holder into the apparatus;

(c)   Start monitoring the rate of heat production. The duration of each test depends on the test temperature and on the rate of heat production. The measuring time as given in Figure 28.4.3.1 can be used as guidance unless it leads to unrealistic measuring times (e.g. greater than 1000 hours). These measuring times are given to achieve a certain degree of conversion of the substance in order to take auto-catalytic effects into account;[3]

(d)   At the end of the test the change in sample mass should be determined;

(e)   The test is repeated with new samples at temperature intervals of 5 °C so that there are at least five results with a maximum heat generation rate between 5 and 100 mW/kg or for tanks a maximum heat generation rate between 1-100 mW/kg.".

Insert a new footnote "2" to read as follows:

"[3]   *References:*

1) J. L. C. van Geel, Investigations into Self-Ignition Hazard of Nitrate Ester Propellants,   Thesis, Technical University of Delft, The Netherlands, 1969.

2) Barendregt, R.B., Thermal Investigation of Unstable Substances, Including a Comparison of Different Thermal Analytical Techniques, Thesis, Technical University of Delft, The Netherlands, 1981."

Figure 28.4.3.1   Insert the following new figure:

"Figure 28.4.3.1: Measuring period as a function of maximum heat generation measured

".
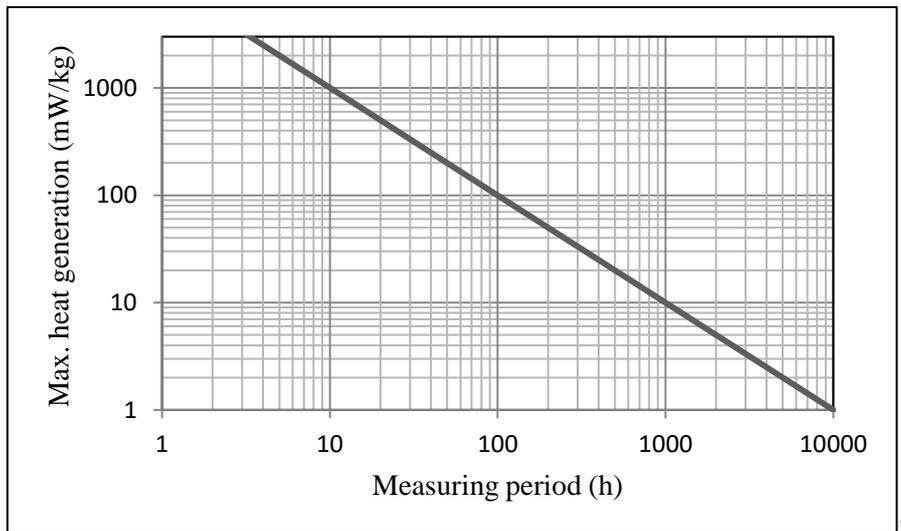
28.4.3.4.1 and 28.4.3.4.2   Delete. Current 28.4.3.4.3 becomes 28.4.3.4.1.

28.4.3.5   Insert a reference to note "a" against the names of all current substances listed in the table and add the following entries at the end:

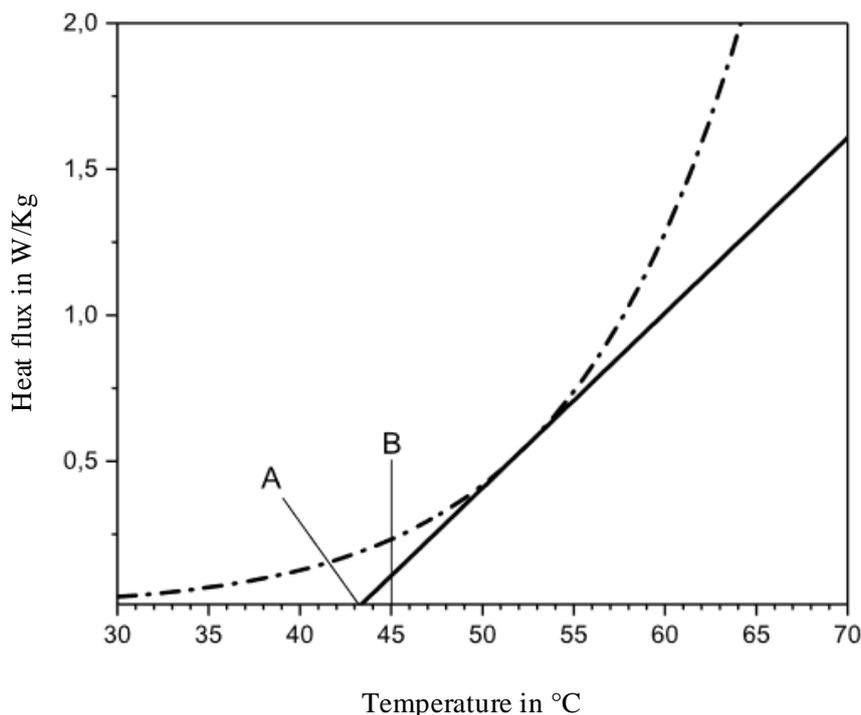| Substance	Mass (kg)	Packaging	Heat loss per unit mass (mW/kg.K)	SADT/SAPT (°C)
Cumyl peroxyneodecanoate (75%)	25	3H1	40	10
tert-Butyl peroxyneodecanoate	25	3H1	40	15
N-Vinylformamide	1000	31H1	33	55

Add the following note "a" under the table:

"**ᵃ** *These historical examples were determined using heat losses that are higher than those currently recommended for classification purposes (see table 28.4).*".

Current figures 28.4.3.1 and 28.4.3.2   Delete.

Insert the following new figure 28.4.3.2:

"Figure 28.4.3.2: Example of determination of SADT or SAPT

	Heat generation curve		Heat loss curve L = 0.06 W (Kg K)
(A)	Critical ambient temperature (intercept of heat loss with the abscissa)	(B)	SADT or SAPT (Critical ambient temperature rounded up to next higher multiple of 5°C)

".

28.4.4.1.1   In the first sentence insert "or polymerization" after "exothermic decomposition" and amend the last sentence to read as follows: "The method can be used for the determination of the SADT or SAPT of a liquid substance in its packaging, including IBCs and small tanks (up to 2 m3) as well as for a solid substance in its packaging up to 50 kg.".

28.4.4.2.2   In the first sentence replace "cell" by "test chamber".

28.4.4.2.3   In the first sentence replace "1.5 to 2.0 mm" by "1.5 mm to 2.0 mm" and "is used" by "can be used".

            Amend the end of the paragraph to read as follows:

            "The air temperature in the double walled metal chamber should be controlled so that the desired temperature for a liquid inert sample in the Dewar vessel to be maintained with a deviation of not more than ± 1 °C for up to 10 days. The air temperature in the double walled metal chamber and the sample temperature in the Dewar should be measured and recorded.".

28.4.4.2.4   Amend the third sentence to read as follows: "The air temperature in the oven and the sample temperature in the Dewar should be measured and recorded.".

28.4.4.2.5   Add the following sentence at the end of the paragraph: "The air temperature in the chamber and the sample temperature in the Dewar should be measured and recorded.".

28.4.4.2.6   Amend the first sentence to read as follows: "Dewar vessels, with their closure system, are used with heat loss characteristics which are representative of the maximum package size under investigation (see also table 28.4).".

Amend the end of the second sentence to read "should be made of inert material".

Amend the beginning of the fourth sentence to read: "An example of a closure system" and insert "and wetted solids" after "medium volatility".

Amend the fifth sentence to read as follows: "Samples which are highly volatile at the test temperature should be tested in a pressure-tight vessel that is made of a material compatible with the sample and fitted with a pressure relief valve.".

28.4.4.2.7 Replace the second sentence with the following: "Small adjustments to the heat loss characteristics of the Dewar can be achieved by varying the closure system.".

In the last sentence replace "0.5 litres" by "0.3 litres".

28.4.4.2.8 Amend the first sentence to read as follows: "Dewar vessels with a volume of 300 – 500 ml, filled at 80% with a liquid substance, with a heat loss of less than or equal to 40 mW/kg.K are normally suitable for representing a 225 *l* package with a liquid substance.".

Delete the last sentence "For example…and small tanks."

28.4.4.3.1 In the first sentence, replace "under test" with "to be tested". Amend the third sentence to read as follows: "In case of cylindrical Dewar vessel the temperature probe is inserted centrally 1/3 of the inner height of the Dewar from the bottom of the Dewar vessel.".

28.4.4.3.2 In the last but one sentence replace "if this occurs sooner" by "whichever occurs sooner". Delete the last sentence ("Note the time…maximum temperature.).

28.4.4.3.4 Delete the first sentence ("Repeat…steps".). Amend the new first sentence to read as follows: "If the substance is being tested to determine if temperature control is necessary, perform sufficient tests, in steps of 5 °C using fresh samples, to determine the SADT or SAPT to the nearest 5 °C or to determine if the SADT or SAPT is equal to or less than the applicable temperature specified in Table 28.2.

28.4.4.4.1 Amend the first sentence to read as follows: "The SADT or SAPT is reported as the lowest chamber temperature at which the sample temperature exceeds the chamber temperature by 6 °C or more within the seven days testing time frame (see 28.4.4.3.2).". In the second sentence delete "test" before "chamber".

28.4.4.5 Insert a reference to a new note "c" after the name of all the substances currently listed in the table except for "2,2'-Azodi(isobutyronitrile)".

In the entry for 2,2'-Azodi(isobutyronitrile), replace "0.18" by "0.28" and "62" by"27".

Insert the following new entries at the end of the current list:

Substance	Sample mass (kg)	Dewar heat loss (mW/kg.K)	SADT/SAPT (°C)
Dilauroyl peroxide, technically pure	0.16	26	50
Didecanoyl peroxide technically pure	0.20	28	40
N-Vinylformamide	0.40	33	55

Insert the following new note "c" under the table:

"*c*   *These historical examples were determined using heat losses that are higher than those currently recommended for classification purposes (see Table 28.4).*".

Current Figure 28.4.4.2 remains unchanged.

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