



U.S. Department
of Transportation

**Pipeline and Hazardous
Materials Safety
Administration**

March 11, 2024

1200 New Jersey Avenue, SE
Washington, DC 20590

DOT-SP 21091
(SECOND REVISION)

EXPIRATION DATE: 2027-03-31

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Air Products and Chemicals, Inc.
Allentown, PA
2. PURPOSE AND LIMITATION:
 - a. This special permit authorizes the transportation in commerce of compressed hydrogen in module assemblies containing non-DOT specification carbon fiber reinforced composite cylinders manufactured under DOT-SP 14576 without pressure relief devices. 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 the development of this special permit only considered the hazards and risks associated with the transportation in commerce.
 - c. No party status will be granted to this special permit.
3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.
4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR § 173.301(f) and (g) in that the cylinders must have pressure relief devices, except as specified herein.
5. BASIS: This special permit is based on the application of Air Products and Chemicals, Inc. dated December 16, 2022, in accordance with § 107.109.

Tracking Number: 2024024981

6. HAZARDOUS MATERIALS (49 CFR 172.101):

Hazardous Materials Description			
Proper Shipping Name	Hazard Class/ Division	Identification Number	Packing Group
Hydrogen, compressed	2.1	UN1049	N/A

7. SAFETY CONTROL MEASURES:

a. PACKAGING: Packaging prescribed is a non-DOT specification fully wrapped carbon-fiber reinforced composite cylinder with aluminum liner manufactured and marked in accordance with DOT-SP 14576, except for the following:

(1) The cylinders are not equipped with pressure relief devices (PRDs).

(2) The cylinders must be mounted inside of special framing and metal panels described as module assemblies. The module assemblies must be designed and constructed in accordance with Air Products and Chemicals, Inc.'s Module Design, CE-000851-USA dated June 17, 2020, on file with the Office of Hazardous Materials Safety (OHMS).

b. REQUALIFICATION: All cylinders under this special permit must be requalified once every 5 years in accordance with the procedures described in paragraph 7.b. of DOT-SP 14576.

c. OPERATIONAL CONTROLS:

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

(2) A cylinder subjected to fire must not be returned to service.

(3) Cylinders must be manifolded in accordance with the requirements of § 173.301(g) except that the cylinders are not equipped with pressure relief devices.

(4) The cylinders must be permanently mounted within a structural frame and panels described as module assemblies that meet the following: Structural framework that is intended for transportation of the cylinders under this special permit must have an appropriate engineering calculation (e.g., Finite Element

Analysis (FEA)). The calculation must demonstrate the framework's ability to protect the cylinders from catastrophic damage (rupture) due to front, rear, or side impact, and rollover. As a minimum, the frame must be designed to meet the following:

(i) All requirements of § 173.301(i). The frame design must withstand a static force of four times the maximum fill weight of the cylinder and frame assembly along the 3 principal axes, applied individually.

(ii) The module assemblies must meet the requirements of a fire-resistant structure in accordance with Air Products and Chemicals, Inc. CE-000851-USA Module Design and dated June 17, 2020, on file with the OHMS.

(5) Cylinders and module assemblies (CE-000851-USA) must be bonfire tested in accordance with the Air Products and Chemicals, Inc.'s bonfire testing "HYDROGEN TRANSPORT MODULE BONFIRE TEST (Without PRD's)" conducted on February 21, 2020, and the report dated June 19, 2020, on file with the OHMS. The bonfire test must demonstrate that none of the composite cylinders in the module assemblies rupture during a minimum of 20 minutes of engulfed fire.

(6) Cylinders or tubes used under this special permit must be mounted inside of an enclosed cabinet. The cabinet must be designed and tested to meet the Lower Flammability Limit of each gas or gas mixture and the Lower Flammability Limit must be calculated for the highest pressure and temperature to ensure the cabinet of the cylinder/tube assembly is equipped with proper ventilation to avoid a fire or explosion during transportation.

(7) Trailer tires must be equipped with a Tire Pressure Monitoring System (TPMS) as described in Air Products and Chemicals, Inc.'s application dated July 28, 2020, on file with the OHMS.

8. SPECIAL PROVISIONS:

a. A person who is not a holder of this special permit who 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 reoffered for transportation in conformance with this special permit and the HMR.

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

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle.

10. MODAL REQUIREMENTS: A current copy of this special permit must be carried aboard each motor vehicle used to transport packages covered 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.:

A handwritten signature in blue ink, appearing to read "W. Schoonover", is written over a light blue rectangular background.

for William Schoonover
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-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: Mark Toughiry/Nicks/Casey Chambers