Council Directive of 20 May 1975 on the approximation of the laws of the Member States relating to aerosol dispensers (75/324/EEC)

ANNEX

6. TESTS

- 6.1. Test requirements to be guaranteed by the person responsible for marketing
- 6.1.1. Hydraulic test on empty containers
- 6.1.1.1. Metal, glass or plastic aerosol dispensers must be able to withstand a hydraulic pressure test as laid down in 3.1.1, 4.1.3 and 4.2.2.
- 6.1.1.2. Metal containers showing assymetrical or major distortions or other similar faults shall be rejected. A slight symmetrical distortion of the base or one affecting the profile of the upper casing shall be allowed provided that the container passes the bursting test.
- 6.1.2. Bursting test for empty metal containers

The person responsible for marketing must ensure that the bursting pressure of containers is at least 20 % higher than the test pressure laid down.

6.1.3. Dropping test for protected glass containers

The manufacturer must ensure that the containers satisfy the test requirements laid down in 4.1.2.

- [^{F1}6.1.4. Final inspection of filled aerosol dispensers
- 6.1.4.1. Aerosol dispensers shall be subject to one of the following final test methods.
- (a) Hot water bath test

Each filled aerosol dispenser shall be immersed in a hot water bath.

- (i) The temperature of the water bath and the duration of the test shall be such that the internal pressure reaches that which would be exerted by its contents at a uniform temperature of 50 $^{\circ}$ C.
- (ii) Any aerosol dispenser showing visible permanent distortion or a leak must be rejected.
- (b) Hot final test methods

Other methods for heating the contents of aerosol dispensers may be used if they guarantee that the pressure and temperature in each filled aerosol dispenser reach the values required for the hot water bath test and distortions and leaks are detected with same precision as in the case of the hot water bath test.

(c) Cold final test methods

An alternative cold final test method may be used if it is in accordance with the provisions of an alternative method to the hot water bath test for aerosol dispensers specified in point 6.2.4.3.2.2 of Annex A to Directive 94/55/EC.

- 6.1.4.2. For aerosol dispensers the contents of which undergo a physical or chemical transformation changing their pressure characteristics after filling and before first use, cold final test methods according to point 6.1.4.1(c) should be applied.
- 6.1.4.3. In case of test methods according to points 6.1.4.1(b) and 6.1.4.1(c):
- (a) The test method must be approved by a competent authority.

- (b) The person responsible for the marketing of aerosol dispensers must submit an application for approval to a competent authority. The application must be accompanied by the technical file describing the method.
- (c) The person responsible for the marketing of aerosol dispensers must, for surveillance purposes, keep the approval of the competent authority, the technical file describing the method and, if applicable, control reports readily available at the address specified on the label in accordance with point (a) of Article 8(1).
- (d) The technical file must be established in an official Community language or a certified copy thereof must be available.
- (e) 'competent authority' means the authority designated in each Member State under Directive 94/55/EC.]

Textual Amendments

- **F1** Substituted by Commission Directive 2008/47/EC of 8 April 2008 amending, for the purposes of adapting to technical progress, Council Directive 75/324/EEC on the approximation of the laws of the Member States relating to aerosol dispensers (Text with EEA relevance).
- 6.2. Examples of inspection tests which may be carried out by Member States
- 6.2.1. Test on unfilled containers

The test pressure shall be applied for 25 seconds on five containers selected at random from a homogeneous batch of 2 500 unfilled containers, i.e. manufactured from the same materials by the same continuous batch manufacturing process, or from a batch constituting one hour's production.

If any one of these containers does not pass the test, ten additional containers shall be drawn at random from the same batch and put through the same test.

If any one of these aerosol containers does not pass the test, the whole batch shall be unsuitable for use.

6.2.2. Tests on filled aerosol dispensers

Air and water-tightness inspection tests shall be carried out by immersing a representative number of filled aerosol dispensers in a bath of water. The temperature of the bath and the period of immersion must be such as to enable the contents of the aerosol dispenser to attain a uniform temperature of 50° C during the time required to ensure that there is no bursting or rupture.

Any batch of aerosol dispensers which does not pass these tests must be considered unsuitable for use.

- [^{F2}6.3. Tests on the flammability of aerosols
- 6.3.1. Ignition distance test for spray aerosols
- 6.3.1.1. Introduction
- 6.3.1.1.1. This test standard describes the method to determine the ignition distance of an aerosol spray in order to assess the associated flame risk. The aerosol is sprayed in the direction of an ignition source at intervals of 15 cm to observe if ignition and sustained combustion of the spray takes place. Ignition and sustained combustion is defined as

when a stable flame is maintained for at least five seconds. The ignition source is defined as a gas burner with a blue, non-luminous flame 4-5 cm in height.

- 6.3.1.1.2. This test is applicable to aerosol products with a spray distance of 15 cm or more. Aerosol products with a spray distance of less than 15 cm such as dispensing foams, mousses, gels and pastes or fitted with a metering valve, are excluded from this test. Aerosol products that dispense foams, mousses, gels or pastes are subject to testing under the aerosol foam flammability test.
- 6.3.1.2. Apparatus and material
- 6.3.1.2.1. The following apparatus is required:

Water bath maintained at 20 °C	accurate to ± 1 °C
Calibrated laboratory scales (balance)	accurate to $\pm 0,1$ g
Chronometer (stopwatch)	accurate to $\pm 0,2$ s
Graduated scale, support and clamp	graduations in cm
Gas burner with support and clamp	
Thermometer	accurate to ± 1 °C
Hygrometer	accurate to $\pm 5 \%$
Pressure gauge	accurate to $\pm 0,1$ bar

6.3.1.3. Procedure

- 6.3.1.3.1. General requirements
- 6.3.1.3.1.Before testing, each aerosol dispenser shall be conditioned and then primed by discharging for approximately one second. The purpose of this action is to remove non-homogeneous material from the diptube.
- 6.3.1.3.1. The instructions of use shall be strictly followed, including whether the dispenser is intended to be used in the upright or inverted position. When shaking is required, shake immediately before testing.
- 6.3.1.3.1. The test shall be carried out in a draught-free environment capable of ventilation, with the temperature controlled at 20 °C \pm 5 °C and relative humidity in the range 30-80 %.
- 6.3.1.3.1. Each aerosol dispenser is to be tested:
- (a) when full according to the complete procedure, with the gas burner in the range of 15-90 cm distance from the actuator of the aerosol can;
- (b) when 10-12 % full nominal (% by mass) only one test, either at 15 cm distance from the actuator when the spray from a full can did not ignite at all, or at the flame ignition distance of the spray of a full can plus 15 cm.
- 6.3.1.3.1. During the test, the can shall be positioned as indicated by label instructions. The ignition source shall be positioned accordingly.
- 6.3.1.3.1. The following procedure requires testing the spray at intervals of 15 cm between the burner flame and the aerosol actuator, in the range of 15-90 cm. It is efficient to start at 60 cm distance between burner flame and aerosol actuator. The distance between

burner flame and aerosol actuator shall be increased by 15 cm in the case of an ignition of the spray at 60 cm distance. The distance shall be decreased by 15 cm in the case of no ignition at 60 cm distance between burner flame and aerosol actuator. The aim of the procedure is to determine the maximum distance between aerosol actuator and burner flame that leads to sustained combustion of the spray or to determine that ignition could not be obtained at 15 cm distance between the burner flame and the aerosol's actuator.

- 6.3.1.3.2. Test procedure
- (a) A minimum of 3 full aerosol dispensers per product shall be conditioned to $20 \text{ }^{\circ}\text{C} \pm 1$ °C with at least 95 % of the dispenser immersed in the water for at least 30 min before each test (if the aerosol is fully immersed, 30 min conditioning is sufficient);
- (b) Comply with general requirements. Record the temperature and relative humidity of the environment;
- (c) Weigh an aerosol dispenser and note its mass;
- (d) Determine the internal pressure and initial discharge rate at 20 °C \pm 1 °C (to eliminate faulty or partly filled aerosol dispensers);
- (e) Support the gas burner on a flat horizontal surface or fix the burner to a support by means of a clamp;
- (f) Ignite the gas burner; the flame shall be non-luminous and approximately 4-5 cm high;
- (g) Place the actuator's exit orifice at the required distance from the flame. The aerosol shall be tested in the position it is designed to be used, e.g. upright or inverted;
- (h) Level the actuator's orifice and burner flame, ensuring that the orifice is properly directed towards and aligned with the flame (see Figure 6.3.1.1). The spray shall be expelled through the top half of the flame;

Figure



- (i) Comply with the general requirements regarding shaking of the dispenser;
- (j) Actuate the valve of the aerosol dispenser, to discharge its contents for five seconds, unless ignition occurs. If ignition occurs, continue discharging and time the duration of the flame for five seconds, from the start of ignition;
- (k) Note the ignition results for the distance between the gas burner and the aerosol dispenser in the table provided;
- (1) If no ignition occurs during step (j), the aerosol shall be tested in alternative orientations, e.g. inverted for upright use products, to check if ignition is obtained;

- (m) Repeat steps (g) to (l) twice more (a total of 3) for the same can at the same distance between the gas burner and the aerosol actuator;
- (n) Repeat the test procedure for another two aerosol cans of the same product at the same distance between gas burner and aerosol actuator;
- (o) Repeat steps (g) to (n) of the test procedure at a distance between 15 and 90 cm between the actuator of the aerosol can and the burner flame depending on the outcome of each test (see also 6.3.1.3.1.4 and 6.3.1.3.1.5);
- (p) If no ignition occurs at 15 cm, the procedure is finished for initially full cans. The procedure is also finished when ignition and sustained combustion is obtained at a distance of 90 cm. If ignition could not be obtained at 15 cm distance, record that ignition did not occur. The maximum distance between burner flame and the aerosol's actuator for which an ignition and sustained combustion was observed is noted as the 'ignition distance', in all other circumstances;
- (q) One test shall also be conducted on three cans of 10-12 % nominal fill level. These cans shall be tested at a distance between the aerosol's actuator and the burner flame of the 'flame ignition distance of full cans + 15 cm';
- Discharge an aerosol can to a 10-12 % nominal fill level (by mass) in bursts of 30 seconds maximum. Observe a 300 seconds minimum time period between bursts. During this interim period dispensers shall be placed in the water bath for conditioning;
- (s) Repeat steps (g) to (n) for 10-12 % nominal fill aerosol cans, omitting steps (l) and (m). This test shall only be performed with the aerosol in one position, e.g. upright or inverted, corresponding with that which produced the ignition (if any) for filled cans;
- (t) Record all results in the Table 6.3.1.1 as shown below.
- 6.3.1.3.2. All experiments shall be performed in a fume hood in a room that may be well ventilated. Ventilation of the fume hood and room can be applied for at least three minutes after each test. Take all necessary safety precautions to prevent the inhalation of combustion products.
- 6.3.1.3.2. The cans with a 10-12 % nominal fill level shall be tested only once. The result tables need only one result per can indicated.
- 6.3.1.3.2.3When the test in the position in which the dispenser is designed to be used gives a negative result, the test shall be repeated in the position of the dispenser most likely to result in a positive result.
- 6.3.1.4. Method of assessing results
- 6.3.1.4.1. All the results shall be recorded. Table 6.3.1.1 below shows the model of 'result table' to be used.

Date	Temperature °C Relative humidity %
Name of product	

TABLE 6.3.1.1

Net volume		Can 1			Can 2			Can 3		
Initial level of filling		%			%			%		
Dispens distance	eFest	1	2	3	1	2	3	1	2	3
15 cm	Ignition Y or N	?								
30 cm	Ignition Y or N	?								
45 cm	Ignition Y or N	?								
60 cm	Ignition Y or N	?								
75 cm	Ignition Y or N	?								
90 cm	Ignition Y or N	?								
Observa includin can position	ations — Ig									

6.3.2. Enclosed space ignition test

6.3.2.1. Introduction

This test standard describes the method to assess the flammability of products emerging from aerosol dispensers due to their propensity to ignite in an enclosed or confined space. The contents of an aerosol dispenser are sprayed into a cylindrical test vessel containing a burning candle. If an observable ignition occurs, the elapsed time and amount discharged is noted.

6.3.2.2. Apparatus and material

6.3.2.2.1. The following apparatus is required:

Chronometer (stopwatch)	accurate to ± 0.2 s
Water bath maintained at 20 °C	accurate to $\pm 1 ^{\circ}\text{C}$
Calibrated laboratory scales (balance)	accurate to $\pm 0,1$ g
Thermometer	accurate to $\pm 1 ^{\circ}\text{C}$
Hygrometer	accurate to $\pm 5 \%$
Pressure gauge	accurate to $\pm 0,1$ bar

- 6.3.2.2.2. Preparation of test apparatus
- 6.3.2.2.2. A cylindrical vessel approximately 200 dm³ volume, approximately 600 mm in diameter and approximately 720 mm long and open at one end shall be modified as follows:
- (a) A closure system consisting of a hinged cover shall be matched to the open end of the receptacle; or
- (b) A plastic film 0,01 to 0,02 mm thick may be used as a closure system. If the test is carried out with a plastic film this must be used as described below: Stretch the film over the open end of the drum and hold it in place with an elastic band. The strength of the band shall be such that when placed around the drum resting on its side, it stretches by only 25 mm when a mass of 0,45 kg is attached to its lowest point. Cut a 25 mm slit in the film, starting 50 mm from the edge of the drum. Ensure that the film is taut;
- (c) At the other end of the drum drill a 50 mm diameter hole 100 mm from the edge in such a way that the orifice is uppermost when the receptacle is laid down and ready for the test (Figure 6.3.2.1.);

Figure



(d) On a 200 × 200 mm metal support place a paraffin wax candle 20 to 40 mm in diameter and 100 mm high. The candle shall be replaced when having a height of less than 80 mm. The candle's flame is protected from the action of the spray by a 150 mm wide, 200 mm high deflector. This includes the plane inclined at 45° produced 150 mm from the base of the deflector (Figure 6.3.2.2.);



(e) The candle placed on the metal support shall be positioned midway between the two ends of the drum (Figure 6.3.2.3);

Figure



- (f) The drum is laid on the ground or on a support at a spot where the temperature is between 15 °C and 25 °C. The product to be tested will be sprayed within the drum of roughly 200 dm3 in which there will be a source of ignition.
- 6.3.2.2.2.1 Jsually, the product leaves the aerosol can at an angle of 90° relevant to the vertical axis of the can. The layout and procedure described refers to this kind of aerosol product. In the case of unusually operating aerosols (e.g. vertical-spray aerosol dispensers) it will be necessary to record changes to equipment and procedures in accordance with good laboratory practice, such as ISO/IEC 17025:1999 General requirements for the competence of testing and calibration laboratories.

6.3.2.3. Procedure

- 6.3.2.3.1. General requirements
- 6.3.2.3.1.Before testing, each aerosol dispenser shall be conditioned and then primed by discharging for approximately 1 second. The purpose of this action is to remove non-homogeneous material from the diptube.

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- 6.3.2.3.1. The instructions of use shall be strictly followed, including whether the dispenser is intended to be used in the upright or inverted position. When shaking is required, shake immediately before testing.
- 6.3.2.3.1. The tests shall be carried out in a draught-free environment capable of ventilation, with the temperature controlled at 20 °C \pm 5 °C and relative humidity in the range 30-80 %.
- 6.3.2.3.2. Test procedure
- (a) A minimum of 3 full aerosol dispensers per product shall be conditioned to 20 °C \pm 1 °C in a water bath with at least 95 % of the dispenser immersed in the water for at least 30 min (if the aerosol is fully immersed, 30 min conditioning is sufficient);
- (b) Measure or calculate the actual volume of the drum in dm³;
- (c) Comply with general requirements. Record the temperature and relative humidity of the environment;
- (d) Determine the internal pressure and initial discharge rate at 20 °C \pm 1 °C (to eliminate faulty or partly filled aerosol dispensers);
- (e) Weigh one of the aerosol dispensers and note its mass;
- (f) Light the candle and apply the closure system (cover or plastic film);
- (g) Place the aerosol dispenser actuator orifice 35 mm or closer for a wide spray product, from the centre of the entrance hole in the drum. Start the chronometer (stopwatch) and following the instructions for use of the product; direct the spray towards the centre of the opposite extremity (cover or plastic film). The aerosol shall be tested in the position it is designed to be used, e.g. upright or inverted;
- (h) Spray until ignition occurs. Stop the chronometer and note the time elapsed. Re-weigh the aerosol dispenser and note its mass;
- (i) Ventilate and clean the drum removing any residue likely to affect subsequent tests. Allow the drum to cool if necessary;
- (j) Repeat the test procedure steps (d) to (i) for another two aerosol dispensers of the same product (three in total, note: each dispenser is only tested once);
- 6.3.2.4. Method of assessing results
- 6.3.2.4.1. A test report containing the following information shall be drawn up:
- (a) The product tested and its references;
- (b) The internal pressure and discharge rate of the aerosol dispenser;
- (c) The temperature and relative air humidity of the room;
- (d) For each test, the discharge time (s) needed to achieve ignition (if the product does not ignite, state this);
- (e) The mass of the product sprayed during each test (in g);
- (f) The actual volume of the drum (in dm^3).
- 6.3.2.4.2. The time equivalent (t_{eq}) needed to achieve ignition in one cubic metre can be calculated as follows:

 $t_{eq} = \frac{1000 \times \text{discharge time (s)}}{1000 \times \text{discharge time (s)}}$

 $t_{eq} = \frac{1}{\text{Actual volume of drum (dm}^3)}$

6.3.2.4.3. The deflagration density (D_{def}) needed to achieve ignition during the test may also be calculated as follows:

 $D_{
m def} = rac{1000 imes
m Amount}{
m Actual} \ {
m observed} \ {
m gm} \ {
m def} \ {
m (g)}$

- 6.3.3. Aerosol foam flammability test
- 6.3.3.1. Introduction
- 6.3.3.1.1. This test standard describes the method to determine the flammability of an aerosol spray emitted in the form of a foam, mousse, gel or paste. An aerosol, which emits a foam, mousse, gel or paste is sprayed (approximately 5 g) on a watchglass and an ignition source (candle, wax taper, match or lighter) is placed at the base of the watchglass to observe if ignition and sustained combustion of the foam, mousse, gel or paste occurs. Ignition is defined as a stable flame maintained for at least two seconds and a minimum 4 cm in height.
- 6.3.3.2. Apparatus and material
- 6.3.3.2.1. The following apparatus is required:

Graduated scale, support and clamp	gradations in cm
Fire-resistant watchglass roughly 150 mm in diameter	
Chronometer (stopwatch)	accurate to $\pm 0,2$ s
Candle, wax taper, match or lighter	
Calibrated laboratory scales (balance)	accurate to $\pm 0,1$ g
Water bath maintained at 20 °C	accurate to ± 1 °C
Thermometer	accurate to $\pm 1 ^{\circ}\text{C}$
Hygrometer	accurate to $\pm 5 \%$
Pressure gauge	accurate to $\pm 0,1$ bar

- 6.3.3.2.2. The watchglass is placed on a fire-resistant surface within a draught-free area that may be ventilated after each test. The graduated scale is positioned exactly behind the watchglass and held vertically by means of a support and clamp.
- 6.3.3.2.3. The scale is positioned in such a way that its origin is on a level with the watchglass base in a horizontal plane.
- 6.3.3.3. Procedure
- 6.3.3.3.1. General requirements
- 6.3.3.3.1.Before testing, each aerosol dispenser shall be conditioned and then primed by discharging for approximately 1 second. The purpose of this action is to remove non-homogeneous material from the diptube.

- 6.3.3.3.1. The instructions of use shall be strictly followed, including whether the dispenser is intended to be used in the upright or inverted position. When shaking is required, shake immediately before testing.
- 6.3.3.3.1. The tests shall be carried out in a draught-free environment capable of ventilation, with the temperature controlled at 20 °C \pm 5 °C and relative humidity in the range of 30-80 %.
- 6.3.3.3.2. Test procedure
- (a) A minimum of four full aerosol dispensers per product shall be conditioned to 20 °C \pm 1 °C with at least 95 % of the dispenser immersed in the water for at least 30 min before each test (if the aerosol is fully immersed, 30 min conditioning is sufficient);
- (b) Comply with general requirements. Record the temperature and relative humidity of the environment;
- (c) Determine the internal pressure at $20^{\circ}C \pm 1^{\circ}C$ (to eliminate faulty or partly filled aerosol dispensers);
- (d) Measure the discharge or flow rate of the aerosol product to be examined, so that the amount of test product dispensed can be more accurately gauged;
- (e) Weigh one of the aerosol dispensers and note its mass;
- (f) On the basis of the measured discharge or flow rate and following the manufacturer's instructions, release approximately 5 g of the product onto the centre of the clean watchglass with the aim of producing a mound no higher than 25 mm;
- (g) Within five seconds of completion of discharge, apply the source of ignition to the edge of the sample at its base and at the same time start the chronometer (stopwatch). If necessary, the ignition source shall be removed from the edge of the sample after approximately two seconds, in order to clearly observe if ignition has occurred. If no ignition of the sample is apparent, the ignition source shall be reapplied to the edge of the sample;
- (h) If ignition occurs note the following points:
- (i) The maximum height of the flame in cm above the base of the watchglass;
- (ii) The flame duration in s;
- (iii) Dry and re-weigh the aerosol dispenser and calculate the mass of the released product;
- (i) Ventilate the test area immediately after each test;
- (j) If ignition is not obtained and the released product remains in the form of a foam or paste throughout its period of use, steps (e) to (i) shall be repeated. Allow the product to stand for 30 sec, 1 min, 2 min or 4 min before applying the ignition source;
- (k) Repeat the test procedure steps (e) to (j) twice more (a total of 3) for the same can;
- (l) Repeat the test procedure steps (e) to (k) for another two aerosol cans (3 cans in total) of the same product.
- 6.3.3.4. Method of assessing results
- 6.3.3.4.1.A test report containing the following information shall be drawn up:

- (a) whether the product ignites;
- (b) maximum flame height in cm;
- (c) duration of flame in s;
- (d) the mass of the product tested.]

Textual Amendments

F2 Inserted by Commission Directive 2008/47/EC of 8 April 2008 amending, for the purposes of adapting to technical progress, Council Directive 75/324/EEC on the approximation of the laws of the Member States relating to aerosol dispensers (Text with EEA relevance).