

April 03, 2020



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 20511  
(FIFTH REVISION)

**EXPIRATION DATE: 2023-06-30**

(FOR RENEWAL, SEE 49 CFR 107.109)

1. GRANTEE: ARMOTECH s.r.o.  
Prague  
Czech Republic

US AGENT: Collins Aerospace  
Lenexa, KS  
United States

2. PURPOSE AND LIMITATIONS:

a. This special permit authorizes the manufacture, mark, sale, and use of non-refillable, non-DOT specification cylinders conforming to all regulations applicable to a UN composite cylinder specified in 49 CFR § 178.71(1)(iii) and UN Standard ISO 11119-3:2013, except as specified herein, 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. The safety analyses did not consider the hazards and risks associated with consumer use, use as a component of a transport vehicle or other device, or other uses not 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.

**April 03, 2020**

3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.
4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR §§ 173.302(a)(1) and 173.302(f)(1) in that non-DOT specification cylinders are authorized; and § 173.302(f)(2) in that an alternative pressure relief device is authorized.

NOTE: This does not relieve the grantee of this special permit from securing and maintaining a valid approval, in accordance with Subpart I of Part 107 or Subpart C of Part 178, from the Associate Administrator for Hazardous Materials Safety.

5. BASIS: This special permit is based on the application of ARMOTECH s.r.o. dated February 27, 2020 and submitted in accordance with § 107.117 and the determination that it is necessary to prevent significant economic loss.
6. HAZARDOUS MATERIALS (49 CFR 172.101):

| <b>Hazardous Material Description</b> |                               |                              |                      |
|---------------------------------------|-------------------------------|------------------------------|----------------------|
| <b>Proper Shipping Name</b>           | <b>Hazard Class/ Division</b> | <b>Identification Number</b> | <b>Packing Group</b> |
| Oxygen, compressed                    | 2.2                           | UN1072                       | N/A                  |

7. SAFETY CONTROL MEASURES:

a. PACKAGING: Packaging prescribed is a non-DOT specification, non-refillable, fully wrapped carbon fiber reinforced composite cylinder with welded stainless steel membrane liner made in accordance with the ARMOTECH s.r.o. drawings and specification file with the Office of Hazardous Materials Safety Approvals and Permits Division (OHMSAPD) and in conformance with all applicable design and manufacturing requirements for UN composite cylinders specified in 49 CFR § 178.71(l)(iii), and of UN Standard ISO 11119-3:2013 except as follows:

- (1) § 3.16 Non-load-sharing liner: In lieu of the non-load sharing liner, the cylinder has a liner with a burst pressure greater than 5% of the nominal burst

**April 03, 2020**

pressure of the completed composite cylinder. The membrane liner is metallic, ductile, and gas impermeable when filled with compressed oxygen.

(2) § 6.1 Liner Material: § 6.1.1 Liner Material: The membrane liner (including metal boss (flange port), flange bottom, cap, bottom, and tube) shall be manufactured from a material suitable for the gas to be contained, as specified in AISI or UNS as follows:

| Steel Designation |                        | Chemical Analysis (Maximum %) |      |      |       |       |           |          |      |
|-------------------|------------------------|-------------------------------|------|------|-------|-------|-----------|----------|------|
| Name              | Number                 | C                             | Si   | Mn   | P     | S     | Cr        | Ni       | N    |
| X5CrNi18-10       | AISI 304 or UNS S30400 | 0.070                         | 1.00 | 2.00 | 0.045 | 0.030 | 17.0-19.5 | 8.0-10.5 | 0.10 |

(3) § 7.2 Design Submission:

(i) § 7.2.1: The cylinder shall have a water volume capacity of up to 3 litres and a finished outer diameter of up to 153 millimeters.

(ii) § 7.2.2(d): Heat treatment of completed liner can cause deformation; therefore, heat treatment of completed liner must not be employed.

(iii) § 7.2.4(b): Intended contents are UN1072 Oxygen, compressed.

(iv) § 7.2.4(c): Working pressure,  $p_w$ , shall be 3000 psi (207 bar) at 70 °F (21 °C).

(v) § 7.2.4(d): Test pressure,  $p_h$ , shall be a minimum of 4500 psi (310 bar) at 70 °F (21 °C).

(vi) § 7.2.4(e): Maximum developed pressure  $p_{max}$  at 65 °C shall be 281 bar.

(vii) § 7.2.4(f): Minimum design burst pressure shall be a minimum of 9,000 psi (621 bar) at 70 °F (21 °C).

(viii) § 7.2.4(g): Design life shall be 26 years.

(4) § 7.3 Manufacturing:

(i) § 7.3.1 In addition, the liner welding processes must be certified to CSN EN ISO 3834-2:2006.

(5) § 8.5 Type Approval Test Procedures and Criteria:

(i) § 8.5.4 Ambient Cycle Test:

(A) Tests must be in accordance with § 8.5.4.1.2, except that the frequency of reversals shall not exceed 10 cycles/minute. The temperature on the outside surface of the cylinder shall not exceed 50 °C during the test.

(B) § 8.5.4.1.3: Both cylinders shall withstand 5,000 pressurization cycles from 121 bar to 283 bar, then 30 pressurization cycles from 0 bar to 310 bar without failure by burst or leakage; or alternatively, both cylinders shall withstand 5,030 cycles from 0 to 310 bar without failure by burst or leakage. The cycle tests must be followed by burst tests, and the required burst pressure shall exceed 80% of minimum design burst pressure without failure by bursting or leakage, in which case the cylinders shall be deemed to have passed the test. No further pressurization cycles are required.

(ii) § 8.5.5 Vacuum Test must be conducted as prescribed, except that the total number of cycles shall be 10.

(iii) § 8.5.6 Environmental Cycle Test must be conducted as prescribed, except as follows: The total number of cycles shall be 2,500 cycles from 0 to 210 bar at a cylinder skin temperature maintained between 60 °C and 70 °C, and 2,500 cycles at a cylinder skin temperature maintained between -40 °C and -50 °C. The frequency of reversals shall not exceed 10 cycles/minute.

(iv) § 8.5.8 Flaw Test: Not required.

**April 03, 2020**

(v) § 8.5.9 Drop Test: Tests must be in accordance with § 8.5.9.1.2 \* \* \*, except that the second cylinder shall only be required to withstand 1,000 pressurization cycles to test pressure,  $p_h$ , without failure by burst or leakage. The frequency of reversals shall not exceed 10 cycles/minute.

(vi) § 8.5.16 Pneumatic Cycle Test: Not required.

(vii) § 8.5.18 Liner Burst Test: Not required.

(6) § 9.1 Liner: The liner must comply with § 9.1.1(f) and the following:

(i) Each membrane liner shall be pressurized from 5 to 10 bar with compressed air and then completely submerged under water for 20 seconds. If there is any evidence of leakage the membrane liner shall be rejected.

(ii) Each membrane liner shall be permanently and legibly marked on the metal boss (flange port) as follows:

(A) Manufacturer's internal identification.

(B) Cylinder lot number.

(C) Serial number of cylinder in a lot.

(D) Year of test/month of test (YYYY/MM).

(7) § 9.4 Composite Cylinder:

(i) In addition to the requirements of § 9.4.3 any cylinder found to exhibit greater than level 1 damage per CGA Pamphlet C-6.2 "Guidelines for Visual Inspection and Requalification of Fiber Reinforced Higher Pressure Cylinders" sections 7 through 10, except 9, shall be determined to be unfit for use or service and must be condemned & scrapped in accordance with § 14.1.

(ii) In addition to the requirements of § 9.4.5, pressure cycling shall be as prescribed as above in § 8.5.4 of this special permit.

(iii) Each cylinder shall be leak tested in accordance with § 9.4.7. Alternatively, each cylinder may be subjected to Helium Gas Mass Spectrometry (HGMS) in accordance with the requirements and procedure on file with the OHMSAPD in lieu of the leak test required by § 9.4.7. Cylinders that are subjected to HGMS must be marked with a durable label containing the Date (2-digit month and 4-digit year) of the HGMS test. Cylinders that fail to successfully meet the HGMS test requirements must be marked by writing an "X" over the previous markings and rendered incapable of holding pressure.

b. TESTING: Authorized non-DOT specification, non-refillable cylinders are not required to be periodically inspected, retested, or requalified in accordance with the requirements of the HMR or CGA.

c. MARKING: Each cylinder shall be permanently marked (other than by stamping) in the composite on the sidewall. The marking must be easily visible and must be protected from external damage due to the environment and handling. The marking shall be as follows:

- (1) "DOT-SP 20511 NRC 3000/4500PSI" (DOT special permit number, Non-Refillable Cylinder, Service Pressure in PSI, Test Pressure in PSI).
- (2) "Federal law forbids transportation if refilled-penalty up to \$500,000 fine and 5 years imprisonment (49 U.S.C. 5124)." (Letters are 2 mm in height).
- (3) Manufacturer's internal identification.
- (4) Cylinder lot number.
- (5) Serial number of cylinder.
- (6) Inspector's mark.
- (7) 4-digit year/2-digit month of hydrotest (YYYY/MM).
- (8) Manufacturer's part number.
- (9) Manufacturer's DOT M-number.

d. OPERATIONAL CONTROLS:

(1) When pressurized with compressed oxygen, the cylinders shall be equipped with a pressure relief device (PRD) conforming to the requirements of CGA Pamphlet S1.1:2007 except as follows: The rated burst pressure of the PRD must be equal to 100% of the cylinder minimum design test pressure (tmin) with a tolerance of plus 5% to minus 10%.

(2) The oxygen flow rate (capacity calculation) must be calculated based on a 10 pound water capacity.

(3) Cylinders must not be filled to a pressure exceeding the marked service pressure, pw (3,000 psi), at 70 °F (21 °C).

(4) Cylinders must be shipped in strong outer packaging in accordance with 49 CFR § 173.301(a)(9).

(5) Transportation of oxygen by aircraft is authorized only when in accordance with 49 CFR § 175.501.

(6) Cylinders manufactured per the requirements of this special permit, shall be authorized for a maximum service use of 26 years from the date of manufacture.

(7) Notwithstanding the marking requirement in paragraph 7.c.(2) and the prohibition on refilling of the cylinders in this special permit, the cylinders identified in the application (by serial number) dated February 27, 2020 must be subjected to the visual inspection per CGA Pamphlet C-6.2 and refilled for the purpose of an additional Helium Gas Mass Spectrometry (HGMS) Test in accordance with the Collins Aerospace test procedure on file with OHMSAPD.

8. SPECIAL PROVISIONS:

a. In accordance with the provisions of Paragraph (b) of § 173.22a, 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.

**April 03, 2020**

- 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 a specific manufacturing facility.
- e. A current copy of this special permit must be maintained at each facility where the packaging is manufactured under this special permit. It must be made available to a DOT representative upon request.
- f. The Helium Gas Spectrometry (HGMS) Test facilities, equipment, personnel, processes, and procedures must be certified by the Independent Inspector prior to performing leak testing and prior to ARMOTECH s.r.o.'s approval of the test results. Certification of the leak test facilities shall be pursuant to the helium leak free requirements in the ARMOTECH s.r.o. application on file with OHMSPAD and must be renewed by the Independent Inspector every 2 years. The Independent Inspector shall provide a copy of the certification letter to the leak test facility, to ARMOTECH s.r.o. and to PHMSA upon request.
- g. ARMOTECH s.r.o. must receive, review and approve all HGMS test results. In addition, ARMOTECH s.r.o. must retain copies of the HGMS test results on site and make these results available to OHMSAPD upon request. Application of the marking specified in paragraph 7.c. of this special permit indicates responsibility for conformance with all requirements of this special permit, including the leak testing requirements of paragraph 7.a.(7).
9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel, passenger-carrying aircraft, and cargo aircraft.

**April 03, 2020**

10. MODAL REQUIREMENTS: A current copy of this special permit must be carried aboard each cargo vessel, aircraft, and motor vehicle used to transport packages covered by this special permit. The shipper must furnish a 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

**April 03, 2020**

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 [http://hazmat.dot.gov/sp\\_app/special\\_permits/spec\\_perm\\_index.htm](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: BMOORE