U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety
Administration**

October 18, 2021

1200 New Jersey Avenue, SE
Washington, DC 20590

DOT-SP 13173
(TWELFTH REVISION)

EXPIRATION DATE: 2025-09-30

(FOR RENEWAL, SEE 49 CFR 107.109)

1. GRANTEE: Luxfer Canada Limited
Calgary, Alberta Canada

US AGENT: Registered Agent Solution, Inc.
Washington, DC

2. PURPOSE AND LIMITATIONS:

a. This special permit authorizes the manufacture, mark, 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.

c. In accordance with 49 CFR 107.107(a) party status may not be granted to a manufacturing permit. These packagings may be used in accordance with 49 CFR 173.22a.

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 May 12, 2021, submitted in accordance with §§ 107.105, 107.109, proceedings thereafter, and additional information submitted September 29, 2021.

6. HAZARDOUS MATERIALS (49 CFR 172.101):

Hazardous Materials Description			
Proper Shipping Name	**Hazard Class/ Division**	**Identi-fication Number**	**Packing Group**
Air, compressed (*containing up to 39% by volume oxygen content)*	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
Methane, compressed *or* Natural gas, compressed *(with high methane content)*	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

Hazardous Materials Description			
Proper Shipping Name	**Hazard Class/ Division**	**Identi-fication Number**	**Packing Group**
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

***NOTE**: Cylinders included in this special permit under Paragraph 7.(a)(1) are authorized to transport only Hydrogen, compressed.

7. SAFETY CONTROL MEASURES:

a. PACKAGING: Prescribed packagings are:

(1) Cylinders previously authorized and marked under the conditions of DOT-SP 16559 which are aluminum lined, fully wrapped carbon-fiber reinforced cylinders manufactured in accordance with Luxfer Canada (formerly Dynetek Industries Ltd.) drawings on file with the Office of Hazardous Materials Safety Approvals Permits & Division and with Transport Canada Permit Number SU6039. The cylinders have a maximum water capacity of 303 Liters and a service pressure of 6527 psig. Only cylinders listed in the Appendix of this special permit are authorized. Cylinders may continue to be marked DOT-SP 16559 until the next testing cycle; and,

(2) Fully wrapped carbon-fiber reinforced aluminum lined cylinders with a maximum service pressure of 6527 psig (450 bar) and a maximum water capacity of 320L (11.3 ft^3). 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. REQUALIFICATION:

(1) Each cylinder must be requalified once every 5 years by a qualified person holding a valid DOT RIN using a hydraulic proof pressure test equal to 5/3 times the marked service pressure and hold the pressure for a minimum of 3 minutes without a loss of pressure. The test equipment must conform to the accuracy requirement of §180.205(g). The hydraulic proof pressure test may be substituted by a pneumatic proof pressure test subject to the following conditions:

(i) Prior to pneumatic proof pressure testing, a complete visual examination as described in this special permit must be completed and all cylinders of the frame must pass the visual examination;

(ii) The testing facility is equipped with a burst chamber, concrete or equivalent barrier wall, or is located with sufficient standoff distance to prevent personnel injury in case of cylinder rupture during the requalification testing;

(iii) Each cylinder is pressurized to 1.25 times the marked service pressure. The pressure must be held for 10 consecutive minutes. The loss of pressure during the hold time must not exceed 5% of the original test pressure;

(iv) In case of equipment failure during the test which results in loss of pressure prior to the completion of the 10-minute hold time, the test may only be repeated one time, at a pressure of 1.27 times the marked service pressure;

(v) A cylinder that fails to maintain the test pressure must be evaluated to determine the cause. A cylinder that shows evidence of damage

(surface distortion, unraveled fibers or other evidence of weakness) must be evaluated in accordance with the visual inspection procedure described in this special permit.

(2) Each cylinder must visually be inspected in accordance with CGA Pamphlet C-6.2 Guidelines for Visual Inspection and Re-qualification of Fiber Reinforced High Pressure Cylinders, except as specifically noted herein:

(i) Cylinders with fiber damage (cuts, abrasions, etc.) that exceeds 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:

(A) Depth - Damage that upon visual inspection is seen to penetrate the outer fiberglass layer but does not expose the carbon layer beneath, or that has a measured depth of greater than 0.005 inch and less than 0.045 inch for cylinders with an outside diameter greater than 7.5 inches or less than 0.035 inch for cylinders 7.5 inches or less in outside diameter;

(B) 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 straight sidewall section length
Cylinder sidewall and domes	In fiber direction (circumferential direction)	20% of the straight sidewall section length

(ii) Cylinders with damage that meet the Level 2 criteria must be rejected. Requalifiers must contact the cylinder manufacturer in the event that the damage cannot be clearly interpreted based on these 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.

(iii) Cylinders that have direct fiber damage that penetrates through the outer fiberglass layer and into the carbon layer, or that have a measured damage depth of greater than the Level 2 maximum 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.

(iv) A hydrostatic requalification may be repeated as provided in § 180.205(g); only two such tests are permitted. Pressurization prior to the official hydrostatic test for the purpose of a systems check may not exceed 85% of the minimum required test pressure.

(3) Persons who perform inspection and testing of cylinders subject to this special permit must comply with § 180.205(b) and with all the terms and conditions of this special permit.

(4) Requalification date (month/year) must be applied on a label securely affixed to the cylinder and over coated with epoxy, near the original test date. Metal stamping of the composite surface is prohibited. Reheat treatment of rejected cylinders is not authorized. The marking of the RIN symbol on the cylinder certifies compliance with all of the terms and conditions of this special permit.

c. OPERATIONAL CONTROLS:

(1) Cylinders manufactured under this special permit or DOT-SP 16559 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 Safety Approvals and Permits Division 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
Associate Administrator for Hazardous Materials Safety

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Pipeline and Hazardous Materials 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 https://www.phmsa.dot.gov/approvals-and-permits/hazmat/special-permits-search. Photo reproductions and legible reductions of this special permit are permitted. Any alteration of this special permit is prohibited.

PO: CWF/TG

Appendix – Serial Numbers of Authorized Cylinders:

N2329	N2327
N2032	N2027
N2321	N2022
N2343	N2300
N2310	N2347
N2345	N2330
N2031	N2334
N2332	N2026
N2025	N2035
N2024	N2315
N2316	N2322
N2037	N2303
N2023	N2338
N2342	N2341
N2314	N2033
N2326	N2306
N2028	N2308
N2323	N2039
N2339	N3126
N2325	N3128
N2312	N2337
N2304	N2340
N2036	N2333
N2324	N2298
N2336	L7538
N2344	N2331
N2328	N2021
N2335	N2309
N2040	N2320
N2311	N2307