U.S. Department
of Transportation

**Research and
Special Programs
Administration**

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

MAY 4 2004

DOT-E 10867
(SEVENTH REVISION)

EXPIRATION DATE: June 30, 2005

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Pacific Scientific Company
HTL/KIN-Tech Division
Duarte, CA

2. PURPOSE AND LIMITATIONS:

a. This exemption authorizes the manufacture, mark, sale and use of non-DOT specification cylinders conforming with all regulations applicable to a DOT specification 3HT cylinder, except as specified herein, for the transportation in commerce of the materials authorized by this exemption. This exemption provides no relief from the Hazardous Materials Regulations (HMR) other than as specifically stated herein.

b. The safety analyses performed in development of this exemption only considered the hazards and risks associated with transportation in commerce.

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

4. REGULATIONS FROM WHICH EXEMPTED: 49 CFR §§ 173.302a(a)and 175.3 in that non-DOT specification cylinders are not authorized, except as specified herein.

5. BASIS: This exemption is based on the application of Pacific Scientific Company dated August 19, 2002 submitted in accordance with § 107.109.

6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Proper Shipping Name/ Hazardous Material Description	Hazard Class/ Division	Identification Number	Packing Group
Compressed gas, n.o.s. (Nitrogen containing 5% helium)	2.2	UN1956	N/A

7. SAFETY CONTROL MEASURES:

a. PACKAGING - Prescribed packaging is a non-DOT specification cylinder, Pacific Scientific part number P/N 41004509-1, EPAS Reservoir, made in accordance with HTL Drawing Numbers 41004509 Rev. J, 53000496 Rev. G, and 53040079 Rev. J and information as to material selection and performance described in the application on file with the Office of Hazardous Materials Exemption and Approvals (OHMEA). The cylinders must be in conformance with DOT-3HT specification (§§ 178.35 and 178.44), except as follows:

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

Cylindrical pressure vessel with welded hemispherical heads and threaded opening as shown in drawings referenced above. Water capacity not to exceed 35 cubic inches nominal. Service pressure not to exceed 3,200 pounds per square inch gauge at 70°F.

§ 178.44(b) *Authorized Material.*

(1) Vessel body: Seamless tubing made from titanium alloy type 3AL-2.5V conforming with ASTM 338-94 Grade 9, Cold Worked and Stress Relieved. Tubing must also meet paragraphs 3.4.6 (Microstructure), 3.5.2.1 (OD Surface), 3.5.2.2 (ID Surface Except Forced-Flow Pickle May Be Accomplished By Immersion), and 3.5.2.3 (Surface Texture Except OD Surface Texture To Be 63 Instead of 32) of Aerospace Materials Specification (AMS) 4944E. The alloy chemistry and the mechanical properties must be as follows:

ELEMENT	PERCENT BY WEIGHT
Aluminum	2.5 - 3.5
Vanadium	2.0 - 3.0
Iron	0.30 max.

Carbon	0.05 max.
Nitrogen	0.02 max
Oxygen	0.12 max
Other elements	0.4 max
Titanium	Balance

Tensile Strength: 115,000 psi minimum.
Yield strength: 95,000 psi minimum.
Elongation: 10% minimum

(2) End caps: Bar stock or forging made from titanium alloy type 6AL-4V conforming with Aerospace Material Specification SAE AMS 4928. The alloy chemistry must be as follows:

ELEMENT	PERCENT BY WEIGHT
Aluminum	5.5 - 6.5
Vanadium	3.5 - 4.5
Iron	0.30 max.
Carbon	0.08 max.
Nitrogen	0.05 max
Oxygen	0.20 max
Yttrium	0.015 max
Other elements	0.40 max
Titanium	Balance

§ 178.44(d) *Manufacture.*

Each cylinder with welded end caps must be stress relieved by heating to 600 to 1000°F, for a period of 30 minutes in an inert gas or vacuum atmosphere. Upon completion of proof testing, the welds must be inspected by dye penetrant test method.

§ 178.44(e) *Welding or brazing.*

(a) Welding as prescribed in § 178.44(d) of this exemption is authorized. The welding procedure must be the same as that used in preparing the design qualification cylinders. The welding procedure and any modification thereto must be documented and made available to the DOT authorized Inspector, upon request.

(b) All pressure weld seams must be examined by 100 percent radiography.

§ 178.44(f) *Wall thickness.*

(1) Applies except minimum wall thickness of any cylinder must not be less than 0.086 inch instead of 0.050 inch.

(2) thru (3) * * *

§ 178.44(g) *Heat treatment.*

The complete cylinder(s) must be uniformly and properly stressed relieved prior to test. Stress relief to be done in an argon atmosphere and argon fan cooled to below 200°F. Heat treatment for the purposes of modifying mechanical properties or performance of completed cylinders is not authorized.

§ 178.35(e) *Safety devices.*

(Added) A frangible disc type safety relief device for each cylinder is required. The maximum rupture pressure of the safety device must not be more than 90 percent of the cylinder rated test pressure specified in § 178.44(i) of this exemption.

§ 178.44(i) *Hydrostatic test.*

(1) and (3) * * *

(4) Each cylinder must be proof tested to a pressure of 7,000 pounds per square inch gage.

§ 178.44(l) *Flattening test.*

Flattening test not required.

§ 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 must be performed externally on the finished pressure vessel after the 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 for rejection.

§ 178.44(o) *Leakage test.*

Not applicable.

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

(1) Not required.

(2) Physical tests.

(i) Elongation at least 10% minimum in gage length not less than 2 inches. Reduction in area must be recorded.

(ii) Ultimate tensile strength is 115,000 psi nominal; yield strength is 95,000 psi minimum.

(3) Burst pressure: Minimum burst pressure must be 3.5 times service pressure.

(4) Cycling tests.

The design must be qualified by cyclic tests prescribed in §178.44(j) of this exemption. At least 50,000 cycles with the test cylinder showing no evidence of distortion or failure. One cylinder from each lot must be tested to 20,000 cycles without distortion or failure.

§ 178.44(q) *Rejected cylinders.*

The cylinders in a lot must be rejected if the lot qualification test cylinder fails any required test or inspection. A rejected lot may be used only if the cause of the failure is known and proper corrective action, which may include weld repair, is acceptable to the DOT authorized inspector. The lot must pass all prescribed tests.

§ 178.44(r) *Marking.*

(1) Applies, except that:

(i) Instead of DOT-3HT, each cylinder must be marked "DOT-E 10867" followed by the service pressure.

(ii) Marking by low stress type method such as electro-chemical etching, vibro-pen or laser marking, which does not decrease the integrity of the pressure vessel, is authorized.

(2) Rejection elastic expansion (REE) stamping is not required. Retest pressure prescribed in § 180.205 as applicable to DOT-3HT specification cylinder.

(3) Name plates not required.

§ 178.44(s) *Inspector's report.*

Inspector's report must be appropriately modified to reflect identification and conformance with this exemption. A copy of the inspector's report on the first lot of cylinders produced must be submitted to the Office of Hazardous Materials Exemptions and Approvals prior to initial shipment

b. TESTING - Each cylinder must be reinspected and hydrostatically retested every 5 years in accordance with § 180.205 as prescribed for DOT-3HT cylinders except that elastic expansion measurement is not required.

8. SPECIAL PROVISIONS:

a. In accordance with the provisions of Paragraph (b) of § 173.22a, persons may use the packaging authorized by this exemption for the transportation of the hazardous materials specified in paragraph 6, only in conformance with the terms of this exemption.

b. A person who is not a holder of this exemption, but receives a package covered by this exemption, 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 exemption and the HMR.

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

d. Each packaging manufactured under the authority of this exemption must be marked with a registration symbol designated by the Office of Hazardous Materials Exemptions and Approvals for a specific manufacturing facility.

e. A current copy of this exemption must be maintained at each facility where the package is manufactured under this exemption. It must be made available to a DOT representative upon request.

f. Cylinders are limited to the use as "reservoir" in the Emergency Power Actuator System (EPAS) for the Boeing 777 aircraft installed as described in the Pacific Scientific's application.

g. Cylinders must be shipped in strong outside packagings in conformance with § 173.301(a)(9).

h. A cylinder is not authorized 24 years after the date of manufacture.

i. The pressure vessels are acceptable for shipment with the properly approved actuating cutter installed in the outlet fitting.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo aircraft only, and passenger-carrying aircraft.

10. MODAL REQUIREMENTS: A current copy of this exemption must be carried aboard each aircraft used to transport packages covered by this exemption. The shipper must furnish a copy of this exemption to the air carrier before or at the time the shipment is tendered.

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. 5101 et seq:

- All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, Parts 171-180.
- Persons operating under the terms of this exemption must comply with the security plan requirement in Subpart I of Part 172 of the HMR, when applicable.
- Registration required by § 107.601 et seq., when applicable.

Each "Hazmat employee", as defined in § 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 §§ 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. (Sections 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, as soon as practicable of any incidents involving the package and shipments made under this exemption.

Issued in Washington, D.C.:

Robert A. McGuire
Associate Administrator for
Hazardous Materials Safety

MAY 4 2004
Date

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.

Copies of this exemption may be obtained by accessing the Hazardous Materials Safety Homepage at http://hazmat.dot.gov/exemptions Photo reproductions and legible reductions of this exemption are permitted. Any alteration of this exemption is prohibited.

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