



Transportation of Dangerous Goods Directorate
L'Esplanade Laurier
300 Laurier Avenue West
Ottawa, Ontario
K1A 0N5

Direction générale du transport des marchandises dangereuses
L'Esplanade Laurier
300, avenue Laurier Ouest
Ottawa (Ontario)
K1A 0N5



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

Certificate No.: SU 5931 (Ren. 11)

Template Number: N/A

Certification Holder: Hexagon Ragasco AS

Mode of Transport: Road, Rail, Air, Marine

Effective Date: November 7, 2023

Expiry Date: December 31, 2028

LEGEND

For the purposes of this equivalency certificate, documents referred to by an abbreviation have the following meaning:

TDG Act: *Transportation of Dangerous Goods Act, 1992*

TDG Regulations: *Transportation of Dangerous Goods Regulations*

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)

ISO 11119-3:2002: ISO standard 11119-3, “Gas cylinders of composite construction - Specification and test methods - Part 3: Fully wrapped fibre reinforced composite gas cylinders with non-load-sharing metallic or non-metallic liners”, dated 2002

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NOTES

Note 1: Subsection 31(4) of the *TDG Act* stipulates that any non-compliance with the conditions of this equivalency certificate causes the provisions of the *TDG Act* and *TDG Regulations* to apply as though this equivalency certificate did not exist.

Note 2: This equivalency certificate provides no regulatory relief other than specifically stated herein. Therefore, all other requirements of the *TDG Act* and the *TDG Regulations* apply.

Note 3: No person shall use or apply this equivalency certificate, including the display of its number, when the equivalency certificate has expired or is otherwise no longer in effect. Any alteration of this equivalency certificate renders it invalid. Visit the Transport Canada website for the latest version of this equivalency certificate.

PURPOSE

(The following is for information purposes only and is not part of the certificate.)

The certificate holder has demonstrated that the manufacture of a cylinder in accordance with Standard *ISO 11119-3:2002* and the conditions specified results in a cylinder which could be used with equivalent safety to that of a TC-3FCM specification cylinder. This equivalency certificate authorizes the manufacture and use of these cylinders under the *TDG Regulations*.

CONDITIONS

This equivalency certificate authorizes **Hexagon Ragasco AS** 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, by aircraft or by vessel in Canada, cylinders in a manner that does not comply with:

- section 5.1.1 of the *TDG Regulations*,
- section 5.2 of the *TDG Regulations*,
- subparagraph 5.10(1)(a)(ii) of the *TDG Regulations*,
- subparagraph 5.10(1)(b)(iii) of the *TDG Regulations*,
- subparagraph 5.10(1)(c)(ii) of the *TDG Regulations*, and
- subparagraph 5.10(1)(d)(iii) of the *TDG Regulations*,

if the following conditions are met:

1) Selection and Use

- a) Subject to conditions 1)b) to 1)h) of this equivalency certificate, the requirements applicable to Specification TC-3FCM cylinders in *CSA B340-18* are complied with;
- b) Despite Clause 4.6.2 of *CSA B340-18*, each cylinder contains the following dangerous goods:

UN Number	Shipping Name and Description	Class	Packing Group
UN1011	BUTANE	2.1	N/A
UN1075	LIQUEFIED PETROLEUM GASES; or PETROLEUM GASES, LIQUEFIED	2.1	N/A
UN1965	HYDROCARBON GAS MIXTURE, LIQUEFIED, N.O.S.	2.1	N/A
UN1978	PROPANE	2.1	N/A

- c) Clause 5.3.4.1 of *CSA B340-18* does not apply except that the filling density is in accordance with Table 4 of *CSA B340-18*;
- d) Cylinders that have been subjected to excessive heat or fire are not returned to service;
- e) Not more than 15 years has elapsed since the original manufacturing test date for each cylinder;
- f) Instead of the standards of inspection specified in Clause 5.1.3(c) of *CSA B340-18*, the visual inspection requirements specified in condition 2)i) of this equivalency certificate apply;

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- g) Despite Clause 5.1.4(b) of *CSA B340-18*, before being filled, cylinders due for requalification are requalified in accordance with the requirements specified in condition 2)i) of this equivalency certificate. Cylinders that do not meet the prefill inspection shall be rejected and not filled until the cause for rejection has been corrected;
- h) The packaging requirements specified in Clause 4.9 of *CSA B340-18* do not apply.

2) Manufacture and Requalification

- a) The cylinders are manufactured at Raufoss Industry Park, Raufoss, Norway in accordance with the specific procedures, the design qualification test reports, and the cylinder designs corresponding to articles 0111155, 0111156, 0111157, 0111158, 0110701, 0112938, 0112939, 0113660, 0113661, 0111159, and 0111160 in Table 1 of drawing number 0110262, rev Q, filed by **Hexagon Ragasco AS** with the Regulatory Frameworks and International Engagement Branch, Transportation of Dangerous Goods Directorate, Transport Canada;
- b) Subject to conditions 2)c) to 2)i) of this equivalency certificate, the cylinders are in compliance with the requirements applicable to fully wrapped composite cylinders with non-load-sharing non-metallic liners specified in *ISO 11119-3:2002*;
- c) Inspections and verifications are in accordance with the requirements of *ISO 11119-3:2002* and carried out by an Independent Inspector registered with Transport Canada in accordance with Clause 25.4 of *CSA B339-18*. In addition, the Independent Inspector:
 - i) performs or witnesses the burst test, vacuum test, drop test, gunfire test, fire resistance test and torque test,
 - ii) for each new cylinder design, prepares a report that includes, as a minimum, all information shown in Annex A of *ISO 11119-3:2002*, and
 - iii) for each cylinder batch, prepares a report that includes, as a minimum, all information shown in Annex B of *ISO 11119-3:2002*. The reports are retained by the manufacturer and by the Independent Inspector for the service life of the cylinders;
- d) The proof pressure test specified in Clause 8.5.1 of *ISO 11119-3:2002* is performed hydraulically or pneumatically. The test system components and test system accuracy verification comply with Compressed Gas Association Publication C-1-2016, "*Methods for Pressure Testing Compressed Gas Cylinders*"; dated 2016;
- e) The burst test specified in Clause 8.5.3 of *ISO 11119-3:2002* is performed and the cylinder remains in one piece. Leakage through the boss fusion joint is permitted, provided that the pressure at failure is a least 4 times the design service pressure;

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- f) The fire resistance test specified in Clause 8.5.11 of *ISO 11119-3:2002* is performed on three cylinders, two in the vertical position and one in the horizontal position. Time-pressure readings are recorded at 30 second intervals from the start of the fire until venting is complete. Venting may occur through the pressure relief device or through the cylinder wall or other surfaces. The cylinder must not burst and must remain in one piece;
- g) The requirements specified in Clause 4.15 of *CSA B339-18* apply;
- h) Each cylinder is permanently marked in accordance with Clause 4.19 of *CSA B339-18*, except the Transport Canada mark, the specification designation and the service pressure are replaced with “**TC-SU 5931**” followed by the service pressure expressed in bar. In addition to these marks, each cylinder must be permanently and legibly marked with:
 - i) the text “**Max Propane**” followed by the maximum mass of propane (in kilograms) and the unit symbol “**kg**”,
 - ii) the letter “**T**” followed by the tare (in kilograms) and the unit symbol “**kg**”,
 - iii) the text “**requalification required 5 years from date of manufacture / requalification requise 5 ans après la date de fabrication**”,
 - iv) the text “**cylinder service life expires 15 years from date of manufacture / durée de vie de la bouteille vient à échéance 15 ans après sa date de fabrication**”, and
 - v) the size of the marks shall be not less than 6 mm in height except that the marks required by items (d) to (g) of Clause 4.19.2 of *CSA B339-18* shall be not less than 3 mm in height;
- i) Each cylinder is requalified at least every five years in accordance with the following conditions:
 - i) the requalification is performed by a facility registered for requalifying cylinders by external visual inspection in accordance with Clause 25.3 of *CSA B339-18*,
 - ii) an external visual inspection is conducted on the exposed composite areas in accordance with CGA Publication C-6.2-2013, entitled “*Standard for Visual Inspection and Requalification of Fiber Reinforced High Pressure Cylinders*”, dated December 2013. The inspection is conducted with the outer casing in place using a high intensity light. The maximum allowable depth of level 2 abrasions and cuts is 0.24 mm in the cylinder sidewall and 0.07 mm in the cylinder head provided that the maximum length of the defect is less than 50% of the external diameter of the cylinder and rework is performed,

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- iii) a visual inspection is conducted on the outer casing in accordance with Appendix A of this equivalency certificate. The inspection is performed with the outer casing in place,
- iv) removal or replacement of the outer casing is only performed by personnel authorized by the manufacturer,
- v) a requalification marking is applied in accordance with Clause 24.6.3 of *CSA B339-18*. The marking is applied on a label securely affixed to the exposed dome of the cylinder and overcoated with epoxy. Stamping of any part of the cylinder is prohibited, and
- vi) the requalification report is kept for the service life of the cylinder; and
- j) The certificate holder, cylinder owner, or user reports any incident involving loss of contents or failure of the cylinders to the Regulatory Frameworks and International Engagement Branch, Transportation of Dangerous Goods Directorate, Transport Canada.

This equivalency certificate serves as the registration of **Hexagon Ragasco AS**, pursuant to Clause 25.2 of *CSA B339-18*, to manufacture cylinders of the designs specified herein. **Hexagon Ragasco AS**'s registered mark, pursuant to *CSA B339-18*, is:

M0407

Signature of Issuing Authority



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

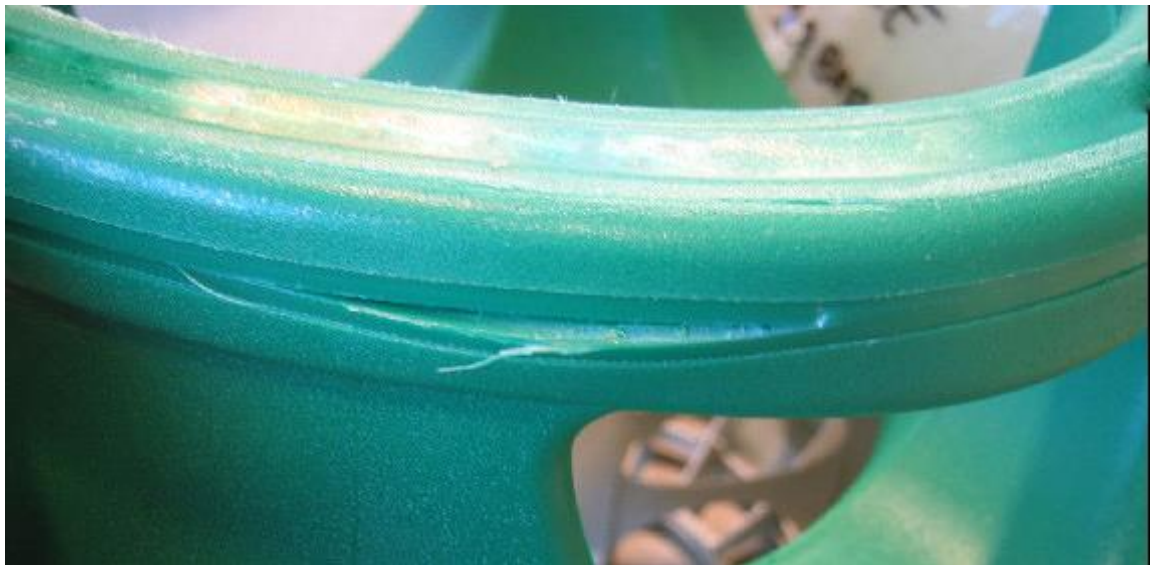
Appendix A

Outer Casing Inspection Criteria

Damage that affects the protective function of the casing is unacceptable. If unacceptable damage is identified, the cylinder must be rejected or the casing removed from the cylinder and the cylinder inspected for damage in accordance with condition 2)i) of this certificate. If the cylinder is acceptable, a new casing may be installed.



Figure 1: Acceptable outer casing damage caused by abrasion



Figures 2 and 3: Unacceptable outer casing damage



Figure 4: Damage sustained from a horizontal drop, which is the most severe for this type of cylinder. If these marks are found in the cylindrical area or at the joint between the upper and lower casing, the cylinder must be rejected.



Figures 5 and 6: Unacceptable outer casing heat damage

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Legend for Certificate Number	
SH - Road, SR - Rail, SA - Air, SM - Marine SU - More than one Mode of Transport Ren - Renewal	

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