U.S. Department
of Transportation

**Research and
Special Programs
Administration**

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Washington, D.C. 20590

DOCKETS UNIT
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CYLINDERS 3-AL
SEE LIST BELOW

D.O.T.E- 6498
7042
8107
8364
8422
6616
6668
8404

SEE SECTION 173.23
49 CFR CODE OF REGULATIONS

**§ 173.23 Previously authorized packaging.**

(a) When the regulations specify a packaging with a specification marking prefix of "DOT," a packaging marked prior to January 1, 1970, with the prefix of "ICC" may be used in its place if the packaging otherwise conforms to applicable specification requirements.

(b) [Reserved]

(c) After July 2, 1982, a seamless aluminum cylinder manufactured in conformance with and for use under DOT exemption E 6498, E 7042, E 8107, E 8364, or E 8422, may be continued in use if marked before or at the time of the next retest with the specification identification "3AL" immediately above the exemption number, or the DOT mark (e.g., DOT 3AL 1800) is added in proximity to the exemption marking.

(d) Cylinders (spheres) manufactured and marked DOT-E 6616 prior to January 1, 1983, may be continued in use if marked before or at the time of the next retest with the specification identification "4BA" near the exemption marking.

(e) After October 1, 1984, cylinders manufactured for use under exemptions DOT E-6668 or E-8404 may be continued in use, and must be marked "DOT-4LXXXYY" (XXX to be replaced by the service pressure, YY to be replaced by the letters "AL", if applicable) in compliance with Specification 4L (§ 178.57 of this subchapter) on or before January 1, 1986. The "DOT-4LXXXYY" must appear in proximity to other required specification markings.

(f) An MC 331 cargo tank motor vehicle must conform to structural integrity requirements in § 178.337-3 or to corresponding requirements in effect at the time of manufacture.

(g) A non-bulk packaging manufactured, tested, marked, and certified on or before September 30, 1996, in accordance with the applicable provisions of subparts L and M of part 178 of this subchapter in effect on September 30, 1995, may be used as authorized by this subchapter if the packaging conforms to all requirements applicable at the time of manufacture. In addition, such a packaging may be reused as authorized by § 173.28 without a nominal thickness marking, if it conforms to the minimum thickness criteria prescribed in § 173.28(b)(4).

[Amdt. 173-3, 33 FR 14921, Oct. 4, 1968, as amended by Amdt. 173-94; 41 FR 16063, Apr. 15, 1976; Amdt. 173-152, 47 FR 26633, June 21, 1982; Amdt. 173-16, 48 FR 50460, Nov. 1, 1983; Amdt. 173-176, 49 FR 24689, June 14, 1984; Amdt. 173-180, 49 FR 42735, Oct. 24, 1984; Amdt. 173-224, 55 FR 52610, Dec. 21, 1990; 57 FR 45460, Oct. 1, 1992; Amdt. 173-240, 60 FR 17400, Apr. 5, 1995; Amdt. 173-242, 60 FR 26805, May 18, 1995]

DEPARTMENT OF TRANSPORTATION
RESEARCH AND SPECIAL PROGRAMS ADMINISTRATION
WASHINGTON, D.C. 20590

DOT-E 8364

1. Luxfer UK, Limited, Nottingham, England,(U.S Agent - Luxfer USA Limited, Riverside, California), is hereby granted an exemption from those provisions of this Department's Hazardous Materials Regulations specified in paragraph 5 below to manufacture, mark, and sell the packaging prescribed in paragraph 7 below for use in transportation in commerce of certain liquefied and nonliquefied compressed gases and certain other hazardous materials described in paragraph 3 below subject to the limitations and special requirements specified herein. This exemption authorizes the use of non-DOT specification aluminum cylinders, and provides no relief from any regulation other than as specifically stated.

2. BASIS. This exemption is based on Luxfer's undated petition received January 9, 1980 and supplemental data received March 8, 1980, submitted in accordance with 49 CFR 107.103 and the public proceeding thereon.

3. HAZARDOUS MATERIALS (Descriptor and class).

a. Air, compressed; argon; carbon dioxide; helium; nitrogen; nitrous oxide; and oxygen, classed as nonflammable gases.

1. For cylinders charged with oxygen, the following apply:

i. Pressure in the contaier must not exceed 3000 psig at 70°F.

ii. Cylinder threads must be straight threads. Tapered threads are not authorized.

iii. Brass valves only are authorized.

iv. Each cylinder must be cleaned in compliance with requirements of Federal Specification RR-C-901b dated August 1, 1967, paragraph 3.8.2. One cylinder selected at random from each lot of 200 or less must be tested as prescribed in RR-C-901b, paragraph 4.4.2.3 and meet the standard of cleanliness specified.

b. Any other flammable or nonflammable, liquefied or nonliquefied compressed gas for which DOT-3A or DOT-3AA cylinder is prescribed in 49 CFR Part 173 specifically identified to and acknowledged in writing by the Office of Hazardous Materials Regulation (OHMR) prior to first shipment.

c. Class A poisons specifically identified to, and acknowledged in writing by, the OHMR prior to the first shipment.

d. Any other hazardous material specifically identified to, and acknowledged in writing by, the OHMR prior to the first shipment.

4. PROPER SHIPPING NAME (49 CFR 172.101). The specific commodity name, or generic description, as appropriate.

5. REGULATION AFFECTED. 49 CFR 173.302(a)(1), 173.304(a)(1) and (d)(3), 173.336(a)(2), 175.3.

6. MODES OF TRANSPORTATION AUTHORIZED. Motor vehicle, rail freight, cargo vessel, cargo-only aircraft, except as specifically provided in paragraph 8(e).

7. SAFETY CONTROL MEASURES. Packaging prescribed is a non-DOT specification seamless high pressure cylinder made of aluminum alloy designated 6351-T6 by the Aluminum Association. Each cylinder must be constructed in accordance with the proposed specification for aluminum cylinders set forth in the Compressed Gas Association Docket 71-6 dated September 1975, with the following exceptions:

178.XX-3 Inspections by whom and where

Inspections and verifications must be performed by an independent inspection agency approved in writing by the Association Director for OE, in accordance with §173.300a of this subchapter. Chemical analyses and tests as specified must be made within the United States unless otherwise approved in writing by the Association Director for OE, in accordance with 49 CFR 173.300b.

178.XX-4 Duties of the inspector

(b) The inspector shall verify compliance with the provisions of §178.XX-5(g) by:

(1) Performing a chemical analyses on each melt or cast lot or other unit of starting material;

(2) Obtaining a certified chemical analysis from the materials manufacturer for each melt or cast of material; or

(3) Performing a check analysis on one cylinder out of each lot of 200 cylinders or less, if a certificate containing sufficient data to indicate compliance with the material specification is obtained.

(c) The inspector must determine that each cylinder complies with this exemption by:

(1) Making a complete internal inspection before closing:

(2) (Added) Making a complete external inspection;

(3) Verifying that heat treatment was proper;

(4) Obtaining the samples to be tested;

(5) Witnessing each test;

(6) Measuring the wall thickness and verifying that the minimum prescribed thickness was met;

(7) (Added) Verifying that the identification of material is proper;

(8) Verifying the threads by gauge;

(9) Reporting volumetric capacity and tare weight;

(10) Determining that each cylinder is marked in compliance with the exemption;

(e) (Added) Verify ultrasonic inspection of all material by inspection or by obtaining the material producer's certificate of ultrasonic inspection. Ultrasonic inspection must be performed or verified as having been performed in accordance with paragraph 178.XX-5(b) of this exemption.

(f) (Added) In this specification, a lot is defined as a group of cylinders of the same size and configuration, fabricated from material of the same specification, manufactured at the same time by the same process to the same specification 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 physical testing need not be counted as being one of the 200.

178.XX-5 Authorized Material

(a) Only 6351-T6 alloy with a minimum elongation of 14 percent in a 2 inch or 4D specimen is authorized.

(b) Before parting, all starting stock must be 100 percent ultrasonically inspected, along the length at right angles to the central axis from two positions at 90° to one another. The equipment and continuous scanning procedure must be capable of detecting and rejecting internal defects such as cracks which have an ultrasonic response greater than that of a calibration block with a 5/64 inch diameter flat bottomed hole.

(c) Cast stock must have uniform equiaxed grain structure not to exceed 250 microns average.

(d) * * *.

(e) (Added) Starting stock must be cast stock that is later scalped prior to extrusion of the cylinder shell. If starting stock is not cast stock, it must be traceable to cast stock.

178.XX-8 Manufacture

(c) * * * the dish radius is no greater that 1.2 times the inside diameter of the shell. The knuckle radius must not be less than 12 percent of the inside diameter of the shell.

178.XX-10 Wall thickness.

(b) Calculations must be made by formula:

$$S = [P(1.3D^2 + .4d^2)] \ / [D^2 - d^2]$$

where:

S=wall stress in psi,
P=minimum test pressure prescribed,
D=outside diameter in inches, and
d=inside diameter in inches.

178.XX-11 Design qualification

(a) * * * (Added) Pressurization rate must not exceed 10 cycles per minute.

(b) * * * failure must not occur at less than 2.5 times the marked service pressure. The test cylinder must remain in one piece and failure must initiate in the cylinder side wall in a longitudinal direction.

(c) In this specification "significant change" means a 10 percent or greater change in cylinder wall thickness or diameter; a 20 percent or greater increase in length, service pressure or gas capacity; and any change in material.

178.XX-16 Flattening test

(b) Cylinder must withstand flattening to 9 times wall thickness without cracking. Flattening to continue until cracking occurs and this point recorded on the report. Any cracks must be longitudinal to the longitudinal axis of the cylinder.

178.XX-17 Mechanical Test.

(c) Specimens must be 4D bar or gauge length 2 inches with width not over 1 1/2 - inch taken in the direction of extrusion approximately 180° from each other in accordance with ASTM E8-78. The specimen, exclusive of grip ends, must not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section. When the size of cylinder does not permit securing straight specimens, the specimens may be taken in any location or direction and may be straightened or flattened cold by pressure only, not by blows. When such specimens are used the inspector's report must show that the specimens were so taken and prepared. Heating of specimens for any purpose is forbidden.

178.XX-19 Marking

(a) * * *

(1) DOT-E 8364 followed by the service pressure.

(2) A serial number and an identifying symbol (letters); location of number to be just below or immediately following the DOT mark; location of symbol to be just below or immediately following the number. The symbol and numbers must be those of the maker, or of the-purchaser or user if the maker's symbol also appears near the date of the original test. Each symbol must be registered with the MTB; duplications unauthorized.

8. SPECIAL PROVISIONS.

a. Shippers may use the packaging covered by this exemption pursuant to 49 CFR 173.22a.

b. A copy of this exemption must be carried aboard each vessel and aircraft used to transport packages covered by this exemption.

c. Each cylinder must be retested as least every five years as prescribed in 49 CFR 173.34(e) for DOT Specification 3AA cylinders, except that a cylinder condemned for excessive permanent expansion may not be reheat treated.

d. A cylinder which has been subjected to the action of fire must not again be placed in service.

e. Cylinders containing Class A poisons:

(1) must be designed and marked for a service pressure of 1800 psi or higher.

(2) are subject to the regulations in Part 173 applicable to specification 3A and 3AA cylinders except 49 CFR 173.34(e)(15) and 173.302(c).

(3) must not be transported by cargo vessel or cargo-only aircraft.

f. Flammable compressed gases are not acceptable for transportation by cargo vessel.

g. Prior to initial shipment of cylinders manufactured under the terms of this exemption, the following documents must be submitted to the OHMR.

(1) Proof of compliance with 49 CFR 173.300a and 173.300b.

(2) Design qualification test results on each design and any significant design change.

9. REPORTING REQUIREMENTS. Any incident involving loss of contents of the package must be reported to the OHMR as soon as practicable.

10. EXPIRATION DATE. April 30, 1982.

Issued at Washington, D.C.:

JUL 21 1980
(DATE)

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Address all inquiries to: Associate Director for Hazardous Materials Regulation, Materials Transportation Bureau, Research and Special Programs Administration, U.S. Department of Transportation, Washington, D.C., 20590. Attention: Exemptions Branch.

Dist: USCG, FAA, FHWA, FRA