

December 7, 2016



U.S. Department
of Transportation

East Building, PHH-30
1200 New Jersey Avenue S.E.
Washington, D.C. 20590

**Pipeline and Hazardous
Materials Safety Administration**

DOT-SP 13173
(EIGHTH REVISION)

EXPIRATION DATE: January 31, 2018

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Luxfer Canada Limited
Calgary, Alberta Canada
(U.S. Agent: Registered Agent Solution, Inc.
Washington, DC)

2. PURPOSE AND LIMITATION:
 - a. This special permit authorizes the manufacture, marking, sale, and use of non-DOT specification fully wrapped carbon-fiber reinforced aluminum lined cylinders which are manifolded and permanently mounted in a protective frame for the transportation in commerce of the materials authorized by this special permit. This special permit provides no relief from the Hazardous Materials Regulations (HMR) other than as specifically stated herein. The most recent revision supersedes all previous revisions.

 - b. The safety analyses performed in development of this special permit only considered the hazards and risks associated with transportation in commerce.

3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.

4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR § 172.101 Table, Column (9B) in that the quantity limitation for cargo aircraft only is exceeded and § 173.302a(a)(1) in that non-DOT specification cylinders are not authorized except as specified herein.

Note: This does not relieve the holder of this special permit from securing an approval for manufacturing cylinders from the Associate Administrator for Hazardous Materials Safety.

5. BASIS: This special permit is based on the application of Luxfer Canada Limited dated December 30, 2015, submitted in accordance with § 107.105 and the public proceeding therein.
6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Hazardous Materials Description			
Proper Shipping Name	Hazard Class/ Division	Identification Number	Packing Group
Air, compressed (<i>containing up to 39% by volume oxygen content</i>)	2.2	UN1002	N/A
Argon, compressed	2.2	UN1006	N/A
Carbon Dioxide	2.2	UN1013	N/A
Compressed gas, flammable, n.o.s.	2.1	UN1954	N/A
Compressed gas, n.o.s.	2.2	UN1956	N/A
Compressed gas, oxidizing, n.o.s.	2.2	UN3156	N/A
Ethane, compressed	2.1	UN1035	N/A
Helium, compressed	2.2	UN1046	N/A
Hydrocarbon gas mixture, compressed, n.o.s.	2.1	UN1964	N/A
Hydrogen, compressed	2.1	UN1049	N/A
Krypton, compressed	2.2	UN1056	N/A
Liquefied gas, n.o.s.	2.2	UN3163	N/A

Hazardous Materials Description			
Proper Shipping Name	Hazard Class/ Division	Identification Number	Packing Group
Methane, compressed or Natural gas, compressed (<i>with high methane content</i>)	2.1	UN1971	N/A
Neon, compressed	2.2	UN1065	N/A
Nitrogen, compressed	2.2	UN1066	N/A
Nitrogen trifluoride	2.2	UN2451	N/A
Nitrous Oxide	2.2	UN1070	N/A
Oxygen, compressed	2.2	UN1072	N/A
Sulfur hexafluoride	2.2	UN1080	N/A
Xenon, compressed	2.2	UN2036	N/A

7. SAFETY CONTROL MEASURES:

a. PACKAGING - Prescribed packaging is a fully wrapped carbon-fiber reinforced aluminum lined cylinder with a maximum service pressure of 6527 psig (450 bar) and a maximum water capacity of 320L (11.3 ft³). Cylinders must be designed, manufactured and marked in conformance with Basic Requirements for Fully Wrapped Carbon-Fiber Reinforced Aluminum Lined Cylinders (DOT-CFFC) (Fifth Revision), dated March 2007 except as follows:

CFFC-2 - Cylinders must be wrapped entirely with an epoxy/carbon fiber laminate in lieu of the outer glass filament and epoxy layer. The aluminum liner is coated with an epoxy layer to provide galvanic corrosion protection. The cylinder maximum water capacity is 320 L in lieu of the maximum 91L capacity.

CFFC-6(a) (vi) - The minimum elongation for a 2 inch tensile specimen of the aluminum liner is 12% in lieu of the specified 14%.

CFFC-6(b)(i) The carbon fiber tensile strength may not exceed 5,360,000kPa (770,402 psi) in lieu of 5,171,068 kPa (750,000 psi).

CFFC-10(c) - At a minimum, one cylinder complete with valve must be subjected to a drop test in accordance with ISO 11119-2 in lieu of the CFFC Standard requirements.

CFFC-10(h) - Two cylinders must be tested in accordance with the specified bonfire test, except that the position of the cylinder must be horizontal instead of vertical.

CFFC-14(a) - Each cylinder that is made in conformance with this special permit must be permanently marked on the composite overwrap on the sidewall with a permanently bonded adhesive backed tamper-proof label in lieu of marking in the composite overwrap on the sidewall.

b. TESTING: Cylinders must be reinspected and hydrostatically retested at least once every five years. Testing must be performed in accordance with DOT-CFFC-13, tested to 5/3 of the marked service pressure, 49 CFR 180.205, and the latest edition of CGA pamphlet C-6.2 "Guidelines for Visual Inspection and Re-qualification of Fiber Reinforced High Pressure Cylinders", except as specifically noted herein:

(1) Cylinders must be volumetrically tested by the water jacket method suitable for the determination of the cylinder expansion for a minimum test time of one minute.

(2) A maximum permanent expansion to total expansion ratio does not apply. The cylinder must be condemned if the elastic expansion exceeds the rejection elastic expansion (REE) as marked on the cylinder.

(3) Retest markings must be applied on a label securely affixed to the cylinder and overcoated with epoxy, near the original test date. Metal stamping of the composite surface is prohibited. Reheat treatment of rejected cylinders is not authorized.

(4) Cylinders with fiber damage (cuts, abrasions, etc.) that exceed Level 1 type damage as defined in CGA Pamphlet C-6.2 and meet the following depth and length criteria are considered to have Level 2 damage:

(i) Depth - Damage that upon visual inspection has a measured depth of greater than 0.005 and less than 0.045 inch for cylinders with an outside diameter greater than 7.5 inches or less than 0.035 inches for cylinders 7.5 inches or less in outside diameter;

(ii) Length - Damage that has a maximum allowable length of:

Region	Direction of fiber damage	Maximum length of damage
Cylinder sidewall and domes	Transverse to fiber direction (longitudinal direction)	20% of the length of the straight sidewall section of the cylinder
Cylinder sidewall and domes	In the direction of the fiber (circumferential direction)	20% of the length of the straight sidewall section of the cylinder

(5) Cylinders with damage that meet the Level 2 criteria must be rejected. Retesters must contact the cylinder manufacturer in the event that damage is questionable based on this criteria. Repair of rejected cylinders is authorized for Level 2 type damage. Repairs must be made in accordance with CGA pamphlet C-6.2, prior to the hydrostatic pressure test. Repairs must be evaluated after the hydrostatic test.

(6) Cylinders that have direct fiber damage that has a measured damage depth of greater than the Level 2 maximum stated in (5)(a) above are considered to have Level 3 type damage. Cylinders that have damage with depth meeting Level 2, but length exceeding the Level 2 maximum are considered to have Level 3 type damage. Cylinders with Level 3 type damage are not authorized to be repaired, and must be condemned.

(7) A hydrostatic retest may be repeated as provided for in § 180.205(g), however, only two such retests are permitted. Pressurization prior to the official hydrostatic test for the purpose of a systems check must not exceed 85% of the required test pressure.

c. OPERATIONAL CONTROLS -

(1) Cylinders manufactured under this special permit are not authorized for use fifteen (15) years after the date of manufacture.

(2) A cylinder that has been subjected to fire may not be returned to service.

(3) Cylinders used in oxygen service must conform with § 173.302(b)(1) through (4).

(4) Transportation of Division 2.1 (flammable gas) is not authorized aboard cargo vessel or aircraft unless specifically authorized in the Hazardous Materials Table (§ 172.101).

(5) Transportation of oxygen is only authorized when in accordance with § 175.501.

(6) Cylinders must be manifolded in accordance with the requirements of § 173.301(g).

(7) All cylinders must be operated and maintained in accordance with the Luxfer Canada Ltd. Cylinder and Component Operation Manuals.

(8) Cylinders shall be permanently mounted within a high strength structural framework that safely secures the cylinders, components, and manifolding. The frame must be designed in accordance with § 173.301(i). The frame must be designed to withstand a static force of eight times the weight of the assembly in three principle axes, applied individually. In addition, the frame must be designed to withstand a static force of seven times longitudinally, three times laterally, and three times vertically, the weight of the structure applied simultaneously.

(9) Any structural framework that will be used to transport the cylinders must have a Finite Element

Analysis (FEA) on file with the Office of Hazardous Materials Safety Approvals and Permits Division. The FEA must demonstrate the framework's ability to protect the cylinders from damage due to front, rear, or side impact, and rollover.

d. MARKING - Each cylinder must be plainly and durably marked "DOT-SP 13173". In addition, each frame must be marked "DOT-SP 13173".

8. SPECIAL PROVISIONS:

a. In accordance with the provisions of § 173.22a(b), persons may use the packaging authorized by this special permit for the transportation of the hazardous materials specified in paragraph 6, only in conformance with the terms of this special permit.

b. A person who is not a holder of this special permit, but receives a package covered by this special permit, may reoffer it for transportation provided no modification or change is made to the package and it is offered for transportation in conformance with this special permit and the HMR.

c. A current copy of this special permit must be maintained at each facility where the package is offered or reoffered for transportation.

d. Each packaging manufactured under the authority of this special permit must be either: (1) marked with the name of the manufacturer and location (city and state) of the facility at which it is manufactured; or (2) marked with a registration symbol designated by the Office of Hazardous Materials Special Permits and Approvals for each specific manufacturing facility.

e. A current copy of this special permit must be maintained at each facility where the package is manufactured under this special permit. It must be made available to a DOT representative upon request.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel, and cargo aircraft only.

10. MODAL REQUIREMENTS: A current copy of this special permit must be carried aboard each cargo vessel, aircraft or motor vehicle used to transport packages covered by this special permit. The shipper must furnish a current copy of this special permit to the air carrier before or at the time the shipment is tendered.
11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this special permit and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. 5101 et seq:
- o All terms and conditions prescribed in this special permit and the Hazardous Materials Regulations, 49 CFR Parts 171-180.
 - o Persons operating under the terms of this special permit must comply with the security plan requirement in Subpart I of Part 172 of the HMR, when applicable.
 - o Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 171.8, who performs a function subject to this special permit must receive training on the requirements and conditions of this special permit in addition to the training required by §§ 172.700 through 172.704. No person may use or apply this special permit, including display of its number, when this special permit has expired or is otherwise no longer in effect.

Under Title VII of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)—"The Hazardous Materials Safety and Security Reauthorization Act of 2005" (Pub. L. 109-59), 119 Stat. 1144 (August 10, 2005), amended the Federal hazardous materials transportation law by changing the term "exemption" to "special permit" and authorizes a special permit to be granted up to two years for new special permits and up to four years for renewals.

12. REPORTING REQUIREMENTS: Shipments or operations conducted under this special permit are subject to the Hazardous Materials Incident Reporting requirements specified in 49 CFR §§ 171.15 - Immediate notice of certain hazardous materials incidents, and 171.16 - Detailed hazardous

materials incident reports. In addition, the grantee(s) of this special permit must notify the Associate Administrator for Hazardous Materials Safety, in writing, of any incident involving a package, shipment or operation conducted under terms of this special permit.

Issued in Washington, D.C.:



for William Schoonover
Acting Associate Administrator for Hazardous Materials Safety

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Pipeline and Hazardous Material Safety Administration, U.S. Department of Transportation, East Building PHH-30, 1200 New Jersey Avenue, Southeast, Washington, D.C. 20590.

Copies of this special permit may be obtained by accessing the Hazardous Materials Safety Homepage at http://hazmat.dot.gov/sp_app/special_permits/spec_perm_index.htm. Photo reproductions and legible reductions of this special permit are permitted. Any alteration of this special permit is prohibited.

PO: CWFreeman/ae