



U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety
Administration**

January 24, 2022

1200 New Jersey Avenue, SE
Washington, DC 20590

DOT-SP 8162
(TWENTY-SIXTH REVISION)

EXPIRATION DATE: 2025-12-31

(FOR RENEWAL, SEE 49 CFR 107.109)

1. GRANTEE: Structural Composites Industries
Pomona, California
2. PURPOSE AND LIMITATIONS:
 - a. This special permit authorizes the manufacture, marking, sale and use of a non-DOT specification fiber reinforced plastic (FRP) full wrapped composite (FC) cylinder conforming with DOT FRP-1 Standard, except as specified herein, for use as an equipment component aboard aircraft and marine craft for the transportation in commerce of certain Division 2.2 gases. 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 packaging 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 §§ 172.203(a) and 172.301(c) in that the marking requirements are waived and §§ 173.302a(a)(1) and 173.304a(a)(1) in that non-specification cylinders are not authorized, except as specified herein.

5. BASIS: This special permit is based on the application of Structural Composites Industries dated November 19, 2021, submitted in accordance with § 107.109.
6. HAZARDOUS MATERIALS (49 CFR 172.101):

Hazardous Materials Description			
Proper Shipping Name	Hazard Class/ Division	Identification Number	Packing Group
Air, compressed	2.2	UN1002	N/A
Argon, compressed	2.2	UN1006	N/A
Bromotrifluoromethane, R13B1	2.2	UN1009	N/A
Carbon dioxide	2.2	UN1013	N/A
Compressed gas, n.o.s.	2.2	UN1956	N/A
Helium, compressed	2.2	UN1046	N/A
Nitrogen, compressed	2.2	UN1066	N/A
Oxygen, compressed	2.2	UN1072	N/A

7. SAFETY CONTROL MEASURES:

a. PACKAGING: Packaging prescribed is a non-DOT specification fiber reinforced plastic (FRP) full composite (FC) cylinder in full compliance with SCI Report 76188 on file with the Office of Hazardous Materials Safety (OHMS) and with DOT FRP-1 Standard Revision 2 (178.AA) dated February 15, 1987, except as follows:

§ 178.AA-4 Duties of Inspector.

* * *

(b) Add an additional sentence which reads: In lieu of testing for filament material properties by the special permit holder, a certificate by the filament manufacturer is acceptable provided that the procurement document specifies strength and quality requirements and that the supplied material is certified to those requirements.

§ 178.AA-5 Authorized material and identification of material.

(a) Aluminum liner must be 6061 alloy and T6 temper.

(b) Filament material must be Kevlar 49 or another Para-Aramid poly-paraphenylene terephthalamide (PPTA) fiber in compliance with the Society of Automotive Engineers aerospace material specification AMS 3901: Organic Fiber (Para-Aramid), Yarn and Roving, High Modulus, dated September 1998, including the applicable supplementary detail specifications thereto. Each filament batch (lot) must be tested in accordance with ASTM D 2343 for strand strength and ASTM D 3317 for Denier.

(1) Strand strength must be 450,000 psig minimum.

(2) Denier must be at least 90 percent of the nominal value specified in AMS 3901. Denier of roving may be certified by the filament manufacturer.

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§ 178.AA-10 Pressure relief devices and protection for valves, relief devices, and other connections.

(a) Pressure relief devices and protection for valves and other connections must be in compliance with §§ 180.205, 173.301, and 178.AA-18(g) of this special permit. However, only § 178.AA-18(g) may be used as the measure of relief device adequacy.

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§ 178.AA-12 Destructive tests.

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(b) Applies except that the rate of cycling may not exceed 10 cycles per minute.

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§ 178.AA-13 Acceptable results of tests.

(a) thru (c) * * *

(d) Burst test.

- (1) Burst pressure shall be at least 3 times the service pressure and in no case less than the value necessary to meet the stress criteria of 178.AA-7(b). Failure must initiate in the cylinder sidewall. Cylinders with marked service pressure not exceeding 2200 psi containing liquefied gas must remain in one piece. Actual burst pressure must be recorded.

(2) * * *

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§ 178.AA-15 Markings

(a) * * *

(b) * * *

Add (6) Rejection elastic expansion (REE) marking in cubic centimeters. The REE for each design type cylinder is obtained as follows:

- (i) Perform hydrostatic testing on a lot of cylinders and record elastic expansion (EE) of each cylinder.
- (ii) Find the mean value of the EE for all cylinders tested in item (i).
- (iii) Mark each cylinder with REE which is equal to 10% above the mean value obtained in item (ii). The REE marking must follow the date of test.

(c) * * *

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§ 178.AA-18 Design qualification tests.

(a) thru (c) * * *

(d) Applies except that the rate of cycling may not exceed 10 cycles per minute.

(e) * * *

(1) * * *

(2) Burst pressure must be at least 3 times the service pressure and in no case less than the value necessary to meet the stress criteria of 178.AA-7(b). Failure must initiate in the sidewall. Cylinders with marked service pressure not exceeding 2200 psi containing liquefied gas must remain in one piece. Actual burst pressure must be recorded.

(f) Gunfire test. One representative cylinder charged with air or nitrogen to service pressure shall be impacted by a 0.30 caliber armor piercing projectile having a velocity of approximately 2800 feet per second. Cylinders shall be so positioned that projectile impact point is in the bottom cylinder wall aimed to exit at cylinder sidewall, or impact point is on the cylinder sidewall at a 90° angle to the cylinder sidewall axis. Distance from firing location to test cylinder not to exceed 50 yards. Tested cylinder shall reveal no evidence of fragmentation failure. Any tear beyond 3 inches from the entrance or exit hole is cause for rejection. Approximate size of entrance and exit openings must be recorded.

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b. REQUALIFICATION:

(1) Cylinders retested prior to July 1, 2006 must be retested within 36 months of the retest date marked on the cylinder. Cylinders retested after July 1, 2006 must be reinspected and hydrostatically retested at least once every five years. Each cylinder must be reinspected and hydrostatically retested in accordance with §§ 180.205 and 180.209 as prescribed for DOT 3HT cylinders. The hydrostatic test must be conducted in accordance with the procedures specified in § 180.205(g) except that the test pressure must be maintained for a minimum of 60 seconds and as much longer as may be necessary to ensure stable volumetric expansion. The elastic and total volumetric expansions must be determined. Reheat treatment or repair of rejected cylinders is not authorized.

(2) Retest dates must be stamped on the exposed metallic surface of the cylinder neck or marked 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.

- (3) When a hydrostatic retest is repeated as authorized by § 180.205(g)(5) only two such retests are permitted.
- (4) A cylinder not marked with an REE must be condemned if the permanent volumetric expansion exceeds 5 percent of the total volumetric expansion at test pressure.
- (5) A cylinder marked with an REE must be condemned if the elastic expansion exceeds the marked rejection elastic expansion.
- (6) Each time a cylinder is retested, it must be visually inspected internally and externally in accordance with the terms of CGA Pamphlet C-6.1 and C-6.2. The cylinder must be approved, rejected, or condemned according to the criteria set forth in the applicable CGA pamphlet.
- (7) 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. The marking of the retester's symbol on the cylinders certifies compliance with all of the terms and conditions of this special permit.

c. OPERATIONAL CONTROLS:

- (1) Prior to the first shipment of cylinders made with a new Para-Aramid (PPTA) filament material, the design qualification tests required in FRP-1 Standard must be performed and successful test results must be submitted to and be on file with OHMS.
- (2) Cylinders are authorized only for use as equipment components aboard aircraft or marine craft specifically identified to the OHMS.
- (3) Cylinder service life may not exceed 15 years from the date of manufacture as marked on the cylinder.
- (4) A cylinder that has been subjected to fire may not be returned to service.
- (5) Cylinders must be packaged in accordance with § 173.301(a)(9).
- (6) Cylinders used in oxygen service must conform with § 173.302(b).
- (7) Filling requirements are subject to all terms contained in § 173.302a for 3AL specification cylinders.

- (8) Maximum filling density for carbon dioxide and Bromotrifluoromethane gases must be such that the pressure in the cylinder at 130 °F does not exceed 5/4 times the marked service pressure.

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.

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 modifications or changes are 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. 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.

e. 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 for a specific manufacturing facility.

f. Transportation of oxygen by aircraft is only authorized when in accordance with § 175.501.

g. The cylinders described in this special permit are authorized only for normal transportation as an article of commerce i.e., the movement of hazardous materials packages from consignor to consignee.

h. The requirements to mark shipping papers and packages with the special permit number in accordance with §§ 172.203(a) and 172.301(c), respectively, are waived.

9. **MODES OF TRANSPORTATION AUTHORIZED:** Motor vehicle, rail freight, cargo vessel, cargo aircraft only, and passenger-carrying aircraft (see paragraph 8.f. for restrictions).

10. **MODAL REQUIREMENTS:** None required by this special permit.

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-13, 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: TG