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**CAN/CGSB-43.123-2022**  
**Corrigendum No. 1 June 2022**

Supersedes CAN/CGSB-43.123-2017



# Aerosol containers and gas cartridges for transport of dangerous goods

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NATIONAL STANDARD OF CANADA

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# **Aerosol containers and gas cartridges for transport of dangerous goods**

CETTE NORME NATIONALE DU CANADA EST DISPONIBLE EN VERSIONS  
FRANÇAISE ET ANGLAISE.

ICS 55.020, 55.130

Published April 2022 by the  
**Canadian General Standards Board**  
Ottawa, Ontario K1A 0S5

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Translation of this National Standard of Canada was conducted by the Government of Canada.

## Preface

This National Standard of Canada CAN/CGSB-43.123-2021 supersedes the 2017 edition published in March 2017. The following corrigendum has been published and incorporated in the April 2022 edition of this standard on June 2022.

### Changes since the previous edition

- The changes made provide alignment with the 21<sup>st</sup> edition of the United Nations *Recommendations on the Transport of Dangerous Goods - Model Regulations* (Orange Book) and Title 49 of the Code of Federal Regulations of the United States (as amended from time to time).
- Addition of specification requirements for the new TC-2P2 specification for gas cartridges intended to be used for liquified petroleum gases.
- Addition of specification requirements for the new TC-2P1 and TC-2Q2 specifications intended to be used for foodstuffs and soaps.
- Addition of reciprocity for DOT-2P1 and DOT-2Q2 specifications.
- Revision of requirements for the transport of aerosol containers and gas cartridges intended for disposal or recycling.
- Various editorial fixes related to the CGSB Style Manual.

### Corrigendum

- Updates to various member organization names.
- Corrected reference titles in Section 2.
- In the French version only, added missing term “en acier” in table in Annex A.

The following definitions apply in understanding how to implement this National Standard of Canada:

- "shall" indicates a **requirement**;
- "should" indicates a **recommendation**;
- "may" is used to indicate that something is **permitted**;
- "can" is used to indicate that something is **possible**, for example, that an organization is able to do something.

Notes accompanying clauses do not include requirements or alternative requirements. The purpose of a note accompanying a clause is to separate explanatory or informative material from the text. Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

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## **Introduction**

This is the fourth edition of CAN/CGSB-43.123, *Aerosol containers and gas cartridges for transport of dangerous goods*. It supersedes the previous edition published in 2017, CAN/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.

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*, 21<sup>st</sup> edition (UN Model Regulations), published by the United Nations (UN).

This standard also provides requirements for a quality management system for both aerosol and gas cartridge manufacturers and fillers and Transport Canada registration requirements for manufacturers.

# 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 110 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.

It should be noted that this standard, by itself, does not have the force of law unless it is officially adopted by a regulatory authority. It is recommended to read the standard in conjunction with the TDG Regulations.

### 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 provided in units from the International System of Units (SI units). Imperial equivalents may be shown in brackets.

## 1.7 Classification

Dangerous goods are classified in accordance with Part 2, Classification, of the TDG Regulations and the corresponding particulars (UN Number, shipping name, class 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 contact information provided below was 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-43.145 – *Design, manufacture and use of large packagings 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.

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.

CAN/CGSB-43.150 – *Design, manufacture and use of UN Standardized drums, jerricans, boxes, bags, combination packaging, composite packaging and other packagings for the transport 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 Contact information

The above may be obtained from the Canadian General Standards Board, Sales Centre. Telephone: 1-800-665-2472. E-mail: [ncr.cgsb-ongc@tpsgc-pwgsc.gc.ca](mailto:ncr.cgsb-ongc@tpsgc-pwgsc.gc.ca). Web site: [www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html](http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html).

### 2.2 Canadian Standards Association (CSA)

CSAB340 — *Selection and use of cylinders, spheres, tubes, and other containers for the transportation of dangerous goods, Class 2*

#### 2.2.1 Contact information

The above may be obtained from CSA Group, Standards Sales. Telephone: 416-747-4000 or 1-800-463-6727. Fax: 416-747-2473. E-mail: [sales@csagroup.org](mailto:sales@csagroup.org). Web site: <https://www.csagroup.org/store/>.

## 2.3 International Maritime Organization (IMO)

*1972 Convention for Safe Containers, (CSC 1972), 2014 edition (including amendments)*

### 2.3.1 Contact information

The above may be obtained from IMO Publishing. Telephone: + 44 (0)20 7735 7611. Fax: + 44 (0)20 7587 3241. E-mail: sales@imo.org. Web site: www.imo.org.

## 2.4 International Organization for Standardization (ISO)

ISO 9001:2015 — *Quality management systems – Requirements*

### 2.4.1 Contact information

The above may be obtained from IHS Global Canada Ltd. Telephone: 613-237-4250 or 1-800-267-8220. Fax: 613-237-4251. Web site: www.global.ihs.com.

## 2.5 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)*

### 2.5.1 Contact information

The above may be obtained from the Publishing and Depository Services, Public Services and Procurement Canada. Telephone: 613-941-5995 or 1-800-635-7943. Fax: 613-954-5779 or 1-800-565-7757. E-mail: publications@tpsgc-pwgsc.gc.ca. Web site: www.publications.gc.ca.

## 2.6 U.S. Department of Transportation (DOT)

Title 49 of the *Code of Federal Regulations of the United States* (as amended from time to time)

### 2.6.1 Contact information

The above may be obtained from U.S. Department of Transportation. Telephone: 202-366-4000. Web site: www.phmsa.dot.gov/hazmat.

## 2.7 United Nations (UN)

*Recommendations on the Transport of Dangerous Goods, Model Regulations (21<sup>st</sup> revised edition)*

### 2.7.1 Contact information

The above may be obtained from distributors of United Nations Publications or from the United Nations Publications Customer Service. Telephone: 1-703-661-1571. Fax: 1-703-996-1010. E-mail: order@un.org. The publication can be viewed and downloaded at [https://unece.org/fileadmin/DAM/trans/danger/publi/unrec/rev21/ST-SG-AC10-1r21e\\_Vol1\\_WEB.pdf](https://unece.org/fileadmin/DAM/trans/danger/publi/unrec/rev21/ST-SG-AC10-1r21e_Vol1_WEB.pdf) and [https://unece.org/fileadmin/DAM/trans/danger/publi/unrec/rev21/ST-SG-AC10-1r21e\\_Vol2\\_WEB.pdf](https://unece.org/fileadmin/DAM/trans/danger/publi/unrec/rev21/ST-SG-AC10-1r21e_Vol2_WEB.pdf).

### 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.

#### **aerosol container**

article consisting of a non-refillable means of containment that

- a) contains a substance under pressure;
- b) is fitted with a self-closing device; and
- c) a release 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. (*bombe aérosol*)

#### **capacity**

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

#### **closure**

device that closes an opening into the container. (*dispositif de fermeture*)

#### **condemned container**

container not permitted for the transportation of dangerous goods. (*contenant refusé*)

#### **condemned lot**

lot of containers not permitted for the transportation of dangerous goods. (*lot refusé*)

#### **container**

aerosol container or gas cartridge as defined in this standard. (*contenant*)

#### **durable marking**

marking placed on a container that remains legible throughout the container's service life. (*marquage durable*)

#### **Executive Director**

Executive Director, Regulatory Frameworks and International Engagement, Regulatory Affairs Branch, Transportation of Dangerous Goods Directorate, Transport Canada. (*directeur exécutif*)

#### **freight container**

article of transport equipment that is of a permanent character and accordingly strong enough to be suitable for repeated use; specifically designed to facilitate the transport of goods, by one or other modes of transport, without intermediate reloading, and designed to be secured and/or readily handled, having fittings for the purposes, and approved in accordance with the International Convention for Safe Containers (CSC), 1972, as amended. The term "freight container" includes neither vehicle nor packaging. However, a freight container that is carried on a chassis is included. (*conteneur*)

**gas cartridge**

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

- a) contains a substance under pressure;
- b) is equipped with or without a valve but has no 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. (*cartouche à gaz*)

**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. (*lot*)

**pressure-relief device**

device intended to prevent the rupture of a container in the event of accidental overpressure or exposure to fire. (*dispositif de détente de surpression*)

**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. (*système de management de la qualité*)

**recycled plastic material**

material recovered from used containers, production residues or re-grind. (*matière plastique recyclée*)

**release device**

a device that is fitted to the valve to open the valve and eject or withdraw the contents. (*dispositif de détente*)

Note: For UN1950 aerosols, the release device is typically an actuator or spray cap.

## 4 Design, manufacture and testing

### 4.1 Design and manufacture of metal containers (TC-2P, TC-2P1, TC-2P2, TC-2Q, TC-2Q2 and TC-2R)

#### 4.1.1 Capacity and inside diameter

TC-2P, TC-2P1, TC-2P2, TC-2Q, TC-2Q2 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, which can be made as either gas cartridges or aerosol containers, the maximum capacity shall be 1 L and the maximum inside diameter shall be 76 mm.

For TC-2P1 aerosol containers and TC-2Q2 aerosol containers, the maximum capacity shall be 1 L and the maximum inside diameter shall be 76 mm.

For TC-2P2 gas cartridges, the maximum capacity shall be 1 L and the maximum inside diameter shall be 110 mm.

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

Note: The TC-2P2 specification can only be made as a gas cartridge (UN2037). The TC-2P1, TC-2Q2 and TC-2R specifications can only be made as an aerosol container (UN1950). Requirements that follow in this standard that state "container" apply to both aerosol containers and gas cartridges.

#### **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 non-ferrous 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**

**4.1.3.1** For TC-2P and TC-2Q containers and for TC-2P1, TC-2Q2 and TC-2R aerosol containers, the minimum wall thickness shall be

- a) 0.18 mm for TC-2P containers and TC-2P1 aerosol containers;
- b) 0.20 mm for TC-2Q containers and TC-2Q2 aerosol containers; and
- c) 0.21 mm for TC-2R aerosol containers.

**4.1.3.2** For TC-2P2 gas cartridges, the minimum wall thickness shall be

- a) 0.32 mm side wall thickness and 0.48 mm bottom wall thickness for gas cartridges with capacity less or equal to 0.3 L;
- b) 0.34 mm side wall thickness and 0.48 mm bottom wall thickness for gas cartridges with capacity greater than 0.3 L but less than or equal to 0.6 L; and
- c) 0.34 mm side wall thickness and 0.58 mm bottom wall thickness for gas cartridges with a capacity greater than 0.6 L but less than or equal to 1 L.

#### **4.1.4 Pressure-relief device**

**4.1.4.1** TC-2P1 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-2P1 aerosol container (1105 kPa) and prior to bursting of the aerosol container.

**4.1.4.2** 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 aerosol container (1245 kPa) and prior to bursting of the aerosol container.

**4.1.4.3** TC-2Q2 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-2Q2 aerosol container (1245 kPa) and prior to bursting of the aerosol container.

**4.1.4.4** 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 aerosol container (1500 kPa) and prior to bursting of the aerosol container.

#### 4.1.5 Openings

Openings shall be circular and in the ends of containers.

#### 4.1.6 Closures

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

4.1.6.2 TC-2P2 gas cartridges with an outside diameter of 40 mm or greater shall have a concave base.

#### 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-2P1 aerosol container or 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.

4.1.7.4 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-2P1, TC-2P2, TC-2Q, TC-2Q2 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 aerosol container from each lot of 5000 or fewer aerosol 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 aerosol container leak, show major distortion or other defect, the lot shall either be a condemned lot or ten additional aerosol containers shall be randomly selected from the same lot and subjected to the internal pressure test. Should any of the ten aerosol containers tested fail, the entire lot shall be a condemned lot.

Note 1: A slight symmetrical distortion of the base or the top end may be allowed, provided the aerosol 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 aerosol 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-2P1, TC-2P2, TC-2Q, TC-2Q2 and TC-2R)**

**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-2P1 aerosol containers, the burst test specified in 4.2.3.1 shall be conducted on one completed aerosol container, without a pressure-relief device, from each lot of 25 000 or fewer aerosol containers.

**4.2.3.3** For TC-2P2 gas cartridges, the burst test specified in 4.2.3.1 shall be conducted on five completed gas cartridges, from each lot of 2500 or fewer containers. For gas cartridges with an outer diameter greater than 40 mm, the concave form of the base shall reverse or the domed top shall permanently extend before any leak or rupture occurs.

**4.2.3.4** 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 aerosol container, without a pressure-relief device, from each lot of 25 000 or fewer aerosol containers.

**4.2.3.5** For TC-2Q2 aerosol containers, the burst test specified in 4.2.3.1 shall be conducted on one completed aerosol container, without a pressure-relief device, from each lot of 25 000 or fewer aerosol containers.

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

**4.2.3.7** 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 aerosol container without the pressure-relief device installed. The prescribed minimum burst pressure shall be:

- a) 1655 kPa for TC-2P containers, TC-2P1 aerosol containers and TC-2P2 gas cartridges;
- b) 1860 kPa for TC-2Q containers and TC-2Q2 aerosol containers; and
- c) 2700 kPa for TC-2R aerosol containers.

Should the container leak or burst below the minimum prescribed burst pressure specified in 4.2.3.7 for the corresponding container, the lot shall either be a condemned lot or ten additional containers shall be randomly selected from the same lot and subjected to the burst test. Should any of the ten aerosol containers tested fail, the entire lot shall be a condemned lot.

#### **4.2.4 Pressure-relief device test (applicable to TC-2P1, TC-2Q, TC-2Q2 and TC-2R aerosol containers)**

**4.2.4.1** For TC-2P1 aerosol containers or TC-2Q2 aerosol containers, one aerosol container from each lot of 25 000 or fewer aerosol 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-2Q aerosol containers with a pressure-relief device, one aerosol container from each lot of 25 000 or fewer aerosol 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** For TC-2R aerosol containers, one aerosol container from each lot of 5000 or fewer aerosol 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.

**4.2.4.4** If the pressure-relief device does not function at a pressure as specified in 4.1.4, the lot shall either be a condemned lot 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 a condemned lot.

### **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** Aerosol containers shall be manufactured of polyethylene terephthalate (PET), polyethylene naphthalate (PEN), polyamide (nylon), or a blend containing some combination of PET, PEN, ethylene vinyl alcohol (EVOH) and/or nylon.

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

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

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

#### **4.4.1 Traceability**

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

#### **4.4.2 New design criteria**

**4.4.2.1** An aerosol 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 aerosol containers shall be filled, closed and pressurized with a test medium consisting of water and propellant to a condition that is representative of filled and pressurized aerosol containers in commercial production. The propellant shall be selected to ensure that the internal pressure in the aerosol container at 55 °C is equal to or greater than the maximum allowable internal pressure in the aerosol container (1105 kPa). Aerosol containers conditioned at -18 °C shall be filled with a substitute test medium that has a density similar to water (0.98 g/cm<sup>3</sup> 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 aerosol container. The mass of the aerosol container, when filled for transport, shall not be greater than the mass of the aerosol container tested.

**4.4.3.4** The closures shall not be protected during the test.

**4.4.3.5** Prior to testing, the aerosol 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 aerosol 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 aerosol container shall not have changed more than 2 °C from the temperature of the aerosol container at the end of the conditioning cycle. The orientation of the test aerosol container shall be random, but direct impact on the valve or closure shall be avoided.

**4.4.3.7** The aerosol 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 aerosol container from each lot of 5000 or fewer aerosol 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 aerosol container bursts shall be recorded and retained as specified in 6.1.1.2.

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

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

## **5 Marking**

**5.1** Each TC specification container that meets the requirements of section 4 of this standard shall be marked with a legible and durable marking by the manufacturer or 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. A symbol, if used, shall be registered with Transport Canada as required by 7.2.2;
- c) Container manufacturer lot or serial number;
- d) Date of manufacture of the container. However, this date does not need to be marked if this date is traceable by the container manufacturer lot or serial number marked in c) above; and
- e) Date of filling of the container or a filled product lot or serial number marked by the filler to which this date is traceable.

**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 fluorescent 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.

**5.5** For gas cartridges that contain or will contain liquified petroleum gases, the marking “NON-REFILLABLE, SAFETY HAZARD IF REFILL ATTEMPTED” shall be applied.

## **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, such as ISO 9001.

#### **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 (e.g. 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 (TC) 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 Section 5 of this standard. The registered manufacturer shall perform its functions at the location stipulated on the Certificate of registration unless the Certificate of registration 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 Section 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**

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.

### **7.5 Length of validity of Certificate of registration**

**7.5.1** Subject to 7.5.2, a Certificate of registration is valid until the expiry date indicated, unless it is revoked by the Executive Director.

**7.5.2** 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 and the Executive Director has not requested information supplementary to the original application for renewal, and
- b) the Certificate of registration due to expire is not revoked by the Executive Director.

### **7.6 Transition period**

A Certificate of registration issued in accordance with the CAN/CGSB-43.123-2017 standard shall be deemed to be registration as a manufacturing facility pursuant to Section 7 of this standard unless the Certificate of registration 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.

Note: Additional service limitations are detailed in 8.1.10.

**8.1.1.2** The design, manufacture, testing (Section 4), marking (Section 5) and registration (Section 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"> <li>1) is capable of withstanding an internal pressure equal to 1.5 times the equilibrium pressure of the gas at 55 °C, and</li> <li>2) has a capacity less than or equal to 1 L;</li> </ol> Note: This permits the use of a non-specification container. <ol style="list-style-type: none"> <li>b) Complies with the requirements for specification TC-2P;</li> <li>c) Complies with the requirements for specification TC-2P1;</li> <li>d) Complies with the requirements for specification TC-2P2;</li> <li>e) Complies with the requirements for specification TC-2Q;</li> <li>f) Complies with the requirements for specification TC-2Q2;</li> <li>g) Complies with the requirements for specification TC-2R; or</li> <li>h) Complies with the requirements for specification TC-2S.</li> </ol>
Greater than 965 kPa but less than or equal to 1105 kPa	<ol style="list-style-type: none"> <li>a) Complies with the requirements for specification TC-2P;</li> <li>b) Complies with the requirements for specification TC-2P1;</li> <li>c) Complies with the requirements for specification TC-2Q;</li> <li>d) Complies with the requirements for specification TC-2Q2;</li> <li>e) Complies with the requirements for specification TC-2R; or</li> <li>f) Complies with the requirements for specification TC-2S.</li> </ol>
Greater than 1105 kPa but less than or equal to 1245 kPa	<ol style="list-style-type: none"> <li>a) Complies with the requirements for specification TC-2Q;</li> <li>b) Complies with the requirements for specification TC-2Q2; or</li> <li>c) Complies with the requirements for specification TC-2R.</li> </ol>
Greater than 1245 kPa but less than or equal to 1500 kPa	<ol style="list-style-type: none"> <li>a) Complies with the requirements for specification TC-2R.</li> </ol>

### 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 a condemned lot. 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  $3.3 \times 10^{-2}$  mbar · L · s<sup>-1</sup> at 20 °C at the test pressure, or any other defect, it shall be a condemned container.

**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  $2.0 \times 10^{-3}$  mbar · L · s<sup>-1</sup> at 20 °C, it shall be a condemned container.

**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 Post-fill test for gas cartridges for liquefied petroleum gases**

**8.1.5.1** Despite 8.1.3, for gas cartridges in liquefied petroleum gases service, 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 90% of 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.

**8.1.5.2** 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.

#### **8.1.6 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 a condemned container. The maximum allowable gross mass shall ensure the volume of the liquid phase does not completely fill the closed container at 55 °C.

#### **8.1.7 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 and inadvertent discharge is prevented.

### 8.1.8 Outer packaging

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

### 8.1.9 Other permitted containers – Reciprocity with the United States

A container marked with DOT specification DOT-2P, DOT-2P1, DOT-2Q, DOT-2Q2 or DOT-2S 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.

### 8.1.10 Service limitations of certain containers and unauthorized dangerous goods

**8.1.10.1** A container manufactured and tested in compliance with this standard shall only be used to handle, offer for transport or transport dangerous goods that are Class 2.1, flammable gases or Class 2.2, non-flammable and non-toxic gases and shall not be used for Class 2.3, toxic gases.

**8.1.10.2** TC-2P2 specification containers shall only be used for liquefied petroleum gas or mixtures thereof.

**8.1.10.3** TC-2P1 and TC-2Q2 specification containers shall only be used for foodstuffs or soaps with soluble or emulsified compressed gas.

**8.1.10.4** 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.

**8.1.10.5** 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.

### 8.1.11 Non-refillable containers

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 outer packagings that have a means of retaining any free liquid that may escape during transport;
- b) the outer packaging has a volume less than 1500 L;
- c) containers are destined for 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 follows:



- 1) for waste aerosol containers and waste gas cartridges that are not severely deformed, the outer packaging is selected as per Table 2 and is ventilated to prevent the creation of a dangerous atmosphere and the build-up of pressure; and
- 2) for waste aerosols and waste gas cartridges that are severely deformed, the outer packaging used is a salvage container as defined in CSA B340, provided that appropriate measures are taken to ensure that there is no dangerous build-up of pressure.

**9.2** Provided that the conditions in 9.1 have been met, waste aerosol containers and waste gas cartridges transported for disposal or recycling need not be protected against movement (see 8.1.8) and inadvertent discharge (see 8.1.7).

**9.3** The requirements of Section 9 do not apply to waste gas cartridges that were filled with Class 2.2 gas and have been pierced.

**Table 2 – Outer packaging for waste aerosol container and gas cartridge transport<sup>1</sup>**

<b>Permitted outer packagings</b>
<p>a) A non-specification rigid strong outer packaging, leakproof, or made leakproof by using a plastic film liner. The rigid strong outer packaging shall be constructed of suitable material and be of adequate strength and design in relation to the packaging capacity and its intended use. The maximum permitted net mass shall be 250 kg.</p> <p>b) UN standardized drum<sup>a</sup> or box that is marked for use for packing group I, II or III for liquids or solids. If the container is not leakproof it shall be lined with a leakproof plastic film liner. 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) or Flexible Intermediate Bulk Container (FIBC) marked for use for packing group I, II or III 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.</p> <p>d) UN standardized rigid and leakproof large packaging. The gross mass of consignment is equal to or less than the gross mass permitted in this UN standardized packaging for packing group I, II or III for liquids or solids. Permitted specifications are: 50A, 50B, 50N, 50H, 50C, 50D, 50F, 50G.</p>
<p><sup>a</sup> The use of UN standardized drum with bung removed for ventilation is permitted for the purposes of waste aerosol transport.</p>

<sup>1</sup> The packagings associated to the UN packaging code for drums and boxes listed in Table 2 are UN standardized containers that meet the requirements applicable to this type of packaging as set out in CAN/CGSB-43.150 or the UN Recommendations and the Regulations of the country of origin, as the case may be, and are marked accordingly.

UN standardized Intermediate Bulk Containers (IBC) referred to in Table 2 are 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 are marked accordingly.

UN standardized large packaging referred to in Table 2 are UN standardized containers that meet the requirements applicable to this type of packaging as set out in CAN/CGSB-43.145 or the UN Recommendations and the Regulations of the country of origin, as the case may be, and are marked accordingly.



**Annex A**  
(informative)

**Designation and description of aerosol containers and gas cartridges**

Specification designation no.	General description	Dimensions (water capacity, diameter or size)	Permitted as aerosol container, gas cartridge or both
TC-2P	Non-refillable containers that are seamless carbon steel, welded carbon steel, brazed carbon steel, seamless aluminum, or welded aluminum.	maximum capacity: 1 L maximum inside diameter: 76 mm	can be made as either gas cartridges or aerosol containers
TC-2P1	Non-refillable containers and are seamless carbon steel, welded carbon steel, brazed carbon steel, seamless aluminum, or welded aluminum.	maximum capacity: 1 L maximum inside diameter: 76 mm	aerosol containers only
TC-2P2	Non-refillable containers and are seamless carbon steel, welded carbon steel, brazed carbon steel, seamless aluminum, or welded aluminum.	maximum capacity: 1 L maximum inside diameter: 110 mm	gas cartridges only
TC-2Q	Containers are non-refillable containers and are seamless carbon steel, welded carbon steel, brazed carbon steel, seamless aluminum, or welded aluminum.	maximum capacity: 1 L maximum inside diameter: 76 mm	can be made as either gas cartridges or aerosol containers
TC-2Q2	Non-refillable containers and are seamless carbon steel, welded carbon steel, brazed carbon steel, seamless aluminum, or welded aluminum.	maximum capacity: 1 L maximum inside diameter: 76 mm	aerosol containers only
TC-2R	Non-refillable containers and are seamless carbon steel, welded carbon steel, brazed carbon steel, seamless aluminum, or welded aluminum.	maximum capacity: 1 L maximum inside diameter: 66 mm	aerosol containers only
TC-2S	Non-refillable plastic containers	maximum capacity: 1 L maximum inside diameter: 76 mm	aerosol containers only

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- [3] International Civil Aviation Organization (ICAO). *Technical Instructions for the Safe Transport of Dangerous Goods by Air*, 2021-2022 edition. Available from [www.icao.int](http://www.icao.int).