

December 07, 2018



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 20507  
(FIRST REVISION)

**EXPIRATION DATE: 2020-06-30**

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: United States Dept. of Energy  
Washington, DC
2. PURPOSE AND LIMITATION:
  - a. This special permit authorizes the transportation in commerce of a limited number of non-DOT specification composite overwrapped pressure vessels (COPVs) containing compressed hydrogen. 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 § 173.302(a) in that non-DOT specification cylinders are not authorized except as specified herein.
5. BASIS: This special permit is based on the application of United States Dept. of Energy dated July 26, 2017, additional information received on March 1<sup>st</sup>, July 27<sup>th</sup>, October 19<sup>th</sup>, November 11<sup>th</sup> and 25<sup>th</sup>, 2018 submitted in accordance with § 107.105 and the public proceeding thereon.

Tracking Number: 2018114754

December 07, 2018

6. HAZARDOUS MATERIALS (49 CFR 172.101):

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

7. SAFETY CONTROL MEASURES:

- a. PACKAGING: Prescribed packagings are type IV composite overwrapped pressure vessels (COPVs), the design qualification and testing are in accordance with European standard, EC-79, drawing 600136 dated 01/25/2016, and design qualification testing and confirmation listed in Appendix B, dated March 12, 2016 on file with the Office of Hazardous Materials Safety Approvals and Permits Division (OHMSAPD). The COPVs were manufactured by Quantum Technology and the design qualification and testing are similar to the UN/ISO 11119-3 standard with the following exceptions:

(i) The ratio of burst to test pressure ( $P_b/P_h$ ) is reduced 20% from 2 to 1.6;

(ii) Service pressure is increased 61% from 433 to 700 bar (10,153 psi);

(iii) Maximum water volume is limited to 80 liters;

(iv) Each COPV (cylinder) has a thermally activated pressure relief device (TPRD) which vents to the roof of the trailer in case of fire;

b. OPERATIONAL CONTROLS:

- (i) COPVs (Cylinders) under this special permit are limited to COPVs described in paragraph 7.a. above. Only cylinders manufactured and marked prior to December 30, 2016 are authorized.

**December 07, 2018**

(ii) COPVs (Cylinders) under this special permit are authorized for a maximum service use of 10 years from the date of manufacture;

(iii) Maximum charged pressure of each COPV (Cylinder) during transportation is 140 bar (2030 psi) which is 20% of the design working pressure of 700 bar (10,153 psi);

(iv) COPVs under this special permit must be permanently installed in a steel framing (e.g. trailer assembly) that is designed in accordance with the DOE specification g loading criteria on file with OHMSAPD;

(v) A COPV that has been subjected to a fire is not authorized for service under this special permit.

c. MARKING:

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

(ii) The marking must contain the following:

(1) DOT special permit number (DOT SP-20507) followed by service pressure expressed in bar (psi).

(2) A serial number and the manufacturer's identification number or a symbol as obtained from the Associate Administrator for Hazardous Materials Safety, located just below or immediately following the DOT marking above. The serial number and the manufacturer's identification number may be placed on the boss provided the marking is accessible for inspection.

(3) After completion of periodic requalification, the marking must contain requalification method, date (month and year) and requalification identification number (RIN) for that cylinder.

**December 07, 2018**

(4) The size of the letters and numbers used must be at least 0.64 cm (1/4 inch) high if space permits.

(5) The following are examples of an authorized format for marking:

DOT-SP 20507-700 bar  
1234-MMI (or symbol)  
II-MM/YY

(6) Additional markings are permitted in the composite, provided the additional markings do not obscure the required marking and are not detrimental to the integrity of the cylinder.

(7) Provisions for marking of the required requalification dates and RIN information must be made near the cylinder markings.

d. Requalification: Each COPV must be requalified once every 5 years by a qualified person holding a valid DOT RIN using one of the two following methods:

(i) Method 1 - Hydraulic Proof Pressure Testing and Visual Inspections: The COPV must be pressurized using hydraulic proof pressure test equal to 1.5 times the marked service pressure and hold the pressure for a minimum of 3 minutes without a loss of pressure. Additionally, each COPV must visually be inspected in accordance with CGA Pamphlet C-6.2 Guidelines for Visual Inspection and Re-qualification of Fiber Reinforced High Pressure COPVs, except as specifically noted herein:

(1) COPVs 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 COPVs with an outside diameter greater than 7.5 inches or less than 0.035 inch for COPVs 7.5 inches or less in outside diameter;

**December 07, 2018**

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

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

(2) COPVs with damage that meet the Level 2 criteria must be rejected. Requalifiers must contact the COPV manufacturer in the event that the damage cannot be clearly interpreted based on these criteria. Repair of rejected COPVs 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.

(3) COPVs 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. COPVs that have damage with depth meeting Level 2 but length exceeding the Level 2 maximum, are considered to have Level 3 type damage. COPVs with Level 3 type damage are not authorized to be repaired, and must be condemned.

(4) A requalification may be repeated only two times.

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

**December 07, 2018**

(6) Requalification date (month/year) must be permanently marked on the COPV as specified in paragraph § 180.213. The marking of the RIN symbol on the COPV certifies compliance with all of the terms and conditions of this special permit.

**or**

(ii) Method 2 - Modal Acoustic Emission (MAE) Testing and External Visual Inspection: Each testing facility seeking a RIN for requalification for performing MAE and external Visual Inspection must meet and prove the following requirements:

(1) Holder of a special permit in performing MAE testing on COPV (composite cylinders or tubes).

(2) MAE testing must be in accordance with the Modal acoustic emission (MAE) Examination Procedure for Requalification of Composite Overwrapped Pressure Vessels (Cylinders and tubes) posted on PHMSA **website**, <https://www.phmsa.dot.gov/technical-resources/hazmat-technical-resources/technical-reports> and the additional SOP provided by the requalification facility on file with the Office of Hazardous Materials Safety Approvals and Permits Division (OHMSAPD).

(3) External visual inspection must be in accordance with CGA pamphlet C-6.2 and additional SOP provided by the requalification facility on file with OHMSAPD.

(4) COPV (cylinder) with severe impact damage - For COPV that was subjected to a severe impact damage from an event such as collision or rollover accident, the pressurization of the MAE testing must be by hydraulic medium (e.g. water) rather than gaseous medium.

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 or its contents and it is reoffered for transportation in conformance with this special permit and the HMR.

**December 07, 2018**

- 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.

**December 07, 2018**

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 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](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.

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