



U.S. Department
of Transportation

**Research and
Special Programs
Administration**

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

MAY 4 2004

DOT-E 7945
(TWELFTH REVISION)

EXPIRATION DATE: June 30, 2005

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Pacific Scientific Company
HTL/Kin Tech Division
Duarte, California
2. PURPOSE AND LIMITATION:
 - a. This exemption authorizes the manufacture, mark, sale and use of a non-DOT specification cylinder conforming to all regulations applicable to DOT specification 4DS, except as specified herein, for use in transporting materials authorized under 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 § 173.304a(a)(1) 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 June 26, 2003, submitted in accordance with § 107.109.

6. HAZARDOUS MATERIALS (49 CFR § 172.101):

| Proper Shipping Name/ Hazardous Materials Description | Hazard Class/ Division | Identi- fication Number | Packing Group |
|---|------------------------------|-------------------------------|------------------|
| Compressed gases, n.o.s. (containing bromotrifluoromethane, pentafluoroethane, or iodotrifluoromethane) | 2.2 | UN1956 | N/A |

7. SAFETY CONTROL MEASURES:

a. **PACKAGING** - Packaging prescribed is a welded steel non-DOT specification cylinder conforming with DOT Specification 4DS(§§ 178.35 and 178.47) except as follows:

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

Applies except that service pressure must be at least 500 psig but not over 1,500 psig.

§ 178.47(b) *Steel.*

(a) Type nitronic 40 (ARMCO 21-6-9) austenitic stainless steel with analysis as follows:

| | Percent |
|------------|-------------|
| Carbon | 0.04 Max. |
| Manganese | 8.00/10.00 |
| Phosphorus | 0.060 Max. |
| Sulfur | 0.030 Max. |
| Silicon | 1.00 Max. |
| Chromium | 19.00/21.50 |
| Nickel | 5.50/7.50 |
| Nitrogen | 0.15/0.40 |

§ 178.47(f) *Wall thickness.*

Minimum wall thickness for any cylinder shall be 0.040 inch. Minimum wall thickness shall be such that the wall stress does not exceed 45,000 pounds per square inch, at the marked service pressure.

- (1) Calculation for sphere must be made by the formula:

$$S = 0.25(PD/tE)$$

where:

S = Wall stress in pounds per square inch.
P = Service pressure, psig.
D = Outside diameter, inches.
t = Minimum wall thickness, inches.
E = 0.85 (provides 85 percent weld efficiency factor which must be applied in the girth weld area and heat affected zone which zone shall extend a distance of 6 times wall thickness from center of weld); E = 1.0 (for all other areas).

- (2) Calculation for a cylinder must be made by the formula:

$$S = P(1.3D^2 + 0.4d^2) / (D^2 - d^2)$$

where:

S = Wall stress in pounds per square inch.
P = Service pressure, psig.
D = Outside diameter, inches.
d = Inside diameter, inches.

§ 178.47(g) *Heat treatment.*

Cylinders may be stress relieved or annealed for forming. Welded cylinder shall be stress relieved at a temperature of 900 °F ± 25 °F after process treatment and before hydrostatic test.

§ 178.47(n) *Acceptable results for flattening and burst tests.*

(1) Flattening required to 50 percent of the original outside diameter without cracking except flattening test not required for spheres.

(2) Burst pressure shall be at least 3 times service pressure or 4/3 times the test pressure whichever is greater.

§ 178.35(g) *Marking.*

Applies except the marking "DOT-E 7945" must be substituted for the DOT-4DS specification marking and followed by the service pressure and the Test Pressure marking, (TP-____), followed by the pressure at which the cylinder was tested, for example, "TP-3,000" must precede or be located immediately above the test date.

b. TESTING - Retest and reinspection must be in accordance with § 180.205, as prescribed for DOT Specification 4DS cylinders, except that the retest pressure must be that stamped on the cylinder.

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. The cylinder must be shipped in strong outside packagings in accordance with § 173.301(a)(9). The pressure vessels transported under this exemption may include properly approved actuating cartridges (Division 1.4C or 1.4S) installed in the discharge outlet without changing the classification of Division 2.2, provided the aggregate quantity of deflagrating (propellant) explosives does not exceed 3.2 grams per cylinder cartridge.

g. Cylinders are for aircraft use only.

h. Packages specified herein marked "DOT SP 5861" prior to March 20, 1976, or "DOT-E 5861" prior to June 1, 1978, and which meet the requirements of the edition of DOT SP 5861 or DOT-E 5861 in effect at the time of manufacture, may be transported under the terms of this exemption.

i. A copy of the inspector's report specified in § 178.47-23 on the first lot of each design of cylinders produced with a service pressure greater than 900 psig must be submitted to the Office of Hazardous Materials Exemptions and Approvals (OHMEA) prior to initial shipment.

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel, cargo aircraft only, and passenger-carrying aircraft.
10. MODAL REQUIREMENTS: A current copy of this exemption must be carried aboard each cargo vessel, aircraft or motor vehicle 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:
- o All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, 49 CFR Parts 171-180.
 - o 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.
 - 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 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 this 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 inform the AAHMS, in writing, of any incident involving the package and shipments made under the terms of this exemption.

Issued in Washington, D.C.:

Robert A. McGuire

MAY 4 2004

 (DATE)

Robert A. McGuire
 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.

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.

PO: KFW/AM