



U.S. Department  
of Transportation

**Research and  
Special Programs  
Administration**

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

**SEP 29 2004**

DOT-E 10440  
(FIFTH REVISION)

EXPIRATION DATE: August 31, 2006

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Mass Systems, A Unit of AMERON GLOBAL, Inc.  
Baldwin Park, 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 Specification 4DS 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 §§ 173.304a(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 Mass Systems, A Unit of AMERON GLOBAL, Inc., dated September 15, 2004, submitted in accordance with § 107.109.

6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Proper Shipping Name/ Hazardous Material Description	Hazard Class/ Division	Identi- fication Number	Packing Group
Compressed gas, n.o.s. or the specific commodity name, as appropriate.	2.2	As appropriate	N/A

7. SAFETY CONTROL MEASURES:

a. PACKAGING - Packagings prescribed are welded austenitic stainless steel non-DOT specification cylinders conforming to Mass Systems, Inc. specifications and drawings on file with the Office of Hazardous Materials Exemptions and Approvals (OHMEA); and meeting all requirements of DOT Specification 4DS (§§ 178.35 and 178.47) except as follows:

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

Applies except service pressure must be at least 500 psig but not over 3000 psig.

§ 178.47(b) *Steel.*

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

(Percent)	(Percent)
C - 0.04 Max.	Si - 1.00 Max.
Mn - 8.00/10.00	Cr - 19.00/21.50
P - 0.060 Max.	Ni - 5.50/7.50
S - 0.030 Max.	N - 0.15/0.40

§ 178.47(f) *Wall thickness.*

Minimum wall thickness for any cylinder must be 0.040 inch.

(1) Minimum wall thickness must be such that the wall stress at the minimum specified test pressure does not exceed 90,000 psi.

(2) Calculation of maximum wall stress for sphere must be made by the formula:

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

where:

S = Wall stress in pounds per square inch.  
P = Test pressure prescribed for water jacket test (two times service pressure), PSIG.  
D = Outside diameter in inches.  
t = Minimum wall thickness in inches.  
E = 0.85 for the girth weld area and heat affected zones which must extend a distance of 6 times the wall thickness from center of weld but 1.0 for all other areas.

(3) Calculation of maximum wall stress 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 = Test pressure prescribed for water jacket test (two times service pressure), PSIG.  
D = Outside diameter in inches.  
d = Inside diameter in inches.

§ 178.47(g) *Heat treatment.*

Cylinders may be stress relieved or annealed for forming. Welded cylinder must be stress relieved at a temperature of  $900^{\circ}\text{F} \pm 25^{\circ}\text{F}$  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 must be at least 3 times service pressure or  $3/2$  times the test pressure marked on the cylinder.

§ 178.35(f) *Markings.*

Applies except the marking "DOT-E 10440" must be substituted for the DOT-4DS specification marking and be followed by the service pressure. If the cylinder is marked with the test pressure, the test pressure marking, for example "TP-6,000", 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. Cylinders are for aircraft use only.

SEP 29 2004

g. Cylinders must be shipped in strong outside packagings in conformance with § 173.301(a)(9). The pressure vessels are acceptable for shipment with the actuating cartridges approved by the Associate Administrator for Hazardous Materials Safety, installed in the discharge outlet.

h. A copy of the inspector's report specified in § 178.35(g) on the first lot of each design of cylinders produced with a service pressure greater than 900 psig, or water capacity greater than 378 cubic inches must be submitted to the Office of Hazardous Materials Exemptions and Approvals prior to initial shipment.

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

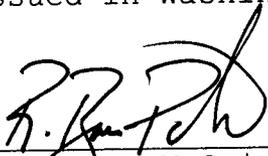
9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel, cargo aircraft only, and passenger-carrying aircraft.
10. MODAL REQUIREMENTS: A current copy of this exemption must be carried aboard each motor vehicle, cargo vessel or aircraft used to transport packages covered by this 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:
- o All terms and conditions prescribed in this exemption and the Hazardous Materials Regulations, 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 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.



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Robert A. McGuire  
Associate Administrator for  
Hazardous Materials Safety

**SEP 29 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.

PO: MT/AM