U.S. Department
of Transportation
**Research and
Special Programs
Administration**

MAY 28 1998

400 Seventh Street, S.W.
Washington, D.C. 20590

DOT-E 9638
(THIRD REVISION)

EXPIRATION DATE: April 30, 2000

(FOR RENEWAL, SEE 49 CFR 107.109)

1. GRANTEE: Allied Signal Aerospace Equipment Systems
Tempe, AZ

2. PURPOSE AND LIMITATIONS:

This exemption authorizes the manufacture, marking and sale of a non-DOT specification cylinder to be used for the transportation of helium, a compressed gas, in commerce. This exemption provides no relief from any regulation other than as specifically stated herein.

3. REGULATORY SYSTEM AFFECTED: 49 CFR Parts 106, 107 and 171-180.

4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR Sections 173.304(a)(1) and 175.3 in that the use of a non DOT specification package is authorized and portion of 178.44 as specified herein.

5. BASIS: This exemption is based on the application of Allied Signal Aerospace Equipment Systems dated May 16, 1997, submitted in accordance with 49 CFR 107.109.

6. HAZARDOUS MATERIALS (49 CFR 172.101):

Hazardous materials description -- proper shipping name	Hazard Class/ Division	Identi-fication Number	Packing Group
Helium, compressed	2.2	UN1046	N/A

7. PACKAGING(S) and SAFETY CONTROL MEASURES:

a. PACKAGING - Packaging prescribed is a non-DOT specification welded, toroidal pressure vessel having 11 cubic inches nominal water capacity and 10,000 psi maximum service pressure. The pressure vessel must be designed and manufactured to conform with Garrett part number P/N 3250838 in accordance with drawing PL 3250838 Revision D; or Garrett part number P/N 3252639 in accordance with drawing PL 3252639 submitted to and on file with the Office of Hazardous Materials Exemptions and Approvals (OHMEA), and with DOT Specification 3HT (49 CFR 178.44) except as follows:

§178.44 (a) *Type, size and service pressure.*

(1) Toroidal pressure vessel with a machined end cap/boss assembly as shown in drawing number PL 3250838 Revision D. Water capacity is 11 cubic inches nominal.

(2) Toroidal pressure vessel with a seamless bent tube and machined end cap/boss assembly as shown in drawing P/N 3252639 and parts list P13252639, Rev A. Water capacity is 11 cubic inches nominal.

(3) Service pressure is 10,000 pounds per square inch maximum.

§178.47(b) *Authorized Material.*

(1) For the design specified in §178.44(a)(1) of this exemption: Corrosion and heat resistant Inconel 718 nickel alloy conforming with Aerospace Materials Specification (AMS) 5662 P. Welding rod must conform with AMS 5832C.

(2) For the design specified in § 178.44(a)(2) of this exemption: Corrosion resistant Inconel 718 nickel alloy seamless tubing conforming to AMS 5589 B, alloy bars, forgings and rings conforming to AMS 5662E. Welding rod must conform with AMS 5832C.

§178.47(d) *Manufacture.*

By best appliances and methods; dirt and scale to be removed as necessary to afford proper inspection. The torus is fabricated from either two machined half shells (AMS 5662P) joined by fusion welding; or by

bending seamless tubing (AMS 5589B) to the desired torus shape. The resulting torus to be attached to a machined end cap/boss assembly by fusion welding. Welding must be per Mil-W 8611A. All weld joints must be 100 percent radiographed and penetrant inspected.

§178.44(e) *Welding or brazing.*

Welding as prescribed in §178.44(d) of this exemption, is authorized.

§178.44(f) *Wall thickness.*

(1) Minimum wall thickness must be such that the wall stress at minimum specified test pressure shall not exceed 135,000 psi or 75 percent of the minimum tensile strength of the material as determined from the physical tests prescribed in §178.44(m).

(2) * * * *

(3) Does not apply.

§178.44(g) *Heat treatment.*

Each pressure vessel must be heat treated per Mil-H-6875 to obtain the mechanical properties specified in §178.44(m) of this exemption.

§178.44(i) *Hydrostatic test.*

(1) thru (3) * * *

(4) Test pressure is 18,400 psig.

§178.44(j) *Cycling test.*

* * *

(1) * * *

(2) Cycle test on each lot is not required if three cylinders from first lot are cycle tested to at least 5000 cycles with no failure.

(3) In this exemption, a "lot" means a group of cylinders successively produced having the same:

(1) Size and configuration;

(2) Specified material of construction;
(3) Process of manufacture and heat treatment;
(4) Equipment of manufacture and heat treatment; and
(5) Conditions of time, temperature and atmosphere during heat treatment.

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(l) *Flattening test.* - Not required.

§178.44(m) *Physical tests.*

(1) Required on 2 specimens cut from one pressure vessel out of each lot or from a ring of the same thickness as the toroidal pressure vessel subjected to the same heat treatment as the finished pressure vessel. The test specimen may be round bar or ½ inch wide sheet type, and conform to specimen geometries prescribed in American Society for Testing and Material Standard (ASTM) E-8.

(2) and (3) * * * *

§178.44(n) *Magnetic particle inspection.*

Not required. Instead, each pressure vessel must be inspected using apparatus and procedures for liquid penetrant examination in accordance with ASTM E-165-65. Inspection shall be performed externally on the finished pressure vessel after hydrostatic test. Evidence of discontinuities, which in the opinion of the independent inspector may appreciably weaken or decrease the durability of the pressure vessel shall be cause of rejection.

§178.44(n) *Acceptable results of tests.*

* * * *

(1) Not applicable.

(2) Physical tests.

(i) Ultimate tensile strength is 180,000 psi nominal; yield strength is 150,000 psi nominal.

(ii) Elongation at least 10 % in gage length not less than 2 inches; reduction in area is 12% minimum.

(3) Burst pressure is 25,250 psig minimum.

(4) Cycling must conform to one of the following:

(i) The design must be qualified by cycling three cylinders from zero to service pressure at a rate not to exceed ten cycles per minute to at least 5,000 pressurizations without evidence of distortion or failure. Lot testing is not required.

(ii) The design must be qualified by cycling three cylinders from zero to service pressure at a rate not to exceed ten cycles per minute to at least 1000 cycles without evidence of failure. Lot testing is required.

§178.44(r) *Marking*.

(1) and (2) * * *

(3) Name plates not required.

(4) Stamping of elastic expansion is not required.

(5) Electrochemical etching, vibro-pen and laser marking is authorized in lieu of steel stamping provided the marking is made at a location where the metal thickness is greater than the minimum thickness.

b. MARKINGS - Markings must be in accordance with the requirements under §178.3(f) except "DOT E 9638" must replace "DOT-3HT".

8. SPECIAL PROVISIONS:

a. Offerors for transportation of the hazardous materials specified in this exemption may use the packaging described in this exemption for the transportation of such hazardous materials provided no modifications or changes are made to the packages, all terms of this exemption are complied with,

and a copy of the current exemption is maintained at each facility from which such offering occurs.

b. A copy of this exemption, in its current status, must be maintained at each manufacturing facility at which this packaging is manufactured and must be made available to a DOT representative upon request.

c. The cylinders must be shipped in strong outside packagings in accordance with §173.301(k) such as Garret drawing 3793006 on file with the Office of Hazardous Materials Exemptions and Approvals (OHMEA).

d. The pressure vessel service life may not exceed 10 years or 10 refills, whichever comes first.

e. The pressure vessels authorized under this exemption may be used in military weapons systems or military aircraft only. A copy of the inspector's report on the first lot required in §178.44(s) must be submitted to the OHMEA prior to initial shipment.

f. Shippers using the packaging covered by this exemption must comply with all provisions of this exemption, and all other applicable requirements contained in 49 CFR Parts 171-180.

g. Each pressure vessel must be reinspected and hydrostatically retested every 5 years in accordance with 49 CFR 173.34(e) as prescribed for DOT-3HT cylinders, except that the rejection elastic expansion criteria does not apply.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, passenger and cargo aircraft only.

10. MODAL REQUIREMENTS: A copy of this exemption must be carried aboard each aircraft used to transport packages covered by this exemption.

11. COMPLIANCE: Failure by a person to comply with any of the following may result in suspension or revocation of this exemption and penalties prescribed by the Federal hazardous materials transportation law, 49 U.S.C. Section 5101 et seq:

- All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, Parts 171-180.

o Registration required by 49 CFR 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in 49 CFR 171.8, who performs a function subject to this exemption must receive training on the requirements and conditions of this exemption in addition to the training required by 49 CFR 172.700 through 172.704.

No person may use or apply this exemption, including display of its number, when the exemption has expired or is otherwise no longer in effect.

12. REPORTING REQUIREMENTS: The carrier is required to report any incident involving loss of packaging contents or packaging failure to the Associate Administrator for Hazardous Materials Safety (AAHMS) as soon as practicable. (49 CFR 171.15 and 171.16 apply to any activity undertaken under the authority of this exemption.) In addition, the holder(s) of this exemption must also inform the AAHMS, in writing of any incidents involving the package and shipments made under the terms of this exemption.

Issued at Washington, D.C.

Ann Mazzulla 5/28/98

for Alan I. Roberts (DATE)
Associate Administrator
for Hazardous Materials Safety

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Research and Special Programs Administration, Department of Transportation, Washington, D.C. 20590. Attention: DHM-31.

The original of this exemption is on file at the above office. Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

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