



U.S. Department  
of Transportation

**Pipeline and Hazardous  
Materials Safety  
Administration**

**October 18, 2023**

1200 New Jersey Avenue, SE  
Washington, DC 20590

DOT-SP 21528  
(FIRST REVISION)

**EXPIRATION DATE: 2027-09-30**

(FOR RENEWAL, SEE 49 CFR 107.109)

1. GRANTEE: Honeywell Intellectual Properties Inc.  
Tempe, AZ
2. PURPOSE AND LIMITATIONS:
  - a. This special permit authorizes the manufacture, mark, sale, and use of non-DOT specification welded cylinder that is comparable to DOT specification 3HT cylinder, except as specified herein, for the transportation in commerce of the hazardous 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 special 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 § 173.302a(a)(1) in that non-DOT specification cylinders are not authorized, except as specified herein.

Tracking Number: 2023104584

5. BASIS: This emergency special permit is based on the application of Honeywell Intellectual Properties Inc. dated October 11, 2023, submitted in accordance with §107.109.
6. HAZARDOUS MATERIALS (49 CFR 172.101):

Hazardous Material Description			
Proper Shipping Name	Hazard Class/ Division	Identification Number	Packing Group
Helium, compressed	2.2	UN1046	N/A

7. SAFETY CONTROL MEASURES:

- a. PACKAGING: Prescribed packagings are non-DOT specification welded cylinders made of titanium alloy having nominal water capacity of 652, 382, and 133 cubic inches, and maximum service pressure of 10,000 psig. The cylinders must be manufactured in accordance with the Honeywell Intellectual Properties Inc. drawings on file and meet the design and testing requirements as described in the application on file with the Office of Hazardous Materials Safety (OHMS). The cylinders must also comply with DOT specification 3HT (§§178.35 and 178.44), except as follows:

§ 178.35(e) *Safety devices*. In lieu of the requirements for a safety relief device as prescribed in § 173.302a (a)(2), the cylinder is designed with thermal insulation to prevent heat transfer into the cylinder in case of fire and has Through Bulkhead Initiators (TBI) installed into the manifold, which will auto-ignite at temperature of  $450 \pm 50$  °F and shear the closure fitting for releasing the gas contents of the cylinder.

§ 178.44(a) *Type, size, and service pressure*. The cylinders are circumferentially welded pressure vessels with nominal water capacity of 652, 382, and 133 cubic inches and maximum service pressure of 10,000 psig.

§ 178.44(b) *Authorized material*. Titanium alloy (TI-6AL-4V) conforming with AMS 4928.

§ 178.44(c) *Identification of Materials*. \* \* \*

§ 178.44(d) *Manufacture*. \* \* \*

§ 178.44(e) *Welding or brazing*. Two machined TI-6AL-4V half shells must be

Electron Beam Welded in accordance with AMS 2680 with one girth weld. All welds must be 100 percent radiographed prior to hydrostatic test and dye-penetrant inspected before and after hydrostatic test.

§ 178.44(f) *Wall thickness.*

(1) \* \* \*

(2) \* \* \*

(3) Stresses must also be evaluated using appropriate closed-form equations for thick-walled cylinders and Finite Element Analysis (FEA) as submitted to and on file with the OHMS.

§ 178.44(g) *Heat treatment.* All cylinders (machined half shells and welded assembly) must be uniformly and properly heat-treated (as specified in the application on file with the OHMS) and inspected by liquid penetrant (ASTM E1417/E1417M/ MIL-STD-1907) and ultrasonic (AMS-STD-2154) methods as applicable, in accordance with the details on the Honeywell Intellectual Properties Inc. drawings referenced in paragraph 7.a., and on file with the OHMS.

§ 178.44(h) *Openings in cylinders and connections (valves, fuse plugs, etc.) for those openings.* \* \* \*

§ 178.44(i) *Pressure testing.* \* \* \*

Each cylinder must be hydrostatically tested to minimum of 5/3 times the service pressure.

§ 178.44(j) *Cycling tests.* Prior to initial shipment of any specific cylinder design, cyclic pressurization tests must be performed on at least three representative samples without failure as follows:

(1) Pressurization must be performed hydrostatically between approximate zero and the service pressure at a rate not more than 10 cycles per minute. Adequate recording instrumentation must be provided to document the test cycles. The cylinders shall then be subjected to a burst test.

(2) Cycle testing not required on production lots.

(3) In this special permit the “lot” is defined as a group of cylinders successively produced having the same size and configuration, same specified material of construction and material heat, manufactured by the

same process and heat treated in the same equipment under the same conditions of time, temperature, and atmosphere. In no case may the lot size exceed 200 cylinders; however, any cylinder processed for use in the required destructive testing need not be counted as being one of the 200.

(4) \* \* \*

§ 178.44(k) Burst test. Burst test shall be performed on design qualification cycle test cylinders. One cylinder taken at random out of each production lot of cylinders must be hydrostatically tested to destruction.

§ 178.44(l) Flattening test. Not required.

§ 178.44(m) Physical test. Intellectual Properties Inc. Intellectual Properties Inc. Intellectual Properties Inc. A physical test must be conducted to determine yield strength, tensile strength, elongation, and reduction of area of material, as follows:

(1) A minimum of two tensile specimens conforming to ASTM E8/E8M (as close to cylinder thickness as possible) shall be taken out of each lot of cylinders for each heat of material in the lot. Tensile specimens shall be heat treated along with the cylinders and then tested at room temperature to verify material properties.

(2) The physical properties shall conform to those specified on the Honeywell Intellectual Properties Inc. drawings referenced in paragraph 7.a. above and listed under acceptable results of tests in § 178.44(p).

(3) Metallographic, microstructure, and fracture toughness tests are one-time tests at design qualification prior to entering production and must be in accordance with the application on file with the OHMS.

§ 178.44(n) Magnetic particle inspection. Not required. Instead, each cylinder must be inspected by a qualified inspector, using apparatus and procedures for liquid penetrant examination in accordance with MIL-STD-6866, with acceptance criteria in accordance with MIL-STD-1907. Inspection must be performed externally on the finished cylinder after the hydrostatic test. Evidence of discontinuities, which in the opinion of the inspector may appreciably weaken or decrease the durability of the cylinder, shall be cause for rejection. A DOT approved Independent Inspection Agency (IIA) shall have oversight for all design qualification and production inspections and test records.

§ 178.44(o) Leakage test. Not applicable.

§ 178.44(p) Acceptable results of tests. Results of the physical tests, burst test, and cycling test must conform to the following:

- (1) Flattening. Not required.
- (2) Physical tests. The following minimum mechanical properties must be met:
  - (i) Ultimate tensile strength = 155,000 psi.
  - (ii) Yield strength = 145,000 psi.
  - (iii) Elongation = 10% Min on 4D gauge length (Transverse Specimen).
  - (iv) Reduction in area = 20% Min.
  - (v) Fracture toughness (at design qualification),  $KIC \geq 45 \text{ ksi-in}^{0.5}$
- (3) The burst pressure must be at least  $\frac{4}{3}$  times the test pressure.
- (4) Cycling: the test cylinders must withstand at least 1000 pressurization cycles without any evidence of distortion or failure.
- (5) The entire cylinder production lot shall be rejected if any of the physical tests fail to meet the specified requirements.

§ 178.44(q) Rejected cylinders. A cylinder lot that was rejected may be repaired and requalified as follows:

- (1) Reheat treatment is authorized; subsequent thereto, acceptable cylinders must pass all prescribed tests.
- (2) Repair of welds is authorized after which reheat treatment is required and, subsequent thereto, acceptable cylinders must pass all prescribed tests.
- (3) If a cylinder lot is rejected and the cause for the rejection is determined by test or inspection, and the defective cylinders are eliminated, then the remaining cylinders may be qualified as a new lot.

§ 178.44(r) Marking.

- (1) Applies, except that:
  - (i) Instead of DOT-3HT, cylinders must be marked “DOT-SP 21528” followed by the service pressure.
  - (ii) Marking must be:
    - (A) By low stress type stamping method such as electro-chemical etching, vibro-pen or laser marking, which does not decrease the integrity of the pressure vessel; and
    - (B) In an area, and to a depth, which will ensure that the wall thickness measured from the root of the stamping to the interior surface is equal to or greater than the minimum prescribed wall thickness.
    - (C) Permanent and legible and must include the date of manufacture.
- (2) Stamping of elastic expansion is not required.
- (3) \* \* \*

§ 178.44(s) Inspector’s report.

\* \* \*

Inspector’s report may be appropriately modified to reflect identification and conformance with this special permit.

b. **REQUALIFICATION:** Not required. The cylinders are non-refillable and are for single use only.

8. **SPECIAL PROVISIONS:**

a. Prior to the first shipment of cylinders under the terms of this special permit, the qualification tests outlined in this special permit must be completed with satisfactory results. The test results must be submitted to the OHMS and be acknowledged in writing.

- b. 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.
  - c. 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 offered for transportation in conformance with this special permit and the HMR.
  - d. A current copy of this special permit must be maintained at each facility where the package is offered or reoffered for transportation.
  - 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 by the Office of Hazardous Materials Safety for a specific manufacturing facility.
  - f. 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.
  - g. Cylinders must be shipped in strong outside packagings in conformance with § 173.301(a)(9).
  - h. The cylinders are for single discharge use only and are not authorized 25 years after the date of manufacture.
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.:



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: SHAFKEY/Casey Chambers