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CAN/CGSB-43.123-2017

Supersedes CGSB-43.123-2010

National Standard of Canada

Aerosol containers and gas cartridges for transport of dangerous goods

Canadian General Standards Board **CGSB**



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CAN/CGSB-43.123-2017

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Aerosol containers and gas cartridges for transport of dangerous goods

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Introduction

This is the third edition of CAN/CGSB-43.123, *Aerosol containers and gas cartridges for transport of dangerous goods*. It supersedes the previous edition published in 2010, CGSB-43.123 *Aerosol containers and gas cartridges for transport of dangerous goods*.

This standard is intended for incorporation by reference into the *Transportation of Dangerous Goods Regulations* (TDG Regulations). Where there are differences between the requirements of the TDG Regulations and this standard, the TDG Regulations prevail, unless specified otherwise, to the extent of the difference. Until the Regulations are amended to adopt this edition of the standard, an earlier edition will be the one legally in effect in Canada. To determine which edition is legally in effect, please refer to Table of Safety Standards and Safety Requirement Documents in Part 1, paragraph 1.3.1, of the TDG Regulations.

This standard sets out requirements for

- the design, manufacture and testing of Transport Canada (TC) specification aerosol containers and gas cartridges;
- the selection and use of containers for the handling, offering for transport and transport of UN1950, aerosols and UN2037, gas cartridges, in Canada; and
- the transport of aerosol containers and gas cartridges intended for disposal or recycling.

This standard is based on the *Recommendations on the Transport of Dangerous Goods, Model Regulations*, 19th edition (UN Model Regulations), published by the United Nations (UN).

This standard also provides requirements for a quality management system and Transport Canada registration.

Changes in the third edition include the following:

- Reorganization of the requirements to promote clear language;
- Revised requirements for Transport Canada registration;
- Clarification as to which parts of this standard apply to non-specification containers; and
- Revision of requirements for the transport of aerosol containers and gas cartridges intended for disposal or recycling. The changes made provide alignment with the 19th edition of the UN Model Regulations and also incorporate Equivalency Certificates previously issued by the Transportation of Dangerous Goods Directorate.

Aerosol containers and gas cartridges for transport of dangerous goods

1 Scope

1.1 Organization and content

This standard sets out the requirements for the design, manufacture, testing and inspection of non-refillable containers with a capacity of not more than 1 L and their selection and use for the handling, offering for transport and transport of UN1950, aerosols and UN2037, gas cartridges, in Canada.

This standard consists of six main sets of requirements.

Sections 1 through 3 specify general requirements, normative references and definitions.

Sections 4 and 5 specify the requirements for the design, manufacture, testing and marking of TC specification aerosol containers and gas cartridges for use in Canada.

Section 6 specifies the quality management system requirements for manufacturers and fillers of aerosol containers and gas cartridges.

Section 7 specifies the Transport Canada registration requirements for manufacturers of TC specification aerosol containers and gas cartridges.

Section 8 specifies the requirements for the selection and use of aerosol containers and gas cartridges in Canada.

Section 9 specifies the requirements for the transport of containers intended for disposal or recycling.

1.2 Application

The standard applies to aerosol containers and gas cartridges with a capacity equal to or less than 1 L and an inside diameter equal to or less than 76 mm.

1.3 Additional requirements

Pressures of all kinds relating to containers (such as test pressure, internal pressure, pressure-relief device set-to-discharge pressure) are indicated in gauge pressure unless specifically noted otherwise.

1.4 Transportation of Dangerous Goods Act and Regulations prevalence

The *Transportation of Dangerous Goods Act, 1992* (TDG Act), and the TDG Regulations may call for additional requirements regarding the design, manufacture, selection, use, and testing of aerosol containers and gas cartridges. Where there is an inconsistency between the requirements of this standard and those of the TDG Act or TDG Regulations, the Act or Regulations prevail to the extent of the inconsistency.

1.5 Safety

The testing and evaluation of a product against this standard may require the use of materials and/or equipment that could be hazardous. This document does not purport to address all the safety aspects associated with its use. Anyone using this standard has the responsibility to consult the appropriate authorities and to establish appropriate health and safety practices in conjunction with any requirements prior to its use.

1.6 Units

Quantities and dimensions used in this standard are given in metric units.

1.7 Classification

Dangerous goods are classified in accordance with Part 2, Classification, of the TDG Regulations and the appropriate shipping names and corresponding particulars (UN number, classification and packing group, as applicable) selected from Schedule 1 of the TDG Regulations.

2 Normative references

The following normative documents contain provisions that, through reference in this text, constitute provisions of this National Standard of Canada. The referenced documents may be obtained from the sources noted below.

NOTE The addresses provided below were valid at the date of publication of this standard.

An undated reference is to the latest edition or revision of the reference or document in question, unless otherwise specified by the authority applying this standard. A dated reference is to the specified revision or edition of the reference or document in question.

2.1 Canadian General Standards Board (CGSB)

CAN/CGSB-43.146 – *Design, manufacture, and use of intermediate bulk containers for the transportation of dangerous goods, classes 3, 4, 5, 6.1, 8 and 9*. The edition in force is that which is referenced in the TDG Regulations, Part 1.

2.1.1 Source

The above may be obtained from the Canadian General Standards Board, Sales Centre, Gatineau, Canada K1A 1G6. Telephone 819-956-0425 or 1-800-665-2472. Fax 819-956-5740. E-mail ncr.cgsb-ongc@tpsgc-pwgsc.gc.ca. Web site www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html.

2.2 Transport Canada (TC)

Transportation of Dangerous Goods Act, 1992, (as amended from time to time)

Transportation of Dangerous Goods Regulations (as amended from time to time)

TP 14850 – *Small Containers for Transport of Dangerous Goods, classes 3, 4, 5, 6.1, 8, and 9, a Transport Canada Standard*. The edition in force is that which is referenced in the TDG Regulations, Part 1.

2.2.1 Source

The above may be obtained from the Publications page of the Transport Canada Web site at www.tc.gc.ca/eng/publications-menu.htm. The Transport Canada publication TP 14850 may be ordered from the Transport Canada Publications Order Desk at www.tc.gc.ca/eng/publications-order-605.html.

2.3 U.S. Department of Transportation (DOT)

Parts 171 to 180 of Title 49 of the “*Code of Federal Regulations*” of the United States, but does not include Subpart B of Part 107 when that subpart is referenced in Parts 171 to 180.

2.3.1 Source

The above may be obtained from U.S. Department of Transportation, 1200 New Jersey Ave, SE, Washington, DC 20590, U.S.A., telephone 202-366-4000, Web site www.phmsa.dot.gov/hazmat.

2.4 United Nations (UN)

Recommendations on the Transport of Dangerous Goods, Model Regulations (19th revised edition).

2.4.1 Source

The above may be obtained from distributors of United Nations Publications or from the United Nations Publications Customer Service, PO Box 960, Herndon, VA 20172, U.S.A. Telephone 1-703-661-1571. Fax 1-703-996-1010. E-mail order@un.org. The publication can be viewed and downloaded at www.unece.org/trans/danger/publi/unrec/rev19/19files_e.html.

3 Terms and definitions

For the purposes of this National Standard of Canada, the following terms and definitions apply. Where there is a conflict between a term or definition in this standard and that of the TDG Regulations, the term or definition in the TDG Regulations shall prevail. Where certain definitions, terms and abbreviations listed are as given in the *Transportation of Dangerous Goods Act and Regulations*, they are identified as such.

3.1

aerosol container

article consisting of a non-refillable means of containment that

- a) contains a substance under pressure; and
- b) is fitted with a self-closing device allowing the contents to be ejected
 - 1) as solid or liquid particles in suspension in a gas;
 - 2) as a foam, paste or powder; or
 - 3) as a liquid or a gas.

3.2

capacity

maximum volume of water that the container can hold at 15°C and at an absolute pressure of 101.325 kPa.

3.3

closure

device that closes an opening into the container.

3.4

condemned container

container not permitted for the transportation of dangerous goods.

3.5

condemned lot

lot of containers not permitted for the transportation of dangerous goods.

3.6

container

aerosol container or gas cartridge as defined in this standard.

3.7

durable marking

marking placed on a container that remains legible throughout the container's service life.

3.8

Executive Director

Executive Director, Regulatory Frameworks and International Engagement, Regulatory Affairs Branch, Transportation of Dangerous Goods Directorate, Transport Canada.

3.9

gas cartridge

article consisting of a non-refillable means of containment without a pressure-relief device that

- a) contains a substance under pressure;
- b) has no re-closable release device; and
- c) allows the contents to be ejected
 - 1) as solid or liquid particles in suspension in a gas;
 - 2) as a foam, paste or powder; or
 - 3) as a liquid or a gas.

3.10

lot

specified maximum number of containers successively produced or filled within a single 24 h period, of the same material, size, design, manufacture, finish and quality.

3.11

pressure-relief device

device intended to prevent the rupture of a container in the event of accidental overpressure or exposure to fire.

3.12

quality management system

systematic program of controls, inspections and documented activities aimed at providing confidence that conformity to this standard is consistently achieved in practice.

3.13

recycled plastic material

material recovered from used containers, production residues or re-grind.

4 Design, manufacture and testing

4.1 Design and manufacture of metal containers (TC-2P, TC-2Q and TC-2R)

4.1.1 Capacity and inside diameter

TC-2P, TC-2Q and TC-2R containers are non-refillable containers and are seamless carbon steel, welded carbon steel, brazed carbon steel, seamless aluminum, or welded aluminum. For TC-2P and TC-2Q containers, the

maximum capacity shall be 1 L and the maximum inside diameter shall be 76 mm. For TC-2R aerosol containers, the maximum capacity shall be 1 L and the maximum inside diameter shall be 66 mm.

4.1.2 Materials

4.1.2.1 Materials used to manufacture the container shall be uniform quality steel plate such as black plate, electro-tin plate, hot dipped tin plate, terne plate or other commercially accepted can making plate; or nonferrous metal of uniform drawing quality. The use of materials with seams, cracks, laminations or other defects is prohibited.

4.1.2.2 The mechanical properties of the container shall not be impaired by the action of the substances contained in it, even during prolonged storage.

4.1.3 Wall thickness

The minimum wall thickness of each completed container shall be

- a) 0.18 mm for TC-2P containers;
- b) 0.20 mm for TC-2Q containers; and
- c) 0.21 mm for TC-2R aerosol containers.

4.1.4 Pressure-relief device

4.1.4.1 TC-2Q aerosol containers may be equipped with a pressure-relief device. The pressure-relief device shall be designed to function above the maximum internal pressure allowed in a TC-2Q container (1245 kPa) and prior to bursting of the container.

4.1.4.2 TC-2R aerosol containers shall be equipped with a pressure-relief device that shall be designed to function above the maximum internal pressure allowed in a TC-2R container (1500 kPa) and prior to bursting of the container.

4.1.5 Openings

Openings shall be circular and in the ends of containers.

4.1.6 Closures

Closures shall be designed and manufactured so that under normal conditions of transport, including handling, the closures remain secure and do not leak.

4.1.7 Manufacture

4.1.7.1 Containers may be seamless or with seams, except that a seam in the cylindrical portion of a TC-2R aerosol container is not authorized. Circumferential seams shall be welded, swedged, brazed, soldered or double-seamed. Longitudinal seams shall be welded, brazed or soldered.

4.1.7.2 Welded seams shall have a design strength no less than the minimum ultimate tensile strength of the shell material in the completed container.

4.1.7.3 The minimum width of brazed joints shall be at least four times the thickness of the shell wall.

4.1.7.0 The brazing material shall have a melting point of not less than 540°C.

4.1.7.5 Brazing on aluminum containers shall be prohibited.

4.1.7.6 The containers shall be manufactured by equipment and methods that ensure the uniformity of the completed containers. The surface finish of the container shall be smooth and uniform with dirt and scale removed. Defects likely to weaken the completed container shall be prohibited.

4.2 Testing of metal containers (TC-2P, TC-2Q and TC-2R)

4.2.1 Traceability

All containers selected for testing shall be traceable to the lot of containers they represent.

4.2.2 Internal pressure test (applicable to TC-2R aerosol containers)

4.2.2.1 For TC-2R aerosol containers, one container from each lot of 5000 or fewer containers shall be randomly selected and pressurized to an internal pressure of 2250 kPa. The test pressure shall be applied for a minimum of 25 s. A record of the internal pressure test shall be retained as specified in 6.1.1.2.

4.2.2.2 Should the container leak, show major distortion or other defect, the lot shall either be condemned or ten additional containers shall be randomly selected from the same lot and subjected to the internal pressure test. Should any of the ten containers tested fail, the entire lot shall be condemned.

NOTE 1 A slight symmetrical distortion of the base or the top end may be allowed, provided the container passes the burst test specified in 4.2.3.

NOTE 2 If the pressure test is conducted using air or other gas as the test medium, additional precautions should be taken to ensure personnel are protected during testing from any risks associated with potential failure of the container under test. As stated in 1.5, this document does not purport to address the safety aspects associated with its use.

4.2.3 Burst test (applicable to TC-2P, TC-2Q and TC-2R containers)

4.2.3.1 One completed container from each lot of 25 000 or fewer containers shall be randomly selected and pressurized to destruction. The rate of pressurization shall not exceed a rate that allows for accurate detection of the burst pressure. The pressure at which the container bursts shall be recorded and retained as specified in 6.1.1.2.

4.2.3.2 For TC-2Q aerosol containers with a pressure-relief device, the burst test specified in 4.2.3.1 shall be conducted on one completed container, without a pressure-relief device, from each lot of 25 000 or fewer containers.

4.2.3.3 For TC-2R aerosol containers, the burst test specified in 4.2.3.1 shall be conducted on one completed container, without a pressure-relief device, from each lot of 5000 or fewer containers. The containers used for the internal pressure test specified in 4.2.2 may be used for the burst test.

4.2.3.4 Each completed container shall withstand, without leaking or bursting, the prescribed minimum burst pressure. For aerosol containers with a pressure-relief device, the prescribed minimum burst pressure applies to the container without the pressure-relief device installed. The prescribed minimum burst pressure shall be

- a) 1655 kPa for TC-2P containers;
- b) 1860 kPa for TC-2Q containers; and
- c) 2700 kPa for TC-2R aerosol containers.

4.2.3.5 Should the container leak or burst below the minimum prescribed burst pressure specified in 4.2.3.4 for the corresponding container, or should the burst fracture initiate in a seam, the lot shall either be condemned or ten additional containers shall be randomly selected from the same lot and subjected to the burst test. Should any of the ten containers tested fail, the entire lot shall be condemned.

4.2.4 Pressure-relief device test (applicable to TC-2Q and TC-2R aerosol containers)

4.2.4.1 For TC-2Q aerosol containers with a pressure-relief device, one container from each lot of 25 000 or fewer containers shall be randomly selected and pressurized until the pressure-relief device activates. The rate of pressurization shall not exceed a rate that allows for accurate detection of the pressure-relief device discharge pressure. The pressure at which the pressure-relief device activates shall be recorded and retained as specified in 6.1.1.2.

4.2.4.2 For TC-2R aerosol containers, one container from each lot of 5000 or fewer containers shall be randomly selected and pressurized until the pressure-relief device activates. The rate of pressurization shall not exceed a rate that allows for accurate detection of the pressure-relief device discharge pressure. The pressure at which the pressure-relief device activates shall be recorded and retained as specified in 6.1.1.2.

4.2.4.3 If the pressure-relief device does not function at a pressure as specified in 4.1.4, the lot is either condemned or a further five aerosol containers shall be randomly selected from the same lot and subjected to the pressure-relief device test. Should any of the five aerosol containers tested fail, the entire lot shall be condemned.

4.3 Design and manufacture of plastic aerosol containers (TC-2S)

4.3.1 Capacity and inside diameter

TC-2S aerosol containers are non-refillable plastic containers with a maximum capacity of 1 L and a maximum inside diameter of 76 mm.

4.3.2 Materials

4.3.2.1 Containers shall be manufactured of polyethylene terephthalate (PET), polyethylene naphthalate (PEN), polyamide (nylon), or a blend containing some combination of PET, PEN, ethyl vinyl alcohol (EVOR) and/or nylon.

4.3.2.2 Recycled material, except production residues or re-grind from the same manufacturing process, shall not be used.

4.3.2.3 The containers shall be resistant to aging and degradation caused by the lading and by ultraviolet radiation.

4.3.3 Closures

Closures shall be designed and manufactured so that under normal conditions of transport, including handling, the closures remain secure and do not leak.

4.3.4 Manufacture

The containers shall be manufactured by equipment and methods that ensure the uniformity of the completed containers. Material with seams, cracks, laminations or other defects likely to weaken the completed container are prohibited.

4.4 Testing of plastic aerosol containers (TC-2S)

4.4.1 Traceability

All containers selected for testing shall be traceable to the lot of containers they represent.

4.4.2 New design criteria

4.4.2.1 A container manufactured in compliance with this standard shall be considered to be of a new design, compared to an existing qualified design, if

- a) the design is manufactured with a new mould; or
- b) the material properties of the raw materials are outside the design limits specified by the manufacturer for the qualified design.

4.4.2.2 Manufacturers shall complete design qualification testing for each new design.

4.4.3 Design qualification testing — Drop test

4.4.3.1 For each design, four groups of 25 containers shall be subjected to the drop test.

4.4.3.2 The containers shall be filled and closed with a test medium that is a mixture of 95% by mass water and 5% by mass propellant. The propellant shall be selected to ensure that the internal pressure in the container at 55°C is equal to or greater than the maximum allowable internal pressure in the container (1105 kPa). Containers conditioned at -18°C shall be filled with a substitute test medium that has a density similar to water (0.98 g/cm³ minimum at room temperature) and remains liquid at -18°C.

4.4.3.3 The volume of fill shall be as intended for the marketed container. The mass of the container, when filled for transport, shall not be greater than the mass of the container tested.

4.4.3.4 The closures shall not be protected during the test.

4.4.3.5 Prior to testing, the containers shall be conditioned as follows:

- a) Group one at -18°C for 24 h;
- b) Group two at 38°C for 26 weeks;
- c) Group three at 50°C for 100 h; and
- d) Group four at 55°C for 18 h.

4.4.3.6 Each container shall be dropped from a minimum height of 1.8 m onto a rigid, non-yielding, flat and horizontal surface following removal from the conditioning environment. At the time of the drop, the temperature of the container shall not have changed more than 2°C from the temperature of the container at the end of the conditioning cycle. The orientation of the test container shall be random, but direct impact on the valve or closure shall be avoided.

4.4.3.7 The containers shall withstand the drop test without leaking. Drop test records shall be recorded and retained by the manufacturer as specified in 6.1.1.2.

4.4.4 Production testing — Burst test

4.4.4.1 One completed container from each lot of 5000 or fewer containers shall be randomly selected and pressurized to destruction. The rate of pressurization shall not exceed a rate that allows for accurate detection of the burst pressure. The pressure at which the container bursts shall be recorded and retained as specified in 6.1.1.2.

4.4.4.2 Each tested container shall withstand, without leaking or bursting, the prescribed minimum burst pressure. For TC-2S containers, the prescribed minimum burst pressure shall be 1655 kPa.

4.4.4.3 Should the container leak or burst below the prescribed minimum burst pressure specified in 4.4.4.2, the lot shall either be condemned or ten additional containers shall be randomly selected from the same lot and subjected to the burst test. Should any of the ten containers tested fail, the entire lot shall be condemned.

5 Marking

5.1 Each TC specification container that meets the requirements of clause 4 of this standard shall be legibly and durably marked by the manufacturer and the filler, as applicable, with the following markings:

- a) Transport Canada specification designation, e.g. “TC-2P”;
- b) Name or symbol of the container manufacturer;
- c) Lot or serial number; and
- d) Date of manufacture of the container and the date of filling. However, these dates do not need to be marked if these dates are traceable by the lot or serial number marked in c) above.

5.2 The markings shall be applied in a manner that does not affect the structural integrity of the container.

5.3 The markings specified in c) and d) above may be applied with invisible ink.

5.4 If the name or symbol of the manufacturer is not unique to the manufacturing location, there shall be additional markings that provide traceability to the manufacturing location.

6 Quality management system

6.1 Application

Each container manufacturing facility and each facility responsible for filling the containers referred to in this standard shall develop and implement a documented quality management system.

6.1.1 Elements and processes

6.1.1.1 The quality management system shall include all of the following elements and processes:

- a) Description of the organizational structure and responsibilities;
- b) Relevant inspection and test, quality control, quality assurance, and process operation instructions that will be used;
- c) Quality records, such as inspection reports, test data, calibration data and certificates;
- d) Management reviews to ensure the effective operation of the quality system;
- e) Process for control of documents and their revisions;
- f) Means for control of non-conforming containers;
- g) Training programs and qualification procedures for relevant personnel; and
- h) Procedures to ensure that there is no damage to the final product.

6.1.1.2 The following records shall be retained by the manufacturer and filler, as applicable, for a minimum of ten years:

- a) Process control documents (ex. bill of materials);

- b) Lot numbers demonstrating traceability to the date of manufacture and date of filling marked on the container; and
- c) Performance testing records for testing as required by 4.2.2, 4.2.3, 4.2.4, 4.4.3, 4.4.4, 8.1.3 and 8.1.4, as applicable to the container being manufactured or filled.

6.2 Management commitment

The management of the facility shall appoint a member of management who, irrespective of other responsibilities, shall have the authority and responsibility for overseeing the quality management system of the facility, including:

- a) Ensuring the quality management system is established and maintained;
- b) Reporting to management on the performance of the quality management system; and
- c) Promoting awareness of the importance of the requirements of this standard and the TDG Regulations throughout the facility.

7 Transport Canada registration

7.1 General

7.1.1 This section specifies the Transport Canada registration requirements for manufacturers of TC specification aerosol containers and gas cartridges. A person shall not manufacture TC specification aerosols or gas cartridges under this standard unless the manufacturing facility is registered with the Executive Director.

7.1.2 Applications for registration shall be submitted to the Executive Director.

7.1.3 A certificate holder shall comply with all the conditions specified on the Certificate of registration.

7.2 Initial registration

7.2.1 A manufacturer of TC specification aerosol containers and/or gas cartridges shall obtain a Certificate of registration from the Executive Director prior to the application of markings in compliance with clause 5 of this standard. The registered manufacturer shall perform its functions at the location stipulated on the Certificate of registration unless the Certificate authorizes the facility to conduct these activities elsewhere.

7.2.2 The following information shall be submitted in the application for registration:

- a) Name, address, telephone number and email address of the applicant;
- b) Symbol of the applicant, if applicable;
- c) Description of the manufacturing processes; and
- d) If the quality management system conforms to the requirements of ISO 9001 and is registered with a quality management registrar accredited or recognized by the Standards Council of Canada (SCC), or a foreign quality assurance systems registrar recognized by the SCC, a copy of the quality management system Certificate of registration. If not, a description of the quality management system required by clause 6.

NOTE Upon verification by the Executive Director of compliance of the application documentation with the requirements of this standard, arrangements may be made for facility inspections by an officer of the Transportation of Dangerous Goods Directorate, Transport Canada.

7.2.3 A Certificate of registration shall be issued by the Executive Director, for a manufacturing facility, if the Executive Director is satisfied that the facility is capable of consistently complying with the applicable requirements of this standard.

7.3 Revocation for cause

The Executive Director may revoke the Certificate of registration of the facility if the Executive Director is satisfied that the facility is not capable of or is not complying with the applicable requirements of this standard.

7.4 Application for renewal

7.4.1 Subject to 7.4.3, a Certificate of registration is valid until the expiry date indicated, unless it is revoked by the Executive Director.

7.4.2 An application for renewal of a Certificate of registration shall include the information required in 7.2 and shall be made no later than 90 calendar days prior to the expiry date.

NOTE Only changes to the information provided in the original application pursuant to 7.2 are required. If no changes have occurred, a statement to that effect should be made in the application for renewal.

7.4.3 A Certificate of registration shall remain valid beyond its expiry date if:

- a) an application for renewal of registration is made in accordance with 7.4.2 and the Executive Director has not requested information supplementary to the original application for renewal, and
- b) the Certificate due to expire is not revoked by the Executive Director.

7.5 Transition period

7.5.1 A Certificate of registration issued in accordance with the CGSB-43.123-2010 standard shall be deemed to be registration as a manufacturing facility pursuant to clause 7 of this standard unless the Certificate has expired or been revoked.

8 Selection and use of aerosol containers and gas cartridges

8.1 UN1950 aerosol containers and UN2037 gas cartridges

8.1.1 UN1950 aerosol containers or UN2037 gas cartridges shall comply with the following:

8.1.1.1 No person shall handle, offer for transport or transport dangerous goods classified as UN1950 or UN2037 unless the internal pressure in the containers at 55°C, when filled for transport with the gas, is within one of the pressure ranges listed in column 1 of Table 1 and the container is in compliance with the condition in column 2 that corresponds to the pressure range. The TC specification containers listed in column 2 of Table 1 shall be manufactured, tested, marked and filled in compliance with the applicable requirements of this standard.

8.1.1.2 The design, manufacture, testing (clause 4), marking (clause 5) and registration (clause 7) sections of this standard do not apply to the non-specification containers permitted for use in Table 1.

Table 1 — Pressure ranges and corresponding conditions

Column 1 Pressure ranges	Column 2 Conditions
Greater than 0 kPa but less than or equal to 965 kPa	a) Complies with the following requirements: <ol style="list-style-type: none"> 1) is capable of withstanding an internal pressure equal to 1.5 times the equilibrium pressure of the gas at 55°C, and 2) has a capacity less than or equal to 1 L; <u>NOTE this permits the use of a non-specification container.</u> b) Complies with the requirements for specification TC-2P; c) Complies with the requirements for specification TC-2Q; d) Complies with the requirements for specification TC-2R; or e) Complies with the requirements for specification TC-2S.
Greater than 965 kPa but less than or equal to 1105 kPa	a) Complies with the requirements for specification TC-2P; b) Complies with the requirements for specification TC-2Q; c) Complies with the requirements for specification TC-2R; or d) Complies with the requirements for specification TC-2S.
Greater than 1105 kPa but less than or equal to 1245 kPa	a) Complies with the requirements for specification TC-2Q; or b) Complies with the requirements for specification TC-2R.
Greater than 1245 kPa but less than or equal to 1500 kPa	a) Complies with the requirements for specification TC-2R.

8.1.2 Volume of liquid phase

The volume of the liquid phase shall not completely fill the closed container at 55°C.

8.1.3 Post-fill test

8.1.3.1 After a person fills a container, and before it is placed in transport, the container shall be subjected to a test in a hot water bath. The temperature of the water bath and the duration of the test shall be such that the internal pressure reaches that which would be reached at 55 °C. If, when subjected to this test, the container leaks, becomes permanently deformed, or displays any other defects, it shall not be used to transport dangerous goods. A TC-2S aerosol container may be deformed through softening provided that it does not leak.

8.1.3.2 The temperature referred to in 8.1.3.1 may be reduced to 50°C if the container is not more than 95% liquid full at 50°C.

8.1.3.3 If a substance to be contained in a container deteriorates by heat, or if the container is made of plastic material which softens at the test temperature specified in 8.1.3.1 or 8.1.3.2, the temperature referred to in those clauses may be reduced to between 20°C and 30°C. In addition, the test in 8.1.3.1 shall be conducted on a sample from every lot of 2000 or fewer containers at the temperature referred to in 8.1.3.1 or 8.1.3.2. If the sample container leaks, becomes permanently deformed, or displays any other defect, the lot of containers from which the sample was taken shall be condemned. A TC-2S aerosol container may be deformed through softening provided that it does not leak.

8.1.3.4 The following records shall be retained for a minimum of ten years: Records of test results for the hot water bath test with a record of both the temperature and duration of the test.

8.1.4 Alternative to post-fill test

8.1.4.1 Despite the test in 8.1.3, an alternative test method may be utilized. The test method shall be as follows:

8.1.4.2 Prior to filling, each container shall be subjected to an internal pressure equal to or greater than the internal pressure in the containers at 55°C when filled for transport with the gas. This pressure shall be at least two-thirds of the minimum burst pressure of the container. If any container shows evidence of distortion, leakage at a rate equal to or greater than 3.3×10^{-2} mbar · L · s⁻¹ at 20°C at the test pressure, or any other defect, it shall be condemned.

8.1.4.3 The temperature referred to in 8.1.4.2 may be reduced to 50°C if the container is not more than 95% liquid full at 50°C.

8.1.4.4 Once filled, each container shall be leak-tested. If a container shows evidence of deformation or a leakage rate greater than 2.0×10^{-3} mbar · L · s⁻¹ at 20°C, it shall be condemned.

8.1.4.5 The following records shall be retained for a minimum of ten years: Records of the test method and test results.

8.1.5 Mass verification

Each filled container shall be weighed. If the container shows a mass that exceeds the maximum allowable gross mass set by the manufacturer or filler, it shall be condemned. The maximum allowable gross mass shall ensure the volume of the liquid phase does not completely fill the closed container at 55°C.

8.1.6 Valve protection

For transport, each aerosol container shall be equipped with a means of valve protection designed and manufactured so that under normal conditions of transport, including handling, the means of valve protection remains secured and actuation of the valve is prevented.

8.1.7 Outer packaging

Containers shall be tightly packed in strong outer packaging. The gross mass of each outer packaging shall be less than or equal to 30 kg.

8.1.8 Other permitted containers – Reciprocity with the United States

A container of a DOT specification authorized by the Code of Federal Regulations 49 (49 CFR) that is equivalent to the corresponding TC specification container may be used in Canada provided that:

- a) the container is manufactured and filled with dangerous goods outside of Canada in accordance with 49 CFR; or
- b) the container is manufactured outside of Canada in accordance with 49 CFR and filled in Canada in accordance with this standard.

8.1.9 Unauthorized dangerous goods

8.1.9.1 A container manufactured and tested in compliance with this standard shall not be used to handle, offer for transport or transport dangerous goods if the contents meet the packing group I criteria specified in Part 2, Classification, of the TDG Regulations.

8.1.9.2 A TC-2R container manufactured and tested in compliance with this standard with a maximum capacity greater than 675 mL shall not be used to handle, offer for transport or transport dangerous goods if the contents meet the Class 2.1 criteria specified in Part 2, Classification, of the TDG Regulations.

8.1.10 Non-refillable

Aerosol containers and gas cartridges shall not be refilled.

9 Transport of containers intended for disposal or recycling

9.1 Aerosol containers and gas cartridges intended for disposal or recycling may be handled, offered for transport and transported under the following conditions.

- a) Containers are packed in strong outer packagings that have a means of retaining any free liquid that may escape during transport;
- b) The outer packagings are ventilated to prevent the creation of a flammable atmosphere and the build-up of pressure;
- c) Containers are transported to a facility for disposal or recycling;
- d) Transport units used to transport the containers are ventilated and are not closed freight containers; and
- e) Outer packagings are selected as per Table 2.

9.2 Provided that the conditions in 9.1 have been met, aerosol containers and gas cartridges transported for disposal or recycling need not be protected against movement (see 8.1.7) and inadvertent discharge (see 8.1.6).

Table 2 – Outer packaging for waste aerosol container and gas cartridge transport¹

Dangerous goods classification	Volume of outer packaging	Permitted outer packaging
UN 1950 or UN 2037	Less than or equal to 1500 L	<p>a) a non-specification rigid outer packaging, leakproof, or made leakproof by using a plastic film liner;</p> <p>b) UN standardized drum^a or box that is marked for use for packing group I or II for liquids or solids. If the container is not leakproof it shall be lined with a leakproof plastic film liner to contain any possible release of liquids. The gross mass of consignment is equal to or less than the gross mass permitted in this UN standardized packaging. Permitted specifications are: Drums (1A1, 1A2, 1B1, 1B2, 1N1, 1N2, 1H1, 1H2, 1D, 1G) Boxes (4A, 4B, 4N, 4C1, 4C2, 4D, 4F, 4G, 4H1, 4H2)</p> <p>c) UN standardized Intermediate Bulk Container (IBC) marked for use for packing group I or II dangerous goods. The gross mass of consignment is equal to or less than the gross mass permitted in this UN standardized packaging. The packaging shall be made of metal or plastic or be lined with a leakproof plastic film liner; and</p> <p>d) UN standardized rigid and leakproof large packaging for packing group II for liquids or solids meeting the requirements of Chapter 6.6 in the UN Recommendations and the Regulations of the country of origin and marked accordingly. Permitted specifications are: 50A, 50B, 50N, 50H, 50C, 50D, 50F, 50G.</p>
<p>^a The use of UN standardized drum with bung removed for ventilation is permitted for the purposes of waste aerosol transport.</p>		

¹ The packagings associated to the UN packaging code for drums and boxes listed in Table 2 shall be UN standardized containers that meet the requirements applicable to this type of packaging as set out in TP14850 or the UN Recommendations and the Regulations of the country of origin, as the case may be, and shall be marked accordingly.

UN standardized Intermediate Bulk Containers referred to in Table 2 shall be UN standardized containers that meet the requirements applicable to this type of packaging as set out in CAN/CGSB-43.146 or the UN Recommendations and the Regulations of the country of origin, as the case may be, and shall be marked accordingly.

Bibliography

- [1] British Standards (BSI). BS 5597:1991 — *Specification for non-refillable plastics aerosol dispensers up to 1000 mL capacity*. Available from: www.bsigroup.com.
- [2] Canadian Standards Association (CSA). CSA B340-14 — *Selection and Use of Cylinders, Spheres, Tubes and Other Containers for the Transportation of Dangerous Goods, Class 2*. Available from: <http://shop.csa.ca/>.
- [3] Canadian Standards Association (CSA). CSA B342-15 — *Selection and use of UN pressure receptacles, multiple-element gas containers, and other pressure receptacles for the transport of dangerous goods, Class 2*. Available from: <http://shop.csa.ca/>.
- [4] International Civil Aviation Organization (ICAO). *Technical Instructions for the Safe Transport of Dangerous Goods by Air*, 2015-2016 edition. Available from: www.icao.int.