

February 19, 2004



U.S. Department  
of Transportation

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

**Research and  
Special Programs  
Administration**

DOT-E 12440  
(FIRST REVISION)

EXPIRATION DATE: January 31, 2006

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Luxfer Gas Cylinders  
Riverside, CA
2. PURPOSE AND LIMITATIONS:
  - a. This exemption authorizes the manufacture, marking, sale and use of a non-DOT specification cylinder conforming with all regulations applicable to a DOT-3AL specification cylinder, except as specified herein, for the transportation in commerce of the materials authorized by this exemption. This exemption provides no relief from any Hazardous Materials Regulation (HMR) other than as specifically stated herein.
  - b. The safety analyses performed in development of this exemption only considered the hazard 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 §§ 173.301(a)(1), 173.302, 173.304, 175.3, and 180.205(a) in that a non-DOT specification cylinder is not authorized except as prescribed herein.
5. BASIS: This exemption is based on the applications of Luxfer Gas Cylinders dated March 31, 2000 and supplemental information dated January 14, May 30, June 4, September 29, and November 5, 2003, submitted in accordance with § 107.105 and the public proceeding thereon.

6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Proper Shipping Name/ Hazardous Material Description	Hazard Class/ Division	Identi- fication Number	Packing Group
Oxygen, compressed	2.2	UN1072	N/A

7. SAFETY CONTROL MEASURES:

a. PACKAGING - Packaging prescribed is a non-DOT specification aluminum cylinder made in accordance with Luxfer Gas Cylinders specification on file with the Office of Hazardous Materials exemptions and Approvals (OHMEA) and in conformance with §§ 178.35 and 178.46 except as follows:

§ 178.35(f) *Marking.*

Applies except using "DOT-E 12440" in lieu of "DOT-3AL" followed by the service pressure.

§ 178.46(a) *Size and service pressure.*

Packaging prescribed is a seamless aluminum cylinder having a:

- maximum service pressure of 207 Bar (3000 psig);
- maximum water capacity of 6 liters;
- maximum external diameter of 122 mm (4.8 inches);
- maximum yield stress of 470 MPa (68.2 ksi);
- maximum ultimate tensile strength of 525 MPa (76.2 ksi); and
- minimum elongation of 12 percent.

§ 178.46(b) *Authorized materials and identification of materials*

(1), (2), (3) \* \* \*

(4) Only aluminum alloy 7032 as described in Luxfer Gas Cylinders specification on file with the OHMEA. The elemental compositions are limited to the following:

## CHEMICAL COMPOSITION IN WEIGHT PERCENT

Alloy	Si	Fe	Cu	Mn	Mg	Cr	Zn	Ti	Pb	Bi	Other		Al
											Each	Total	
7032	0.07 Max	0.1 Max	1.7- 2.3	0.05 Max	1.5- 2.2	0.16- 0.22	5.7- 6.5	0.1 Max	0.005 Max	0.005 Max	0.05 Max	0.15 Max	Bal

§ 178.46 (c) *Manufacture.*

(1) \* \* \*

(2), (3) Shape and thickness of the cylinder bottom and sidewall adjacent to the bottom must be such that failure during the cyclic pressure test occurs in the sidewall of the cylinder.

(4), (5), (6) \* \* \*

(7) *Electrical Conductivity Test.* Each cylinder must be subjected to an electrical conductivity test to estimate the yield strength of the solution-heat treated, quenched and aged cylinder. At a minimum, two readings must be taken in the cylindrical section approximately three inches from the shoulder and bottom of each cylinder after the heat treatment. Measured electrical conductivity values should exceed 40.1% and be less than 42.9% of the International Annealed Copper Standard (IACS) at 20°C where by definition commercially pure copper is considered to be 100%. The electrical conductivity test procedure must be in accordance with MIL-STD-1537C and Luxfer Gas Cylinders test method on file with the OHMEA.

(8) *Fatigue Performance Test.* The design authorized herein must be qualified initial and future production lots by subjecting a prototype sample to pressure cycling tests and burst tests as follows:

Lot (Batch) Number*	Cylinder Sample Rate
1-15	1 per lot
16-30	1 for every 2 lots
31-50	1 for every 5 lots
51-100	1 for every 10 lots

\* A "lot" is described in this exemption, paragraph 7a § 178.46(1).

(i) *Cycle Test.* The cycle test must be performed on a completed cylinder after hydrostatic (autofrettage) test by subjecting the cylinder to successive hydrostatic pressurizations from the lower cyclic pressure to the upper cyclic pressure at a rate not to exceed 10 cycles per minute. The cylinder must withstand at least 3,500 cyclic pressurizations without visual distortion, leaking or rupture at any point in the cylinder. All cycle tests must be performed using water with corrosion inhibitors as the pressurizing medium. Adequate recording instrumentation must be provided if equipment is to be left unattended for any period of time. Lower cyclic pressure must not exceed 10 percent of the upper cyclic pressure. Upper cyclic pressure must be at least equal to the minimum prescribed test pressure.

(ii) If a cylinder fails the cycling test described herein, the cylinder-sampling rate per lot will return to one level more demanding as described in the Fatigue Performance Test table above. If the first cylinder tested from a lot fails, two additional cylinders from the lot must be cycle tested. A lot will be rejected if either of the addition cylinders fails to survive 3,500 cycles.

(iii) *Burst Pressure Test.* The cylinder that successfully passed the cycling test described in the Fatigue Performance Test table above must be hydrostatically tested to destruction. The rate of pressurization must not exceed 200 psi per

second. The cylinder that is subjected to the burst test must withstand a pressure of at least 2 times the service pressure without failure. Failure must initiate in the sidewall in a longitudinal direction, and the cylinder must remain in one piece. If a cylinder fails to meet the hydrostatic pressurization test value (2 times the service pressure), the lot must be rejected.

§ 178.46(d) \* \* \*

§ 178.46(e) \* \* \*

§ 178.46(g) *Hydrostatic test.*

(1) \* \* \*

(2) Any internal pressure applied to the cylinder (autofrettage) before or during any official test may not exceed 130 percent of the cylinder's design test pressure.

(3), (4) \* \* \*

§ 178.46(h) \* \* \*

§ 178.46(k) *Duties of inspector.*

(1) (2) (3) (4) \* \* \*

(5) The inspector shall verify that the lot qualification tests described in paragraph 7.a., § 178.46(c)(7) and (8) of this exemption have been performed with acceptable results.

§ 178.46(l) \* \* \*

§ 178.46(m) *Inspection's report.*

\* \* \*

(1) The inspector must also record all data and results of the testing described in paragraph 7.a., § 178.46(c)(7) and (8) of this exemption

b. TESTING:

(1) Each cylinder must be requalified for use every five years in accordance with § 180.205 as prescribed for DOT Specification 3AL cylinders.

c. OPERATIONAL CONTROLS:

(1) A cylinder that has been subjected to fire may not be returned to service.

(2) Cylinders used in oxygen service must conform with § 173.302(a)(5)(i)-(iv).

(3) Transportation of oxygen by aircraft is only authorized when in accordance with § 172.102(c)(2) Special Provision A52 and §§ 175.85(h) and (i).

8. SPECIAL PROVISIONS:

a. The maker of the cylinder under this specification must retain the test reports required by this specification indefinitely as long as these cylinders are authorized.

b. A copy of the Inspector's report for each of the first three lots produced must be submitted to the OHMEA prior to shipment of a given lot.

c. During the initial use of this exemption OHMEA must be notified of the inspection procedures prior to the first production of the cylinders. Additionally, a copy of the Inspector's report for the manufacturing described in paragraph 7.a., § 178.46(c) of this exemption shall be reported to OHMEA after the first 15 lots, after the second 15, after the next 20 lots and then after the next 50 lots. The report shall include cycling test data, burst pressure test data and the results for each lot.

d. A person who is not a holder of this exemption, but receives a package covered by this exemption, may use the packaging authorized by this exemption for the transportation of hazardous materials specified in paragraph 6, only in conformance with the terms of this exemption.

- e. 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 Program for a specific manufacturing facility.
- f. 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.
- g. 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.
- h. A current copy of this exemption must be maintained at each facility where the charged package is offered or reoffered for transportation.
9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel, and cargo aircraft only. (See paragraphs 7.c.(3) for restrictions.)
10. MODAL REQUIREMENTS: A current copy of this exemption must be carried aboard each cargo vessel or aircraft used to transport packages covered by this exemption. The shipper must furnish a current copy of this exemption to the air carrier before or at the time the shipment is tendered. Additionally, any modal specific requirements applicable to DOT Specification 3AL cylinders apply to cylinders authorized under the terms of 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. 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.:



for 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: MMToughiry:dl