U.S. Department
of Transportation

**Research and
Special Programs
Administration**

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

MAR 1 5 2004

DOT-E 9370
(SEVENTH REVISION)

EXPIRATION DATE: February 28, 2006

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Norris Cylinder Company
Longview, Texas

2. PURPOSE AND LIMITATIONS:

a. This exemption authorizes the manufacture, marking, sale and use of a non-DOT specification cylinder complying in part with the DOT 3T Specification for the transportation in commerce of those hazardous materials authorized in DOT 3T cylinders. This exemption provides no relief from the Hazardous Materials Regulations 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 §§ 173.301(a)(1), 173.302a(b), and 175.3 in that a non-DOT specification cylinder is not authorized except as specified herein.

5. BASIS: This exemption is based on Norris Cylinder Company's application dated February 18, 2004, submitted in accordance with § 107.109.

6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Hazardous Materials Description			
Proper Shipping Name	**Hazard Class/ Division**	**Identification Number**	**Packing Group**
Non-liquefied compressed gases, or mixtures of such compressed gases which are authorized in the Hazardous Materials Regulations to be transported in DOT 3T specification cylinders.	2.1, 2.2 or 2.3, as appropriate	As appropriate	N/A

Note: The following materials are not authorized under this exemption:

(a) Hydrogen, compressed natural gas, hydrogen sulphide, and carbon monoxide;

(b) Any gas mixture containing hydrogen sulfide or other free sulphides, hydrogen, or compressed natural gas;

(c) Any gas mixture containing more than 10% carbon monoxide;

(d) Any gas mixture containing carbon monoxide and having a dew point higher than minus 52°F at one atmosphere;

(e) Any gas or mixture of gases which does not remain in gaseous state when contained in the cylinder at 70°F and rated filling pressure; and

(f) Any gas or mixture of gases, the quantity of one or more of which is capable of combining chemically with other gases in such mixture or of combining chemically with the cylinder steel so as to significantly reduce the effectiveness of the cylinder.

7. SAFETY CONTROL MEASURES:

a. PACKAGING - Packaging prescribed is non-DOT specification steel cylinder made in compliance with DOT 3T (§ 178.45) except as follows:

§ 178.35 (c) Duties of the inspector

[Add]

(5) Prior to initial production of any design or design change, verify that the design qualification tests prescribed in §178.45(c)(8) have been performed with acceptable results.

§ 178.35(e) Pressure relief devices and protection for valves and pressure relief devices.

(a) Must be as required by the Department of Transportation's regulations that apply (see §§ 173.34(d) and 173.301(g)).

(b) Pressure relief devices must be in compliance with § 173.302(c)(1).

§ 178.45(a) Type, size and service pressure.

Each cylinder must be of seamless construction with the bottom convex to pressure. The maximum water capacity is 120 pounds with a minium service pressure of 1,800 p.s.i.

§ 178.45(b) Material, steel.

Only open hearth, basic oxygen, or electric furnace process steel of uniform quality is authorized. The steel analysis must conform to the following:

Analysis Tolerances

Element (percent)	Ladle analysis	Check analysis Under	Over
Carbon.....	0.32 to 0.38	0.03	0.04
Manganese.....	0.60 to 1.05	0.04	0.04
Phosphorus (max)....	0.015	....	0.01
Sulfur (max).....	0.010	....	0.001
Silicon.....	0.15 to 0.35	0.02	0.03
Chromium.....	0.80 to 1.15	0.05	0.05
Molybdenum.....	0.15 to 0.25	0.02	0.02

§ 178.45(c) Manufacture

[Add]

(6) Cylinder shells must be manufactured by the backward extrusion method.

(7) The thickness of the bottoms of cylinders is, under no condition, to be less than two times the minimum wall thickness of the cylindrical shell; such bottom thickness to be measured within an area bounded by a line representing the points of contact between the cylinder and floor when the cylinder is in a vertical position.

(8) Each new design and any significant change to any acceptable design must be qualified for production by subjecting at least three prototype samples to pressure cycling tests and burst tests as follows:

(i) Cycle Test. The cycle test must be performed on the completed cylinder after hydrostatic test by subjecting the cylinder to successive hydraulic pressurizations from the lower cyclic pressure to the upper cyclic pressure at a rate not to exceed 10 cycles per minute. 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) Burst Pressure Test. The burst pressure test must be performed on the completed cylinder by hydraulically pressurizing the cylinder to destruction. Rate of pressurization must not exceed 200 psi per second.

(9) In this specification "significant change" means a 10 percent or greater change in cylinder wall thickness, service pressure, or diameter; a 30 percent or greater change in water capacity or base thickness; any change in material; over 100 percent increase in size of openings; or any change in the number of openings.

(10) After all shell forming operations and prior to closing in, the cylindrical section of each shell must be examined in accordance with ASTM Standard A-388-80 using the angle beam technique. The equipment used must be calibrated to detect a notch equal to five percent of the design minimum wall thickness. Any discontinuity indication greater than that produced by the five percent notch is cause for rejection of the shell unless the discontinuity is repaired within the requirements of this specification.

§ 178.45(d) Wall thickness

The minimum wall thickness must be such that the wall stress at the minimum specified test pressure does not exceed 67 percent of the minimum tensile strength of the steel as determined by the physical tests required in §178.45(j) and §178.45(k). A wall stress of more than 90,500 p.s.i. is not permitted. In no case may wall thickness be less than .210 inch.

(1) * * * . Except P = minimum test pressure, at least 3/2 service pressure.

(2) Does not apply.

§ 178.45(f) Openings

(1) Openings are permitted in cylinder head only.

(2) All openings must be threaded. Threads must be in compliance with the following:

(i) Each thread must be clean cut, even, without checks, and to gauge.

(ii) Taper threads, when used, must be in compliance with one of the following:

(A) American Standard Pipe Thread (NPT) type must be in compliance with the requirements of Federal Standard H-28 (1978), Section 7.

(B) National Gas Taper Thread (NGT) type must be in compliance with the requirements of Federal Standard H-28 (1978), Section 7 and 9.

(C) Other taper threads in compliance with other standards may be used provided the length is not less than that specified for NPT threads.

(iii) Straight threads when used must be in compliance with one of the following:

(A) National Gas Straight Thread (NGS) type must be in compliance with the requirements of Federal Standard H-28 (1978), Sections 7 and 9.

(B) Unified Thread (UN) type must be in compliance with the requirements of Federal Standard H-28 (1978), Section 2.

(C) Controlled Radius Root Thread (UNJ) type must be in compliance with the requirements of Federal Standard H-28 (1978) Section 4.

(D) Other straight threads in compliance with other recognized standards may be used provided that the requirements in (4) below are met.

(iv) All straight threads must have at least 6 engaged threads, a tight fit, and a factor of safety in shear of at least 10 at the test pressure of the cylinder. Shear stress must be calculated by using the appropriate thread shear area per Federal Standard H-28 (1978), Appendix A5, Section 3.

§ 178.45(g) Hydrostatic test

* * * * *

(6) Each cylinder must be tested to at least 3/2 times its service pressure.

§ 178.45(h) Ultrasonic examination

[Add]

Wet magnetic particle examination for detecting the presence of quench cracks may be substituted for the ultrasonic examination prescribed in this section. When magnetic particle examination is performed it must be done after the hydrostatic test on the cylindrical section of each cylinder in accordance with ASTM Standard E 709-80. Any cylinder found to have a quenching crack must be rejected and may not be requalified.

§ 178.45(i) Basic requirements for tension and Charpy impact tests.

(1) Two tension specimens and three Charpy impact specimens must be tested from one cylinder taken at random out of each lot of 200 or less.

(2) Not applicable.

(3) Each specimen for tension and Charpy impact tests must be taken from the side wall of the cylinder after heat treatment. The axis of the specimens must be parallel to the axis of the cylinder.

(4) The test cylinder need represent only one of the heats in a lot provided the other heats in the lot have been tested and have passed the tests.

(5) Test results must conform to the requirements specified in § 178.45-14 and § 178.45-15.

(6) When the test results do not conform to the requirements specified, the cylinders represented by the tests may be reheat treated and the tests repeated. Paragraph (e) of this section applies to any retesting.

§ 178.45(j) Basic conditions for acceptable physical testing.

* * *

(1) * * *

(2) * * *

(3) * * *

(4) Three Charpy impact specimens must be taken from one cylinder in each lot, after heat treatment and tested at -60 degrees F (-50 degrees C) or colder. Each impact specimen must be Charpy V-notch type, size 10 mm x 5 mm (1/2 size) prepared and tested in accordance with ASTM Standard E 23-88.

§ 178.45(k) Acceptable results of tests.

* * *

(1) * * *

(2) * * *

(3) The Charpy V-notch impact properties for the three 1/2 size (10 mm x 5 mm) impact specimens must not be less than:

Average value for 3 specimens; 25 ft-lb (85 J/cm). Minimum value for any one of the 3 specimens: 21 ft-lb (70 J/cm^2).

When the test results do not meet the requirements specified, the lot must be rejected.

(4) * * *

(5) Cylinders subjected to design qualification cycling tests must withstand at least 10,000 cyclic pressurizations without distortion or failure.

(6) Cylinders subjected to design qualification burst tests must withstand a pressure of at least 2.25 times the service pressure without failure. Failure must initiate in the sidewall in a longitudinal direction, and the cylinder must remain in one piece.

§ 178.45(m) Markings

Marking must be in accordance with 178.35(f) except "DOT-E 9370" in lieu of "DOT 3T" followed by the service pressure. Rejection elastic expansion (REE) in cubic centimeters(cc) may be marked near the date of test.

b. TESTING - Each cylinder must be requalified for use in accordance with § 180.209 as prescribed for DOT 3T cylinders except that the minimum retest pressure must be 3/2 times the service pressure.

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. Reports.

(1) Prior to the initial shipment of cylinders made to any specific design, a report of test results specified in § 178.45(c)(8) must be submitted to the OHMEA.

(2) The maker of the cylinder under this specification must retain the test reports required by this specification for 15 years from the original test date on the cylinder.

g. These cylinders may not be used for carriage of gases that would cause hydrogen embrittlement of the steel.

h. Filling limits specified in § 173.302(c) are not authorized. Under no circumstances are these cylinders to be filled to a pressure exceeding the marked service pressure at 70 degrees F.

i. A copy of the Inspector's report for each of the first three lots produced, must be submitted to the OHMEA prior to shipment.

j. Cylinders made under this exemption may be transported in an upright position.

k. Transportation of Division 2.1 (flammable gases) and Division 2.3 materials (gases which are poisonous by inhalation) are not authorized aboard cargo vessel or aircraft unless specifically authorized in the Hazardous Materials Table (§ 172.101).

l. 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).

9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel and cargo aircraft only (See restrictions in paragraphs 8.k and 8.l).

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 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, 49 CFR 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 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.

MAR 1 5 2004

(DATE)

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: DL