

May 12, 2009



U.S. Department
of Transportation

East Building, PHH-30
1200 New Jersey Avenue, Southeast
Washington, D.C. 20590

**Pipeline and Hazardous
Materials Safety Administration**

DOT-SP 14794

EXPIRATION DATE: September 30, 2009

(FOR RENEWAL, SEE 49 CFR § 107.109)

1. GRANTEE: Worthington Cylinders of Canada Corp.
Tilbury, Ontario, Canada
(US Agent: Worthington Cylinder Corporation
Columbus, Ohio)
2. PURPOSE AND LIMITATIONS:
 - a. This emergency special permit authorizes the manufacture, marking, sale and use of a non-DOT specification steel cylinder, used as a component on the US Army's Future Combat Systems Manned Ground Vehicle (FCSMGV), conforming with all regulations applicable to a DOT Specification 4BA cylinder except as specified herein, for the transportation in commerce of the materials authorized by this special permit. This special permit provides no relief from the Hazardous Materials Regulations (HMR) other than as specifically stated herein. The most recent revision supersedes all previous revisions.
 - b. The safety analyses performed in development of this special permit only considered the hazards and risks associated with transportation in commerce. The safety analyses did not consider the hazards and risks associated with consumer use, use as a component of a transport vehicle or other device, or other uses not 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) and (a)(2), and 173.302a(a)(1) in that a non-DOT specification cylinder is not authorized, except as prescribed herein.

NOTE: The holder of this special permit must secure and maintain a valid approval as a foreign manufacturer under § 107.807 from the Associate Administrator for Hazardous Materials Safety.

5. BASIS: This special permit is based on the application of Worthington Cylinders of Canada Corp. dated November 14, 2008 and additional information dated March 13 and March 31, 2009, submitted in accordance with § 107.117 and a determination that it is necessary for immediate national security purposes.
6. HAZARDOUS MATERIALS (49 CFR § 172.101):

Hazardous Material Description			
Proper Shipping Name	Hazard Class/ Division	Identification Number	Packing Group
Compressed gas, n.o.s.	2.2	UN1956	N/A

7. SAFETY CONTROL MEASURES:

a. PACKAGING -Packaging prescribed is a non-DOT specification steel cylinder made in accordance with Worthington Cylinders of Canada Corp. (Worthington) specifications and drawing LC0180 dated October 31, 2008 on file with the Office of Hazardous Materials Special Permits and Approvals (OHMSPA) and in compliance with the DOT-4BA Specification (§§ 178.35 and 178.51) except as follows:

§ 178.51(a) *Type, size, and service pressure.* Cylinder has maximum water capacity of 10.0 pounds (4.45 liters) and service pressure and 1,000 psig (69 bar).

(1) The seamless steel cylinder incorporating sidewall flanges as shown on Worthington drawing LC0180. The flanges must be welded in accordance with procedures described in Worthington application on file with OHMSPA.

(2) Not applicable.

§ 178.51(b) *Steel*. Steel shall be aluminum killed and made by a fine grain de-oxidation practice with Ferritic grain size 6 or finer in accordance with ASTM E 112-96. The steel must be calcium treated for inclusion shape control. The steel analysis must conform to chemical compositions specified in the Worthington application on file with OHMSPA.

§ 178.51(c) *Identification of material*. Materials must be identified by a suitable method. Steel stamping of heat identification must not be made in any area that will eventually become the sidewall of the cylinder. Depth of stamping must not encroach upon the minimum prescribed wall thickness of the cylinder.

§ 178.51(d) *Manufacture*. Cylinder shells must be of seamless construction manufactured in accordance with procedures described in the Worthington application on file with OHMSPA. For each new design the following test must be completed:

(1) Cycling Test - Two cylinders must be hydrostatically cycle tested to an upper cyclic pressure of 2 times service pressure. The successive hydrostatic pressurizations from the lower cyclic pressure to the upper cyclic pressure must not exceed a rate of ten cycles per minute. Lower cyclic pressure must not exceed 10 percent of the upper cyclic pressure. Each cylinder must withstand 10,000 cyclic pressurizations without failure.

(2) Burst Test - Three cylinders must be hydrostatically burst without evidence of fragmentation and must remain in one piece. The rate of pressurization must not exceed 100 psi per second. Cylinders subjected to the burst test must withstand a pressure of at least 3 times the marked service pressure without failure.

(3) Hydrostatic Test - Each cylinder must successfully withstand a hydrostatic test as described in § 178.51(i) (1)-(3). Additionally three (3) cylinders must successfully withstand a hydrostatic test in accordance with § 178.51(i) (4) (ii).

§ 178.51(e) *Welding and brazing* - Welding of bosses to the sidewall of the cylinder must be in accordance with procedure listed in the Worthington application on file with OHMSPA. All attachments must weldable steel with maximum carbon content of 0.25 percent. Brazing is not authorized for any attachments.

§ 178.51(f) *Wall thickness* - The minimum wall thickness of the cylinder must meet the following conditions:

(1) The minimum wall thickness must be calculated in such that the wall stress at specified test pressure does not exceed 65 percent of the minimum tensile strength of the steel as determined in § 178.51 (j). Additionally, maximum wall stress must be less than or equal to 42,500 psi.

(2) Cylinder sidewall must have the wall stress calculated by the formula:

$$S = [P (1.3D^2 + 0.4d^2)] / (D^2 - d^2)$$

Where:

S = wall stress in psi;

P = minimum test pressure prescribed for water jacket test;

D = outside diameter in inches;

d = inside diameter in inches.

§ 178.51(g) *Heat treatment* - Each completed cylinder must be uniformly heat treated in accordance with procedure described in the Worthington application on file with OHMSPA.

§ 178.51(h) *Openings in cylinders* - Openings in cylinders must comply with the following requirements:

(1) Openings are limited to those that are shown on Worthington drawing LC0180 and are made in accordance with the step-by-step procedure, analysis and testing described in the Worthington application on file with OHMSPA.

(2) Each opening on the sidewall of the cylinder must include pad, weld-o-let, fitting or boss, that is weldable steel and attached to the cylinder by fusion welding.

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(3) If threads are used, they must comply with the following:

(i) Threads must be clean-cut, even, without checks and tapped to gauge.

(ii) Taper threads must be of a length not less than that specified for American Standard taper pipe threads.

(iii) Straight threads, having at least 4 engaged threads, must have a tight fit and a has shear strength of at least 10 times the test pressure of the cylinder. Gaskets, adequate to prevent leakage, are required.

§ 178.51(i) *Hydrostatic test* - * * *

(4) * * *

(i) Each cylinder must be tested to at two times marked service pressure.

(ii) Permanent volumetric expansion may not exceed 10 percent of the total volumetric expansion at test pressure.

§ 178.51(j) *Physical test* - A physical test must be conducted to determine yield strength, tensile strength, elongation, and reduction of area of material, as follows:

(1) The test is required on 2 specimens cut from one cylinder or part thereof having passed the hydrostatic test and heat-treated as required, taken at random out of each lot of 200 or less.

§ 178.51(k) *Elongation* - Physical (tensile) test and specimens must be prepared and performed in accordance with the Worthington application on file. The minimum elongation is 16% on a 6t x 24 t specimen.

§ 178.51(l) *Tests of welds* - All fillet welds for the attachment of bosses must be tested as follows:

(1) Macro-Etch Test - As a minimum one specimen must be cut from the bosses from a randomly selected cylinder of each lot. The specimens must

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be prepared in accordance with and meet the requirements of CGA Publication C-3, §8.6.

§ 178.51(m) *Rejected cylinders* - If any lot in an already accepted heat treatment fails any of the qualification tests as prescribed here in this special permit, that lot may be subjected to one repeated heat treatment. Any lot subjected to second heat treatment is considered as equivalent to a new heat and must pass all physical tests prescribed in this special permit. If any lot subjected to a second heat treatment fails any of the prescribed physical tests, the cylinders from that lot may not be used under the terms of this special permit. Repair of fillet welds by TIG is authorized provided the length of any individual repair does not exceed 1.5 inches.

§ 178.51(n) *Markings* - All marking apply except that "DOT-SP 14794" must be used in lieu of "DOT-4BA" followed by the service pressure as shown on Worthington drawing SLC0180 file with OHMSPA.

b. OPERATIONAL CONTROLS -

(1) Cylinders authorized under this special permit are limited to use as components of the US Army's Future Combat Systems Manned Ground Vehicle (FCSMGV).

(2) Production Tests -

(i) Pressure Cycling Test - One cylinder per each heat of steel must be hydrostatically cycle tested to an upper cyclic pressure of 1-1/2 times service pressure. The cylinder must withstand 10,000 cyclic pressurizations without failure;

(ii) Burst Pressure Test - One cylinder per each lot of cylinders t be hydrostatically burst tested. The cylinder must without a pressure of at least 3 times the marked service pressure without failure;

(3) New Design - A cylinder design is considered a new design, which requires design qualification tests, that meets any of the following changes:

(i) 10 percent or greater change in minimum design wall thickness;

(ii) service pressure, water volume or diameter greater than 30% of the original design;

(iii) additional opening from the original design; or

(iv) change of any of the opening size that exceed 100% of original design;

(4) The manufacturer of the cylinder covered by this special permit must retain the test reports required by this special permit as long as the cylinders are authorized for use.

(5) A copy of the Inspector's report for the first three (3) lots of cylinders produced under this special permit must be submitted to OHMSPA prior to shipment.

c. REQUALIFICATION -

(1) Each cylinder must be requalified for use in accordance with § 180.209(e) as prescribed for DOT Specification 4BA cylinders that are used for non-corrosive service and are protected externally by a suitable corrosion resistant coating. Cylinders subjected to action of fire must be condemned.

(2) Requalification must be performed by the facility identified in the Worthington application (Kidde Aerospace and Defense "RIN C246") or a qualified re-tester approved by the OHMSPA.

8. SPECIAL PROVISIONS:

a. In accordance with the provisions of Paragraph (b) of § 173.22a, persons may use the packaging authorized by this special permit for the transportation of the hazardous materials specified in Paragraph 6, only in conformance with the terms of this special permit.

b. A person who is not the holder of this special permit, but receives a packaging covered by this special permit, may re-offer it for transportation provided no modification or change is made to the packaging and it is offered for transportation in conformance with this special permit and the HMR.

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- c. A current copy of this special permit must be maintained at each facility where the package is offered or re-offered for transportation as well as at the re-qualifier.
- d. Each packaging manufactured under the authority of this special permit must be marked with a registration symbol designated by the Office of Hazardous Materials Special Permits Approvals Program for a specific manufacturing facility.
- e. A current copy of this special permit must be maintained at each manufacturing facility at which this packaging is manufactured and must be made available to a DOT representative upon request.
- f. These cylinders may not be used for carriage of any gas that would cause hydrogen embrittlement of steel.
- g. Filling limits specified in § 173.302a(b) are not authorized. These cylinders must not be filled to a pressure exceeding the marked service pressure at 70°F.
9. MODES OF TRANSPORTATION AUTHORIZED: Motor vehicle, rail freight, cargo vessel, and cargo aircraft only as currently authorized by the HMR for the hazardous materials being transported.
10. MODAL REQUIREMENTS: A current copy of this special permit must be carried aboard each cargo vessel, aircraft or motor vehicle used to transport packages covered by this special permit. The shipper must furnish a copy of this special permit 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 special permit 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 special permit and the Hazardous Materials Regulations, 49 CFR Parts 171-180.
 - o Persons operating under the terms of this special permit must comply with the security plan requirement in Subpart I of Part 172 of the HMR, when applicable.

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- 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 special permit must receive training on the requirements and conditions of this special permit in addition to the training required by §§ 172.700 through 172.704.

No person may use or apply this special permit, including display of its number, when this special permit has expired or is otherwise no longer in effect.

Under Title VII of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU)—"The Hazardous Materials Safety and Security Reauthorization Act of 2005" (Pub. L. 109-59), 119 Stat. 1144 (August 10, 2005), amended the Federal hazardous materials transportation law by changing the term "exemption" to "special permit" and authorizes a special permit to be granted up to two years for new special permits and up to four years for renewals.

12. REPORTING REQUIREMENTS: Shipments or operations conducted under this special permit are subject to the Hazardous Materials Incident Reporting requirements specified in 49 CFR §§ 171.15 - Immediate notice of certain hazardous materials incidents, and 171.16 - Detailed hazardous materials incident reports. In addition, the grantee(s) of this special permit must notify the Associate Administrator for Hazardous Materials Safety -- OHMSPA, in writing, of any incident involving a package, shipment or operation conducted under terms of this special permit.

Issued in Washington, D.C.:



for Theodore L. Willke
Associate Administrator for Hazardous Materials Safety

Address all inquiries to: Associate Administrator for Hazardous Materials Safety, Pipeline and Hazardous Material Safety Administration, U.S. Department of Transportation, East Building PHH-30, 1200 New Jersey Avenue, Southeast, Washington, D.C. 20590.

Copies of this special permit may be obtained by accessing the Hazardous Materials Safety Homepage at http://hazmat.dot.gov/sp_app/special_permits/spec_perm_index.htm Photo reproductions and legible reductions of this special permit are permitted. Any alteration of this special permit is prohibited.

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