U.S. Department
of Transportation

**Research and
Special Programs
Administration**

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

**DOT-E 8789 (EXTENSION)**
**FIRST REVISION November 13, 1986**

In accordance with 49 CFR 107.105 of the Department of Transportation (DOT) Hazardous Materials Regulations DOT-E 8789 is hereby extended for the party(ies) listed below by changing the expiration date in paragraph 10 to February 28, 1993. This change is effective from the issue date of this extension. All other terms of the exemption remain unchanged.

This extension applies only to party(ies) listed below based on the application(s) received in accordance with 49 CFR 107.105 and the public proceeding thereon. This extension constitutes a necessary part of this exemption and must be attached to it.

MAR 29 1991

J. Suzanne Hedgspeth
for Alan I. Roberts
Associate Administrator
for Hazardous Materials Safety

(DATE)

Dist: FHWA FRA USCG FAA

| EXEMPTION HOLDER | APPLICATION DATE |
|---|---|
| Turner/Cooper Group<br>Sycamore, IL | February 8, 1991 |

No Renewal
Not Active

U.S. Department
of Transportation

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Special Programs
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400 Seventh St., S.W.
Washington, D.C. 20590

DOT-E 8789
(FIRST REVISION)

NOV 13 1986

1. Turner Industries, Sycamore, Illinois, 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 described in paragraph 7 below for use in the transportation of the flammable gas described in paragraph 3 below in commerce subject to the requirements specified herein. This exemption authorizes the use of a non-DOT specification cylinder described in paragraph 7 below, and provides no relief from any regulation other than as specifically stated.

2. BASIS. This exemption is based on the application of Turner Industries dated January 13, 1986, submitted in accordance with 49 CFR 107.105 and the public proceeding thereon.

3. HAZARDOUS MATERIALS (Descriptor and class). Propane classed as a flammable gas.

4. PROPER SHIPPING NAME (49 CFR 172.101). Propane or liquefied petroleum gas.

5. REGULATION AFFECTED. 49 CFR 173.304, 175.3.

6. MODES OF TRANSPORTATION AUTHORIZED. Motor vehicle, rail freight, cargo vessel, cargo-only aircraft.

7. SAFETY CONTROL MEASURES. Packaging prescribed is a non-DOT specification, small, low pressure, cylinder made as follows:

§178.XX Inside container, refillable brazed cylinder.

§178.XX-1 Compliance.

Each cylinder must meet the applicable requirements of 49 CFR 173.24 and Drawing RC 500 dated December 1, 1981.

§178.XX-2 Type, size and service pressure.

(a) The cylinder must be of brazed construction. Longitudinal seams are prohibited.

(b) Maximum water capacity is 3 pounds (84 cubic inches) nominal.

(c) Service pressure must be at least 240 psig but not over 300 psig.

§178.XX-3 Inspection.

Inspections and verifications must be performed by a competent inspector of the manufacturer or by an independent inspection

agency approved in writing by the Director for OHMT 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 Director for OHMT in accordance with §173.300b of this subchapter.

§178.XX-4 Duties of the Inspector.

(a) The inspector shall determine that all materials conform with this specification before releasing those materials for cylinder manufacture.

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

(1) Performing or witnessing the performance of the chemical analyses on each heat of steel; or

(2) Obtaining a certified chemical analysis from the material or cylinder manufacture for each heat of steel; or

(3) Obtaining a certified check analysis or performing a check analysis on one cylinder out of each lot of 1000 cylinders or less, if a certificate containing data to indicate compliance with the material specification is obtained.

(c) The inspector shall determine that each cyliner conforms with this exemption by:

(1) Making a complete internal inspection before closing;

(2) Making a complete external inspection of the finished cylinder;

(3) Verifying that heat treatment was proper;

(4) Selecting the samples for all tests;

(5) Selecting the samples for check analyses performed by other than the material producer;

(6) Witnessing each test;

(7) Verifying that the prescribed minimum thickness was met by measuring or witnessing the measurement of the wall thickness of at least 2 cylinders out of each lot;

(8) Verifying that the identification of material is proper;

(9) Verifying the threads, by gauge;

(10) Reporting volumetric capacity, and minimum thickness noted;

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

(12) Preparing and providing the required report to the cylinder maker, and upon request to the purchaser.

§178.XX-5 Authorized material.

(a) Open hearth, basic oxygen or electric steel of uniform quality is authorized with maximum content percent for the following: Carbon 0.12, phosphorus 0.045, and sulfur 0.055.

(b) Material with seams, cracks, laminations, or other injurious defects not permitted.

(c) Material used must be identified by any suitable method.

§178.XX-6 Manufacture.

(a) General manufacturing requirements are as follows:

(1) Dirt and scale must be removed prior to inspection and processing.

(2) The surface finish must be uniform and reasonably smooth.

(3) Inside surfaces must be clean, dry and free of loose particles.

(4) No defect of any kind is permitted if it is likely to weaken a finished cylinder.

(b) Requirements for seams:

(1) Longitudinal seams are not permitted.

(2) Brazed seams must be as follows:

(i) Mating shells attached by brazing must have a driving fit with the shell, unless the shell is crimped, swedged, or curled over the skirt or flange of the mating shells, and be thoroughly brazed until complete penetration by the brazing material of the brazed joint is secured.

(ii) Brazing materials must have a melting point of not lower than 1,000 °F.

(iii) The brazing material must completely penetrate the full length and the minimum width of any brazed joint which must be at least four times the thickness of the shell wall.

§178.XX-7 Wall Thickness.

(a) The minimum wall thickness must be such that the wall stress at minimum test pressure shall not exceed 17,000 pounds per square inch. The minimum wall for any cylinder shall be 0.040 inch.

(b) Calculation 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;
D = outside diameter in inches;
d = inside diameter in inches;
P = minimum prescribed test pressure (see 178.XX.11(a)).

§178.XX-8 Heat Treatment.

(a) Cylinders must be uniformly and properly heat treated prior to tests.

§178.XX-9 Openings in cylinders.

(a) Openings are permitted in heads only.

(b) Each opening in the cylinder must be provided with a fitting securely attached to cylinder by brazing. If the fitting has threads, they must be:

(1) Clean cut, even, without checks, and tapped to gauge;

(2) Taper threads of a length not less than as specified for American Standard taper pipe threads, or;

(3) Straight threads, having at least 4 engaged threads, having a calculated shear strength at least 10 times the test pressure of the cyliner.

(c) Closure of fitting must be adequate to prevent leakage.

NOV 13 1986

§178.XX-10 Safety devices.

Safety devices must meet the requirements of 49 CFR 173.34(d) and 173.301(k).

§178.XX-11 Pressure tests.

(a) Each cylinder must be tested at an internal pressure of at least two times service pressure and must be held at that pressure for at least 30 seconds.

(1) The leakage test must be conducted by submersion under water or by some other method that will be equally sensitive.

(2) Where pneumatic testing is used means designed to protect personnel must be provided.

(3) If the cylinder leaks, evidences visible distortion, or any other defect, while under test, it must be rejected (see §178.XX-13):

(b) One cylinder taken from the beginning of each lot, and one from each 1,000 or less successively produced within the lot thereafter, must be hydrostatically tested to destruction. The entire lot must be rejected if (see §178.XX-13).

(1) A failure occurs at a gauge pressure of at or below 2.0 times the test pressure.

(2) A failure initiates in the brazed area thereof, or

(3) A failure is other than in the sidewall of the cylinder longitudinal with its long axis.

(c) A "lot" is defined as 1,000 cylinders successively produced having identical size, design, construction, material, heat treatment, finish, and quality.

§178.XX-12 Flattening test.

(a) One cylinder must be taken from the beginning of production of each lot (as defined above) and subjected to a flattening test.

(1) The flattening test must be made on a cylinder that has been tested at test pressure.

(2) The flattening must be between 60 degrees included-angle, wedged shaped knife edges, rounded to a 0.5 inch radius.

(3) Cylinders must be flattened so that their outer surfaces are not more than six times wall thickness apart.

(b) If any cylinder cracks when subjected to the specified flattening test, the lot of cylinders represented by the test must be rejected (see §178.XX-13).

§178.XX-13 Rejected cylinders.

(a) If the cause for rejection of a lot is determinable, and if by test or inspection defective cylinders are eliminated from the lot, the remaining cylinders must be qualified as a new lot under §§178.XX-11 and 178.XX-12.

(b) Defective cylinders may be repaired and qualified as a new lot under §§178.XX-11 and 178.XX-12.

§178.XX-14 Repair of brazed seams.

(a) Only repair of brazed seams by brazing is authorized provided such cylinders are requalified and pass the tests prescribed in §178.XX-11.

§178.XX-15 Markings.

(a) The following markings must be applied at the valve end of each cylinder by embossing or stamping plainly and permanently on the head of the cylinder or on a plate which is permanently attached to the head of the cylinder.

(1) DOT-E 8789 followed by the service pressure.

(2) Serial number or lot number and the manufacturer's registration number or an identifying symbol registered with the Office of Hazardous Materials Transportation.

(3) Inspector's official mark and date of test so placed that dates of subsequent tests can be easily added.

(b) Size of marks must be at least 1/4" high if space permits.

§178.XX-16 Inspector's report.

(a) The inspector's report must be retained by the manufacturer for a period of 15 years and must be available for examination by representatives of the Department.

(b) The report must be legible, and contain at least the following information:

NOV 13 1986

(Place)_____
(Date)_____

Steel gas cylinder

Manufactured for_____Company
Location at_____
Manufactured by_____Company
Location at_____
Consigned to_____Company
Location at_____
Quantity_____
Size____inches outside diameter by____inches long
Identification marks on cylinder are:

Specification DOT-E 8789
Lot number_____
Identifying symbol(s) (registered)_____
Test date_____
These cylinders were made by process of
_____
_____.

The steel used was identified by heat or analysis numbers as shown on the "Record of Chemical Analysis of Steel for Cylinders" attached hereto.

The steel used was verified as to chemical analysis and record thereof is attached hereto.

All material was inspected and each cylinder was inspected both before and after closing; all accepted material and cylinders were found free from seams, cracks, laminations, and other defects which might prove injurious to the strength of the cylinder. The processess of manufacture and heat treatment were supervised and found to be efficient and satisfactory.

A test cylinder of each lot was measured and had a minimum wall thickness and volumetric capacity as shown in table below.

| Date of test | Lot No. | Number in lot | Minimum wall thickness (inches) | Volumetric capacity (cubic inches) |
|---|---|---|---|---|
| | | | | |
| | | | | |
| | | | | |
| | | | | |

Each and every cylinder was properly tapped; the threads were inspected and found to be clean cut, of proper length, and correct as to gauge.

One finished cylinder out of each lot was taken at random and burst by interior hydrostatic pressure with the following results:

| Date of test | Lot No. | Pressure at which cylinder ruptured (pounds per square inch) |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

Each and every cylinder was subjected to an interior pressure of ____ pounds per square inch and showed no leak or other defect.

Hydrostatic tests, pressure tests, flattening tests, and other tests, as prescribed in DOT-E 8789 were made in the presence of the inspector and all material and cylinders accepted were found to be in compliance with the requirements of that specification.

I hereby certify that all of these cylinders proved satisfactory in every way and comply with requirements of DOT-E 8789 except as follows:

Exceptions:_____

_____

_____

(Signed)_____

Inspector.

| Lot No. | Number in lot | Heat No. | Check analysis | Chemical analysis | | |
|---|---|---|---|---|---|---|
| | | | | C | P | S |
| | | | | | | |
| | | | | | | |

NOV 13 1986

8. SPECIAL PROVISIONS.

a. Shippers may use the packagings 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. The cylinders must be shipped in strong outside packagings as provided in 49 CFR 173.301(k).

d. Each cylinder must be retested in accordance with 49 CFR 173.34(e) as prescribed for DOT 9 specification cylinders at an internal pressure of at least 2 times service pressure.

e. A copy of the inspector's report on the first lot of cylinders manufactured after May 31, 1986 must be submitted to the Office of Hazardous Materials Transportation as soon as practicable.

9. REPORTING REQUIREMENTS. Any incident involving loss of contents of the package must be reported to the Office of Hazardous Materials Transportation as soon as practicable.

10. EXPIRATION DATE. June 30, 1988.

Issued at Washington, D.C.:

NOV 13 1986

Alan I. Roberts
Director
Office of Hazardous Materials Transportation

(DATE)

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

Dist: USCG, FAA, FHWA, FRA.