



Transportation of Dangerous Goods Directorate  
Tower C, Place de Ville  
330 Sparks Street  
Ottawa, Ontario  
K1A 0N8

Direction générale du Transport des marchandises dangereuses  
Tour C, Place de Ville  
330, rue Sparks  
Ottawa (Ontario)  
K1A 0N8



## Equivalency Certificate (Approval issued by the competent authority of Canada)

**Certificate No.:** SU 9686 (Ren. 7)

**Certificate Holder:** Structural Composites Industries,  
a Worthington Cylinders Company

**Mode of Transport:** Road, Rail, Marine

**Effective Date:** July 19, 2018

**Expiry Date:** September 30, 2023

### LEGEND

For the purposes of this equivalency certificate, the document name listed in the short form has the same meaning as the document name listed in the long form. If a document is referred to in this equivalency certificate, it is referred to by the short form.

***TDG Regulations:*** *Transportation of Dangerous Goods Regulations*

***CSA B339:*** *CSA Standard B339, "Cylinders, spheres, and tubes for the transportation of dangerous goods", published by the Canadian Standards Association (CSA), as amended from time to time*

***CSA B339-18:*** *CSA Standard B339-18, "Cylinders, spheres, and tubes for the transportation of dangerous goods", June 2018, published by the Canadian Standards Association (CSA)*

***CSA B340-18:*** *CSA Standard B340-18, "Selection and use of cylinders, spheres, tubes, and other containers for the transportation of dangerous goods, Class 2", June 2018, published by the Canadian Standards Association (CSA)*

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**CONDITIONS**

This equivalency certificate authorizes Structural Composites Industries, a Worthington Cylinders Company, to sell, offer for sale, distribute, or deliver in Canada and authorizes any person to handle, offer for transport, transport, or import into Canada, by road or railway vehicle, or by ship, cylinders, in a manner that does not comply with:

- subsections 5.1.1(1) and 5.1.1(2) of the *TDG Regulations*,
- section 5.2 of the *TDG Regulations*,
- subparagraphs 5.10(1)(a)(ii), 5.10(1)(b)(iii), and 5.10(1)(d)(iii) of the *TDG Regulations*, and
- subsection 5.10(2) of the *TDG Regulations*,

if the following conditions are met:

**Selection and Use**

(a) Subject to conditions (b) to (h) of this certificate, the requirements applicable to Specification TC-3CCM cylinders in *CSA B340-18* are complied with.

(b) Each cylinder contains one of the following dangerous goods, as specified in the design qualification test reports:

<u>DANGEROUS GOODS</u>	<u>PIN</u>
AIR, COMPRESSED with not more than 23.5 per cent oxygen, by volume	UN1002
ARGON, COMPRESSED	UN1006
CARBON MONOXIDE, COMPRESSED	UN1016
HELIUM, COMPRESSED	UN1046
HYDROGEN, COMPRESSED	UN1049
KRYPTON, COMPRESSED	UN1056
NEON, COMPRESSED	UN1065
NITROGEN, COMPRESSED	UN1066
NITROUS OXIDE	UN1070
OXYGEN, COMPRESSED	UN1072
SULFUR HEXAFLUORIDE	UN1080
COMPRESSED GAS, FLAMMABLE, N.O.S.	UN1954
COMPRESSED GAS, N.O.S.	UN1956
METHANE, COMPRESSED; or NATURAL GAS, COMPRESSED with high methane content	UN1971
XENON, COMPRESSED	UN2036
CARBON MONOXIDE AND HYDROGEN MIXTURE, COMPRESSED	UN2600
COMPRESSED GAS, OXIDIZING, N.O.S.	UN3156

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- (c) Cylinders that have been subjected to fire are not returned to service.
- (d) Cylinders involved in an accident or collision are subjected to requalification before being returned to service.
- (e) The cylinders are manifolded in accordance with Clause 4.4 of *CSA B340-18* and permanently mounted within a high strength structural framework that safely secures the cylinders, components, and manifolding. The frame is:
  - (i) designed to secure the cylinders while withstanding a static force of eight times the weight of the assembly, in the three principal axes, applied individually,
  - (ii) designed to secure the cylinders while withstanding a static force of seven times the weight of the assembly longitudinally, three times the weight of the assembly laterally and three times the weight of the assembly vertically, applied simultaneously,
  - (iii) designed in such a manner that no cylinder or component extends beyond the envelope defined by the frame,
  - (iv) designed to protect the cylinders from localized impact and from road debris through adequate shielding, and
  - (v) inspected for damage and permanent deflection of framing members at time of cylinder requalification or when there is cause to believe that the framing members may have sustained damage such as damage resulting from a vehicle accident or exposure to corrosive materials. Any damaged framing member that is found non-compliant with the conditions of this certificate or the frame manufacturer's specifications is restored to a compliant condition by repair or replacement.
- (f) The requirements of Clause 4.5 of *CSA B340-18* are complied with.
- (g) No more than 15 years has elapsed since the original manufacturing test date for each cylinder.
- (h) When used in nitrous oxide service, the cylinders comply with Clause 4.6.1.1 of *CSA B340-18*.

**Manufacture and Requalification**

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(i) The cylinders are manufactured at 336 Enterprise Place, Pomona, CA, U.S.A., in accordance with the specific procedures, the design qualification test report, and model number ALT 962, ALT 962L, ALT 881DK, or ALT 881DKL filed by Structural Composites Industries, a Worthington Cylinders Company with the Executive Director, Regulatory Frameworks and International Engagement, Regulatory Affairs Branch, Transportation of Dangerous Goods Directorate, Transport Canada.

(j) Subject to conditions (k) to (t) of this certificate, the cylinders are in compliance with the requirements applicable to Specification TC-3CCM set out in *CSA B339-18*.

(k) The requirement for the maximum water capacity of 91 L as specified in Clause 9.1.3 of *CSA B339-18* does not apply and the water capacity of the cylinders shall be in accordance with the applicable cylinder design specified in condition (i) of this certificate.

(l) The requirement for the maximum service pressure of 34.5 MPa in Clause 9.1.3 of *CSA B339-18* does not apply and the service pressure of the cylinders shall be in accordance with the applicable cylinder design specified in condition (i) of this certificate.

(m) Despite Clause 9.9.1 of *CSA B339-18*, the specimens are cut from a test ring that has been heat-treated in the same furnace load as the liners it represents. The test ring is of the same nominal diameter and thickness as the liners it represents and is taken from a heat of aluminium tubing material that is represented in the load. The ring is at least 60 cm long and has its ends covered during the heat-treatment process.

(n) In relation to the design qualification test requirements specified in Clause 9.13 of *CSA B339-18*:

(i) it is not required that each test cylinder be subjected to a vertical bonfire test, as specified in Clause 9.13.7 of *CSA B339-18*. However, at least two cylinders, representative of each new design, are subjected to the horizontal bonfire test except that the fire for tests is generated by propane and the cylinders may vent through the pressure-relief device and the cylinder-to-valve connection,

(ii) the drop test required by Clause 9.13.8 of *CSA B339-18* does not apply provided that at least one cylinder representative of each new design is subjected to a drop test in accordance with clause 8.5.8 of International Standard ISO 11119-2:2012, "*Gas Cylinders – Refillable composite gas cylinders and tubes – Design, construction and testing – Part 2: Fully wrapped fibre reinforced composite gas cylinders and tubes up to 450 L with load-sharing metal liners*",

(iii) the representative cylinder that is subjected to the gunfire test prescribed in Clause 9.13.6 of *CSA B339-18* may be impacted by a 12.7 mm calibre

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armour-piercing projectile.

- (o) The reports are retained by the manufacturer and by the independent inspector for the service life of the cylinders.
- (p) The Transport Canada mark, the specification designation, and the service pressure marked on each cylinder is, "TC-SU 9686" followed by the service pressure expressed in bar.
- (q) Each cylinder is marked "DO NOT USE AFTER MM/YYYY", where "MM" is the month and "YYYY" is the year representing the service life limitation of the cylinder which does not exceed 15 years from the original manufacturing test date.
- (r) The requalification period is 5 years.
- (s) Despite section 10 of CGA Publication C-6.2, "*Guidelines for Visual Inspection and Requalification of Fiber Reinforced High Pressure Cylinders*", 2013, the acceptance criteria for level 2 cuts and abrasions in the fibre are:
  - (i) for depth: is not to penetrate completely through the outer glass fibre layers, such that the carbon fibre has been exposed, cut or abraded. The maximum measurable depth is 0.889 mm for cylinder diameters up to 190.5 mm and is 1.143 mm for cylinder diameters greater than 190.5 mm,
  - (ii) for length: is not to exceed 20% of the full straight sidewall length of the cylinder. The straight sidewall length is measured between those two points where ends begin to curve.
- (t) The certificate holder, cylinder owner or user reports any incident involving loss of contents or failure of the cylinders to the Executive Director, Regulatory Frameworks and International Engagement, Regulatory Affairs Branch, Transportation of Dangerous Goods Directorate, Transport Canada.

This equivalency certificate serves as the registration of Structural Composites Industries, a Worthington Cylinders Company pursuant to Clause 25.2 of *CSA B339-18*, to manufacture cylinders of the designs specified herein. Structural Composites Industries, a Worthington Cylinders Company's registered mark pursuant to *CSA B339-18* is:

**ALT**

<p><b>Note 1: The conditions of this equivalency certificate must be complied with. Subsection 31(4) of the <i>Transportation of Dangerous Goods Act, 1992</i></b></p>
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**stipulates that non-compliance with any of the terms or conditions invalidates the equivalency certificate. If any of the conditions are not complied with, the *Transportation of Dangerous Goods Act, 1992 and TDG Regulations* would apply as though this equivalency certificate did not exist.**

**Note 2: The issuance of this equivalency certificate in no way reduces the certificate holder's responsibility to comply with any other requirements of the *TDG Regulations* that are not specifically addressed in this certificate.**

Signature of Issuing Authority



David Lamarche, P. Eng., ing.  
Chief,  
Approvals and Special Regulatory Projects

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*(The following Explanatory Note is for information purposes only and is not part of this certificate.)*

**Explanatory Note**

This equivalency certificate allows for the manufacture and use of fully-wrapped carbon-fibre reinforced aluminium-lined cylinders which are manifolded and permanently mounted within a protective framework for the transport of compressed gases. Aside from certain exceptions provided by this equivalency certificate, the cylinders comply with the TC-3CCM specification, a cylinder specification authorized by CSA B339.

**Legend for Certificate Number**

SH - Road, SR - Rail, SA - Air, SM - Marine  
SU - More than one Mode of Transport  
Ren. - Renewal

**NOTE**

Under Canadian Law, a foreign manufacturer of non-specification cylinders cannot be charged with an offence under the *Transportation of Dangerous Goods Act, 1992* for failure to comply with the conditions of a Certificate. However, certain remedies under the Act are available to Transport Canada in this eventuality.

These include:

1. detention of dangerous goods and consequently the means of containment containing them (subsection 17(1));
2. detention of the means of containment whether full or empty (subsection 17(1));
3. directions not to import the means of containment or to return them to origin (subsection 17(3));
4. inspectors' directions (section 19);
5. directions to importers of the means of containment to issue notices of defective construction or recall (subsection 9(2)); and
6. revocation of the certificate, thereby making any use of the means of containment an offence; (subsection 31(6)).

If none of the foregoing are adequate, Protective Directions may be issued to prohibit or to control the use of the cylinders. (section 32).