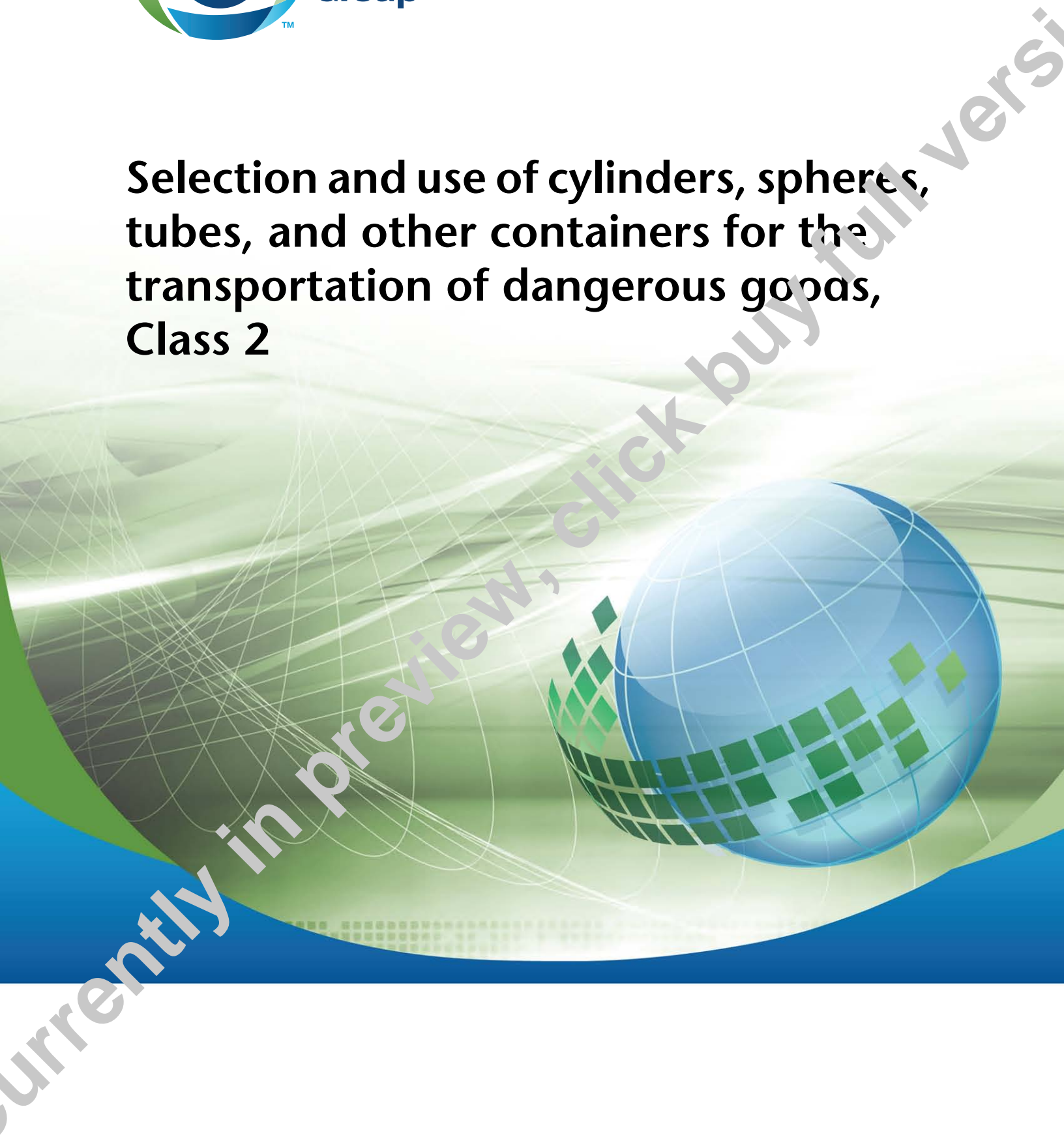




CSA  
Group

**B340-14**

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



# Legal Notice for Standards

Canadian Standards Association (operating as “CSA Group”) develops standards through a consensus standards development process approved by the Standards Council of Canada. This process brings together volunteers representing varied viewpoints and interests to achieve consensus and develop a standard. Although CSA Group administers the process and establishes rules to promote fairness in achieving consensus, it does not independently test, evaluate, or verify the content of standards.

## Disclaimer and exclusion of liability

This document is provided without any representations, warranties, or conditions of any kind, express or implied, including, without limitation, implied warranties or conditions concerning this document’s fitness for a particular purpose or use, its merchantability, or its non-infringement of any third party’s intellectual property rights. CSA Group does not warrant the accuracy, completeness, or currency of any of the information published in this document. CSA Group makes no representations or warranties regarding this document’s compliance with any applicable statute, rule, or regulation.

IN NO EVENT SHALL CSA GROUP, ITS VOLUNTEERS, MEMBERS, SUBSIDIARIES, OR AFFILIATED COMPANIES, OR THEIR EMPLOYEES, DIRECTORS, OR OFFICERS, BE LIABLE FOR ANY DIRECT, INDIRECT, OR INCIDENTAL DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES, HOWSOEVER CAUSED, INCLUDING BUT NOT LIMITED TO SPECIAL OR CONSEQUENTIAL DAMAGES, LOST REVENUE, BUSINESS INTERRUPTION, LOST OR DAMAGED DATA, OR ANY OTHER COMMERCIAL OR ECONOMIC LOSS, WHETHER BASED IN CONTRACT, TORT (INCLUDING NEGLIGENCE), OR ANY OTHER THEORY OF LIABILITY, ARISING OUT OF OR RESULTING FROM ACCESS TO OR POSSESSION OR USE OF THIS DOCUMENT, EVEN IF CSA GROUP HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES, INJURY, LOSS, COSTS, OR EXPENSES.

In publishing and making this document available, CSA Group is not undertaking to render professional or other services for or on behalf of any person or entity or to perform any duty owed by any person or entity to another person or entity. The information in this document is directed to those who have the appropriate degree of experience to use and apply its content, and CSA Group accepts no responsibility whatsoever arising in any way from any and all use of or reliance on the information contained in this document.

CSA Group is a private not-for-profit company that publishes voluntary standards and related documents. CSA Group has no power, nor does it undertake, to enforce compliance with the contents of the standards or other documents it publishes.

## Intellectual property rights and ownership

As between CSA Group and the users of this document (whether it be in printed or electronic form), CSA Group is the owner, or the authorized licensee, of all works contained herein that are protected by copyright, all trade-marks (except as otherwise noted to the contrary), and all inventions and trade secrets that may be contained in this document, whether or not such inventions and trade secrets are protected by patents and applications for patents. Without limitation, unauthorized use, modification, copying, or disclosure of this document may violate laws that protect CSA Group’s and/or others’ intellectual property and may give rise to a right in CSA Group and/or others to seek legal redress for such use, modification, copying, or disclosure. To the extent permitted by licence or by law, CSA Group reserves all intellectual property rights in this document.

## Patent rights

Attention is drawn to the possibility that some of the elements of this standard may be the subject of patent rights. CSA Group shall not be held responsible for identifying any or all such patent rights. Users of this standard are expressly advised that determination of the validity of any such patent rights is entirely their own responsibility.

## Authorized use of this document

This document is being provided by CSA Group for informational and non-commercial use only. The user of this document is authorized to do only the following:

If this document is in electronic form:

- load this document onto a computer for the sole purpose of reviewing it;
- search and browse this document; and
- print this document if it is in PDF format.

Limited copies of this document in print or paper form may be distributed only to persons who are authorized by CSA Group to have such copies, and only if this Legal Notice appears on each such copy.

In addition, users may not and may not permit others to

- alter this document in any way or remove this Legal Notice from the attached standard;
- sell this document without authorization from CSA Group; or
- make an electronic copy of this document.

If you do not agree with any of the terms and conditions contained in this Legal Notice, you may not load or use this document or make any copies of the contents hereof, and if you do make such copies, you are required to destroy them immediately. Use of this document constitutes your acceptance of the terms and conditions of this Legal Notice.



# ***Standards Update Service***

***B340-14***

***January 2014***

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

**Pagination:** **63 pages** (viii preliminary and 55 text), each dated **January 2014**

To register for e-mail notification about any updates to this publication

- go to **shop.csa.ca**
- click on **CSA Update Service**

The **List ID** that you will need to register for updates to this publication is **2422488**.

If you require assistance, please e-mail [techsupport@csagroup.org](mailto:techsupport@csagroup.org) or call 416-747-2233.

Visit CSA Group's policy on privacy at [csagroup.org/legal](http://csagroup.org/legal) to find out how we protect your personal information.

Currently in preview, click buy full version

*B340-14*  
***Selection and use of cylinders, spheres,  
tubes, and other containers for the  
transportation of dangerous goods, Class 2***



**CSA  
Group**

™A trademark of the Canadian Standards Association, operating as "CSA Group"

*Published in January 2014 by CSA Group  
A not-for-profit private sector organization  
5060 Spectrum Way, Suite 100, Mississauga, Ontario, Canada L4W 5N6  
1-800-463-6727 • 416-747-4044*

**Visit our Online Store at [shop.csa.ca](http://shop.csa.ca)**



CSA Group prints its publications on Rolland Enviro100, which contains 100% recycled post-consumer fibre, is EcoLogo and Processed Chlorine Free certified, and was manufactured using biogas energy.

To purchase standards and related publications, visit our Online Store at [shop.csa.ca](http://shop.csa.ca) or call toll-free 1-800-461-6727 or 416-747-4044.

ISSN 1978-1-77139-214-3

© 2014 CSA Group

All rights reserved. No part of this publication may be reproduced in any form whatsoever without the prior permission of the publisher.

# Contents

Technical Committee on Cylinders, Spheres, and Tubes for the Transportation of Dangerous Goods v

Preface *viii*

## 1 Scope 1

## 2 Reference publications 1

## 3 Definitions 3

## 4 Container requirements 5

- 4.1 General 5
  - 4.1.1 Cylinders, spheres, and tubes 5
  - 4.1.2 Other containers 6
  - 4.1.3 Fire extinguishers 6
  - 4.1.4 Venting of means of transport 6
- 4.2 Valves, accessories, means of protection, and container orientation and securement during transportation 6
  - 4.2.1 Container valves and accessories 6
  - 4.2.2 Means of protection for valves and accessories 7
  - 4.2.3 Container orientation and securement during transportation
- 4.3 Pressure-relief devices 10
- 4.4 Manifolder containers 11
- 4.5 Horizontally mounted cylinders and tubes 13
- 4.6 Service limitations of certain containers 13
  - 4.6.1 Specification TC-3ALM or CTC-3AL cylinders 13
  - 4.6.2 Specification TC-3CCM, TC-3FCM, or TC-3HWM cylinders 14
  - 4.6.3 Specification TC-3HTM or CTC-3HT cylinders 14
  - 4.6.4 Specification TC-4EM or CTC-4E cylinders 14
  - 4.6.5 Specification TC-39M or CTC-39 containers 14
- 4.7 ICC-3 cylinders 15
- 4.8 Markings 15
- 4.9 Packaging 15

## 5 Selection and filling of containers for transportation 15

- 5.1 General requirements 15
- 5.2 Filling cylinders, spheres, and tubes with compressed gases 16
  - 5.2.1 Cylinders and spheres 16
  - 5.2.2 Tubes 17
  - 5.2.3 Filling pressures 18
  - 5.2.4 Ethylene, compressed, UN1962 18
  - 5.2.5 Carbon monoxide, compressed, UN1016 18
  - 5.2.6 Natural gas, compressed, with high methane content, UN1971 19
  - 5.2.7 Hexafluoroethane, compressed, or refrigerant gas R116, compressed, UN2193 19
- 5.3 Filling cylinders, spheres, and tubes with liquefied gases 19
  - 5.3.1 General requirements 19
  - 5.3.2 Gases listed in Table 3 20
  - 5.3.3 Gases not specifically listed in Clauses 5.3 and 5.6, except liquefied petroleum gases 20
  - 5.3.4 Specific requirements for liquefied petroleum gases not listed in Table 3 31
  - 5.3.5 Ethylene oxide, or ethylene oxide with nitrogen up to a total pressure of 1 MPa (10 bar) at 50 °C, UN1040 32

- 5.3.6 Ethylene oxide and dichlorodifluoromethane mixture with not more than 12.5% ethylene oxide, UN3070 33
- 5.3.7 Tungsten hexafluoride, UN2196 33
- 5.4 Filling cylinders with acetylene, dissolved, UN1001 33
- 5.5 Filling containers with refrigerated liquefied gases 33
- 5.6 Filling containers with specific dangerous goods, Class 2 35
  - 5.6.1 Application 35
  - 5.6.2 General requirements 35
  - 5.6.3 Specific requirements 38
- 5.7 Filling cylinders, spheres, and tubes with radioactive gases 40

## 6 Other containers 40

- 6.1 Accumulators transported as articles, pressurized, hydraulic (containing nonflammable gas) or articles, pressurized, pneumatic (containing nonflammable gas), UN3164 40
- 6.2 Refrigerating machines containing nonflammable, nontoxic, liquefied gas or ammonia solutions, UN2857, and refrigerating machines containing flammable, nontoxic, liquefied gas, UN2558 40
- 6.3 Lighters or lighter refills (cigarettes) containing flammable gas and capable of passing the tests specified in the Hazardous Products (Lighters) Regulations, UN1057 40
- 6.4 Salvage containers 41
- 6.5 Filling and handling of foreign cylinders for export 41
- 6.6 Containers not specifically listed 42

## Annexes

- A** (informative) — Containers not covered in this Standard 43
- B** (informative) — Determination of equivalent containers 44
- C** (informative) — List of compounds referenced in the Act but not listed in CSA B340 45
- D** (informative) — Contact information 48
- E** (informative) — Index of dangerous goods in CSA B340 49
- F** (informative) — Marking of means of cylinder valve protection 54

## Tables

- 1** — Gases permitted in manifolded containers 12
- 2** — Compressed gases permitted in TC-3, LM or CTC-3AL cylinders 17
- 3** — Filling requirements for liquefied gases in cylinders, spheres, and tubes 21
- 4** — Filling density for liquefied petroleum gases 32
- 5** — Refrigerated liquefied gases and permitted mixtures 34
- 6** — Filling limits for refrigerated liquefied gases 34
- 7** — Dangerous goods covered by Clause 5.6 37

# ***Technical Committee on Cylinders, Spheres, and Tubes for the Transportation of Dangerous Goods***

<b>A. Park</b>	Compressed Gas Association, Ottawa, Ontario	<i>Chair</i>
<b>J. Wedding</b>	Norris Cylinder, Huntsville, Alabama, USA	<i>Vice-Chair</i>
<b>M. Abdelli</b>	Air Liquide Canada Inc., Montréal, Québec	
<b>S. Bartlett</b>	Air Products and Chemicals Inc., Allentown, Pennsylvania, USA	<i>Associate</i>
<b>W.L. Birch</b>	Luxfer Inc., Riverside, California, USA	
<b>C. Butler</b>	Air Products and Chemicals Inc., Allentown, Pennsylvania, USA	<i>Associate</i>
<b>T. Carey</b>	Chart Industries, Inc., Ball Ground, Georgia, USA	<i>Associate</i>
<b>N. Chaudhary</b>	Transport Canada, Ottawa, Ontario	<i>Associate</i>
<b>M.E. Chell</b>	Chell Engineering Services Inc., Fenelon Falls, Ontario	<i>Associate</i>
<b>D. Connor</b>	Vipond Systems Group, Mississauga, Ontario	
<b>J.W. Felbaum</b>	FLA Technologies, Inc., Milbury, Massachusetts, USA	<i>Associate</i>
<b>D. Fraser</b>	CanGas Solutions Inc., Calgary, Alberta	<i>Associate</i>
<b>S.T. Gentry</b>	Worthington Cylinder Corporation, Columbus, Ohio, USA	
<b>J.A. Harris</b>	T.H. Cochrane Laboratories, Ltd., Milwaukee, Wisconsin, USA	<i>Associate</i>
<b>C. Hochman</b>	U.S. Department of Transportation, Washington, DC, USA	<i>Associate</i>
<b>G. Houghton</b>	Carbide Industries Louisville, Kentucky, USA	<i>Associate</i>

<b>M. Kotb</b>	Régie du bâtiment du Québec, Montréal, Québec	
<b>S. LaGrange</b>	Praxair Canada, Inc., Brampton, Ontario	<i>Associate</i>
<b>R. Lalonde</b>	Praxair Canada, Inc., St-Laurent, Québec	
<b>K.T. Lau</b>	Alberta Boilers Safety Association, Edmonton, Alberta	
<b>K. Lum</b>	Praxair Canada Inc., Toronto, Ontario	<i>Associate</i>
<b>T. MacLean</b>	Transport Canada, Ottawa, Ontario	
<b>C. Martin</b>	Arrowhead Industrial Services Inc., Graham, North Carolina, USA	<i>Associate</i>
<b>M. Masse</b>	Worthington Cylinders of Canada Corp., Tilbury, Ontario	<i>Associate</i>
<b>A. Olivares</b>	HSB Global Standards, Hartford, Connecticut, USA	
<b>R.K. Opersko</b>	Air Products Canada Ltd., Nanticoke, Ontario	
<b>C. Scherer</b>	Nordco Rail Services & Inspection Technologies, Ridgefield, Connecticut, USA	<i>Associate</i>
<b>E. Sinkovits</b>	Linde Canada Ltd., Mississauga, Ontario	<i>Associate</i>
<b>J. Sommer</b>	Manchester Iron & Equipment Company, Elkhart, Indiana, USA	
<b>D.J. Stainrod</b>	D. Stainrod & Associates Ltd., Newcastle, Ontario	
<b>D.W. Treadwell</b>	C-P Industries, McKeesport, Pennsylvania, USA	
<b>C. Turylo</b>	Technical Standards & Safety Authority, Toronto, Ontario	
<b>R. Wark</b>	Linde AG, Pullach, Germany	
<b>C. Webster</b>	Powertech Labs Inc., Surrey, British Columbia	
<b>G. Wilson</b>	Arrowhead Industrial Services, Inc., Graham, North Carolina, USA	

**J.Y. Wong**

Powertech Labs Inc.,  
Surrey, British Columbia

*Associate*

**R. Meyers**

CSA Group,  
Mississauga, Ontario

*Project Manager*

# Preface

This is the sixth edition of CSA B340, *Selection and use of cylinders, spheres, tubes, and other containers for the transportation of dangerous goods, Class 2*. It supersedes the previous editions, published in 2008, 2002, 1997, 1988, and 1986.

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. Since regulations may adopt the Standard with certain exceptions or additional requirements, it is recommended that the regulations of the relevant jurisdiction be consulted in order to establish the extent to which this Standard has been adopted. Notwithstanding the provisions of this Standard, compliance with the provisions of the *Transportation of Dangerous Goods Act* and the Regulations thereto may call for additional requirements due to particular characteristics or properties of individual dangerous goods. Any requirements of the Transportation of Dangerous Goods Regulations regarding the handling, the offering for transport, and the transportation of dangerous goods in cylinders, spheres, and tubes are to be fully complied with.

For the development of this new edition, the CSA Technical Committee on Cylinders, Spheres, and Tubes for the Transportation of Dangerous Goods reviewed and made extensive use of the Transportation of Dangerous Goods Regulations of Transport Canada, Compressed Gas Association publications, and the US *Code of Federal Regulations*. This Standard takes into account proven experience and current technical advances made in the field.

This Standard is written in SI units except for the cylinder marking requirements, where the service pressure and, where applicable (e.g., Specification TC-39M), the test pressure are expressed in bar. However, for consistency in the design and test requirements of all containers, MPa and kPa have been retained as units to express service pressure. Considering the use of the “bar” unit by ISO (International Organization for Standardization) to mark service and test pressures, it was decided to use the same unit for marking service pressure in this Standard. The capital letter “M” has been added to each specification designation to identify formally that the container specification is metricated.

This Standard was prepared by the Technical Committee on Cylinders, Spheres, and Tubes for the Transportation of Dangerous Goods, under the jurisdiction of the Strategic Steering Committee on Mechanical Industrial Equipment Safety, and has been formally approved by the Technical Committee.

## Notes:

- (1) Use of the singular does not exclude the plural (and vice versa) when the sense allows.
- (2) Although the intended primary application of this Standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the Standard to judge its suitability for their particular purpose.
- (3) This Standard was developed by consensus, which is defined by CSA Policy governing standardization — Code of good practice for standardization as “substantial agreement. Consensus implies much more than a simple majority, but not necessarily unanimity”. It is consistent with this definition that a member may be included in the Technical Committee list and yet not be in full agreement with all clauses of this Standard.
- (4) To submit a request for interpretation of this Standard, please send the following information to [inquiries@csagroup.org](mailto:inquiries@csagroup.org) and include “Request for interpretation” in the subject line:
  - (a) define the problem, making reference to the specific clause, and, where appropriate, include an illustrative sketch;
  - (b) provide an explanation of circumstances surrounding the actual field condition; and
  - (c) where possible, phrase the request in such a way that a specific “yes” or “no” answer will address the issue.Committee interpretations are processed in accordance with the CSA Directives and guidelines governing standardization and are available on the Current Standards Activities page at [standardsactivities.csa.ca](http://standardsactivities.csa.ca).
- (5) This Standard is subject to review within five years from the date of publication. Suggestions for its improvement will be referred to the appropriate committee. To submit a proposal for change, please send the following information to [inquiries@csagroup.org](mailto:inquiries@csagroup.org) and include “Proposal for change” in the subject line:
  - (a) Standard designation (number);
  - (b) relevant clause, table, and/or figure number;
  - (c) wording of the proposed change; and
  - (d) rationale for the change.

# B340-14

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

### **1 Scope**

#### **1.1**

This Standard covers safety requirements for the selection and use of cylinders, spheres, tubes, and other containers for the transportation of dangerous goods, Class 2.

#### **1.2**

This Standard covers requirements for the handling and filling of cylinders, spheres, tubes, and other containers for the transportation of dangerous goods, Class 2.

#### **1.3**

In this Standard, “shall” is used to express a requirement, i.e., a provision that the user is obliged to satisfy in order to comply with the standard; “should” is used to express a recommendation or that which is advised but not required; “may” is used to express an option or that which is permissible within the limits of the standard.

Notes accompanying clauses do not include requirements or alternative requirements; the purpose of a note accompanying a clause is to separate from the text explanatory or informative material.

Notes to tables and figures are considered part of the table or figure and may be written as requirements.

Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

### **2 Reference publications**

This Standard refers to the following publications, and where such reference is made it shall be to the edition listed below, including all amendments published thereto. Where foreign Standards are referenced, only the technical content applies. Where there is a variance with this Standard, the requirements of this Standard shall prevail except in the case of Canadian regulations. Users of this Standard are advised against the direct application of any of the following reference publications without careful consideration of this Standard’s reference to that standard, specification, or code.

**Note:** See [Annex D](#) for information on the reference organizations.

#### **CSA Group**

B51-08

*Boiler, pressure vessel, and pressure piping code*

B52-05

*Mechanical refrigeration code*