DEPARTMENT OF TRANSPORTATION

Pipeline and Hazardous Materials Safety Administration

49 CFR Parts 107, 171, 172, 173, 178 and 180

[Docket No. PHMSA–2011–0140 (HM–234)]

RIN 2137–AE80

Hazardous Materials: Miscellaneous Amendments Pertaining to DOT-Specification Cylinders (RRR)

AGENCY: Pipeline and Hazardous Materials Safety Administration (PHMSA), DOT.

ACTION: Notice of proposed rulemaking (NPRM).

SUMMARY: The Pipeline and Hazardous Materials Safety Administration (PHMSA) is proposing to amend the Hazardous Materials Regulations to revise certain requirements applicable to the manufacture, use, and requalification of DOT-specification cylinders. PHMSA is taking this action in response to petitions for rulemaking submitted by stakeholders and to agency review of the compressed gas cylinders regulations. Specifically, PHMSA is proposing to incorporate by reference or update the references to several Compressed Gas Association publications, amend the filling requirements for compressed and liquefied gases, expand the use of salvage cylinders, and revise and clarify the manufacture and requalification requirements for cylinders.

DATES: Comments must be submitted by September 26, 2016. To the extent possible, PHMSA will consider late-filed comments as a final rule is developed.

ADDRESSES: You may submit comments identified by the docket number PHMSA–2011–0140 (HM–234) by any of the following methods:

- *Federal eRulemaking Portal: http://www.regulations.gov.* Follow the instructions for submitting comments.
- *Fax:* 1–202–493–2251.
- *Mail:* Docket Management System; U.S. Department of Transportation, West Building, Ground Floor, Room W12–140, Routing Symbol M–30, 1200 New Jersey Avenue SE., Washington, DC 20590.
- *Hand Delivery:* To the Docket Management System; Room W12–140 on the ground floor of the West Building, 1200 New Jersey Avenue SE., Washington, DC 20590, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

Instructions: All submissions must include the agency name and docket number for this NPRM at the beginning of the comment. To avoid duplication, please use only one of these four methods. All comments received will be posted without change to the Federal Docket Management System (FDMS), including any personal information.

Docket: For access to the dockets to read background documents or comments received, go to *http://www.regulations.gov* or DOT's Docket Operations Office (*see* **ADDRESSES**). To access and review the ASME material proposed for incorporation by reference in this rulemaking, please refer to the following Web site: *http://go.asme.org/PHMSA-ASME-PRM.* To access and review the CGA materials proposed for incorporation by reference in this rulemaking, please refer to the following Web site: *https://www.cganet.com/customer/dot.aspx.*

Privacy Act: Anyone is able to search the electronic form of any written communications and comments received into any of our dockets by the name of the individual submitting the document (or signing the document, if submitted on behalf of an association, business, labor union, etc.). You may review DOT's complete Privacy Act Statement in the **Federal Register** published on April 11, 2000 (65 FR 19477), or you may visit *http://www.regulations.gov.*

FOR FURTHER INFORMATION CONTACT: Eileen Edmonson, Standards and Rulemaking Division, and Mark Toughiry, Mechanical Engineer, Engineering and Research Division, Pipeline and Hazardous Materials Safety Administration, U.S. Department of Transportation, 1200 New Jersey Avenue SE., Washington, DC 20590, at (202) 366–8553.

SUPPLEMENTARY INFORMATION:

I. Executive Summary

Cylinders filled with a Class 2 hazardous material (gas) and offered for transportation must comply with various subparts of the Hazardous Materials Regulations (HMR; 49 CFR parts 171–180). These include 49 CFR part 173, subpart G, which sets forth the requirements for preparing and packaging gases; 49 CFR part 178, subpart C, which sets forth the specifications for cylinders (*i.e.,* how they should be constructed); and 49 CFR part 180, subpart C, which sets forth the requirements for continued qualification, maintenance, and periodic requalification of cylinders. Additionally, cylinders must meet other requirements in the HMR, such as regulations that address the modal effects on cylinders in transportation including general handling, loading, unloading, and stowage.

PHMSA (also ''we'' or ''us''), in response to petitions for rulemaking submitted by stakeholders and an agency initiated review of the regulations, is proposing changes to the HMR, including but not limited to the following: Incorporating by reference or updating references to several Compressed Gas Association (CGA) publications; amending the filling requirements for compressed and liquefied gases; expanding the use of salvage cylinders; revising and clarifying the manufacture and requalification requirements for cylinders; and adopting a special permit (DOT–SP 14237). This NPRM is also presenting minor and miscellaneous regulatory editorial corrections. Further, PHMSA is addressing the comments received from a previous Advance Notice of Proposed Rulemaking (ANPRM; 77 FR 31551), and proposing additional revisions that have been requested in petitions received since the ANPRM's 2012 publication. These proposed revisions intend to reduce regulatory burdens while maintaining or enhancing the existing level of safety. In this NPRM, PHMSA is responding to 20 petitions for rulemaking submitted by stakeholders.

II. ANPRM Background

On May 29, 2012 [77 FR 31551], PHMSA published an ANPRM to obtain public comment from those likely to be affected by the possible incorporation of 10 petitions for rulemaking and 3 special permits into the HMR. These include cylinder manufacturers (approximately 568 companies); cylinder requalifiers; independent

inspection agencies; commercial establishments that own and use DOT-specification cylinders and UN pressure receptacles; and individuals who export non-UN/ISO compressed gas cylinders. Incorporating these petitions for rulemaking and special permits would update and expand the use of currently authorized industry consensus standards; revise the construction, marking, and testing requirements of DOT–4 series cylinders; clarify the filling requirements for cylinders; discuss the handling of cylinders used in fire suppression system; and revise the requalification and condemnation requirements for cylinders.

The ANPRM comment period closed on August 27, 2012. PHMSA received comments from 13 stakeholders, including compressed gas and/or cylinder manufacturers, cylinder testers, and trade associations representing the compressed gas industry or shippers of hazardous materials. Most comments either answered questions PHMSA posed in the ANPRM or responded to multiple petitions and/or special permits. Regarding the petitions, the comments received were mostly supporting for all but one—P–1515. PHMSA received four comments regarding special permits, and all supported their adoption into the HMR. A list of the commenters, along with the related Docket ID Number, is shown in Table 1 below:

TABLE 1—ANPRM COMMENTERS AND ASSOCIATED COMMENTS DOCKET NOS.

Company	Docket ID No.
Air Products and Chemicals, Inc	PHMSA–2011–0140–0004
	PHMSA–2011–0140–0008
	PHMSA–2011–0140–0018
Bancroft Hinchley	PHMSA–2011–0149–0024
Barlen and Associates, Inc	PHMSA–2011–0140–0019
City Carbonic, LLC	PHMSA–2011–0140–0029
Compressed Gas Association	PHMSA–2011–0140–0005
	PHMSA–2011–0140–0012
	PHMSA–2011–0140–0013
	PHMSA–2011–0140–0020
Council on Safe Transportation of Hazardous Articles, Inc	PHMSA–2011–0140–0026
CTC Certified Training	PHMSA–2011–0140–0001
	PHMSA–2011–0140–0023
	PHMSA–2011–0140–0030
HMT Associates	PHMSA–2011–0140–0002
	PHMSA–2011–0140–0021
Hydro-Test Products, Inc	PHMSA–2011–0140–0017
Manchester Tank	PHMSA–2011–0140–0016
Norris Cylinder	PHMSA–2011–0140–0025
SodaStream USA, Inc	PHMSA–2011–0140–0027
Worthington Cylinder Corporation	PHMSA–2011–0140–0028

III. Petitions for Rulemaking and Comments Received

Table 2 lists the petitions included in the docket for this proceeding. This NPRM addresses 20 total petitions. Ten petitions are associated with the ANPRM, and 10 additional petitions have been included since its publication. This table provides the petition number, the petitioner's name, the docket number on *www.regulations.gov*, a brief summary of the petitioner's requests, the affected sections, and whether or not we are proposing to adopt the petition:

TABLE 2—PETITION SUMMARY

Petition No.	Petitioner	Docket No.	Summary	Proposed affected sections	Proposing to adopt?
P–1499	Compressed Gas Association.	PHMSA–2007–28485	Replace the incorporated by reference (IBR) Seventh Edition of the CGA C–6 Standards for Visual Inspection of Steel Compressed Gas Cylinders with the revised Tenth Edition and update the appropriate references throughout the HMR.	§§ 171.7; 172.102 (SP 338); 173.3(d)(9); 173.198(a); 180.205(f)(1); 180.209(c), (b)(1)(iii), (d), (f), (g), (m); 180.211(d)(1)(ii); 180.411(b); 180.510(c).	Yes.
P–1501	Compressed Gas Association.	PHMSA–2007–28759	Revise the specification requirements for 4B, 4BA, 4BW, and 4E cylinders to provide clarity.	§§ 178.50, 178.51, 178.61, 178.68.	Yes, in part.
P–1515	Certified Training Company	PHMSA–2008–0101	Adopt changes to the requalification process designed to clarify the regulations in the event CGA Standard C–1, Methods of Pressure Testing Compressed Gas Cylinders, is not incorporated.	§§ 180.203, 180.205, 180.207, 180.209, 180.211, 180.212, 180.213, 180.215, appendix C to part 180, appendix E to part 180.	Yes, except those changes not necessary because of IBR of CGA C–1 under P–1626.

TABLE 2—PETITION SUMMARY—Continued

Petition No.	Petitioner	Docket No.	Summary	Proposed affected sections	Proposing to adopt?
P–1521	Compressed Gas Association.	PHMSA–2008–0152	Allow the use of labels described in CGA C–7–2004 on a cylinder contained in an overpack.	§ 172.400a(a)(1)(i)	Yes.
P–1538	The Wicks Group, representing Jetboil Inc.	PHMSA–2009–0138	Allow § 173.306(a)(1) to permit camping stove cylinders containing liquefied petroleum gas in amounts less than four (4) ounces to be shipped as consumer commodity (ORM–D). Define ''capacity'' in § 171.8.	§§ 171.8, 173.306(a)(1)	No.
P–1539	Matheson Tri-Gas	PHMSA–2009–0140	Allow DOT 3A, 3AA, 3AL cylinders in Division 2.2 Services to be retested every 15 years. Allow DOT 3A, 3AA, and 3AL cylinders packaged with Division 2.1 materials to be requalified every 10 years..	§ 180.209(a)	No.
P–1540	Compressed Gas Association.	PHMSA–2009–0146	Require newly manufactured DOT 4B, 4BA, 4BW, and 4E cylinders to be marked with the mass weight, tare weight, and water capacity.	§ 178.35(f)	Yes.
P–1546	GSI Training Services, Inc.	PHMSA–2009–0250	Allow cylinders used as a component of a fixed fire suppression system to be transported under the exceptions applicable to fire extinguishers.	§ 173.309(a)	Yes.
P–1560	Air Products and Chemicals, Inc.	PHMSA–2010–0176	Modify the maximum permitted filling densities for carbon dioxide and nitrous oxide to include 70.3%, 73.2%, and 74.5% in DOT 3A, 3AA, 3AX, 3AAX, and 3T cylinders.	§ 173.304a(a)(2)	No. Addressed by revisions made under rulemaking HM–233F [81 FR 3635].
P–1563	Regulatory Affairs Management Center—3M Package Engineering, Global Dangerous Goods.	PHMSA–2010–0208	Authorize an ''overpack'' as a strong outer package for cylinders listed in the section, except aerosols ''2P'' and ''2Q,'' marked with the phrase ''inner packagings conform to the prescribed specifications''.	§ 173.301 (a)(9)	Uncertain. We are asking for further comment.
P–1572	Barlen and Associates, Inc.	PHMSA–2011–0017	Revise the filling ratio for liquefied compressed gases in MEGCs consistent with Packing Instruction (P200) of the United Nations (UN)—Model Regulations (17th ed. 2011), as specified in § 173.304b; and prohibit liquefied compressed gases in manifolded DOT cylinders from exceeding the filling densities specified in § 173.304a(a)(2).	§§ 173.301(g)(1)(ii) and 173.312.	Yes, in part.
P–1580	HMT Associates	PHMSA–2011–0123	Require the burst pressure of the rupture disc on a cylinder ''shall not exceed 80% of the minimum cylinder burst pressure and shall not be less than 105% of the cylinder test pressure''.	§§ 173.301(f)(4), 173.302(f)(2), 173.304(f)(2).	Yes.
P–1582	Water Systems Council	PHMSA–2011–0135	Revise the limited quantity exception for water pump system tanks to authorize transport of tanks manufactured to American National Standards Institute's Water Systems Council Standard PST–2000–2005(2009).	§ 173.306(g)	Yes.

TABLE 2—PETITION SUMMARY—Continued

Petition No.	Petitioner	Docket No.	Summary	Proposed affected sections	Proposing to adopt?
P–1592	Compressed Gas Association.	PHMSA–2012–0173	IBR CGA S–1.1, 2011 Pressure Relief Device Standards, Part 1, Cylinder for Compressed Gas, Fourteenth Edition.	§§ 173.301(c), (f) and (g), 173.304a(e), 178.75(f).	Yes.
P–1596	Chemically Speaking, LLC.	PHMSA–2012–0200	Add Class 4 and Class 5 hazardous materials to the hazard classes in an authorized salvage cylinders.	§ 173.3(d)(2)	Yes.
P–1622	Worthington Cylinders Corporation.	PHMSA–2013–0210	Restrict the internal volume of hazardous materials shipped in a DOT-specification 39 cylinder to not exceed 75 cubic inches.	§§ 173.304a and 173.304a(a)(3).	Yes.
P–1626	Compressed Gas Association.	PHMSA–2013–0265	IBR CGA C–1–2009, Methods for Pressure Testing Compressed Gas Cylinders, Tenth Edition (C–1, 2009) as a reference in 49 CFR, and provide for specific language for sections affected.	§§ 171.7, 178.36, 178.37, 178.38, 178.39, 178.42, 178.44, 178.45, 178.46, 178.47, 178.50, 178.51, 178.53, 178.55, 178.56, 178.57, 178.58, 178.59, 178.60, 178.61, 178.65, 178.68, 180.205, 180.209.	Yes.
P–1628	Compressed Gas Association.	PHMSA–2013–0278	IBR CGA C–3–2005, Reaffirmed 2011, Standards for Welding on Thin-Walled, Steel Cylinders, Seventh Edition.	§§ 171.7, 178.47, 178.50, 178.51, 178.53, 178.55, 178.56, 178.57, 178.58, 178.59, 178.60, 178.61, 178.65, 178.68, 180.211.	Yes.
P–1629	Compressed Gas Association.	PHMSA–2014–0012	IBR CGA C–14–2005, Reaffirmed 2010, Procedures for Fire Testing of DOT Cylinder Pressure Relief Device Systems, Fourth Edition, as a reference in 49 CFR.	§§ 171.7, 173.301, 173.323	Yes.
P–1630	Compressed Gas Association.	PHMSA–2014–0027	Add the term ''recondition'' for DOT–4L welded insulated cylinders and revise language to clarify when a hydrostatic test must be performed on the inner containment vessel after the DOT–4L welded insulated cylinder has undergone repair.	§§ 180.203, 180.211(c), and 180.211(e).	Yes.

P–1499

The CGA submitted P–1499 requesting that PHMSA replace the currently incorporated by reference *C–6 Standards for Visual Inspection of Steel Compressed Gas Cylinders,* Seventh Edition with the revised Tenth Edition and update the appropriate references throughout the HMR. The Tenth Edition provides enhanced guidance for cylinder requalifiers—including guidance on the inspection of Multiple-Element Gas Containers (MEGCs) and the requirements for thread inspection for cylinders used in corrosive gas service—and clarifies maximum allowable depths and measuring techniques for various types of corrosion.

PHMSA identified approximately 5,000 companies that would be subject to this standard, with the majority being classified as small businesses using the Small Business Administration (SBA) size standards (<500 employees). This revision would impose a one-time cost of between $78 and $142 per document depending on the document format (electronic or hard copy) and the purchaser's CGA membership.

Air Products and Chemicals, City Carbonic, CGA, Hydro-Test Products, and Worthington Cylinders support the proposal as discussed in the May 29, 2012 ANPRM. No commenters objected to the proposal.

PHMSA agrees that the Tenth Edition provides improved and updated guidance on inspecting MEGCs. While there were no comments opposed to the incorporation, subsequent to the submission of this petition, a more current updated version of CGA C–6 has been made available (*i.e.,* an eleventh edition). Therefore, in this NPRM, PHMSA is proposing to update the IBR of CGA C–6 to the 2013 Eleventh Edition. We invite comment on this course of action.

P–1501

The CGA submitted P–1501 requesting that PHMSA revise the manufacturing requirements for DOT 4B, 4BA, 4BW, and 4E cylinders. According to the petition, the current DOT–4 series welded cylinder manufacturing requirements are unclear in some respects and result in varied interpretation by manufacturers and enforcement personnel. The CGA states that although the proposed changes do not present a significant economic impact to any single manufacturer or user, they will enhance regulatory clarity, promote consistent manufacturing practices, and create greater uniformity between the specifications for DOT–4 series cylinders and the requirements for welded cylinders found in International Organization for Standardization (ISO) Standard 4706–1, *Gas cylinders—Refillable welded steel cylinders—Part 1: Test pressure 60 bar and below,* which is referenced in the UN Model Regulations.

Summary of the changes proposed by P–1501 and the comments received are detailed below:

(1) Revise the requirements for DOT-specification 4B, 4BA, 4BW, and 4E cylinders in §§ 178.50(b), 178.51(b), 178.61(b), and 178.68(b), respectively, to ensure material compositions and the heat treatment are within the specified tolerances and are of uniform quality as follows: (1) Require a record of intentionally-added alloying elements, and (2) require materials manufactured outside of the United States to have a ladle analysis confirmed by a check analysis.

Norris Cylinder sought clarification on the requirement to report intentionally added alloying elements. Specifically, Norris Cylinder inquired if PHMSA would require the manufacturer to maintain documents other than the mill certificate and the DOT Test Report.

PHMSA has decided that the proposed revisions to §§ 178.50(b), 178.51(b), 178.61(b), and 178.68(b) with respect to proposed measure (2) above is not necessary based on the required duties of inspectors in § 178.35(c)(2) to verify the material of construction meets the requirements of the applicable specification by (1) making a chemical analysis of each heat of material; (2) obtaining a certified chemical analysis from the material manufacturer for each heat of material (a ladle analysis is acceptable); or (3) if an analysis is not provided for each heat of material by the material manufacturer, by making a check analysis of a sample from each coil, sheet, or tube. However, we do believe a record of intentionally added alloying elements will be useful for ensuring material compositions are within the specified tolerances. As pointed out by Norris cylinder, the regulatory text proposed by CGA does not specify who must maintain the document. In this NPRM, we specify that the cylinder manufacturer must maintain the record of intentionally added alloying elements. Further, we are not proposing to require a check analysis to confirm the ladle analysis for materials manufactured outside of the United States because we believe this is already addressed by requiring domestic performance of required check analyses under § 178.35(b) of the HMR. We invite comment on this course of action.

(2) Revise the pressure tests for DOT-specification 4B, 4BA, 4BW, and 4E cylinders in §§ 178.50(i), 178.51(i), 178.61(i), and 178.68(h), respectively, to permit use of the volumetric expansion test, a hydrostatic proof pressure test or a pneumatic proof pressure test.

Hydro-Test Products and Manchester Tank expressed concern that PHMSA would allow a pneumatic pressure test. Because the potential release of energy in the event of a cylinder rupture during a pneumatic test is much greater than that released if a cylinder ruptured during a hydrostatic test, the commenters state that the person conducting the test must take additional precautions to safeguard against injury, such as erecting a safety barrier to protect personnel. Worthington Cylinders noted that it had extensive experience conducting proof pressure tests with gas but further stated that each company's safety considerations of the testing equipment will be different.

Given the added risk associated with pneumatic testing and the fact that there are suitable alternatives to determine the leakproofness of a cylinder at the time of manufacture, PHMSA is not proposing to permit the use of pneumatic proof pressure testing in this NPRM.

(3) Revise the physical and flattening tests and retest criteria for DOT-specification 4B, 4BA, 4BW, and 4E cylinders in §§ 178.50, 178.51, 178.61, and 178.68, respectively, for consistency. These revisions would clarify the location on the cylinder from which the test specimens are removed.

Manchester Tank requested that the specific proposed wording, or more detailed information, be made available for comment. Readers may review the specific changes to these sections at the end of this document.

(4) Revise §§ 178.50(n), 178.51(n), and 178.61(o), and 178.68, respectively, for DOT-specification 4B, 4BA, 4BW, and 4E cylinders to permit marking on the footring for cylinders with water capacities up to 30 pounds, instead of 25 pounds.

Manchester Tank and Worthington Cylinders support the CGA proposal that would allow markings to be applied to the footring on cylinders up to 30-pounds water capacity, instead of the current capacity limit of 25 pounds. The commenters state that this revision would not impose any cost and would expand upon existing options. In this NPRM, PHMSA is proposing this revision as stated in the petition.

(5) *Add requirements for the location of markings on DOT 4E cylinders in § 178.68.*

Manchester Tank and Worthington Cylinders support the proposed modification to permit marking of the valve protection collar of DOT 4E cylinders. In this NPRM, PHMSA is proposing the revision as stated in the petition.

P–1515

The Certified Training Company (CTC) submitted P–1515 requesting that PHMSA make numerous revisions to the requirements for the requalification of DOT-specification cylinders found in 49 CFR part 180, subpart C. These requirements include definitions for terms used in the subpart, references to CGA publications for the visual inspection of cylinders, and requirements for hydrostatically testing cylinders including methods to ensure the accuracy of test equipment. The CTC states that the current requirements create confusion for requalifiers and enforcement officials. In the ANPRM, PHMSA requested comments on two possible methods of responding to this petition. The first, as was suggested by CTC in P–1515, was to modify the specific HMR provisions in §§ 180.203 through 180.215 for requalification of cylinders. The second was to IBR into § 180.205 CGA C–1, *Methods for Pressure Testing Compressed Gas Cylinders,* Tenth Edition (2009), which contains most of the provisions and additions specified in P–1515, including revisions to definitions in § 180.203, appropriate procedures for conducting the hydraulic pressure tests, and marking and recordkeeping requirements.

PHMSA identified 980 entities that conduct hydrostatic retesting. Incorporation of CGA C–1 would impose a one-time cost of between $102 and $186 per document depending on the document format (electronic or hard copy) and the purchaser's CGA membership.

We received eight comments on this petition. Air Products and Chemicals, CGA, Bancroft Hinchley, and Worthington Cylinders support adoption of the CGA C–1 standard. Conversely, Hydro-Test Products stated that the proposals in P–1515 and the CGA C–1 impose stricter requirements on accuracy, pressure drop, and verification, therefore imposing an unnecessary burden on the industry. SodaStream requested PHMSA modify the appropriate sections of 49 CFR part 180, subpart C, instead, as adoption of CGA C–1 would limit their ability to conduct volumetric expansion tests and would result in a need to obtain a special permit.

As indicated by Worthington Cylinders, several commenters stated similar concerns to those shared regarding the option to IBR CGA C–1, with Worthington Cylinders further stating that CGA C–1 ''represents the best testing practices for the industry.'' Moreover, as indicated by CGA, the

changes proposed in P–1515 would not resolve the confusion of requalifiers and enforcement officials that the petition seeks to address. For these reasons, in this NPRM, PHMSA is proposing to IBR CGA C–1, *Methods for Pressure Testing Compressed Gas Cylinders,* at § 171.7 and into § 180.205 and numerous other sections (see discussion of Petition P–1626). However, subsequent to the submission of this petition, an eleventh edition of CGA C–1 has been made available. Therefore, in this NPRM, PHMSA is proposing to update the IBR of CGA C–1 to the 2016 Eleventh Edition. We invite comment on this course of action.

The CTC further requests that PHMSA correct and reissue two letters of interpretation (Reference Nos. 00–0309 and 05–0087), as well as provide formal interpretation on six additional issues identified in its petition. PHMSA invites public comment on the questions, recommendations, and proposed responses detailed below:

(1) Existing Clarification Letter Reference No. 00–0309

On March 15, 2001, PHMSA responded to an inquiry from Vallen Technical Services (VTS) pertaining to the pressure retest of DOT-specification cylinders (Reference No. 00–0309). Citing that former § 173.34(e)(4)(v)—currently § 180.205(g)(5)—states, ''In the case of a malfunction of the test equipment, the test may be repeated at a pressure increased by 10 percent or 100 [pounds per square inch] psi, whichever is less,'' VTS stated its understanding that only one repeat test is permitted. PHMSA responded with the following: ''Your understanding of this requirement is correct. Section 173.34(e)(4)(v) permits only one repeat test in the case of a malfunction of the test equipment. With regards to your reference to the Compressed Gas Association (CGA) pamphlet C–1, currently the HMR do not incorporate the pamphlet by reference. However, we proposed in a notice of proposed rulemaking to reference certain pressure test procedures contained in the CGA pamphlet. (Docket No. HM–98–3684 (HM–220); October 30, 1998).''

The CTC states that § 180.205(g)(5) ''permits only one repeated test'' and further posits that this letter's response directly contradicts language PHMSA previously issued in a final rule [Docket No. HM–220A (61 FR 26750); February 28, 1996)] that states: ''A commenter specifically asks how many repeated tests are allowed before condemning the cylinder, and the response is that the cylinder is to be condemned when it exceeds its permanent expansion limit. It even specifies, '. . . Thus when this limit [Perm. Expan.] is exceeded . . .' [*i.e.,* no limit to the number of repeats is given, even when the specific question was asked.]''

Although the CTC states it favors limiting the number of repeat tests of this type, it believes PHMSA's statement on this matter in Reference No. 00–0309 ''constitutes a rulechange, not an interpretation.'' The CTC believes requiring only one repeat test ''may be overly restrictive in some cases, such as small aircraft cylinders, and certain composite cylinders,'' and suggests allowing two repeated tests, as permitted in special permits DOT–SPs 10915, 10945, and 11194, would be ''more in line with current industry procedure.''

On August 8, 2002, PHMSA's predecessor agency, the Research and Special Programs Administration, issued a final rule under Docket No. HM–220D that consolidated the requirements for qualification, use, and maintenance of cylinders in 49 CFR part 180, subpart C. As a result, the regulatory sections referred to in Reference No. 00–0309 are no longer correct. Further, not all the requirements previously codified in § 173.34 have parallel requirements in 49 CFR [art 180, subpart C. See § 180.205(g)(5) for additional information. However, PHMSA agrees with the CTC that the language in Reference No. 00–0309 may be misleading and believes the IBR of CGA C–1 into § 180.205 will resolve any issue the CTC may have with this letter of interpretation. We invite comment on this conclusion. PHMSA also plans to retract Reference No. 00–0309.

(2) Existing Clarification Letter Reference No. 05–0087

On May 10, 2005, PHMSA responded to an inquiry from G&C Kinney, Inc., concerning calibration verification of equipment used for volumetric expansion tests for DOT-specification cylinders (Reference No. 05–0087). The company asked whether the maximum pressure at which the verification test is being conducted (for example, 3,000 pounds) must be maintained at the final pressure for 30 seconds or whether the pressure may be allowed to drop between 2 psi and 10 psi. PHMSA responded by stating, ''Overall, for any pressure test (calibration or production retest), the 30-second hold time begins only when the cylinder has completed its expansion. If the cylinder pressure drops by any measurable amount (such as 2 psi) during the recorded 30-second hold time, the hold time must be restarted, or the test would be considered invalid.''

The CTC requests that PHMSA retract its Reference No. 05–0087 response because it contradicts regulatory text found in § 180.205(g)(2), (g)(3)(i), and (g)(5); DOT–SPs 10915 and 10945; standards in CGA C–1, Seventh Edition (1996); and some manuals of manufacturers of hydrostatic test equipment. Specifically, the CTC states the following:

Paragraph 180.205(g)(5) states, ''Minimum test pressure must be maintained for at least 30 seconds, *and as long as necessary for complete expansion of the cylinder.*'' [Emphasis added.] This statement tells us that the cylinder may be expanding during the 30 second hold time, and if the cylinder is still expanding at the end of the 30 seconds, we must hold even longer than the minimum 30 seconds. As the cylinder expands, its volume increases, and pressure will drop. Therefore, the statement ''as long as necessary for complete expansion of the cylinder'' is equivalent to saying ''until the pressure ceases to drop''. The regulations state that this may occur during the 30 second hold time; the regulations do not specify the hold time begins after the cylinder has completed its expansion. Therefore, this ''interpretation'' directly contradicts § 180.205(g)(5), and constitutes a rule change.

Paragraph 180.205(g)(2) states, ''[t]he pressure indicating device of the testing apparatus must permit reading of pressures to within 1% of the minimum prescribed test pressure of each cylinder tested.'' Paragraph 180.205(g)(3)(i) states, ''[t]he pressure-indicating device, as part of the retest apparatus, is accurate within ±1.0% of the prescribed test pressure of any cylinder tested that day.'' This interpretation attempts to declare a test invalid due to a 2 psi drop in pressure at 3000 psi. The pressure indicating device has already been defined as having a 1% resolution and ±1% accuracy. According to the definition of the device, it can deviate by ±30 psi at 3000 psi (30 psi = 1% of 3000 psi). This interpretation violates the definition of the device as stated in these two paragraphs.

Furthermore, many special permits, such as DOT–SP 10915 and 10945, recognize that different materials (such as the carbon-fiber wrapped, aluminum lined cylinders referenced in these special permits) take even longer than 30 seconds to completely deform under the load of test pressure, and therefore require a hold time of 60 seconds. According to this interpretation, these special permits would require a hold time of 60 seconds (or longer), until the cylinder completed its expansion, and then an additional 60 seconds of hold time, wherein the pressure could not drop by even 2 psi. This, obviously, is not the intention of these special permits when they state, ''. . . for a minimum test time of one minute.''

Industry standard CGA C–1, Seventh Edition 1996, ''Methods for Hydrostatic Testing of Compressed Gas Cylinders,'' in paragraph 4.4(g) states, ''[w]hen the desired

value is reached, stop the pressurization and hold for 30 seconds.'' And, ''[t]he expansion and pressure should remain stable during the entire 30 seconds. If either the pressure or expansion do not stabilize within ±1%, see 4.5 [Troubleshooting].'' Thus, the 30-second hold begins when the pump stops, and deviation during the hold time is allowed up to the defined accuracy of the device, that is, ±1% of the test pressure, and ±1% of the total expansion.

Manufacturers of hydrostatic test equipment specify in their manuals and the software controlling automated equipment that the 30-second hold time begins when the test pressure is reached and the pump is turned off.

The CTC further states: ''This interpretation declares virtually every test performed on cylinders in the past century to be invalid, since every cylinder tested (as well as the hoses on the machine) will continue to expand after the pump is stopped. Therefore the pressure will drop. The only issue is whether or not the device is capable of detecting such a minute drop in pressure.'' The CTC believes this interpretation is based on two misunderstandings:

1. *Closed loop hydraulics vs. open system.* In a closed loop hydraulic system (such as the controls on an aircraft), any drop in pressure is unacceptable. This does not apply to an open system where the pressure will drop (*e.g.,* a cylinder expanding during a test).

2. *Higher precision digital devices vs. analog devices.* There has always been a slight drop in pressure during the hold time. On an analog device, it was not visible. It is now visible on a digital device, but that does not simply invalidate the test.

PHMSA agrees with the CTC that the language in Reference No. 05–0087 is misleading and believes the IBR of CGA C–1 into § 180.205, in conjunction with additional changes to the regulations proposed consistent with petition P–1626, will resolve any issue the CTC may have with this letter of interpretation. We invite comment on this conclusion. PHMSA also plans to retract Reference No. 05–0087.

P–1521

The CGA submitted P–1521 requesting that PHMSA modify the provision in § 172.400a(a)(1)(i) to remove the limitation that only allows the use of the neckring markings if a cylinder is not overpacked. The petition would still require the overpack to display the labels in conformance with 49 CFR part 172, subpart E.

The HMR permit the use of a neckring marking, under certain conditions, in conformance with the CGA C–7, *Guide to Preparation of Precautionary Labeling and Marking of Compressed Gas Containers, Appendix A,* Eighth Edition (2004) under § 172.400a. This neckring marking identifies the contents of a cylinder by displaying the proper shipping name, the UN identification number, and the hazard class or division label within a single marking. Section 172.400a(a)(1) permits the use of this marking in lieu of required labels on a Dewar flask meeting the requirements in § 173.320 or a cylinder containing Division 2.1, 2.2, and 2.3 material that is not overpacked. This requirement should provide flexibility in hazard communication for cylinders, especially small cylinders.

The marking prescribed in appendix A to CGA C–7 provides useful information in a clear and consistent manner, and its widespread use on cylinders has enhanced its recognition. CGA's proposed change would provide greater flexibility for shipments of overpacked cylinders while ensuring adequate hazard communication. If cylinders are contained in an overpack, the overpack must display the appropriate markings and labels.

PHMSA identified approximately 86 entities engaged in Industrial Gas Manufacturing, of which 74 are classed as small entities (<500 employees). Other potentially impacted entities include wholesalers of medical equipment, service establishment equipment and supplies, and other miscellaneous durable goods. In the ANPRM, PHMSA asked for comments on the potential implications of this change, specifically regarding its necessity and the potential safety and economic impacts. PHMSA also sought data concerning the breadth of shipments to be impacted by the proposal. PHMSA received no responses to these questions from commenters to the ANPRM.

Both Air Products and Chemicals and Worthington Cylinders support CGA's petition to revise § 172.400a(a)(1)(i). Therefore, in this NPRM, PHMSA is proposing to revise § 172.400a(a)(1)(i) to remove the limitation that would only allow the use of the neckring markings if the cylinders are not overpacked, as proposed in P–1521. The petition would still require the overpack to display the required labels in conformance with 49 CFR part 172, subpart E.

P–1538

On behalf of Jetboil, Inc., The Wicks Group submitted P–1538 requesting that PHMSA revise § 173.306(a)(1) to permit camping stove cylinders containing liquefied petroleum gas (LPG) in amounts less than 4 ounces but in a container exceeding 4 fluid ounce capacity to be shipped as consumer commodity (ORM–D). Section 173.306 prescribes requirements for transporting compressed gases as a limited quantity and a consumer commodity. Paragraph (a)(1) of § 173.306 requires a container of only compressed gas to be limited to a capacity of 4 fluid ounces or less except cigarette lighters, which are required to meet rigorous performance design standards and packaging requirements prescribed in § 173.308. The Wicks Group states if more than 4 fluid ounces of the liquefied portion of the gas were enclosed in the cylinder, ''there would be insufficient space remaining for the gaseous portion of the liquefied gas, as required by [§§ 173.304(b) and 173.304a(d)(1)]. In other words, [§§ 173.304(b) and 173.304a(d)(1)] together limit the *percentage of space* [emphasis added] that the liquefied portion of a liquefied gas may take up in a cylinder. Thus, since the canisters at issue here could not safely or legally hold more than four (4) fluid ounces of LPG while complying with the HMR filling limits and filling density requirements, they can reasonably be said to have a capacity of four (4) fluid ounces.'' The petitioner included a certificate from the manufacturer of the ''Jetpower'' 100G canister of cooking fuel, Taeyang Ind., Co., LTD, of Seoul, Korea, certifying ''that the capacity of the 100G canister is less than 4 oz. because the capacity of the canister should be measured by the amount of liquefied gas contents in a fluid condition that it can hold, still leaving room for the portion in a gas condition. The 100G canisters must have less than 4 oz. of liquefied gas to meet that requirement. The capacity of the 100G canisters 'Jetpower' should be considered less than 4 ounces. These canisters are safe for transportation as ORM–D.[1] We are unaware of any problems occurring with these canisters in transportation.'' PHMSA seeks public comment on the safety issues associated with this proposal, especially those regarding the safe performance of containers of this type in transportation.

The Wicks Group further states on behalf of Jetboil, Inc., that ''. . . 49 CFR 173.306(a)(1) is ambiguous as currently drafted. In brief, the HMR do not define the term capacity, but do define the term 'maximum capacity,' at 49 CFR 171.8, as meaning 'the maximum inner volume of receptacles or packagings.' If PHMSA interprets 'capacity' as meaning the total volume of the container, then

[1] Note that the ORM–D class will be completely phased out for all modes of transportation by December 31, 2020.

the word 'maximum' would be rendered meaningless. This violates the long-established rule of statutory and regulatory interpretation that courts must give effect to every clause and word of a legal text whenever possible. Indeed, the omission of a word in one section of a text can be telling where that word issued in another section of the same act or regulation.'' In addition, the petitioner states providing industry an opportunity to comment on this issue in a rulemaking will give them the chance ''to explain why these containers present a reduced safety risk, and to demonstrate that there have been no transportation safety incidents involving these containers.''

PHMSA has limited the amount of compressed gas in limited quantity packagings to reduce the opportunity and speed of the gaseous product's reaction to an activating event, having found that including non-gaseous materials in the same container with the gas—such as foodstuffs, soap, etc.—slowed this reaction. The petitioner requested that PHMSA define the word ''capacity'' in the HMR to add meaning to the maximum capacity definition in § 171.8. The Interstate Commerce Commission first adopted the provision for § 173.306(a)(1) (previously § 73.306(a)(1)) in a final rule published July 1, 1966 (31 FR 9067). The provision provided an ''exemption'' (*i.e.,* an exception) from regulations for shipping of compressed gases ''when in containers of not more than 4 fluid ounce water capacity.'' Thus, historically, the provision applies to the capacity of the container and not to the quantity of its contents. This is consistent with design requirements for the capacity of packagings found in part 178 that includes a specification for the water capacity of the packaging (*e.g.,* Specification 3A and 3AX seamless steel cylinders in § 178.36); however, the publication of a final rule on April 15, 1976 (41 FR 15972) inadvertently dropped the term ''water'' from paragraph (a)(1) regardless of there having been no express discussion of the intent to do so or to change the size standard from the originally adopted water capacity to the quantity of the contents.

Furthermore, the definition ''maximum capacity'' was introduced as part of a harmonization effort with international regulations and standards in a final rule published December 21, 1990 (55 FR 52402) for consistency with use of terminology internationally for UN performance oriented packaging. See the part 178, subpart L non-bulk performance oriented packaging sections. Therefore, based on the historical context of capacity as its use in § 173.306(a)(1) to mean water capacity and the adoption of the term ''maximum capacity'' in association with the adoption of UN performance-oriented packaging, we are not proposing to amend § 173.306(a)(1) to accommodate this petition for rulemaking.

P–1539

Matheson-TriGas submitted P–1539 requesting that PHMSA revise § 180.209, which prescribes requirements for requalifying cylinders. Paragraph (a) of § 180.209 requires each DOT-specification cylinder listed in ''table 1 of this paragraph'' to be requalified and marked in conformance with requirements specified in § 180.209. The petitioner requests that PHMSA extend the 10-year retest period prescribed in this table for DOT 3A, 3AA, and 3AL specification cylinders in Division 2.2 (non-flammable) gas service to once every 15 years. Matheson-TriGas also requests in its petition that PHMSA extend the 5-year retest period prescribed in this table for DOT 3A, 3AA, and 3AL specification cylinders in Division 2.1 (flammable) gas service to once every 10 years. The petitioner states: ''Historically over 99.4% of cylinders in the above[-mentioned] services that were [subjected] to the water jacket test pass the test,'' and ''it is more likely . . . the cylinder failed the external or internal visual [test] rather than failing the water jacket test.''

Matheson-TriGas notes PHMSA's statement from an earlier rulemaking regarding the history of the plus rating for steel cylinders resulting from the steel shortage of World War II, which resulted in changes ''that benefitted the industry with no compromise of public safety down to this day.'' Matheson-TriGas extrapolates that we face similar metal shortage challenges in today's economy.

Upon further consideration of this petition based on our concern of increasing the risk of cylinder failure by lengthening the timeframe between periodic qualifications, PHMSA is electing not to propose to revise the 10-year requalification period for DOT 3A, 3AA, and 3AL specification cylinders in Division 2.2 (non-flammable) gas service to once every 15 years, nor to revise the 5-year requalification period for DOT 3A, 3AA, and 3AL specification cylinders in Division 2.1 (flammable) gas service to once every 10 years. We invite comment on this decision and request detailed information in support or opposition to this decision.

P–1540

The CGA submitted P–1540 requesting that PHMSA require newly manufactured DOT 4B, 4BA, 4BW, and 4E cylinders to be marked with the mass weight, tare weight, and water capacity. As specified in § 178.35(f), the HMR require DOT-specification cylinders to be permanently marked with specific information including the DOT-specification, the service pressure, a serial number, an inspector's mark, and the date manufacturing tests were completed. These marks provide vital information to fillers and uniquely identify the cylinder.

Certain DOT 4-series specification cylinders contain liquefied gases filled by weight, so the tare weight (*i.e.,* the weight of the empty cylinder and appurtenances) or the mass weight (*i.e.,* the weight of the empty cylinder), and the water capacity must be known by the filler to properly fill the cylinder. This information is essential for cylinders filled by weight, as cylinders overfilled with a liquefied gas can become liquid full as the ambient temperature increases. If temperatures continue to rise, pressure in the overfilled cylinder will rise disproportionately, potentially leading to leakage or a violent rupture of the cylinder after only a small rise in temperature. Despite these risks, the HMR do not require tare weight, mass weight, or water capacity markings on DOT-specification cylinders.

To address this, the CGA petitioned PHMSA to require tare weight or mass weight, and water capacity to be marked on newly constructed DOT 4B, 4BA, 4BW, and 4E specification cylinders. The petition also requests that PHMSA provide guidance on the accuracy of these markings and define the party responsible for applying them. In its petition, CGA notes that PHMSA IBRs the National Fire Protection Association's *58-Liquefied Petroleum Gas Code* (NFPA 58), which requires cylinders used for liquefied petroleum gases to be marked with the tare weight and water capacity; [2] however, as stated in the petition, NFPA 58 gives no guidance as to the accuracy of these markings or the party required to provide them. The CGA states that this lack of guidance can lead to the overfilling of a cylinder and the potential for unsafe conditions.

While DOT 4B, 4BA, 4BW, and 4E cylinders are often used to transport liquefied compressed gas, we noted in

[2] Note that IBR of NFPA 58 is not for marking purposes but for purposes of equipping storage tanks containing LPG or propane with safety devices. See § 173.315(j).

the ANPRM that these are not the only cylinder types used for liquefied compressed gas transport. For that reason, in the ANPRM, PHMSA asked for comment regarding the potential revision of § 178.35 to require all DOT-specification cylinders suitable for the transport of liquefied gases to be marked with the cylinder's tare weight or water capacity. PHMSA understands that many in the compressed gas industry, especially the liquefied petroleum gas industry, already request manufacturers mark cylinders with this additional information as an added safety measure. Based on this assumption, PHMSA estimates the impact on the liquefied compressed gas industry will be minimal as many in the industry are already voluntarily applying these markings. In the ANPRM, we requested comment on this assertion.

PHMSA identified six U.S. based manufacturers of the cylinders identified in the petition, of which five are classified as small businesses using SBA size standards (< 500 employees). PHMSA requested comments and supporting data regarding the increased safety benefits and the economic impact of this proposal. With regards to the cost associated with this modification, in the ANPRM, PHMSA asked the following specific questions:

- What is the average total cost per cylinder to complete these markings (*i.e.,* is an estimated cost of $0.10 per character for new markings accurate)?
- What is the estimated quantity of newly manufactured 4B, 4BA, 4BW and 4E cylinders each year? Furthermore, how many of these cylinders already display tare weight and water capacity markings in compliance with NFPA 58 or other codes?
- How many manufacturers of the cylinders mentioned above are considered small businesses by the SBA?

PHMSA sought to identify: (1) The frequency of which the mass weight or tare weight, and water capacity markings are already permissively applied to cylinders, (2) the costs associated with applying these marks, (3) the safety benefits associated with the additional markings, and (4) the alternate methods or safeguards against overfilling of cylinders currently being implemented.

Air Products and Chemicals supports the petition with no additional comments. The CGA supports the inclusions of tare weight, mass weight, and water capacity requirements on newly constructed DOT 4B, 4BA, 4BW, and 4E specification cylinders at the time of manufacture but does not support—and strongly disagrees with—PHMSA's consideration of modifying § 178.35 to require all DOT-specification cylinders suitable for the transport of liquefied gases to be marked with the cylinder's tare weight and water capacity. The CGA also believes that the 49 CFR must further clarify that no cylinder must be filled with a liquefied gas unless a mass or tare weight is marked on the cylinder, providing the following justification:

- At the time of manufacture, the manufacturer would not know whether the DOT 3 series cylinders are or are not be used in a liquefied gas service;
- Marking all cylinders, as suggested by DOT, would include every cylinder manufactured in conformance with the specifications set forth in the HMR, which would therefore require cylinders that have been designed and manufactured for a specific permanent gas application be marked for tare weight and water capacity just because the cylinder could be used (at some time) for liquefiable gas;
- There would be instances on small 3-series cylinders where the additional marking would not fit onto the dome of the cylinder; and
- The economic impact estimated for marking all cylinders is significantly greater than the estimates submitted by PHMSA.

Manchester Tank expresses concern that numerous variations in stamped weights could cause confusion in the field among fillers. They state that adding mass weight stamping to a cylinder that already has tare weight stamped could lead to incorrect filling if the wrong figure is used. They ask PHMSA for specific clarification of the language to assign the duty to mark tare weight to the valve installer and indicate that there are many cylinders that are not valved by the manufacturer, further declared that those cylinders can be marked correctly with mass weight—but not with tare weight, since the weight of the appurtenance may not be known to the manufacturer of the vessel. In addition, Manchester Tank notes that available space for stamping is limited on some vessels and increased stamping will not allow significant space for retest marking information.

In this NPRM, PHMSA is proposing to revise § 178.35(f) to require that tare weight or mass weight, and water capacity be marked on certain DOT 4-series specification cylinders used for the transport of liquefied gases as petitioned by the CGA. We stress that while cylinder markings are important to ensure the safe filling of liquefied compressed gas, they do not take the place of adequate personnel training, procedures to ensure proper filling, and continued requalification and maintenance of cylinders in preventing incidents. PHMSA seeks additional comment on expanding this marking requirement to other DOT-specification cylinders and the costs and benefits as well as the safety implications of doing so.

P–1546

GSI Training Services submitted P–1546 requesting that PHMSA allow cylinders that form a component of fire suppression systems to use the proper shipping name ''Fire extinguishers'' when offered for transportation. The Hazardous Materials Table (HMT) in § 172.101 provides a shipping description for cylinders used as fire extinguishers (*i.e.,* ''UN1044, Fire extinguishers, 2.2'') and references § 173.309 for exceptions and non-bulk packaging requirements. Fire extinguishers charged with a limited quantity of compressed gas are excepted from labeling, placarding, and shipping paper requirements under certain conditions if the cylinder is packaged and offered for transportation in conformance with § 173.309.[3] Additionally, fire extinguishers filled in conformance with the requirements of § 173.309 may use non-specification cylinders (*i.e.,* cylinders not manufactured to specifications in part 178). Part 180 also provides special requirements for cylinders used as fire extinguishers (*e.g.,* § 180.209(j) includes different requalification intervals).

PHMSA has written several letters of clarification regarding the applicability of § 173.309 to fire extinguishers. Notably on March 9, 2005, PHMSA wrote a letter (Reference No. 04–0202) to Safecraft Safety Equipment regarding non-specification stainless steel cylinders used as a component in a fire suppression system for installation in vehicles and stated that the cylinders used in the fire suppression system appeared to meet the requirements of § 173.309. PHMSA issued another letter (Reference No. 06–0101) on May 30, 2008, to Buckeye Fire Equipment stating that the company could not use the shipping name ''Fire extinguishers'' for their cylinders, which served as a component of a kitchen fire suppression system, and must use the proper shipping name that best describes the material contained in the cylinder since these cylinders were not equipped to function as fire extinguishers. This latter clarification effectively required

[3] Note that the format of § 173.309 was changed under a final rule published January 7, 2013 (HM–215K; 78 FR 1101) such that the exceptions for limited quantities has been relocated to paragraph (d) of § 173.309.

cylinders that are part of a fixed fire suppression system to meet an appropriate DOT-specification.

In response to Reference No. 06–0101, GSI Training Services submitted a petition for rulemaking requesting PHMSA to allow cylinders that form a component of fire suppression systems to use the proper shipping name ''Fire extinguishers'' when offered for transportation, stating that: (1) At least one company manufactured over 39,000 non-specification cylinders for use in fire suppression systems based on the information provided in the March 9, 2005 letter; and (2) the May 30, 2008 clarification effectively placed this company out of compliance. GSI Training Services further suggests that cylinders comprising a component of a fixed fire suppression system will provide an equal or greater level of safety than portable fire extinguishers since cylinders in fire suppression systems are typically installed in buildings where they are protected from damage and not handled on a regular basis.

In this NPRM, PHMSA is proposing to revise the § 173.309 introductory text to include cylinders used as part of a fire suppression system as a cylinder type authorized for transport in accordance with the HMT entry for fire extinguishers. The controls detailed in § 173.309 provide an acceptable level of safety regardless of whether the cylinder is equipped for use as a handheld fire extinguisher or as a component of a fixed fire suppression system.

P–1563

3M Corporation submitted P–1563 requesting that PHMSA address the regulatory confusion between marking requirements for overpacks in § 173.25 and outside packages for certain thin-walled cylinders specified in § 173.301(a)(9). The petitioner notes that the differing marking requirements in §§ 173.25 and 173.301(a)(9) create confusion and make training difficult. This petition requests modification of the HMR to permit materials packaged in conformance with § 173.301(a)(9)—except aerosols ''2P'' and ''2Q''—to display the ''OVERPACK'' marking described in § 173.25, in lieu of the current requirement for ''an indication that the inner packaging conforms to prescribed specifications.''

In accordance with § 173.301(a)(9), DOT-specification 2P, 2Q, 3E, 3HT, spherical 4BA, 4D, 4DA, 4DS, and 39 cylinders must be packed in strong non-bulk outer packagings. This configuration meets the definition of a combination package as indicated in paragraph (a)(9) and further, as defined in § 171.8 of the HMR. Paragraph (a)(9) requires the outside of this combination packaging to be marked with an indication that the inner packagings conform to the prescribed specifications. The completed combination package is subject to marking and labeling, as appropriate; however, the inner packagings do not have to be marked or labeled. These combination packages cannot also then be considered ''overpacks.'' For each completed package bearing required marking(s) and label(s) that is placed in an overpack, for consolidation or ease of handling, the overpack must also display the appropriate marking(s) and label(s) unless visible through the overpack [see § 173.25(a)(2)]. The ''OVERPACK'' mark must be applied when specification packagings are required by the HMR to communicate that the overpack contains specification packagings in conformance with the HMR.

The marking ''inside (inner) packages comply with the prescribed specifications'' for overpacks in § 173.25 was changed in 2004 to ''OVERPACK'' in an effort to better align with global overpack requirements. The 3M Corporation accurately states that prior to 2004 both the overpack requirements in § 173.25 and the requirement in § 173.301(a)(9) to package certain DOT-specification cylinders in strong, non-bulk outer packagings used very similar language intended to inform package handlers that although not visible, the inner packages contained specification packagings that conformed to appropriate DOT or UN standards.

PHMSA recognizes that differing marking requirements in §§ 173.25 and 173.301(a)(9) to communicate the same intended meaning may be causing confusion without enhancing safety. In order to address the petition and provide for greater clarity, PHMSA is proposing to revise § 173.301(a)(9) to authorize use of the ''OVERPACK'' marking as specified in § 173.25(a)(3) as a method to satisfy the current requirement in paragraph (a)(1) to mark the completed package with an indication that the inner packagings conform to prescribed specifications for the listed cylinders. We agree with 3M that the issue is more complex for 2P and 2Q containers as specified in §§ 173.304, 173.305, and 173.306 and, therefore, are not including 2P and 2Q in the allowance for the ''OVERPACK'' marking. The revision will also include instructional language that the combination package is not to be considered an ''overpack.'' PHMSA welcomes comments from affected entities regarding the following: potential consequences, safety and economic impacts, current level of difficulty and unnecessary confusion, need for change, quantity of shipments per year to be impacted, etc.

P–1572

Barlen and Associates submitted P–1572 requesting that PHMSA explicitly state in § 173.312 that for liquefied compressed gases in Multiple-Element Gas Containers (MEGCs), the filling density of each pressure receptacle must not exceed the values contained in Packing Instruction P200 of the UN Model Regulations, as specified in § 173.304b, and the contents of each DOT-specification cylinder cannot exceed the densities specified in § 173.304a(a)(2).[4]

Requirements for shipping MEGCs are specified in § 173.312. Specifically, § 173.312(b) details the filling requirements for MEGCs and states,'' [a] MEGC may not be filled to a pressure greater than the lowest marked working pressure of any pressure receptacle [and a] MEGC may not be filled above its marked maximum permissible gross mass.'' The requirement that each pressure receptacle contained in the MEGC may not be filled above the working pressure of the lowest marked working pressure of any pressure receptacle is clear for permanent (non-liquefied compressed) gases, which are generally filled by pressure; however, § 173.312(b) does not contain a corresponding requirement addressing pressure receptacles containing a liquefied compressed gas, which are most often filled by weight. This lack of specificity for MEGCs containing liquefied compressed gas has led to some confusion on methods for their proper filling. Therefore, in this NPRM, we propose to specify the filling ratio requirements for pressure receptacles.

PHMSA does not anticipate this provision will impose any new burden, as this proposal would only emphasize an important safety requirement already stated in § 173.304a for DOT-specification cylinders and § 173.304b for UN pressure receptacles. PHMSA invites comments from affected entities regarding the following: Safety and economic impacts, level of difficulty and unnecessary confusion, need for change, etc.

[4] Note that the petition specifically referenced the 17th ed. of the UN Model Regulations, however, we will propose a change that references the edition currently incorporated by reference in § 171.7 because we biennially update the edition for harmonization with international standards.

P–1580

HMT Associates submitted P–1580 requesting that PHMSA revise §§ 173.302(f)(2) and 173.304(f)(2) to require that the burst pressure of a rupture disc coincide with CGA S–1.1 for DOT 39 cylinders offered for transportation after October 1, 2008; other DOT-specification cylinders with the first requalification due after October 1, 2008; and UN pressure receptacles prior to initial use. Specifically, as prescribed in 4.2.2 of CGA S–1.1, the required burst pressure of the rupture disc ''shall not exceed 80% of the minimum cylinder burst pressure and shall not be less than 105% of the cylinder test pressure.''

Section 173.301(f) states that a cylinder filled with a compressed gas and offered for transportation ''must be equipped with one or more [pressure relief devices (PRDs)] sized and selected as to type, location and quantity and tested in conformance with CGA S–1.1 [*Pressure Relief Device Standards—Part 1—Cylinders for Compressed Gases,* Fourteenth Edition (2005)] and CGA S–7 [*Method for Selecting Pressure Relief Devices for Compressed Gas Mixtures in Cylinders* (2005)].'' Sections 172.302(f)(2) and 172.304(f)(2) specify that the rated burst pressure of a rupture disc for DOT 3A, 3AA, 3AL, 3E, and 39 cylinders, as well as that for UN ISO 9809–1, ISO 9809–2, ISO 9809–3, and ISO 7866 cylinders containing oxygen, compressed; compressed gas, oxidizing, n.o.s.; or nitrogen trifluoride, must be 100 percent of the cylinder minimum test pressure with a tolerance of 'plus zero' to minus 10 percent.

In response to PHMSA's NPRM entitled ''Hazardous Materials: Miscellaneous Amendments'' published on September 29, 2010 [75 FR 60017] under Docket No. PHMSA–2009–0151 (HM–218F), HMT Associates submitted a late-filed comment that identified a potential discrepancy between the HMR and CGA S–1.1. Specifically, this commenter stated the HMR have different PRD settings than CGA S–1.1 for DOT 39 cylinders that make it virtually impossible to comply with both the HMR and CGA S–1.1. Sections 173.302(f)(2) and 173.304(f)(2) require the rated burst pressure of a rupture disc for DOT 3A, 3AA, 3AL, 3E, and DOT 39 cylinders to be 100 percent of the cylinder minimum test pressure with a tolerance of 'plus zero' to minus 10 percent, whereas section 4.2.2 of CGA S–1.1 requires the rated burst pressure of the rupture disc on DOT 39 cylinders to be not less than 105 percent of the cylinder test pressure.

In this NPRM, PHMSA proposes to revise § 173.301(f) as it applies to DOT 39 cylinders to alleviate any confusion and conflict between the PRD requirements in § 173.301(f) and those in §§ 173.302(f)(2) and 173.304(f)(2) with respect to minimum burst pressure of pressure relief devices on a DOT 39 cylinder used for the transport of compressed and liquified oxidizing gases by air. PHMSA notes that the revision made to § 173.301(f) was based on option 2 presented in HMT Associates comment to rulemaking HM–218F and submitted as petition P–1580. PHMSA requests comments from the compressed gas industry regarding this course of action.

P–1582

Water Systems Council submitted P–1582 requesting that PHMSA revise § 173.306(g), which provides a limited quantity exception for water pump system tanks, by permitting tanks manufactured to American National Standards Institute (ANSI) and Water Systems Council (WSC) standard PST–2000–2005(2009) to be authorized for transport.

ANSI and WSC standard PST–2000–2005 is an industry standard that prescribes minimum performance and construction requirements for pressurized storage tanks for service in water well systems with a maximum factory pre-charge pressure of 40 psig (280 kPa), to be operated in ambient air temperatures up to 120 °F (49 °C), with maximum working pressures not less than 75 psig (520 kPa) and not greater than 150 psig (1,000 kPa) and tank volumes not exceeding 120 gallons (450 L). The standard was developed by a group of WSC members comprised of leading U.S. manufacturers of pressurized water storage tanks for water wells to define and promote—through voluntary written standards—minimum performance and construction requirements for pressurized water storage tanks for service in water well systems. Incorporating the standard into the HMR will provide minimum requirements for pressurized water storage tanks for water wells that provide at least an equivalent level of safety as currently provided in the HMR.

PHMSA identified 38 U.S. based manufacturers or distributors of water pump system tanks, most of which would be classified as a small business using SBA size standards (<500 employees). There are no costs associated with this proposal because it is already incorporated into the regulations. This proposal will authorize tanks to be tested to current standards in the HMR or the manufacturer's specified minimum working pressure. Further, it allows water pump system tanks to be charged with helium in addition to the currently authorized nitrogen. The revisions would provide greater flexibility to stakeholders without compromising safety. Therefore, in this NPRM, PHMSA is proposing these recommended changes.

P–1592

The CGA submitted P–1592 requesting that PHMSA replace the 2005 edition of CGA S–1.1, *Pressure Relief Device Standards-Part 1-Cylinders for Compressed Gases* with the 2011 edition as referenced in the HMR.

CGA S–1.1 provides standards for selecting the correct pressure relief device to meet the requirements of § 173.301(f) for over 150 gases. It provides guidance on when a pressure relief device can be optionally omitted and when one's use is prohibited, as well as direction on their manufacture, testing, operational parameters, and maintenance.

PHMSA identified approximately 5,000 companies that would be subject to this standard, with the majority being classified as small businesses using SBA size standards (<500 employees).

This minor update to the regulations improves the timeliness and clarity of industry standards that are IBR. It supports the goal of facilitating voluntary compliance and reducing the burdens associated with references to outdated material. Therefore, in this NPRM, PHMSA is proposing these recommended changes.

P–1596

Chemically Speaking, LLC submitted P–1596 requesting that PHMSA revise the HMR pertaining to salvage drums. Specifically, they propose amending § 173.3(d) to allow Class 4 and Class 5 materials to be placed in salvage cylinders.

For over 30 years the gas industry, public agencies, gas cylinder users, and gas disposal companies have used open head salvage cylinders fabricated to ASME specifications to quickly and safely contain and transport leaking cylinders to locations where they can be safely emptied or repaired. Salvage cylinders were originally permitted under special permits (exemptions) specific for each design,[5] but these exemptions were adopted into the HMR in 2005. Class 4 or 5 materials were not

[5] DOT–E 9507, 9781, 9991, 10022, 10110, 10151, 10323, 10372, 10504, 10519, 10789, 10987, 11257, 11459, 12698, 12790, and 12898.

included in the adoption; however, there is no preamble language in the rules specifically indicating reasons for the exclusion. A salvage cylinder made to ASME specifications as a pressure vessel and packaged as prescribed in § 173.3(d) is a more robust package than a salvage container, which is used for liquids or solids. The addition of a pyrophoric material will not add a new hazard in the use of salvage cylinders, as some of the compressed gases that are also authorized have pyrophoric properties, such as silane, 2.1 (UN2203) or phosphine, 2.3 (UN2199). Moreover, these gases also have the added hazards of high pressure (1,500 psig), with the latter also being a toxic material.

Over a period of four years (2006–2010), the use of salvage pressure receptacles was debated at the UN Subcommittee on Transportation of Dangerous Goods. Numerous papers were submitted in support of this effort. In the December 2010 session, the use of salvage pressure receptacles was approved and published in ''Amendments to the sixteenth revised edition of the Recommendations on the Transport of Dangerous Goods, Model Regulations.'' The amendments include the authorization of salvage cylinders for Class 4 and 5 materials.

This change will have a positive economic impact on owners of salvage cylinders as this will increase the instances where a salvage cylinder can be used. Many metal alkyl users and gas suppliers already own a salvage cylinder. There will be a negligible burden for procedures to be updated to include these cylinders. Therefore, in this NPRM, PHMSA is proposing these recommended changes; however, we do not propose additional reporting requirements.

P–1622

Worthington Cylinders submitted P–1622 requesting that PHMSA allow the internal volume of DOT 39 cylinders not to exceed 75 cubic inches, which will be reflected in revisions to the entries for cyclopropane, ethane, and ethylene in the § 173.304a(a)(2) table to include this limit in new footnote ''Note 9.'' This proposal would also clarify the 75 cubic inch limit for DOT 39 cylinders by adding it in a new sentence to § 173.304a(d)(3). Worthington Cylinders states its justifications for this petition are as follows:

As discussed in my May 2011 letter, 49 CFR went through a rewrite in 2001. At this point in time, Paragraph 173.304 titled *''Charging of cylinders with liquefied compressed gas''* was divided into two specific sections, 173.304 and 173.304a. Previous to the change in 2001, Note 9 was present in the Table of Paragraph 173.304. This note stated ''When used for shipment of flammable gases, the internal volume of a Specification 39 cylinder must not exceed 75 cubic inches.'' This would apply specifically to cylinders containing liquefied compressed gases. At the same time, Paragraph 173.302 titled ''*Charging of cylinder with non-liquefied compressed gases''* stated in subsection 4 that for ''Specification 39 cylinders for flammable gases, the internal volume may not exceed 75 cubic inches.'' This paragraph would specifically pertain to cylinders charged with non-liquefied gases.

The problem lies with each edition of 49 CFR published since 2001. Paragraph 173.304a is not making any statement limiting the Specification 39 cylinder volume when charging the cylinder with liquefied flammable gases, yet paragraph 173.302a(3) limits the flammable compressed gas in a Specification 39 cylinder to a maximum of 75 cubic inches. Clearly, DOT would not want to authorize a liquefied flammable compressed gas for any volume Specification 39 cylinder when the specifications limit the volume to 75 cubic inches for a flammable compressed gas. I will use propane as an example: Propane can be shipped as a compressed gas or a liquefied compressed gas. If it is shipped as a compressed gas the specifications limit the shipper to a container 75 cubic inches or smaller (49 CFR 173.302). If the shipper was shipping propane as a liquefied compressed gas there are no limitations in the regulations on the Specification 39 cylinder volume (49 CFR 174.304a). This clearly makes no logical sense when propane expands 270 times its volume from a liquid to a vapor. Why would the stored energy for a Specification 39 cylinder with vapor be limited to 75 cubic inches and for a liquid have no limitations?

Specification 39 cylinders have a proven track record. Millions of these cylinders have been manufactured and used for the safe and reliable storage and transportation of compressed gases and liquefied compressed gases. This proven safety and reliable track record includes 2.1 flammable liquefied compressed gases limited to 75 cubic inch capacity. Worthington's concerns of using up to 1526 cubic inch volume cylinders for 2.1 flammable liquefied compressed gases centers around the puncture resistance and corrosion resistance which are ''real life'' issues in the transportation of cylinders. Releasing basically four gallons of propane from a Specification 39 cylinder from a puncture or corrosion is not in the best interest of safety. Worthington strongly recommends that PHMSA review the following and consider it as immediate changes to 49 CFR 173.304a and 173.304(d)(3).

PHMSA agrees with the petitioner and will permit valves other than those listed in CGA S–1.1 to be used by adding the word ''may'' to this phrase in the regulatory text: ''a CG–7 pressure relief valve may be used.'' In this NPRM, PHMSA is proposing these recommended changes.

Worthington Cylinders also asked PHMSA to explain what is meant by ''chemical under pressure'' in § 173.302a(a)(3) as it relates to this phrase: ''or 50L for chemical under pressure.'' Section 173.302a(a) describes detailed filling requirements for the shipment of non-liquefied (permanent) compressed gases in specification cylinders. Specifically, § 173.302a(a)(3) limits the capacity of a DOT 39 cylinder to 1.23 L (75 in^3) when the cylinder is filled with a Division 2.1 material or 50 L (3050 in^3) when the cylinder is filled with a chemical under pressure. PHMSA revised §§ 173.301b and 173.302a in a final rule [Docket No. PHMSA–2012–0027 (HM–215L); 78 FR 988] to increase the maximum allowable water capacity for non-refillable cylinders containing chemicals under pressure to 50 liters (3050in^3); therefore, this request has been addressed.

The phrase in question was added to the HMR under a final rule published January 7, 2013 (HM–215L; 78 FR 988). Under that final rule we introduced new HMT entries for ''chemical under pressure,'' assigned authorized non-bulk and bulk packaging, and included other safety requirements such as quantity and filling limits. See §§ 172.102, Special Provision 362, and 173.335. In the HM–215L final rule (78 FR 989), PHMSA discussed a comment received from 3M in support of the proposal; however, 3M requested that PHMSA authorize the use of non-refillable cylinders (*i.e.,* DOT 39s) larger than 1.25 liters containing flammable gas consistent with the UN Model Regulations. We noted our '' intent regarding the chemical under pressure entry was to comprehensively align the requirements of this entry with international standards.'' In the HM–215L final rule, we revised the packaging requirements for chemical under pressure to authorize the use of nonrefillable cylinders larger than 1.25 liters for chemical under pressure, hence, the inclusion of ''or 50L for chemical under pressure'' for DOT 39 cylinders in § 173.302a(a)(3). This language applies to ''chemicals under pressure'' as described in Special Provision 362 and must not be applied to flammable gases. PHMSA is also looking to resolve the discrepancy created by this allowance for larger capacities for this cylinder type because it exceeds the size limits authorized under the design specifications for DOT 39 cylinders in § 178.65. In this NPRM, PHMSA is proposing to revise § 173.302a(a)(3) to clarify any confusion on the applicable capacity limits.

P–1626

The CGA submitted P–1626 requesting that PHMSA IBR CGA C–1,

Methods for Pressure Testing Compressed Gas Cylinders, Tenth Edition (2009) and revise the regulations regarding the retesting of cylinders by the hydrostatic test as they are not only unclear to requalifiers, but also missing necessary information rendering the regulations unenforceable. Although the petition proposed the Tenth Edition, currently there is an Eleventh Edition (2016) available. PHMSA is proposing to IBR this most current version and requests comment regarding this action.

PHMSA identified approximately 980 entities that conduct hydrostatic testing, including cylinder requalifiers, retesters, and manufacturers.

In this NPRM, PHMSA is proposing to adopt clarifying language and IBR the CGA C–1 standard, as proposed in P–1626, as it provides more detailed instructions and illustrations than what is possible in the HMR and addresses the deficiencies detailed in the petition. The CGA requests that this proposed IBR apply to the following sections: §§ 178.36, 178.37, 178.38, 178.39, 178.42, 178.44, 178.45, 178.46, 178.47, 178.50, 178.50, 178.51, 178.53, 178.55, 178.56, 178.57, 178.58, 178.59, 178.60, 178.61, 178.65, 178.68, 180.205, and 180.209. The incorporation of CGA C–1, 2016 supports the goal of increasing compliance and improving overall safety as its reference increases clarity, provides enhanced guidance, and reduces confusion between CGA current dates and IBR versions. Specific clarifications include instructions for performing volumetric expansion tests using both the water-jacket and direct expansion methods, as well as a provision for retesting in case of equipment failure or operator error. Revising the HMR to IBR CGA C–1 will provide the desired clarification without imposing requirements that are potentially costly or unnecessarily difficult.

P–1628

The CGA submitted P–1628 requesting that PHMSA IBR CGA C–3–2005, Reaffirmed 2011, *Standards for Welding on Thin-Walled, Steel Cylinders,* Seventh Edition as material incorporated by reference in the HMR. Presently, the HMR reference CGA C–3–1994, *Standards for Welding on Thin-Walled Steel Cylinders,* Fourth Edition.

This publication contains information on welding process qualification, welding operator qualifications, tensile testing, bend testing, and radiographic inspection. The changes between the C–3–1994, Fourth Edition and the C–3–2005, Reaffirmed 2011, Seventh Editions were predominantly editorial or technical in nature. The significant technical changes are summarized as follows and can be reviewed in detail in the docket to this petition:

- Added section to the testing criteria to employ the use of macro etch samples in lieu of weld guided bend test and weld tensile testing when the cylinder size would not permit securing of proper size specimens.
- Clarified the weld bend testing procedure, weld bend testing tooling, and proper clearances that are required in the tooling.
- Clarified definitions for the welding procedure qualification and the welding operator weld qualification.
- Added tolerance section to C–3–2005, Reaffirmed 2011 that indicates the plus and minus tolerances when a specific dimensional tolerance is indicated in the publication.
- Added drawings to the C–3–2005, Reaffirmed 2011 illustrating different weld joint designs.
- Reviewed C–3–2005, Reaffirmed 2011 for conditional wording and revised it for enforceable wording.

PHMSA identified approximately 5,000 companies that would be subject to this standard, with the majority being classified as small businesses using SBA size standards (<500 employees).

This minor update to the regulations improves the timeliness and clarity of industry standards that are IBR. It supports the goal of facilitating voluntary compliance and reducing the burdens associated with references to outdated material. Therefore, in this NPRM, PHMSA is proposing these recommended changes.

P–1629

The CGA submitted P–1629 requesting that PHMSA IBR CGA C–14–2005, Reaffirmed 2010, *Procedures for Fire Testing of DOT Cylinder Pressure Relief Device Systems,* Fourth Edition, as a material incorporated by reference in the HMR. Presently, the HMR reference CGA C–14–1979, *Procedures for Fire Testing of DOT Cylinder Pressure Relief Device Systems,* First Edition. Since the incorporation of this edition, CGA has revised the publication in 1992, 1999, 2005, and reaffirmed the publication in 2010.

This standard describes test procedures and apparatus for fire testing compressed gas cylinder safety (pressure) relief devices as was required by former § 173.34(d). The procedures are applicable for cylinders that are less than 500 pounds water capacity and designed to provide a means of testing to DOT requirements anywhere with reliable test data and repeatable test results. The changes from the 1979 First Edition to the 2005 and Reaffirmed 2010 editions of CGA C–14 were predominantly editorial or technical in nature. The significant technical changes are summarized as follows and can be reviewed in detail in the docket to this petition:

- Permitted the use of an alternate lading. If the intended lading would present an increased safety hazard during the test procedure (such as the use of poisonous or flammable gas), the cylinder may be charged with a typical liquefied or non-liquefied gas. Gases with essentially similar physical properties may be classified as typical.
- Added the Bonfire Test Method to the publication. This permitted the Board of Explosives (BOE) test method to be used to qualify pressure relief device systems. The Bonfire Test Method was successfully used to qualify pressure relief device systems for decades.
- Clarified what information is to be recorded before and during the actual test.
- Increased the water capacity of a cylinder that can be fire tested from 500 lb. water capacity to 1000 lbs. water capacity to permit a test method for all 4 series cylinders.
- Reviewed C–14–2005, Reaffirmed 2010 for conditional wording and modified it to replace conditional wording with enforceable wording, wherever appropriate.

PHMSA identified approximately 5,000 companies that would be subject to this standard, with the majority being classified as small businesses using SBA size standards (<500 employees).

This minor update to the regulations improves the timeliness and clarity of industry standards that are IBR. It supports the goal of facilitating voluntary compliance and reducing the burdens associated with references to outdated material. Therefore, in this NPRM, PHMSA is proposing these recommended changes.

P–1630

The CGA submitted P–1630 requesting that PHMSA revise the HMR requirements for DOT 4L welded insulated cylinders. Specifically, the CGA requests PHMSA make two changes:

(1) Add a Definition for ''Recondition'' to § 180.203

The CGA states ''[t]he term 'recondition' is distinct from work presently defined as repair or rebuild and describes work on a part or component of a DOT 4L welded insulated cylinder that does not involve repair or rebuilding of the inner containment vessel. For purposes of this

petition, the inner containment vessel refers to the term cylinder as defined in § 171.8. In addition, DOT 4L welded insulated cylinder refers to that packaging defined in § 178.57.'' The CGA did not propose language for the definition.

The HMR prescribe the requirements for reconditioning DOT 4L cylinders in § 180.211, further specifying additional requirements for rebuilding DOT 4L cylinders in paragraph (e). ''Recondition'' is a word that describes a process that applies to several cylinder packaging types under the HMR. PHMSA is concerned that adding a definition for ''recondition'' that applies only to DOT 4L specification cylinders would cause confusion that may reduce the safe application of these regulations. Therefore, PHMSA is not proposing in this NPRM to define a ''reconditioned cylinder'' in § 180.203.

(2) Amend Paragraphs §§ 180.211(c) and 180.211(e) To Clarify when a Hydrostatic Test Must Be Performed on the Inner Containment Vessel After the DOT 4L Welded Insulated Cylinder has Undergone Repair as Interpreted in DOT Letters of Interpretation Reference Nos. 11–0237 and 12–0065

Reference No. 11–0237 states: ''[t]he term 'rebuild' is defined in § 180.203 as the replacement of a pressure part (*e.g.,* a wall, head, or pressure fitting) by welding. While a 'rebuild' would be required when the inner vessel of a DOT–4 series cylinder is compromised, it is not the only scenario that would constitute a 'rebuild.' DOT–4 series cylinders requiring rebuild, as defined in § 180.203, must do so in conformance with § 180.211. In addition, DOT 4L cylinders must meet additional requirements for repair specified in § 180.211(e) including proof pressure testing each inner containment vessel at two times its service pressure. DOT 4L cylinders which undergo procedures that are not defined as a rebuild in § 180.203 are not subject to the requirements of § 180.203(e).''

Reference No. 12–0065 states: ''[t]he term 'repair' is defined in § 180.203 as a procedure for correction of a condemned cylinder that may involve welding. A repair is not limited to the correction of a condemned cylinder that has had only its inner vessel compromised; therefore, DOT–4 series cylinders requiring repair, as defined in § 180.203, must be done in conformance with § 180.211. In addition, DOT 4L cylinders must meet additional requirements for repair specified in § 180.211(c) including being pressure-tested in conformance with the specifications under which the cylinder was originally manufactured. DOT 4L cylinders which undergo procedures that are not defined as a repair in § 180.203 are not subject to the requirements of § 180.211(c) including the requirement to be pressure-tested in conformance with the specifications under which the cylinder was originally manufactured.''

The CGA notes its understanding that these DOT interpretations ''state that testing the inner containment vessel after reconditioning, as defined below, are relatively new and prior to these interpretations no such testing had taken place.'' The CGA further notes that it ''knows of no incidents related to the lack of such testing.''

While the requirements the petitioner is referring to have existed since 2002 [67 FR 51626]—and prior to that to some extent in former § 173.34—PHMSA agrees with the petitioner that adding language to clarify when a rebuilt DOT 4L cylinder and its components need to be pressure tested would make this requirement easier to understand; therefore, PHMSA is revising § 180.211(c) to include the clarifying language about this requirement included in letter Reference No. 11–0237.

The CGA further states its ''purpose for requesting amendments to §§ 180.211(c) and 180.211(e) is to clarify that certain work on parts and components of a DOT 4L welded insulated cylinder other than the inner containment vessel does not require hydrostatic testing of the inner containment vessel. The addition and definition of the term 'recondition' with respect to these DOT 4L welded insulated cylinders identifies this work and enables verification of the integrity of such work using a pneumatic leak test at 90% of service pressure for which the DOT 4L welded insulated cylinder was designed and tested and by using a mass spectrometer detection system.''

As previously stated, while this requirement has existed since 2002, PHMSA agrees with the petitioner that revising the language in § 180.211(e) to include the language in letter Reference No. 12–0065 would improve the understanding of this requirement and, thereby, possibly improve safety.

In this NPRM, PHMSA is proposing to amend § 180.211(c) and (e) for clarification as petitioned.

IV. Special Permits

In the ANPRM, PHMSA considered proposing revisions to adopt certain special permits into the HMR. Specifically, PHMSA proposed changes based on DOT–SPs 12929, 13318, and 13599. We are no longer proposing changes in this NPRM in association with these special permits because: (1) DOT–SP 12929 was determined not suitable for adoption under rulemaking HM–233F (80 FR 5340; January 30, 2015); and (2) DOT–SPs 13318 and 13599 were adopted under HM–233F (81 FR 3635; January 21, 2016).

Since publication of the ANPRM, we have considered proposing revisions to the HMR based on adoption of DOT–SP 14237. For over ten years, PHMSA has authorized the use of certain non-bulk DOT-specification cylinders to transport specific adsorbed gases under special permits. DOT–SP 14237, first issued on December 22, 2006, is general in its application in that it does not require the use of drawings and applications for DOT-specification cylinders that are specific to one company. Adopting this special permit would reduce costs associated with application and management, while also increasing safety and expanding the use of DOT-specification cylinders for adsorbed gases. PHMSA is not aware of any incident or investigation concerning the performance of packaging and transport under this special permit since its issuance; therefore, PHMSA is proposing in this NPRM to adopt the special permit into the HMR.

Furthermore, PHMSA added provisions to the HMR for shipping adsorbed gases in a final rule issued on January 7, 2015 [Docket No. PHMSA–2013–0260 (HM–215M); 80 FR 1075] applicable to UN pressure receptacles. Specifically, these changes incorporated international standards designed to allow the transportation of certain gases when they are adsorbed onto a porous solid material in a non-bulk UN standard pressure receptacle. Two commenters to the HM–215M NPRM requested that PHMSA also permit adsorbed gases in DOT-specification cylinders. One commenter, Entegris, Inc., proposed regulatory text that includes DOT cylinder specifications and provisions not previously authorized under DOT special permit. PHMSA chose not to accept the comment and did not adopt the changes at that time; however, PHMSA invites the public to review Entegris, Inc.'s comments under Docket No. PHMSA–2013–0260 at *www.regulations.gov* and to comment on the safety and costs associated with its proposal and its possible inclusion under new § 173.302d.

V. Agency Initiated Editorial Corrections

In an ongoing attempt to improve safety, PHMSA regularly reviews and revises the HMR to correct errors and

clarify any regulations that are unclear or confusing. PHMSA is adopting the following issues of concern into this NPRM and seeks comment regarding the changes.

Section 107.803

Section 107.803 provides approval procedures for independent inspection agencies (IIA) conducting cylinder inspections and verifications as required by parts 178 and 180. In its application for approval status, the IIA must provide information, including a detailed description of its qualifications and ability both to perform and to verify inspections. However, at present, the application information requirements of § 107.803(c)(3) only reference part 178. In this NPRM, PHMSA is proposing to revise § 107.803(c)(3) to include part 180, subpart C for consistency.

Section 107.805

Section 107.805 provides approval procedures for persons to inspect, test, certify, repair, or rebuild a cylinder in accordance with the HMR. PHMSA is proposing to revise the requirements for application for approval of cylinder requalifiers to include a reference to the option of having a mobile cylinder requalification unit (*i.e.,* a mobile unit). See § 180.203 for further discussion.

Section 178.70

Section 178.70 provides approval for the manufacture of UN pressure receptacles (*i.e.,* cylinders). Current § 178.70(d) restricts the user (manufacturer) from the flexibility that is provided in the UN/ISO standards. The regulation as constructed results in additional cost and delay without any added safety. The UN/ISO standards are developed based on performance testing and include adequate testing for a wide range of design-type modifications. All UN/ISO standards to which the original design type conforms permit certain modifications to an approved design type. PHMSA has received several requests to revise this regulation to allow an authorized manufacturer to benefit from the UN Model Regulations and produce UN/ISO cylinders. In this NPRM, PHMSA is proposing to adopt language consistent with UN/ISO standards to reduce the need for approvals.

Section 180.203

Section 180.203 specifies definitions that apply to cylinder use, qualification, and maintenance. PHMSA has encountered frequent problems regarding this section and is recommending the following revisions:

(1) Define and Incorporate ''Mobile Unit'' Requalification Operations

The hazardous materials program procedures of 49 CFR part 107 for approval of cylinder requalifiers do not specify the option of a ''mobile cylinder requalification unit.'' The intent of this operation is for a cylinder requalifier to be able to perform its requalifying function within a 100-mile radius of its primary place of business. To operate, a mobile cylinder requalifier must adhere to the requirements in a PHMSA-issued approval letter.

Since companies may not be familiar with the option to offer mobile testing of cylinders to their customers through an approval by the Associate Administrator, PHMSA is proposing in this NPRM to add a definition of ''mobile unit'' to the HMR in § 180.203 and a new paragraph in § 107.805 identifying application requirements for mobile units. These proposed revisions would enhance requalifiers' ability to perform cylinder requalifications under the scope of the HMR.

(2) Revise Definition of Proof Pressure Test for Cylinders

The HMR no longer prescribe modified hydrostatic pressure testing, which has been and continues to be the method of low-pressure testing of fire extinguishers. Not all retesters know that proof pressure testing allows the test to be performed with just air (no water), therefore taking approximately one-third the time of a modified hydro test without wasting water. The required test is only looking for leaks not determining a cylinder expansion percentage rate. We expect that use of a proof pressure will pass along cost savings to a requalifier.

The HMR prescribes in § 180.209(e) (for DOT 4-series cylinders) and (j) (for fire extinguishers) that a proof pressure test is authorized. In § 180.203, proof pressure test is defined as ''a pressure test by interior pressurization without the determination of expansion of the cylinder'' (*i.e.,* a leak test). In this NPRM, PHMSA is proposing to revise the definition of proof pressure test to specify that a liquid or a gas may be used to conduct the test. However, we note that the safety risk for conducting this test is substantially more using gas such as air versus a liquid such as water although this risk is lessened for low-pressure cylinders such as fire extinguishers. We seek comment on the impact of this revision and whether this clarification achieves the intent of enhancing compliance by specifying the air may be used for a proof pressure test. We also invite comment on a better method for communicating that a gas may be used for a proof pressure test, preferrable for low-pressure cylinders.

Section 180.207

Section 180.207(d) authorizes the use of ISO 6406 to requalify UN refillable seamless steel cylinders and UN refillable seamless steel tube cylinders. The current ISO 6406 has a limitation of 150 liters for the size of these cylinders, which is substantially less than the maximum volume of a UN refillable seamless steel tube (3,000 liters). PHMSA has received several requests for interpretation of this regulation and its application to the requalification of UN seamless steel pressure receptacles larger than 150 liters. PHMSA responded to these requests through a letter of clarification issued under Reference No. 13–0146, stating that § 180.207(d)(1) authorizes the requalification of seamless steel UN pressure receptacles larger than 150 liters. In addition, PHMSA Engineering staff is participating in an ISO/TC58/SC4 working group that is considering a revision to the ISO 6406 standard to include pressure receptacles larger than 150 liters; therefore, PHMSA is proposing in this NPRM to add the phrase ''larger than 150 liters'' after ''including MEGC's pressure receptacles'' to clarify that the use of larger UN pressure receptacles is permitted under § 180.207(d)(1).

Section 180.213

Section 180.213 prescribes marking requirements for the visual inspection of cylinders (see § 180.213 paragraphs (f)(5), (f)(8), and (f)(9)). In the past, PHMSA has allowed a visual (V) requalifier identification number (*i.e.,* a V number) to be marked in the same manner as a requalifier identification number (RIN) marking per § 180.213. V number markings have four different options for markings; however, PHMSA issues approval letters that permit a V number marking yet only provide three of the four available marking options and do not reference § 180.213.

Section 180.213 of the HMR should include the marking requirements for a V number consistent with those for an RIN. The V number could be placed in a square pattern as shown in § 180.213. However, marking a V number, which is a single letter followed by six numbers, in a square pattern like an RIN, which is a single letter followed by three numbers, requires clarification, as the marks vary. Including the marking requirements for V numbers into § 180.213 will make authorized options for these identifiers to be placed on a cylinder more widely understood.

PHMSA is proposing in this NPRM to include this V number marking in § 180.213(g).

Section 180.215

Section 180.215(a)(6) requires that a person who requalifies, repairs, or rebuilds cylinders must maintain in their records and report information contained in each applicable CGA or ASTM standard incorporated by reference under § 171.7 of the HMR that applies to requalifier activities. In this NPRM, PHMSA is proposing to remove the last sentence of paragraph (a)(6) of this section to reduce confusion, as it essentially repeats what is requested in the first sentence of this paragraph.

VI. Section-by-Section Review

Section 107.803

Section 107.803(c)(3) states that each application to obtain approval to perform duties as an IIA must contain a detailed description of the applicant's qualifications and ability both to perform the inspections and to verify the inspections required by part 178 of the HMR or under the terms of a DOT special permit. In this NPRM, we propose to revise § 107.803(c)(3) to clarify that the applicant's description of his or her ability to perform and verify inspections must include those required under 49 CFR part 180, subpart C.

Section 107.805

Section 107.805(c) prescribes additional information an application must contain to obtain approval from PHMSA to requalify cylinders and pressure receptacles. In this NPRM, we propose to add paragraph (c)(5) to this section to clarify what information must be added to the application to authorize mobile unit requalifiers and the information necessary to acquire approval. We also propose to make a conforming edit to paragraphs (c)(3) and (c)(4) by moving the ''and'' clause from paragraph (c)(3) to (c)(4).

Section 171.7

Section 171.7 lists reference standards and regulations incorporated by reference into the HMR that are not specifically set forth in the HMR. Paragraph (g) incorporates into the HMR publications issued by the American Society of Mechanical Engineers, specifically, the ASME Boiler and Pressure Vessel Code. In this NPRM, we propose to revise the list of sections in paragraph (g)(1) to include § 173.302d based on the addition of this new section to the HMR and its reference to this standard in § 173.302d(b)(11). Also, paragraph (n) specifically incorporates into the HMR publications issued by the Compressed Gas Association, an industrial and medical gas association that, among others, develops standards and practices for the safe transportation of gases and their containers. In this NPRM, we propose to add to § 171.7(n) the latest CGA publication C–1, *Methods for Pressure Testing Compressed Gas Cylinders.* We also propose to update the editions of CGA publications C–3, C–6, C–14, and S–1.1 already incorporated in the HMR. The remaining changes to paragraph (n) are editorial based on PHMSA's initiative to renumber the list to accommodate the new publications and add missing section number symbols, punctuation, and spaces. Also, note a weblink in the **ADDRESSES** section of the introduction to this rulemaking to review these publications during the comment period. The documents are summarized below.

The ASME publication is 2015 ASME *Boiler and Pressure Vessel Code (ASME Code) Section VIII—Rules for Construction of Pressure Vessels Division 1.* The publication provides requirements applicable to the design, fabrication, inspection, testing, and certification of pressure vessels operation at either internal or external pressures exceeding 15 psig. Division 1 also contains mandatory and nonmandatory appendices detailing supplementary design criteria, nondestructive examination and inspection acceptance standards. During the open comment period of this NPRM, this publication is freely available on the ASME Web site at: *http://go.asme.org/PHMSA-ASME-PRM.*

The Compressed Gas Association publications include the following:

(1) CGA C–1, *Methods for Pressure Testing Compressed Gas Cylinders* (2016). During the open comment period of this NPRM, this publication is freely available on the CGA Web site at: *https://www.cganet.com/customer/dot.aspx.* This publication provides the standard(s) for pressure testing of compressed gas cylinders for many newly manufactured cylinders and requalification of cylinders. This standard contains operating and equipment requirements necessary to perform pressure testing of compressed gas cylinders properly. Tests include the water jacket method, direct expansion method, and proof pressure method.

(2) CGA C–3, *Standards for Welding on Thin-Walled Steel Cylinders* (2005) (Reaffirmed 2011). During the open comment period of this NPRM, this publication is freely available on the CGA Web site at: *https://www.cganet.com/customer/dot.aspx.* This publication contains information on welding process qualification, welding operator qualifications, tensile testing, bend testing, and radiographic inspection. Additionally, this publication clarifies dimensional tolerances and when weld macro etch can be used for weld process approval and welder qualification approval.

(3) CGA C–6, *Standards for Visual Inspection of Steel Compressed Gas Cylinders* (2013). During the open comment period of this NPRM, this publication is freely available on the CGA Web site at: *https://www.cganet.com/customer/dot.aspx.* This publication provides cylinder users (requalifiers, owners, fillers, operators, etc.) with criteria to accept, reject, and condemn steel compressed gas cylinders. This standard does not cover all circumstances for each individual cylinder type and condition of lading. Inspection procedures include preparation of cylinders for inspection, exterior inspection, interior inspection (if required), nature and extent of damage to be looked for, and for some tests, the conditions of the cylinder, etc. A sample inspection report is provided in an appendix.

(4) CGA C–14, *Procedures for Fire Testing of DOT Cylinder Pressure Relief Device Systems* (2005) (Reaffirmed 2010). During the open comment period of this NPRM, this publication is freely available on the CGA Web site at: *https://www.cganet.com/customer/dot.aspx.* This publication describes test procedures and apparatus for fire testing compressed gas cylinder safety (pressure) relief devices as required by the HMR. The procedures are applicable for cylinders that are less than 500 lbs. water capacity and designed to provide a means of testing to the HMR anywhere with reliable test data and repeatable test results.

(5) CGA S–1.1, *Pressure Relief Device Standards—Part 1—Cylinders for Compressed Gases* (2011). During the open comment period of this NPRM, this publication is freely available on the CGA Web site at: *https://www.cganet.com/customer/dot.aspx.* This publication provides the standard(s) for selection of the correct pressure relief device that is required to meet the requirements of the HMR for over 150 gases. It provides guidance on when a pressure relief device can be optionally omitted, and when the use of a pressure relief device is prohibited. It provides direction and guidance on the manufacture and testing of pressure relief devices as well as the operation parameters and maintenance.

Section 171.23

Section 171.23 prescribes requirements for transport of specific materials and packaging under international transportation standards such as the International Civil Aviation Organization Technical Instructions for the Safe Transport of Dangerous Goods by Air. Paragraph (a)(4) outlines requirements for filling of cylinders for export or use onboard a vessel. In this NPRM, we propose to revise the marking requirements consistent with changes made to § 180.213.

Section 172.400a

Section 172.400a(a)(1) prescribes exceptions from labeling for Dewar flasks or cylinders that comply with the provisions of this paragraph and are durably marked and labeled in conformance with CGA C–7. In this NPRM, we propose to revise paragraph (a)(1) to clarify how this labeling exception applies to overpacks.

Section 173.3

Section 173.3(d)(1) prescribes how a damaged or leaking cylinder that contains hazardous material may be transported in a non-DOT-specification fully opening hinged-head or removable head steel salvage cylinder. In this NPRM, we propose to permit cylinders that contain Class 4 or 5 materials to also use this exception. In addition, because of the proposal to include Class 4 or 5 materials as authorized material for salvage cylinders, we are reformatting the regulatory text to reference those materials in damaged or leaked cylinders that are excluded from being allowed to be overpacked in a salvage cylinder rather than listing those that are authorized.

Section 173.301

Section 173.301 provides the general requirements for shipment of compressed gases and other hazardous material in cylinders. In this NPRM, we propose to clarify the marking requirements of paragraph (a)(9), specifically use of the ''OVERPACK'' mark to indicate the combination packaging contains inner packagings that conform to specifications. Additionally, in paragraphs (c) and (f), we propose an editorial revision to the section citation of CGA S–1.1 to correctly read 9.1.1. Finally, we propose to revise paragraph (f) to clarify the minimum burst pressure requirements for DOT 39 cylinders used to transport compressed or liquefied oxidizing gases.

Section 173.302

Section 173.302(a)(2) prescribes the requirements for adsorbed gases. In this NPRM, we propose to include references to new § 173.302d applicable to DOT-specification cylinders and to replace reference to ''UN cylinders'' with ''UN pressure receptacles'' for consistency with other parts of the HMR.

Section 173.302a

Section 173.302a(a)(3) prescribes the filling requirements for DOT 39 cylinders that contain Division 2.1 gas or chemical under pressure. In this NPRM, we propose to clarify the capacity (internal volume) requirements to make it clear that the 1.23 L limit applies to Division 2.1 material and the 50 L limit applies to chemical under pressure classed as Division 2.1 (see § 172.102, special provision 362). We also propose an editorial correction to the start of paragraph (a)(3) by removing the non-italicized ''DOT 39.''

Section 173.302d

In this NPRM, we propose to add new § 173.302d prescribing requirements for transportation of adsorbed gases in DOT-specification cylinders. The requirements of this new section are based on the adoption of special permit DOT–SP 14237 provisions.

Section 173.304a

Section 173.304a prescribes the maximum permitted filling density and authorized cylinders for specific gases. In this NPRM, we propose to add new paragraph (a)(3) to § 173.304a to clearly state that the maximum capacity (internal volume) of a DOT 39 cylinder containing liquefied flammable gas is 1.23 liters (75 in^3). We also propose to require these cylinders to be equipped with a pressure relief valve, as prescribed in CGA S–1.1, unless the material is not listed in CGA S–1.1, in which case a CG–7 pressure relief valve must be used.

Section 173.306

Section 173.306 provides exceptions from the requirements of the HMR for limited quantities of compressed gas. Paragraph (g) excepts water pump system tanks charged with compressed air or limited quantities of nitrogen to not over 40 psig from labeling and specification packaging when shipped in conformance with the requirements prescribed in the paragraph. In this NPRM, we propose to revise § 173.306(g) to authorize tanks to be tested to current standards in the HMR or the manufacturer's specified maximum working pressure, to allow water pump system tanks to be charged with helium, to clarify that transportation by aircraft is not an authorized mode of transport.

Section 173.309

In this NPRM, we propose to revise § 173.309 to state that the requirements applicable to fire extinguishers also apply to those cylinders used as part of a fire suppression system.

Section 173.312

Section 173.312(b)(1) prescribes the filling requirements for multiple element gas containers (MEGCs). In this NPRM, we propose requirements for filling pressure receptacles containing liquefied compressed gas by weight.

Section 178.35

Section 178.35(f) prescribes the marking requirements that apply to DOT-specification cylinders. In this NPRM, we propose to add new paragraph (f)(7) to § 178.35 to require that cylinder tare weight or mass weight, and water capacity, be marked on certain DOT-specification cylinders filled by weight.

Sections 178.36, 178.37, 178.38, 178.39, 178.42, 178.44, 178.45, 178.46, 178.47, 178.50, 178.51, 178.53, 178.55 178.56, 178.57, 178.58, 178.59, 178.60, 178.61, 178.65, and 178.68

These sections prescribe the DOT-specification requirements for a cylinder type including the performance standards for pressure testing of the cylinder. In this NPRM, we propose to require that testing and equipment used to conduct the pressure testing be in conformance with CGA C–1, *Methods for Pressure Testing Compressed Gas Cylinders,* to provide for consistency and clarity in performance of pressure testing. We also propose to revise the format of the pressure testing paragraphs for greater consistency.

Sections 178.50, 178.51, 178.61, and 178.68

These sections prescribe DOT 4-series specification requirements. These specifications are often unclear to manufacturers and enforcement personnel. In this NPRM, we propose to revise the specification requirements to promote consistent and uniform manufacturing practices for DOT 4-series cylinders.

Section 178.70

Section 178.70(d) prescribes the requirements to obtain design approval of a UN pressure receptacle. In this NPRM, we propose to revise paragraph (d) to include language that an approval for a design modification is not required if the specific design modification is

covered under the UN/ISO standard for the design type already approved.

Section 180.203

Section 180.203 prescribes definitions that apply to the qualification, maintenance, and use of cylinders under the HMR. In this NPRM, we propose to add new definitions for the terms or phrases ''accuracy,'' ''accuracy grade,'' ''actual test pressure,'' ''calibrated cylinder,'' ''error,'' ''master gauge,'' ''mobile unit,'' ''overpressurized,'' ''percent permanent expansion,'' ''precision,'' ''proof pressure test,'' ''reference gauge,'' and ''service pressure''; and revise the definitions for ''commercially free of corrosive components,'' ''defect,'' and ''test pressure.'' These proposed definitions will clarify the cylinder requirements prescribed in 49 CFR part 180, subpart C.

Section 180.205

Section 180.205 prescribes the general requirements for requalifying DOT-specification cylinders. In this NPRM, we propose to revise and add new regulatory text for clarity. Specifically, we propose to clarify the conditions requiring test and inspection of cylinders under paragraph (d) by including a reference to evidence of grinding; revise the paragraph (f) visual inspection requirements to include reference to shot blasting and ''chasing'' of cylinders; clarify and revise the paragraph (g) retest equipment tolerances for consistency with ISO standards 6406 and 10461 (*i.e.,* standards for periodic inspection and testing of gas cylinders) which are both incorporated by reference in the HMR in § 180.207 to allow for broader use of retest equipment (we invite comment on this course of action relative to the tolerances provided for in CGA C–1); revise the paragraph (i) cylinder condemnation requirements to clarify the responsibilities of the requalifier and add conditions under which a cylinder must be condemned; and include a reference to training materials, under new paragraph (j), that are suitable for training persons who requalify cylinders using the volumetric expansion test method.

Section 180.207

Section 180.207 prescribes requirements for requalifying UN pressure receptacles. In this NPRM, we propose to revise and add new regulatory text for clarity. Specifically, we propose to clarify the language prohibiting the use of a UN pressure receptacle beyond its service life by, for example, removing approval authorization language; to revise the requalification procedures for seamless steel cylinders to include MEGC pressure receptacles larger than 150 liters water capacity; and to revise the requalification schedule for dissolved acetylene UN cylinders to be requalified no sooner than five years and no later than ten years from the date of manufacture.

Section 180.209

Section 180.209 prescribes requirements for requalifying specification cylinders. In this NPRM, we propose to revise and add new regulatory text for clarity; and to incorporate the current version of CGA C–1, *Methods for Pressure Testing Compressed Gas Cylinders.* Specifically, we propose to revise the paragraph (a) table 1 to include reference to the paragraph (e) conditions for an alternate requalification period; the paragraph (b) conditions for star-marking of a DOT 3A or 3AA cylinder; and the paragraph (m) requalification conditions for DOT 3AL cylinders made of 6351–T6 aluminum alloy.

Section 180.211

Section 180.211 prescribes requirements to repair, rebuild, and reheat treat DOT–4 series specification cylinders. In this NPRM, we propose to clarify that the requirements to repair DOT 4L cylinders in paragraph (c) of this section are for rebuilding the cylinders and to clarify paragraph (e) for when a hydrostatic test may be performed on the inner containment vessel of a DOT 4L welded insulated cylinder. We do not propose in this NPRM to add a definition for ''recondition'' to § 180.203 because of our concern that adding this definition for only DOT 4L cylinders might cause further confusion and reduce safety.

Section 180.212

Section 180.212(a) prescribes requirements to repair seamless DOT 3-series specification cylinders and seamless UN pressure receptacles. In this NPRM, we propose to require an ultrasonic examination on DOT 3-series cylinders and seamless UN pressure receptacles after any grinding is performed on these cylinders.

Section 180.213

Section 180.213 prescribes requirements for marking DOT-specification cylinders and UN pressure receptacles that are successfully requalified. In this NPRM, we propose to revise the requalification marking method to clarify the steps involved and that stamping the sidewall of the cylinder is prohibited. Additionally, we propose to clarify the marking requirements for foreign cylinders filled for export under paragraph (d) and to include two new marking requirements under paragraph (f) for designation of grinding with ultrasonic wall thickness examination and for designation of requalification of a foreign cylinder requalified in conformance with §§ 171.23(a)(4) and 180.209(l) of this subchapter. Finally, we propose to add visual inspection identifier number marking requirements under a new paragraph (g).

Section 180.215

Section 180.215 prescribes reporting and retention requirements for a person who requalifies, repairs, or rebuilds cylinders. In this NPRM, we propose to clarify what information these documents must contain.

49 CFR Part 180, Appendix C

Part 180, appendix C prescribes the requirements eddy current examination equipment must meet to inspect DOT 3AL, 6351–T6 aluminum alloy cylinders. In this NPRM, we propose to retitle the appendix and revise paragraph 1 for clarity regarding equipment calibration procedures when conducting eddy current examination.

VII. Regulatory Analyses and Notices

A. Statutory/Legal Authority for This NPRM

Federal Hazardous Materials Transportation Law (49 U.S.C. 5101–5128) authorizes the Secretary of Transportation to ''prescribe regulations for the safe transportation, including security, of hazardous material in intrastate, interstate, and foreign commerce.'' Section 5117(a) authorizes the Secretary to issue a special permit exempting compliance with a regulation prescribed in §§ 5103(b), 5104, 5110, or 5112 ''to a person transporting, or causing to be transported, hazardous material in a way that achieves a safety level at least equal to the safety level required under [the Federal hazmat law], or consistent with the public interest . . . if a required safety level does not exist.'' The issues described in this NPRM respond to 20 outstanding petitions for rulemaking.

B. Executive Order 12866, Executive Order 13563, and DOT Regulatory Policies and Procedures

This NPRM is not considered a significant regulatory action under section 3(f) of Executive Order 12866 (''Regulatory Planning and Review'') and was not reviewed by the Office of Management and Budget (OMB).

Neither was it considered a significant rule under the Regulatory Policies and Procedures order issued by the Department of Transportation [44 FR 11034].

Executive Order 13563 (''Improving Regulation and Regulatory Review'') is ''supplemental to and reaffirms the principles, structures, and definitions governing regulatory review that were established in Executive Order 12866 of September 30, 1993.'' In addition, Executive Order 13563 specifically requires agencies to: (1) Involve the public in the regulatory process; (2) promote simplification and harmonization through interagency coordination; (3) ''identify and consider regulatory approaches that reduce burdens and maintain flexibility''; (4) ensure the objectivity of any scientific or technological information used to support regulatory action; and (5) consider how to best promote retrospective analysis to modify, streamline, expand, or repeal existing rules that are outmoded, ineffective, insufficient, or excessively burdensome.

PHMSA has involved the public in the regulatory process by (1) addressing issues identified for possible future rulemaking in letters of interpretation and other correspondence, and (2) responding to 20 petitions for rulemaking submitted by stakeholders in the compressed gas industry in conformance with 49 CFR 106.95. Overall, the issues discussed in this NPRM promote the continued safe transportation of hazardous materials while producing a net benefit.

These petitions clarify the existing regulatory text in the HMR, incorporate widely used industry publications, and address specific safety concerns, thus enhancing the safe transportation of compressed gases while limiting the impact on the regulated community. Incorporating the provisions of special permits into regulations with general applicability will provide shippers and carriers with additional flexibility to comply with established safety requirements, thereby reducing burdens and costs and increasing productivity.

Further, PHMSA on its own initiative is clarifying existing regulatory language to reduce misunderstandings that will thereby improve safety. Some of the proposed changes are summarized below, by topic.

Incorporating Updated CGA C–6, Visual Inspection of Steel Cylinders

PHMSA proposes to replace the currently incorporated Seventh Edition of the CGA publication C–6, *Standards for Visual Inspection of Steel Compressed Gas Cylinders* with the revised Eleventh Edition and update the appropriate references throughout the HMR.

Under the HMR, compressed gas cylinders must be visually inspected as part of the requalification process once every five years. CGA C–6 serves as a guide to cylinder requalifiers and users for establishing cylinder inspection procedures and standards. The Tenth Edition provides updated and enhanced guidance on the inspection of multi-element gas containers, cylinder thread inspection for cylinders used in corrosive gas service, and clarified maximum allowable depths and measuring techniques for various types of corrosion.

PHMSA identified approximately 5,000 companies that would be subject to this standard. The majority of these companies are classified as small businesses using SBA size standards. This revision would impose a one-time individual cost for purchase of the updated standard. We assume that the majority of companies subject to this standard are non-CGA members or non-CGA subscribers. Assuming approximately 5,000 companies purchase the Eleventh Edition of CGA–6, we estimate the upper bound of the total cost across all affected entities for this proposal would be approximately $710,000.

The benefit of this change is that it would improve the clarity of industry standards that are currently incorporated by reference. It facilitates voluntary compliance and reduces the burdens associated with references to outdated material. PHMSA believes that these changes may yield an incremental improvement to the overall safety of hazmat cylinder transportation. In comments made to the ANPRM, five stakeholders support the proposal to update the IBR of CGA C–6 to the Tenth Edition. No commenters objected to the proposal or provided benefit data.

Incorporating CGA C–1 Methods of Pressure Testing Compressed Gas Cylinders Into the HMR

PHMSA proposes to revise the HMR regarding the retesting of cylinders using pressure testing. The HMR is often perceived as unclear on procedures and requirements for pressure testing of cylinders. Incorporating by reference CGA C–1, *Methods for Pressure Testing Compressed Gas Cylinders* clarifies ambiguities in the HMR.

It is estimated that this would affect approximately 980 entities that conduct pressure testing, including cylinder requalifiers, retesters, and manufacturers. PHMSA estimates a one-time compliance cost of $186 for each entity purchasing the Eleventh Edition of CGA C–1. The upper bound of the total cost across all affected entities for this proposal would be approximately $182,280. Actual costs are expected to be lower, as some of the 980 entities may be members, subscribers, or already own the revised edition. Revising the HMR to incorporate CGA C–1 would increase clarity, reduce confusion, provide enhanced guidance, and provide marginal safety benefits without imposing requirements that are potentially costly or difficult.

Weight Marking Requirements for Filling of DOT 4-Series Specification Cylinders

PHMSA proposes to require newly manufactured DOT 4B, 4BA, 4BW, and 4E cylinders to be marked with the tare weight or the mass weight and the water capacity. Accurate cylinder tare weight, or mass weight, and water capacity are crucial for safe filling and transportation of cylinders containing liquefied compressed gas. Overfilled cylinders have the potential for leakage and possible failure during transport.

PHMSA identified six U.S. based manufacturers of the cylinders. Five of these companies are classed as small businesses using SBA size standards. The HMR already incorporate by reference NFPA 58, LP Gas Code, which requires cylinders used for liquefied petroleum gases to be marked with the tare weight and water capacity. The NFPA 58 does not specify how the cylinders must be marked, nor does it specify by whom. Further, NFPA 58 only addresses liquefied petroleum gas, not all liquefied compressed gases. We do not anticipate significant additional costs to DOT 4-series-specification cylinders, manufacturers, or owners, because many in the liquefied compressed gas industry already request that manufacturers mark cylinders with this additional information as an added safety measure.

Clarify Filling Limits on Multiple Element Gas Containers

PHMSA proposes to clarify filling limits for a liquefied compressed gas in a manifold comprised of DOT-specification cylinders or a multiple element gas container (MEGC). Specifically, liquefied compressed gases contained in manifold cylinders cannot exceed the filling densities specified in § 173.304a(a)(2) and liquefied gases in MEGCs comprised of UN pressure receptacles must not exceed the values contained in P200 as specified in § 173.304b.

This proposed change will remove the discrepancy between the set pressure

specified in CGA S–1.1 and the differing set pressures prescribed in §§ 173.302(f)(2) and 173.304(f)(2). This revision would not impose any new costs on affected industries, and although the proposed revision restates a requirement from another section in the HMR, we believe it would provide additional protection against overfilling of a cylinder. This change would promote regulatory compliance and foster safe filling practices.

C. Executive Order 13132

This proposed rule has been analyzed in accordance with the principles and criteria contained in Executive Order 13132 (''Federalism'') and the President's memorandum (''Preemption'') that was published in the **Federal Register** on May 22, 2009 [74 FR 24693]. This proposed rule will preempt State, local, and Native America tribal requirements but does not propose any regulation that has substantial direct effects on the States, the relationship between the national government and the States, or the distribution of power and responsibilities among the various levels of government. Therefore, the consultation and funding requirements of Executive Order 13132 do not apply.

The Federal Hazardous Materials Transportation Law, 49 U.S.C. 5101–5128, contains an express preemption provision [49 U.S.C. 5125 (b)] that preempts State, local, and Native American tribal requirements on the following subjects:

(1) The designation, description, and classification of hazardous materials;

(2) The packing, repacking, handling, labeling, marking, and placarding of hazardous materials;

(3) The preparation, execution, and use of shipping documents related to hazardous materials and requirements related to the number, contents, and placement of those documents;

(4) The written notification, recording, and reporting of the unintentional release in transportation of hazardous material; and

(5) The design, manufacture, fabrication, marking, maintenance, recondition, repair, or testing of a packaging or container represented, marked, certified, or sold as qualified for use in transporting hazardous material.

PHMSA invites those with an interest in the issues presented in this NPRM to comment on the effect the adoption of specific proposals may have on State or local governments.

D. Executive Order 13175

This NPRM was analyzed in accordance with the principles and criteria contained in Executive Order 13175 (''Consultation and Coordination with Indian Tribal Governments''). Because this NPRM does not have tribal implications and does not impose substantial direct compliance costs on Native American tribal governments, the funding and consultation requirements of Executive Order 13175 do not apply, and a tribal summary impact statement is not required. We invite Native American tribal governments to provide comments on the effect the adoption of specific proposals may have on Indian communities.

E. Regulatory Flexibility Act, Executive Order 13272, and DOT Procedures and Policies

The Regulatory Flexibility Act (5 U.S.C. 601 *et seq.*) requires an agency to review regulations to assess their impact on small entities unless the agency determines that a rule is not expected to have a significant impact on a substantial number of small entities. The term ''small entities'' comprises small businesses and not-for-profit organizations that are independently owned and operated and are not dominant in their fields and governmental jurisdictions with populations of less than 50,000. (*See* 5 U.S.C. 601.) This notice has been developed in accordance with Executive Order 13272 (''Proper Consideration of Small Entities in Agency Rulemaking'') and DOT's Policies and Procedures to promote compliance with the Regulatory Flexibility Act to ensure that potential impacts of draft rules on small entities are properly considered. Section 603(b) of the Regulatory Flexibility Act requires an analysis of the possible impact of the proposed rule on small entities, including the need for the rule, the description of the action, the identification of potentially affected small entities, the reporting and recordkeeping requirements, the related Federal rules and regulations, and the alternative proposals considered. Such analysis for this NPRM is as follows:

1. Need for the NPRM

Current requirements for the manufacture, use, and requalification of cylinders can be traced to standards first applied in the early 1900s. Over the years, the regulations have been revised to reflect advancements in transportation efficiency and changes in the national and international economic environment. This NPRM is part of a retrospective analysis to modify and streamline existing requirements that are outmoded, ineffective, insufficient, or excessively burdensome. This rulemaking also introduces new provisions suggested or developed by industry representatives, industry groups that develop standards, or international regulatory bodies.

2. Description of Action

This NPRM considers incorporating the provisions of one special permit, responds to 20 petitions for rulemaking, considers clarifying other requirements in the HMR, and addresses areas of concern that are currently left out of the HMR. The amendments discussed in this NPRM are designed to increase flexibility for the regulated community, promote technological advancement, and facilitate international transportation while maintaining a comparable level of safety.

3. Identification of Potentially Affected Small Entities

The amendments considered here are likely to affect cylinder manufacturers (NAICS code 332420; approximately 568 companies); cylinder requalifiers; independent inspection agencies; commercial establishments that own and use DOT-specification cylinders and UN pressure receptacles; and individuals who export non-UN/ISO compressed gas cylinders (NAICS codes 32512, 336992, 423450, 423850, 423990, 454312, 541380). Nearly all of these companies, particularly cylinder requalification facilities of which there are approximately 5,000, are small entities based on the criteria developed by the Small Business Administration.

4. Reporting and Recordkeeping Requirements

This NPRM does not include any new reporting or recordkeeping requirements.

5. Related Federal Rules and Regulations

The Occupational Safety and Health Administration (OSHA) prescribes requirements for the use, maintenance, and testing of portable fire extinguishers in 29 CFR 1910.157 and requirements for fixed fire suppression systems in 29 CFR 1910.160. The issues discussed in this NPRM pertaining to the transportation of fire extinguishers and compressed gas cylinders that are a component of a fixed fire suppression system do not conflict with the requirements in 29 CFR. With respect to the transportation of compressed gases in cylinders, there are not related rules or regulations issued by other

departments or agencies of the Federal government.

6. Alternative Proposals for Small Business

Certain regulatory actions may affect the competitive situation of an individual company or group of companies by imposing relatively greater burdens on small, rather than large, enterprises. PHMSA requests comments from small entities on the impacts of these additional requirements.

7. Conclusion

This NPRM requests information that will be used to develop a proposal to amend provisions of the HMR addressing the manufacture, maintenance, and use of cylinders. PHMSA anticipates that the proposals in this NPRM will reduce burdens for most persons and any costs resulting from adoption of new requirements will be offset by the benefits derived from eliminating the need to apply for special permits, increasing regulatory flexibility, and improving safety through enhanced compliance. If your business or organization is a small entity and the adoption of the proposals contained in this NPRM could have a significant economic impact on your operations, please submit a comment explaining how and to what extent your business or organization could be affected.

F. Paperwork Reduction Act

This NPRM does not impose new information collection requirements. Depending on the results of our request for comments to this NPRM, there may be a decrease in the annual burden and costs under OMB-proposed changes to incorporate provisions contained in certain widely used or longstanding special permits with an established safety record.

PHMSA specifically requests comments on the information collection and recordkeeping burdens associated with developing, implementing, and maintaining these requirements for approval under this NPRM.

Address written comments to the Dockets Unit as identified in the **ADDRESSES** section of this NPRM. We must receive comments regarding information collection burdens prior to the close of the comment period identified in the **DATES** section of this NPRM.

G. Regulation Identifier Number (RIN)

A regulation identifier number (RIN) is assigned to each regulatory action listed in the Unified Agenda of Federal Regulations. The Regulatory Information Service Center publishes the Unified Agenda in April and October of each year. The RIN contained in the heading of this document may be used to cross-reference this action with the Unified Agenda.

H. Unfunded Mandates Reform Act of 1995

This NPRM does not impose unfunded mandates under the Unfunded Mandates Reform Act of 1995. It does not result in costs of $141.3 million or more to either State, local, or tribal governments, in the aggregate, or to the private sector and is the least burdensome alternative that achieves the objective of the rule. Further, in compliance with the Unfunded Mandates Reform Act of 1995, PHMSA will evaluate any regulatory action that might be proposed in subsequent stages of the proceeding to assess the effects on State, local, and tribal governments and the private sector.

I. Environmental Assessment

The National Environmental Policy Act of 1969 (NEPA), as amended (42 U.S.C. 4321–4347), and implementing regulations by the Council on Environmental Quality (CEQ) (40 CFR part 1500) require Federal agencies to consider the consequences of major Federal actions and prepare a detailed statement on actions that significantly affect the quality of the human environment. The CEQ regulations require Federal agencies to conduct an environmental review considering: (1) The need for the proposed action; (2) alternatives to the proposed action; (3) probable environmental impacts of the proposed action and alternatives; and (4) the agencies and persons consulted during the consideration process.

1. Need for the Action

This NPRM responds to 20 petitions for rulemaking submitted by the regulated community and seeks comment on incorporating the provisions of one special permit. The issues discussed in this NPRM would, if eventually adopted, update and expand the use of currently authorized industry consensus standards; revise the construction, marking, and testing requirements of DOT 4-series cylinders; clarify the filling requirements for cylinders; discuss the handling of cylinders used in fire suppression systems; and revise the requalification and condemnation requirements for cylinders.

This NPRM discusses the following amendments to the HMR:

- Replace the currently incorporated Seventh Edition of the CGA's publication *C–6 Standards for Visual Inspection of Steel Compressed Gas Cylinders* with the revised Tenth Edition and update the appropriate references throughout the HMR.
- Revise the manufacturing requirements for certain DOT–4 series cylinders.
- Revise the requirements for the requalification of DOT-specification cylinders by pressure testing found in 49 CFR part 180, subpart C.
- Allow the use of the labels described in the Eighth Edition of CGA's publication C–7 *Guide to the Preparation of Precautionary Labeling and Marking of Compressed Gas Containers* (currently IBR in the HMR) appendix A on cylinders contained in overpacks.
- Require manufacturers to mark newly manufactured cylinders suitable for the transport of liquefied compressed gas with the mass weight or tare weight, and water capacity.
- Allow non-specification cylinders used in a fixed fire suppression system to be transported under the same exceptions as those provided for fire extinguishers.
- Permit use of the OVERPACK marking for cylinders packed in conformance with § 173.301(a)(9).
- Clarify filling limits for a liquefied compressed gas in a manifold or a multiple element gas container (MEGC).
- Clarify the requirements for filling non-specification cylinders for export or use on board a vessel.
- Add requirements for DOT-specification cylinders used to transport adsorbed gases.

2. Alternatives Considered

Alternative (1): Do nothing. Our goal is to update, clarify, and provide relief from certain existing regulatory requirements to promote safer transportation practices, eliminate unnecessary regulatory requirements, and facilitate international commerce. We rejected the do-nothing alternative.

Alternative (2): Preferred choice. With this alternative, PHMSA will publish an NPRM seeking public comment on the issues raised in 20 petitions for rulemaking and the incorporation of one special permit; review the comments received on the amendments described in the ANPRM and their potential economic and safety implications; and use these comments to craft more specific proposals that are published in this NPRM. This is the selected alternative.

3. Environmental Impacts

Hazardous materials are substances that may pose a threat to public safety or the environment during transportation because of their physical, chemical, or nuclear properties. The hazardous materials regulatory system is a risk management system that is prevention-oriented and focused on identifying a safety hazard and reducing the probability and quantity of a hazardous material release. Hazardous materials are categorized by hazard analysis and experience into hazard classes and packing groups. The regulations require each shipper to classify a material in accordance with these hazard classes and packing groups. The process of classifying a hazardous material is itself a form of hazard analysis. Further, the regulations require the shipper to communicate a material's hazards through the use of hazard class, packing group, and proper shipping name on the shipping paper and the use of labels on packages and placards on transport vehicles. Thus, the shipping paper, labels, and placards communicate the most significant findings of the shipper's hazard analysis. A hazardous material is assigned to one of three packing groups based upon its degree of hazard, from a high hazard material (Packing Group I) to a low hazard material (Packing Group III). The quality, damage resistance, and performance standards of the packaging in each packing group are appropriate for the hazards of the material transported.

Under the HMR, hazardous materials are transported by aircraft, vessel, rail, and highway. The potential for environmental damage or contamination exists when packages of hazardous materials are involved in accidents or en route incidents resulting from cargo shifts, valve failures, package failures, loading, unloading, collisions, handling problems, or deliberate sabotage. The release of hazardous materials can cause the loss of ecological resources (*e.g.,* wildlife habitats) and the contamination of air, aquatic environments, and soil. Contamination of soil can lead to the contamination of ground water. Compliance with the HMR substantially reduces the possibility of accidental release of hazardous materials.

It is anticipated that the petitions and special permits discussed in this NPRM if adopted in a future rulemaking, would have minimal, if any, environmental consequences.

4. Agencies Consulted

Occupational Safety and Health Administration

National Institute of Standards and Technology

U.S. Environmental Protection Agency

5. Conclusion

PHMSA has conducted a technical review of the amendments discussed in this NPRM and determined that the amendments considered would provide protection against the release of hazardous materials based on sound scientific methods and would not result in unusual stresses on the cylinder or adversely impact human health or the environment. PHMSA welcomes any data or information related to environmental impacts, both positive and negative, that may result from a future rulemaking addressing the issues discussed in this NPRM.

J. Privacy Act

In accordance with 5 U.S.C. 553(c), DOT solicits comments from the public to better inform its rulemaking process. DOT posts these comments, without edit, including any personal information the commenter provides, to *www.regulations.gov*, as described in the system of records notice (DOT/ALL–14 FDMS), which can be reviewed at *www.dot.gov/privacy.*

K. International Trade Analysis

The Trade Agreements Act of 1979 (Pub. L. 96–39), as amended by the Uruguay Round Agreements Act (Pub. L. 103–465), prohibits Federal agencies from establishing any standards or engaging in related activities that create unnecessary obstacles to the foreign commerce of the United States. Pursuant to these Acts, the establishment of standards is not considered an unnecessary obstacle to the foreign commerce of the United States, so long as the standards have a legitimate domestic objective, such as the protection of safety, and do not operate in a manner that excludes imports that meet this objective. The statute also requires consideration of international standards and, where appropriate, that they be the basis for U.S. standards. PHMSA notes the purpose is to ensure the safety of the American public and has assessed the effects of this NPRM to ensure that it does not exclude imports that meet this objective. As a result, this NPRM is not considered as creating an unnecessary obstacle to foreign commerce.

List of Subjects

49 CFR Part 107

Administrative practice and procedure, Hazardous materials transportation, Penalties, Reporting and recordkeeping requirements.

49 CFR Part 171

Exports, Hazardous materials transportation, Hazardous waste, Imports, Incorporation by reference, Reporting and recordkeeping requirements.

49 CFR Part 172

Education, Hazardous materials transportation, Hazardous waste, Incorporation by reference, Labeling, Markings, Packaging and containers, Reporting and recordkeeping requirements.

49 CFR Part 173

Hazardous materials transportation, Incorporation by reference, Packaging and containers, Radioactive materials, Reporting and recordkeeping requirements, Uranium.

49 CFR Part 178

Hazardous materials transportation, Incorporation by reference, Motor vehicle safety, Packaging and containers, Reporting and recordkeeping requirements.

49 CFR Part 180

Hazardous materials transportation, Motor carriers, Motor vehicle safety, Packaging and containers, Railroad safety, Reporting and recordkeeping requirements.

In consideration of the foregoing, PHMSA is proposing to amend 49 CFR Chapter I as follows:

PART 107—HAZARDOUS MATERIALS PROGRAM PROCEDURES

■ 1. The authority citation for part 107 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; Pub. L. 101–410 section 4 (28 U.S.C. 2461 note); Pub. L. 104–121, sections 212–213; Pub. L. 104–134, section 31001; Pub. L. 112–141 section 33006; 49 CFR 1.81 and 1.97.

■ 2. In § 107.803, revise paragraph (c)(3) to read as follows:

§ 107.803 Approval of an independent inspection agency (IIA).

* * * * *

(c) * * *

(3) Detailed description of the applicant's qualifications and ability to perform the inspections and to verify the inspections required by part 178 and part 180 of this chapter; or those required under the terms of a special permit issued under this part.

* * * * *

■ 3. In § 107.805, revise paragraphs (c)(3) and (c)(4), and add paragraph (c)(5) to read as follows:

§ 107.805 Approval of cylinder and pressure receptacle requalifiers.

* * * * *

(c) * * *

(3) A certification that the facility will operate in compliance with the applicable requirements of subchapter C of this chapter;

(4) The signature of the person making the certification and the date on which it was signed; and

(5) For a mobile unit operation (as defined in § 180.203 of subchapter C of this chapter), the type of equipment to be used, the specific vehicles to be used, the geographic area the applicant is requesting to operate within, and any differences between the mobile operation and the facility operation as described under paragraph (c)(2) of this section.

* * * * *

PART 171—GENERAL INFORMATION, REGULATIONS, AND DEFINITIONS

■ 4. The authority citation for part 171 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; Pub. L. 101–410 section 4 (28 U.S.C. 2461 note); Pub. L. 104–121, sections 212–213; Pub. L. 104–134, section 31001; 49 CFR 1.81 and 1.97.

■ 5. In § 171.7, revise paragraphs (g)(1) and (n) to read as follows:

§ 171.7 Reference material.

* * * * *

(g) * * *

(1) 2015 ASME Boiler and Pressure Vessel Code (ASME Code), 2015 Edition, July 1, 2015 (as follows), into §§ 172.102; 173.3; 173.5b; 173.24b; 173.302d; 173.306; 173.315; 173.318; 173.420; 178.255–1; 178.255–2; 178.255–14; 178.255–15; 178.273; 178.274; 178.276; 178.277; 178.320; 178.337–1; 178.337–2; 178.337–3; 178.337–4; 178.337–6; 178.337–16; 178.337–18; 178.338–1; 178.338–2; 178.338–3; 178.338–4; 178.338–5; 178.338–6; 178.338–13; 178.338–16; 178.338–18; 178.338–19; 178.345–1; 178.345–2; 178.345–3; 178.345–4; 178.345–7; 178.345–14; 178.345–15; 178.346–1; 178.347–1; 178.348–1; 179.400–3; 180.407.

* * * * *

(n) Compressed Gas Association (CGA), 1235 Jefferson Davis Highway, Arlington, VA 22202.

(1) CGA C–1, Methods for Pressure Testing Compressed Gas Cylinders, 2016, into §§ 178.36, 178.37, 178.38, 178.39, 178.42, 178.44, 178.45, 178.46, 178.47; 178.50; 178.51; 178.53; 178.55; 178.56; 178.57; 178.58; 178.59; 178.60; 178.61; 178.65; 178.68; 180.205, 180.209.

(2) CGA C–3, Standards for Welding on Thin-Walled Steel Cylinders, 2005 (Reaffirmed 2011), into §§ 178.47; 178.50; 178.51; 178.53; 178.55; 178.56; 178.57; 178.58; 178.59; 178.60; 178.61; 178.65; 178.68; 180.211.

(3) CGA C–5, Cylinder Service Life—Seamless Steel High Pressure Cylinders, 1991 (Reaffirmed 1995), into § 173.302a and 180.209.

(4) CGA C–6, Standards for Visual Inspection of Steel Compressed Gas Cylinders, 2013, into §§ 172.102, 173.3, 173.198, 173.302d, 180.205, 180.209, 180.211, 180.411, 180.519.

(5) CGA C–6.1, Standards for Visual Inspection of High Pressure Aluminum Compressed Gas Cylinders, 2002, into §§ 180.205; 180.209.

(6) CGA C–6.2, Guidelines for Visual Inspection and Requalification of Fiber Reinforced High Pressure Cylinders, 1996, into § 180.205.

(7) CGA C–6.3, Guidelines for Visual Inspection and Requalification of Low Pressure Aluminum Compressed Gas Cylinders, 1991, into §§ 180.205; 180.209.

(8) CGA C–7, Guide to Preparation of Precautionary Labeling and Marking of Compressed Gas Containers, Appendix A, issued 2004, into § 172.400a.

(9) CGA C–8, Standard for Requalification of DOT–3HT Cylinder Design, 1985, into §§ 180.205; 180.209.

(10) CGA C–11, Recommended Practices for Inspection of Compressed Gas Cylinders at Time of Manufacture, 2001, into § 178.35.

(11) CGA C–12, Qualification Procedure for Acetylene Cylinder Design, 1994, into §§ 173.301; 173.303; 178.59; 178.60.

(12) CGA C–13, Guidelines for Periodic Visual Inspection and Requalification of Acetylene Cylinders, 2000, into §§ 173.303; 180.205; 180.209.

(13) CGA C–14, Procedures for Fire Testing of DOT Cylinder Pressure Relief Device Systems, 2005 (Reaffirmed 2010), into §§ 173.301; 173.323.

(14) CGA G–1.6, Standard for Mobile Acetylene Trailer Systems, 2011, in § 173.301(g).

(15) CGA G–2.2, Guideline Method for Determining Minimum of 0.2% Water in Anhydrous Ammonia, 1985, Reaffirmed 1997, into § 173.315.

(16) CGA G–4.1, Cleaning Equipment for Oxygen Service, 1985, into § 178.338–15.

(17) CGA P–20, Standard for the Classification of Toxic Gas Mixtures, 2003, Third Edition, into § 173.115.

(18) CGA S–1.1, Pressure Relief Device Standards—Part 1—Cylinders for Compressed Gases, (except paragraph 9.1.1), 2011, into §§ 173.301; 173.304a; 178.75.

(19) CGA S–1.2, Safety Relief Device Standards Part 2—Cargo and Portable Tanks for Compressed Gases, 1980, into §§ 173.315; 173.318; 178.276; 178.277.

(20) CGA S–7, Method for Selecting Pressure Relief Devices for Compressed Gas Mixtures in Cylinders, 2005, into § 173.301.

(21) CGA TB–2, Guidelines for Inspection and Repair of MC–330 and MC–331 Cargo Tanks, 1980, into §§ 180.407; 180.413.

(22) CGA TB–25, Design Considerations for Tube Trailers, 2008, into § 173.301.

* * * * *

■ 6. In § 171.23, revise paragraph (a)(4)(i) to read as follows:

§ 171.23 Requirements for specific materials and packagings transported under the ICAO Technical Instructions, IMDG Code, Transport Canada TDG Regulations, or the IAEA Regulations.

* * * * *

(a) * * *

(4) * * *

(i) The cylinder has been requalified and marked in accordance with subpart C of part 180 of this subchapter, or has been requalified as authorized by the Associate Administrator;

* * * * *

PART 172—HAZARDOUS MATERIALS TABLE, SPECIAL PROVISIONS, HAZARDOUS MATERIALS COMMUNICATIONS, EMERGENCY RESPONSE INFORMATION, TRAINING REQUIREMENTS, AND SECURITY PLANS

■ 7. The authority citation for part 172 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.81, 1.96 and 1.97.

■ 8. In § 172.400a, revise paragraph (a)(1) to read as follows:

§ 172.400a Exceptions from labeling.

* * * * *

(a) * * *

(1) A Dewar flask meeting the requirements in § 173.320 of this subchapter, or a cylinder containing a Division 2.1, 2.2, or 2.3 material, that is durably and legibly marked in conformance with CGA C–7, appendix A (IBR; *see* § 171.7 of this subchapter). However, if overpacked, marking (or appropriate labels) must be communicated on the exterior of the overpack unless visible from the outside in accordance with § 173.25 of this subchapter.

* * * * *

PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

■ 9. The authority citation for part 173 continues to read as follows:

Authority: 49 U.S.C. 5101–5128, 44701; 49 CFR 1.81, 1.96 and 1.97.

■ 10. In § 173.3, revise paragraph (d)(1) to read as follows:

§ 173.3 Packaging and exceptions.

* * * * *

(d) * * *

(1) Except for Class 1, Class 7, or acetylene material, a cylinder containing a hazardous material may be overpacked in a salvage cylinder.

* * * * *

■ 11. In § 173.301:

■ a. Revise paragraphs (a)(9) and (f)(4); and

■ b. In paragraphs (c) and (f), replace ''9.1.1.1'' with ''9.1.1'' in each place it appears.

The revision reads as follows:

§ 173.301 General requirements for shipment of compressed gases and other hazardous materials in cylinders, UN pressure receptacles and spherical pressure vessels.

(a) * * *

(9) Specification 2P, 2Q, 3E, 3HT, spherical 4BA, 4D, 4DA, 4DS, and 39 cylinders must be packed in strong non-bulk outer packagings. The outside of the combination package must be marked with an indication that the inner packagings conform to the prescribed specifications. Except for Specification 2P and 2Q containers, the ''OVERPACK'' marking in accordance with § 173.25(a)(3) of this part may be used to satisfy the marking requirement of this paragraph. Display of the ''OVERPACK'' marking is not an indication that this combination package is an overpack.

* * * * *

(f) * * *

(4) *DOT 39 cylinders.* (i) A pressure relief device is required on a DOT 39 cylinder regardless of cylinder size or filled pressure.

(ii) A DOT 39 cylinder used for liquefied Division 2.1 materials must be equipped with a metal pressure relief device.

(iii) Fusible pressure relief devices are not authorized on a DOT 39 cylinder containing a liquefied gas.

(iv) Notwithstanding the requirements of paragraph (f)(1) of this section with respect to the minimum burst pressure of pressure relief devices, a pressure relief device on a DOT 39 cylinder used to transport compressed or liquefied oxidizing gases may have a minimum burst pressure within the range prescribed in §§ 173.302(f)(2) or 173.304(f)(2), as appropriate.''

* * * * *

■ 12. In § 173.302, revise paragraph (a)(2) to read as follows:

§ 173.302 Filling of cylinders with nonliquefied (permanent) compressed gases or adsorbed gases.

(a) * * *

(2) *Adsorbed gas.* A cylinder filled with an adsorbed gas must be offered for transportation in conformance with the requirements of paragraph (d) of this section and § 173.301 of this subpart. In addition, UN pressure receptacles must meet the requirements in §§ 173.301b, 173.302b, and 173.302c of this subpart, as applicable, and DOT-specification cylinders must meet the requirements of §§ 173.301a, 173.302a and 173.302d, as applicable, of this subpart. Where more than one section applies to a cylinder, the most restrictive requirements must be followed.

* * * * *

■ 13. In § 173.302a, revise paragraph (a)(3) to read as follows:

§ 173.302a Additional requirements for shipment of nonliquefied (permanent) compressed gases in specification cylinders.

(a) * * *

(3) *DOT 39 cylinders.* When the cylinder is filled with a Division 2.1 flammable gas, the internal volume of the cylinder may not exceed 1.25 L (75 in^3). For chemical under pressure (see § 172.102, special provision 362 of this subchapter), the internal volume may not exceed 50 L (3050 in^3).

* * * * *

■ 14. Add § 173.302d to read as follows:

§ 173.302d Additional requirements for the shipment of adsorbed gases in DOT-specification cylinders.

(a) *General.* A cylinder filled with an adsorbed gas must be offered for transportation in DOT-specification cylinders subject to the requirements in this section, and §§ 173.301 and 173.302 of this subpart.

(b) *Packaging.* (1) DOT–3E1800, DOT–3AA2015, and DOT–3AA2265 cylinders must be used with a capacity between 0.4 and 7.3 liters.

(2) Each cylinder authorized by this section must remain in dedicated product service for its entire life.

(3) The maximum pressure inside each cylinder must be 0 psig at 70 °F and 30 psig at 140 °F.

(4) The contents of the cylinders must be limited in pressure and volume so that if totally discharged into the overpack cylinder, the pressure in the overpack cylinder will not exceed ¾ of the MAWP at 55 °C (131 °F).

(5) The valve wheel of each cylinder must be secured by a strap that provides tension in the tightening direction. A plug must be placed in each valve and the cylinder and valve area must be shrink-wrapped before being placed in the overpack cylinder. A protective valve cap must be used on all pressure vessels except the DOT–3E1800 cylinder. Valves on the DOT–3E1800 cylinders must be protected in conformance with § 173.40(d) of this part.

(6) Prior to each shipment, the leak integrity of the overpack cylinder must be verified and have a leak rate no greater than 1×10^{-4} standard atmospheric cubic centimeters per second.

(7) All closures of the overpack cylinder shall have a method to determine if they have been tampered with during transportation. The pressure indicating device on the overpack cylinder may be used to indicate tampering.

(8) The shipper must instruct the carriers to reject or remove the overpack cylinder from transportation in the event that the pressure gauge drops below a pressure designated by the shipper.

(9) Each overpack cylinder must be labeled for the hazardous material it contains.

(10) *Adsorbent material.* Each cylinder is filled with a monolith solid microporous sorbent and/or bead-type sorbent onto which the gas is adsorbed. The gas remains adsorbed during transportation in essentially a solid state. The system is filled, operated, and transported at sub-atmospheric pressures and is described as a sub-atmospheric gas delivery system (SDS). The gas must be removed from the SDS using the input of external energy, such as a steady vacuum.

(11) *Overpack.* (i) Cylinders authorized under this section must be transported in a non-DOT-specification full-opening, hinged-head or fully removable head, steel overpack cylinder. The overpack cylinder must be constructed to Section VIII, Division 1 of the ASME Code (IBR; *see* § 171.7 of this subchapter) with a minimum design margin of 4 to 1. The minimum MAWP must be 75 psig. The maximum water capacity must be 450 L (119 gallons). The overpack cylinder must not be equipped with a pressure relief device. The cylinders must be securely positioned within the overpack to prevent excessive movement. The overpack cylinder must have gaskets, valves and fittings that are compatible

with the hazardous materials they contain. The overpack cylinder must have a pressure gauge clearly visible from the outside. The pressure gauge must be recessed into the overpack cylinder or otherwise protected from damage during transportation. The overpack cylinder must be pressurized to 3–5 psig with inert gas.

(ii) *Overpack testing.* Each overpack cylinder must be visually inspected in conformance with CGA C–6 (IBR; *see* § 171.7 of this subchapter) at least once every five years. In addition, each overpack must be pressure tested to a minimum test pressure of at least 1.5 times MAWP. The pressure must be maintained for at least 30 seconds. The cylinder must be examined under test pressure and removed from service if a leak or defect is found. The retest and inspection must be performed by a person trained and experienced in the use of the inspection and testing equipment.

(iii) *Overpack marking.* Each overpack cylinder that is successfully requalified must be durably and legibly marked with the word ''Tested'' followed by the requalification date (month/year). The marking must be in letters and numbers at least 12 mm (0.5 inches) high. Stamping on the overpack sidewall is not permitted. The requalification marking may be placed on any portion of the upper end of the cylinder near the marking required by the following method, or on a metal plate permanently secured to the cylinder. The outside of each overpack cylinder must be plainly and durably marked on any portion of the upper end with ''OVERPACK CYLINDER'' (in lieu of the ''OVERPACK'' marking requirement of § 173.25(a)(4) of this part), the proper shipping name of the hazardous material contained inside the overpack, the name and address of the consignee or consignor, and the name and address or registered symbol of the overpack manufacturer.

(iv) *Recordkeeping.* The person who tested the overpack or that person's agent must retain a record of the most recent visual inspection and pressure test of the overpack until the cylinder is requalified. The records must be made available to a DOT representative upon request.

(12) *Sub-atmospheric gas delivery system (SDS) testing.* Each cylinder, except DOT–3E cylinders, must be retested by persons trained to perform this procedure. DOT–3AA cylinders must be retested and marked in conformance with the requirements for DOT–3AA cylinders in 49 CFR part 180 or the requirements of a current DOT special permit for ultrasonic examination.

(c) *Gases.* The gases permitted to be transported as adsorbed in DOT-specification cylinders in conformance with this section are:

Proper shipping name/hazardous materials description	Hazard class/division	Identification No.	Hazard zone
Arsine	2.3	UN 2188	Zone A.
Boron Trifluoride	2.3	UN 1008	Zone B.
Hydrogen Selenide, Anhydrous	2.3	UN 2202	Zone A.
Liquefied Gas, Toxic, Corrosive, n.o.s. (Arsenic Pentafluoride)	2.3	UN 3308.	
Liquefied Gas, Toxic, Corrosive, n.o.s. (Germanium Tetrafluoride)	2.3	UN 3308	Zone B.
Liquefied Gas, Toxic, Corrosive, n.o.s. (Phosphorus Trifluoride)	2.3	UN 3308.	
Phosphine	2.3	UN 2199	Zone A.
Silicon Tetrafluoride	2.3	UN 1859	Zone B.

■ 15. In § 173.304a, add paragraph (a)(3) to read as follows:

§ 173.304a Additional requirements for shipment of liquefied compressed gases in specification cylinders.

(a) * * *

(3) The internal volume of a DOT 39 cylinder may not exceed 1.23 liters (nominal 75 in^3) for a liquefied flammable gas. This cylinder shall be equipped with a pressure relief device as defined by the commodity in CGA S–1.1 (IBR; *see* § 171.7 of this subchapter). If the commodity is not listed in CGA S–1.1, a CG–7 pressure relief valve must be used.

* * * * *

■ 16. In § 173.306, revise paragraph (g) to read as follows:

§ 173.306 Limited quantities of compressed gases.

* * * * *

(g) *Water pump system tank.* A water pump system tank charged with compressed air or limited quantities of nitrogen or helium to not over 40 psig for single trip shipment to an installation site is excepted from labeling, and the specification packaging requirements of this subchapter when shipped under the following conditions. In addition, shipments of these tanks are not subject to subpart F (placarding) requirements of part 172 of this subchapter, and not subject to parts 174 (except § 174.24) and 177 (except § 177.817) of this subchapter.

(1) The tank must be of steel or composite, with heads concave to pressure, having a rated water capacity not exceeding 120 gallons and with an outside diameter not exceeding 24 inches. Safety relief devices are not required.

(2) The tank must be pneumatically tested to the manufacturer's specified maximum working pressure. The test pressure must be permanently marked on the tank.

(3) The stress at prescribed pressure for steel tanks must not exceed 20,000 psi (or 25,000 psi for deep-draw steel), concave dome tanks using the formula:

$$S = Pd/2t$$

Where:

S = wall stress in psi:

P = prescribed pressure for the tank of at least three (3) times charged pressure at 70 °F or 100 psig, whichever is greater;

d = inside diameter in inches;

t = minimum wall thickness, in inches.

(4) For composite tanks, the minimum value of a hydrostatic leak test, per design, must be at least six (6) times the charge pressure at 70 °F or three (3) times the manufacturer's specified maximum working pressure, whichever is greater.

(5) For steel and composite tanks, the burst pressure must be at least six (6) times the charge pressure at 70 °F or three (3) times the manufacturer's specified maximum working pressure, whichever is greater.

(6) Each tank must be over-packed in a strong outer packaging in conformance with § 173.301(h) of this part.

(7) Transportation is limited to motor vehicle, railcar, and vessel. Transportation by aircraft is not authorized.

* * * * *

■ 17. In § 173.309, revise the introductory text to read as follows:

§ 173.309 Fire extinguishers.

This section applies to portable fire extinguishers for manual handling and operation, fire extinguishers for installation in aircraft, fire extinguishers for installation as part of a fire suppression system, and large fire extinguishers. Large fire extinguishers include fire extinguishers mounted on wheels for manual handling; fire extinguishing equipment or machinery mounted on wheels or wheeled platforms or units transported similar to (small) trailers; and fire extinguishers composed of a non-rollable pressure drum and equipment, and handled, for example, by forklift or crane when loaded or unloaded.

* * * * *

■ 18. In § 173.312, revise paragraph (b)(1) to read as follows:

§ 173.312 Requirements for shipment of MEGCs.

* * * * *

(b) * * *

(1) An MEGC being filled with a liquefied compressed gas must have each cylinder filled separately by weight. Manifolding during filling is not authorized. The filling density for DOT-specification cylinders may not exceed the values contained in § 173.304a(a)(2) of this subpart and for UN pressure receptacles may not exceed the values in accordance with § 173.304b(b) of this subpart.

* * * * *

PART 178—SPECIFICATIONS FOR PACKAGINGS

■ 19. The authority citation for part 178 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 49 CFR 1.81 and 1.97.

■ 20. In § 178.35, add paragraph (f)(7) to read as follows:

§ 178.35 General requirements for specification cylinders.

* * * * *

(f) * * *

(7) *Tare weight or mass weight, and water capacity marking.* DOT-specification 4B, 4BA, 4BW, and 4E cylinders manufactured after January 1, 2017, must be marked with the tare weight or mass weight. Additionally, the cylinder must be permanently marked with the water capacity. The owner of the cylinder at the time of manufacture must ensure it is marked with the following information, as applicable:

(i) *Tare weight.* The tare weight for a cylinder 25 pounds (11.34 kg) or less at the time of manufacture, with a lower tolerance of 3 percent and an upper tolerance of 1 percent; or for a cylinder exceeding 25 pounds (11.34 kg) at the time of manufacture, with a lower tolerance of 2 percent and an upper tolerance of 1 percent. The tare weight marking must be the actual weight of the fully assembled cylinder, including the valve(s) and other permanently affixed appurtenances. Removable protective cap(s) or cover(s) must not be included in the cylinder tare weight, or

(ii) *Mass weight.* The mass weight for a cylinder 25 pounds (11.34 kg) or less at the time of manufacture, with a lower tolerance of 3 percent and an upper tolerance of 1 percent; or the mass weight marking for a cylinder exceeding 25 pounds (11.34 kg) at the time of manufacture, with a lower tolerance of 2 percent and an upper tolerance of 1 percent. The mass weight marking must be the actual weight of the fully assembled cylinder, excluding valve(s) and removable protective cap(s) or cover(s); and

(iii) *Water capacity.* The water capacity for a cylinder 25 pounds (11.34 kg) water capacity or less, with a tolerance of minus 1 percent and no upper tolerance; or for a cylinder exceeding 25 pounds (11.34 kg) water capacity, with a tolerance of minus 0.5 percent and upper tolerance. The marked water capacity of the cylinder must be the capacity of the cylinder at the time of manufacture.

* * * * *

■ 21. In § 178.36, revise paragraph (i) to read as follows:

§ 178.36 Specification 3A and 3AX seamless steel cylinders.

* * * * *

(i) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) The test must be by water-jacket or direct expansion method as prescribed in CGA C–1 (IBR; see § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(2) Each cylinder must be tested to a minimum of 5/3 times service pressure.

(3) The minimum test pressure must be maintained for at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and previous to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error the test pressure cannot be maintained the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

* * * * *

■ 22. In § 178.37, revise paragraph (i) to read as follows:

§ 178.37 Specification 3AA and 3AAX seamless steel cylinders.

* * * * *

(i) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) The test must be by water-jacket or direct expansion method as prescribed in CGA C–1 (IBR; see § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(2) Each cylinder must be tested to a minimum of 5/3 times service pressure.

(3) The minimum test pressure must be maintained for at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and previous to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error the test pressure cannot be maintained the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

* * * * *

■ 23. In § 178.38, revise paragraph (i) to read as follows:

§ 178.38 Specification 3B seamless steel cylinders.

* * * * *

(i) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) The test must be by water-jacket or direct expansion method as defined in CGA C–1 (IBR; see § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA Pamphlet C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA Pamphlet C–1.

(2) Cylinders must be tested as follows:

(i) Each cylinder to at least two (2) times its service pressure; or

(ii) One (1) cylinder out of each lot of 200 or fewer to at least three (3) times its service pressure.

(3) When each cylinder is tested to the minimum test pressure, the minimum test pressure must be maintained at least 30 seconds and sufficiently longer to

ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

(5) When one (1) cylinder out of each lot of 200 or less is tested to at least 3 times service pressure, the balance of the lot must be pressure tested by the water-jacket, direct expansion or proof pressure test methods as defined in CGA C–1. The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1. The cylinders must be subjected to at least 2 times service pressure and show no defect. Determination of expansion properties is not required.

* * * * *

■ 24. In § 178.39, revise paragraph (i) to read as follows:

§ 178.39 Specification 3BN seamless nickel cylinders.

* * * * *

(i) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) The test must be by water-jacket or direct expansion method as prescribed in CGA C–1 (IBR; see § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGAC–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(2) Each cylinder must be tested to a minimum of at least two (2) times its service pressure.

(3) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

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■ 25. In § 178.42, revise paragraph (f) to read as follows:

§ 178.42 Specification 3E seamless steel cylinders.

* * * * *

(f) *Pressure testing.* Cylinders must withstand a pressure test as follows:

(1) *Lot Testing.* One cylinder out of each lot of 500 or fewer must be subjected to a test pressure of 6,000 psig or higher. The testing equipment must be calibrated as prescribed in CGA Pamphlet C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA Pamphlet C–1

(2) *Pressure Testing.* The remaining cylinders of the lot must be pressure tested by water jacket, direct expansion or proof pressure method as prescribed in CGA C–1 (IBR; see § 171.7 of this subchapter). The cylinders must be examined under pressure of at least 3,000 psig and not to exceed 4,500 psig and show no defect. The test pressure must be maintained for at least 30 seconds and sufficiently longer to ensure complete examination.

(3) *Burst Testing.* (i) The cylinder in paragraph (f)(1) of this section must burst at a pressure higher than 6,000 psig without fragmenting or otherwise showing lack of ductility, or must hold a pressure of 12,000 psig for 30 seconds without bursting. In which case, it must be subjected to a flattening test without cracking to six (6) times wall thickness between knife edges, wedge shaped 60-degree angle, rounded out to a half-inch radius. The inspector's report must be suitably changed to show results of latter alternate and flattening test.

(ii) The cylinders in paragraph (f)(2) tested at a pressure in excess of 3,600 psig must burst at a pressure higher than 7,500 psig.

* * * * *

■ 26. In § 178.44, revise paragraph (i) to read as follows:

§ 178.44 Specification 3HT seamless steel cylinders for aircraft use.

* * * * *

(i) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) The test must be by water-jacket or direct expansion method as prescribed in CGA C–1 (IBR; *see* § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(2) Each cylinder must be tested to minimum of 5/3 times service pressure.

(3) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

* * * * *

■ 27. In § 178.45, revise paragraph (g) to read as follows:

§ 178.45 Specification 3T seamless steel cylinder.

* * * * *

(g) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) The test must be by water-jacket or direct expansion method as prescribed in CGA C–1 (IBR; *see* § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(2) Each cylinder must be tested to minimum of 5/3 times service pressure.

(3) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

* * * * *

■ 28. In § 178.46, revise paragraph (g) to read as follows:

§ 178.46 Specification 3AL seamless aluminum cylinders.

* * * * *

(g) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) The test must be by water-jacket or direct expansion method as prescribed in CGA C–1 (IBR; see § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(2) The minimum test pressure must be the greater of the following:

(i) 450 psig regardless of service pressure;

(ii) Two (2) times the service pressure for cylinders having service pressure less than 500 psig; or

(iii) 5/3 times the service pressure for cylinders having a service pressure of 500 psig or greater.

(3) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower. If the test apparatus again fails to maintain the test pressure, the cylinder being tested must be condemned. Any internal pressure applied to the cylinder before any official test may not exceed 90 percent of the test pressure.

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

* * * * *

■ 29. In § 178.47, revise paragraph (j) to read as follows:

§ 178.47 Specification 4DS welded stainless steel cylinders for aircraft use.

* * * * *

(j) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) The test must be by water-jacket or direct expansion method as prescribed in CGA C–1 (IBR; *see* § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(2) Each cylinder must be tested to a minimum of at least two (2) times its service pressure.

(3) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

(5) *Cause for condemnation.* Following the pressure test, the cylinder must be inspected. A cylinder with wall thickness less than that required by paragraph (f) of this section must be condemned. Bulges and cracks are cause for condemnation. Welded joint defects exceeding requirements of paragraph (k) of this section are cause for condemnation.

* * * * *

■ 30. Revise § 178.50 to read as follows:

§ 178.50 Specification 4B welded or brazed steel cylinders.

(a) *Type, size, pressure, and application.* A DOT 4B is a welded or brazed steel cylinder with longitudinal seams that are forged lap-welded or brazed and with water capacity (nominal) not over 1,000 pounds and a service pressure of at least 150 but not over 500 psig. Cylinders closed in by spinning process are not authorized.

(b) *Steel.* Open-hearth, electric or basic oxygen process steel of uniform quality must be used. Content percent may not exceed the following: carbon, 0.25; phosphorus, 0.045; sulphur, 0.050. The cylinder manufacturer must maintain a record of intentionally added alloying elements.

(c) *Identification of material.* Pressure-retaining materials must be identified by any suitable method that does not compromise the integrity of the cylinder. Plates and billets for hotdrawn cylinders must be marked with the heat number.

(d) *Manufacture.* Cylinders must be manufactured using equipment and processes adequate to ensure that each cylinder produced conforms to the requirements of this subpart. No defect is permitted that is likely to weaken the finished cylinder appreciably. A reasonably smooth and uniform surface finish is required. Exposed bottom welds on cylinders over 18 inches long must be protected by footrings. Welding procedures and operators must be qualified in conformance with CGA C–3 (IBR, *see* § 171.7 of this subchapter). Seams must be made as follows:

(1) *Brazing materials.* Brazing materials must be by copper brazing, by copper alloy brazing, or by silver alloy brazing. Copper alloy composition must be: Copper, 95 percent minimum; Silicon, 1.5 percent to 3.85 percent; Manganese, 0.25 percent to 1.10 percent.

(2) *Brazed circumferential seams.* Heads 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 head, and be thoroughly brazed until complete penetration by the brazing material of the brazed joint is secured. Depth of brazing of the joint must be at least four (4) times the minimum thickness of shell metal.

(3) *Welded circumferential seams.* Circumferential seams are permitted by the welding process.

(4) *Longitudinal seams in shells.* Longitudinal seams must be a forged lap joint design. When brazed, the plate edge must be lapped at least eight (8) times the thickness of the plate, laps being held in position, substantially metal to metal, by riveting or electric spot-welding; brazing must be done by using a suitable flux and by placing brazing material on one side of seam and applying heat until this material shows uniformly along the seam of the other side.

(e) *Welding or brazing.* Only the attachment of neckrings, footrings, handles, bosses, pads, and valve protection rings to the tops and bottoms of cylinders by welding or brazing is authorized. Attachments and the portion of the cylinder to which they are attached must be made of weldable steel, the carbon content of which may not exceed 0.25 percent except in the case of 4130X steel, which may be used with proper welding procedure.

(f) *Wall thickness.* The wall thickness of the cylinder must comply with the following requirements:

(1) For cylinders with outside diameters over 6 inches, the minimum wall thickness must be 0.090 inch. In any case, the minimum wall thickness must be such that calculated wall stress at minimum test pressure (paragraph (i)(4) of this section) may not exceed the following values:

(i) 24,000 psi for cylinders without longitudinal seam.

(ii) 22,800 psig for cylinders having copper brazed or silver alloy brazed longitudinal seam.

(iii) 18,000 psi for cylinders having forged lapped welded longitudinal seam.

(2) Calculation must be made 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 or 450 psig whichever is the greater;
D = outside diameter in inches;
d = inside diameter in inches.

(g) *Heat treatment.* Cylinder heads, bodies or the completed cylinder, formed by drawing or pressing, must be uniformly and properly heat treated by an applicable method shown in table 1 of appendix A of this part before tests.

(h) *Opening in cylinders.* Openings in cylinders must comply with the following:

(1) Any opening must be placed on other than a cylindrical surface.

(2) Each opening in a spherical type of cylinder must be provided with a fitting, boss, or pad of weldable steel securely attached to the cylinder by fusion welding.

(3) Each opening in a cylindrical type cylinder, except those for pressure relief devices, must be provided with a fitting, boss, or pad, securely attached to container by brazing or by welding.

(4) 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 as specified for American Standard taper pipe threads.

(iii) Straight threads, must have at least four (4) engaged threads, must have tight fit and a calculated shear strength at least ten (10) times the test pressure of the cylinder; gaskets are required for straight threads and must be of sufficient quality to prevent leakage.

(iv) A brass fitting may be brazed to the steel boss or flange on cylinders used as component parts of handheld fire extinguishers.

(5) The closure of a fitting, boss, or pad must be adequate to prevent leakage.

(i) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) *Lot testing.* (i) At least one (1) cylinder randomly selected out of each lot of 200 or fewer must be tested by the water jacket or direct expansion method as prescribed in CGA C–1 (IBR; see § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(ii) Each cylinder must be tested to a minimum of 2 times service pressure.

(iii) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

(2) *Pressure testing.* (i) The remaining cylinders in the lot must be tested by the water-jacket, direct expansion or proof pressure test methods as prescribed in CGA C–1. The minimum test pressure must be maintained for a specific timeframe as prescribed and the testing equipment must be calibrated as prescribed in CGA C–1. Further, all testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1. Determination of expansion properties is not required.

(ii) Each cylinder must be tested to a minimum of at least two (2) times service pressure and show no defect.

(j) *Mechanical test.* A mechanical test must be conducted to determine yield strength, tensile strength, elongation as a percentage, and reduction of area of material as a percentage as follows:

(1) Testing is required on two (2) specimens removed from one (1) cylinder, or part thereof, heat-treated as required, as illustrated in appendix A to subpart C of this part. For lots of 30 or fewer, mechanical tests are authorized to be made on a ring at least 8 inches long removed from each cylinder and subjected to the same heat of material taken as the finished cylinder.

(2) Specimens must comply with the following:

(i) When a cylinder wall is 3⁄16 inch thick or less, one the following gauge lengths is authorized: A gauge length of 8 inches with a width not over 1½ inches, a gauge length of 2 inches with a width not over 1½ inches, or a gauge length at least twenty-four (24) times the thickness with a width not over six (6) times the thickness.

(ii) The specimen, exclusive of grip ends, may not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section.

(iii) When the size of a 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 specimens are taken and prepared using this method, the inspector's report must show detailed information regarding such specimens in connection with the record of mechanical tests.

(iv) Heating of a specimen for any purpose is not authorized.

(3) The yield strength in tension must be the stress corresponding to a permanent strain of 0.2 percent of the gauge length. The following conditions apply:

(i) The yield strength must be determined by either the ''offset'' method or the ''extension under load'' method as prescribed in ASTM E 8 (IBR, see § 171.7 of this subchapter).

(ii) In using the ''extension under load'' method, the total strain (or ''extension under load'') corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations must be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram must be plotted and the yield strength determined from the 0.2 percent offset.

(iii) For the purpose of strain measurement, the initial strain reference must be set while the specimen is under a stress of 12,000 psi, and strain indicator reading must be set at the calculated corresponding strain.

(iv) Cross-head speed of the testing machine may not exceed 18 inch per minute during yield strength determination.

(v) The yield strength must not exceed 73 percent of the tensile strength.

(k) *Elongation.* Mechanical test specimens must show at least a 20 percent elongation. However, elongation percentages may be reduced numerically by one (1) percentage for each 7,500 psi increase of tensile strength above 50,000 psi. The tensile strength may be incrementally increased by a maximum total of 30,000 psi.

(l) *Flattening test.* (1) *Cylinders.* After pressure testing, a flattening test must be performed on one cylinder taken at random out of each lot of 200 or fewer by placing the cylinder between wedge-shaped knife edges having a 60 degree included angle, rounded to a half-inch radius. The longitudinal axis of the cylinder must be at a 90-deqree angle to knife edges during the test. For lots of 30 or fewer, flattening tests are authorized to be performed on a ring of at least 8 inches long removed from each cylinder and subjected to same heat of material taken as the finished cylinder.

(2) *Pipes.* When cylinders are constructed of lap welded pipe, an additional flattening test is required, without evidence of cracking, up to six (6) times the wall thickness. In such case, the rings (crop ends) removed from each end of the pipe, must be tested with the weld 45 °F or less from the point of greatest stress.

(m) *Acceptable results for flattening tests.* There must be no evidence of cracking of the sample when it is flattened between flat plates to no more than six (6) times the wall thickness. If this test fails, one additional sample from the same lot may be taken. If this second sample fails, the entire lot must be condemned.

(n) *Condemned cylinders.* (1) Unless otherwise stated in this section, if a

sample cylinder or specimen taken from a lot of cylinders fails the prescribed test, then two additional specimens must be selected from the same lot and subjected to the prescribed test. If either of these fails the test, then the entire lot must be condemned.

(2) *Reheat treatment of a condemned cylinder.* Reheat treatment is authorized for a condemned cylinder in accordance with this paragraph. After reheat treatment, a cylinder must pass all prescribed tests in this section to be considered acceptable. Repair of brazed seams by brazing and welded seams by welding is authorized. For cylinders with an outside diameter of less than or equal to six (6) inches, welded seam repairs greater than one (1) inch in length shall require reheat treatment of the cylinder. For cylinders greater than an outside diameter of 6 inches, welded seam repairs greater than three (3) inches in length shall require reheat treatment.

(o) *Markings.* (1) Markings must be as required as in § 178.35 of this subpart and in addition must be stamped plainly and permanently in any of the following locations on the cylinder:

(i) On shoulders and top heads whose wall thickness is not less than 0.087-inch thick;

(ii) On side wall adjacent to top head for side walls which are not less than 0.090 inch thick;

(iii) On a cylindrical portion of the shell that extends beyond the recessed bottom of the cylinder, constituting an integral and non-pressure part of the cylinder;

(iv) On a metal plate attached to the top of the cylinder or permanent part thereof; sufficient space must be left on the plate to provide for stamping at least six retest dates; the plate must be at least 1/16-inch thick and must be attached by welding, or by brazing. The brazing rod must melt at a temperature of 1100 °F. Welding or brazing must be along all the edges of the plate;

(v) On the neck, neckring, valve boss, valve protection sleeve, or similar part permanently attached to the top of the cylinder; or

(vi) On the footring permanently attached to the cylinder, provided the water capacity of the cylinder does not exceed 30 pounds.

(2) Embossing the cylinder head or sidewall is not permitted.

■ 31. Revise § 178.51 to read as follows:

§ 178.51 Specification 4BA welded or brazed steel cylinders.

(a) *Type, size, pressure, and application.* A DOT 4BA cylinder is a cylinder, either spherical or cylindrical design, with a water capacity of 1,000 pounds or less and a service pressure range of 225 to 500 psig. Closures made by the spinning process are not authorized.

(1) Spherical type cylinder designs are permitted to have only one circumferentially welded seam.

(2) Cylindrical type cylinder designs must be of circumferentially welded or brazed construction; longitudinally brazed or silver-soldered seams are also permitted.

(b) *Steel.* The steel used in the construction of the cylinder must be as specified in table 1 of appendix A to this part. The cylinder manufacturer must maintain a record of intentionally added alloying elements.

(c) *Identification of material.* Pressure-retaining material must be identified by any suitable method that does not compromise the integrity of the cylinder. Plates and billets for hotdrawn cylinders must be marked with the heat number.

(d) *Manufacture.* Cylinders must be manufactured using equipment and processes adequate to ensure that each cylinder produced conforms to the requirements of this subpart. No defect is permitted that is likely to appreciably weaken the finished cylinder. A reasonably smooth and uniform surface finish is required. Exposed bottom welds on cylinders over 18 inches long must be protected by footrings.

(1) Seams must be made as follows:

(i) Minimum thickness of heads and bottoms must be not less than 90 percent of the required thickness of the side wall.

(ii) Circumferential seams must be made by welding or by brazing. Heads 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 head and must be thoroughly brazed until complete penetration by the brazing material of the brazed joint is secured. Depth of brazing from end of the shell must be at least four (4) times the thickness of shell metal.

(iii) Longitudinal seams in shells must be made by copper brazing, copper alloy brazing, or by silver alloy brazing. Copper alloy composition must be: Copper 95 percent minimum, Silicon 1.5 percent to 3.85 percent, Manganese 0.25 percent to 1.10 percent. The melting point of the silver alloy brazing material must be in excess of 1,000 °F. The plate edge must be lapped at least eight times the thickness of plate, laps being held in position, substantially metal to metal, by riveting or by electric spot-welding. Brazing must be done by using a suitable flux and by placing brazing material on one side of seam and applying heat until this material shows uniformly along the seam of the other side. Strength of longitudinal seam: Copper brazed longitudinal seam must have strength at least 3/2 times the strength of the steel wall.

(2) Welding procedures and operators must be qualified in conformance with CGA C–3 (IBR, *see* § 171.7 of this subchapter).

(e) *Welding or brazing.* Welding or brazing of any attachment or opening to the heads of cylinders is permitted provided the carbon content of the steel does not exceed 0.25 percent except in the case of 4130 × steel, which may be used with proper welding procedure.

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

(1) For any cylinder with an outside diameter of greater than 6 inches, the minimum wall thickness is 0.078 inch. In any case, the minimum wall thickness must be such that the calculated wall stress at the minimum test pressure may not exceed the lesser value of any of the following:

(i) The value shown in table 1 of appendix A to this part, for the particular material under consideration;

(ii) One-half of the minimum tensile strength of the material determined as required in paragraph (j) of this section;

(iii) 35,000 psi; or

(iv) Further provided that wall stress for cylinders having copper brazed longitudinal seams may not exceed 95 percent of any of the above values. Measured wall thickness may not include galvanizing or other protective coating.

(2) Cylinders that are cylindrical in shape 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.

(3) Cylinders that are spherical in shape must have the wall stress calculated by the formula:

$$S = PD/4tE$$

Where:

S = wall stress in psi;
P = minimum test pressure prescribed for water jacket test;
D = outside diameter in inches;
t = minimum wall thickness in inches;
E = 0.85 (provides 85 percent weld efficiency factor which must be applied in the girth weld area and heat affected zones which zone must extend a distance of 6 times wall thickness from center line of weld);
E = 1.0 (for all other areas).

(4) For a cylinder with a wall thickness less than 0.100 inch, the ratio of tangential length to outside diameter may not exceed 4.1.

(g) *Heat treatment.* Cylinders must be heat treated in accordance with the following requirements:

(1) Each cylinder must be uniformly and properly heat treated prior to test by the applicable method shown in table 1 of appendix A to this part. Heat treatment must be accomplished after all forming and welding operations, except that when brazed joints are used, heat treatment must follow any forming and welding operations, but may be done before, during or after the brazing operations [*see* § 178.51(m) for weld repairs].

(2) Heat treatment is not required after the welding or brazing of weldable low carbon parts to attachments of similar material which have been previously welded or brazed to the top or bottom of cylinders and properly heat treated, provided such subsequent welding or brazing does not produce a temperature in excess of 400 °F in any part of the top or bottom material.

(h) *Openings in cylinders.* Openings in cylinders must comply with the following requirements:

(1) Any opening must be placed on other than a cylindrical surface.

(2) Each opening in a spherical type cylinder must be provided with a fitting, boss, or pad of weldable steel securely attached to the container by fusion welding.

(3) Each opening in a cylindrical type cylinder must be provided with a fitting, boss, or pad, securely attached to container by brazing or by welding.

(4) 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 calculated shear strength of at least 10 times the test pressure of the cylinder. Gaskets, adequate to prevent leakage, are required.

(i) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) *Lot testing.* (i) At least one (1) cylinder randomly selected out of each lot of 200 or fewer must be tested by water jacket or direct expansion method as prescribed in CGA C–1 (IBR, see § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure.

(iii) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

(2) *Pressure testing.* (i) The remaining cylinders in the lot must be tested by the water-jacket, direct expansion or proof pressure test methods as prescribed in CGA C–1. The minimum test pressure must be maintained for a specific timeframe and the testing equipment must be calibrated as prescribed in CGA C–1. Further, all testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1. Determination of expansion properties is not required.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure and show no defect.

(j) *Mechanical test.* (1) A mechanical test must be conducted to determine yield strength, tensile strength, elongation as a percentage, and reduction of area of material as a percentage, as follows:

(i) *Cylinders.* Testing is required on two (2) specimens removed from one cylinder or part thereof taken at random out of each lot of 200 or fewer. Samples must be removed as illustrated in appendix A to subpart C of this part.

(ii) *Spheres.* Testing is required on two (2) specimens removed from the sphere or flat representative sample plates of the same heat of material taken at random from the steel used to produce the spheres. Samples (including plates) must be taken from each lot of 200 or fewer. The flat steel from which two specimens are to be removed must receive the same heat of material taken as the as the spheres themselves. Samples must be removed as illustrated in appendix A to subpart C of this part.

(2) Specimens must comply with the following:

(i) When a cylinder wall is 3⁄16 inch thick or less, one the following gauge lengths is authorized: A gauge length of 8 inches with a width not over 1½ inches, a gauge length of 2 inches with a width not over 1½ inches, or a gauge length at least twenty-four (24) times the thickness with a width not over six (6) times the thickness.

(ii) The specimen, exclusive of grip ends, may not be flattened. Grip ends may be flattened to within one inch of each end of the reduced section.

(iii) When size of the 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 specimens are so taken and prepared, the inspector's report must show in connection with record of physical tests detailed information in regard to such specimens.

(iv) Heating of a specimen for any purpose is not authorized.

(3) The yield strength in tension must be the stress corresponding to a permanent strain of 0.2 percent of the gauge length. The following conditions apply:

(i) The yield strength must be determined by either the ''offset'' method or the ''extension under load'' method as prescribed in ASTM E 8 (IBR, see § 171.7 of this subchapter).

(ii) In using the ''extension under load'' method, the total strain (or ''extension under load''), corresponding to the stress at which the 0.2 percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations must be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram must be plotted and the yield strength determined from the 0.2 percent offset.

(iii) For the purpose of strain measurement, the initial strain reference must be set while the specimen is under a stress of 12,000 psi, and the strain indicator reading must be set at the calculated corresponding strain.

(k) *Elongation.* Mechanical test specimens must show at least a 40 percent elongation for a 2-inch gauge length or at least 20 percent in other cases. However, elongation percentages may be reduced numerically by 2 percent for 2-inch specimens, and by 1 percent in other cases, for each 7,500 psi increase of tensile strength above 50,000 psi. The tensile strength may be incrementally increased by a maximum total of 30,000 psi.

(l) *Tests of welds.* Except for brazed seams, welds must be tested as follows:

(1) *Tensile test.* A specimen must be removed from one cylinder of each lot

of 200 or fewer, or welded test plate. The welded test plate must be of one of the heats in the lot of 200 or fewer which it represents, in the same condition and approximately the same thickness as the cylinder wall except that in no case must it be of a lesser thickness than that required for a quarter size Charpy impact specimen. The weld must be made by the same procedures and subjected to the same heat of material taken as the major weld on the cylinder. The specimen must be taken from across the major seam and must be prepared and tested in conformance with and must meet the requirements of CGA C–3 (IBR, *see* § 171.7 of this subchapter). Should this specimen fail to meet the requirements, one additional specimen must be taken from two additional cylinders or welded test plates from the same lot and tested. If any of these latter two specimens fail to meet the requirements, the entire lot represented must be condemned.

(2) *Guided bend test.* A root bend test specimen must be removed from the cylinder or welded test plate, used for the tensile test specified in paragraph (l)(1) of this section. The specimen must be taken from across the circumferential seam and must be prepared and tested in conformance with and must meet the requirements of CGA C–3. Should this specimen fail to meet the requirements, one additional specimen must be taken from two additional cylinders or welded test plates from the same lot and tested. If any of these latter two specimens fail to meet the requirements, the entire lot represented must be condemned.

(3) *Alternate guided-bend test.* This test may be used and must be as required by CGA C–3. The specimen must be bent until the elongation at the outer surface, adjacent to the root of the weld, between the lightly scribed gage lines a to b, must be at least 20 percent, except that this percentage may be reduced for steels having a tensile strength in excess of 50,000 psig, as provided in paragraph (k) of this section. Should the specimen fail to meet the requirements, one additional specimen must be taken from two additional cylinders or welded test plates from the same lot and tested. If any of these latter two specimens fail to meet the requirements, the entire lot represented must be condemned.

(m) *Condemned cylinders.*

(1) Unless otherwise stated in this section, if a sample cylinder or specimen taken from a lot of cylinders fails the prescribed test, then two additional specimens must be selected from the same lot and subjected to the prescribed test. If either of these additional specimens fails the test, then the entire lot must be condemned.

(2) *Reheat treatment of a condemned cylinder.* Reheat treatment is authorized for a condemned cylinder in accordance with this paragraph. After reheat, a cylinder must pass all prescribed tests in this section to be acceptable. Repair of brazed seams by brazing and welded seams by welding is considered authorized. For cylinders with an outside diameter of less than or equal to six (6) inches, welded seam repairs greater than one (1) inch in length shall require reheat treatment of the cylinder. For cylinders greater than an outside diameter of six (6) inches, welded seam repairs greater than three (3) inches in length shall require reheat treatment.

(n) *Markings.* (1) Markings must be as required in § 178.35 of this subpart and in addition must be stamped plainly and permanently in one of the following locations on the cylinder:

(i) On shoulders and top heads whose wall thickness is not less than 0.087 inch thick;

(ii) On side wall adjacent to top head for side walls not less than 0.090 inch thick;

(iii) On a cylindrical portion of the shell that extends beyond the recessed bottom of the cylinder constituting an integral and non-pressure part of the cylinder;

(iv) On a plate attached to the top of the cylinder or permanent part thereof; sufficient space must be left on the plate to provide for stamping at least six retest dates; the plate must be at least 1/16-inch thick and must be attached by welding, or by brazing at a temperature of at least 1100 °F, throughout all edges of the plate;

(v) On the neck, neckring, valve boss, valve protection sleeve, or similar part permanently attached to the top of the cylinder; or

(vi) On the footring permanently attached to the cylinder, provided the water capacity of the cylinder does not exceed 30 pounds.

(2) Embossing the cylinder head or side is not permitted.

■ 32. In § 178.53, revise paragraph (h) to read as follows:

§ 178.53 Specification 4D welded steel cylinders for aircraft use.

* * * * *

(h) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) *Lot Testing.* (i) At least one cylinder selected at random out of each lot of 200 or fewer must be tested by water-jacket or direct expansion as prescribed in CGA C–1 (IBR; *see* § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(ii) Each cylinder must be tested to a minimum of three (3) times service pressure.

(iii) The minimum test pressure must be maintained be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

(2) *Pressure testing.* (i) The remaining cylinders in each lot must be tested by the water-jacket, direct expansion or proof pressure test methods as prescribed in CGA C–1. The minimum test pressure must be maintained for a specific timeframe, and the testing equipment must be calibrated as prescribed in CGA C–1. Further, all testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1. Determination of expansion properties is not required.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure and show no defect.

* * * * *

■ 33. In § 178.55, revise paragraph (i) to read as follows:

§ 178.55 Specification 4B240ET welded or brazed cylinders.

* * * * *

(i) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) *Lot Testing.* (i) At least one (1) cylinder selected at random out of each lot of 200 or fewer must be tested by water-jacket or direct expansion method as prescribed in CGA C–1 (IBR; *see* § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure.

(iii) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure

applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

(2) *Pressure testing.* (i) The remaining cylinders in each lot must be tested by the water-jacket, direct expansion or proof pressure test methods as prescribed in CGA C–1. The minimum test pressure must be maintained for a specific timeframe, and the testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1. Determination of expansion properties is not required.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure and show no defect.

(3) *Burst testing.* (i) For purposes of burst testing, each 1,000 cylinders or fewer successively produced each day constitutes a lot. All cylinders of a lot must be of identical size, construction heat treatment, finish, and quality.

(ii) One cylinder must be selected from each lot and be hydrostatically pressure tested to destruction. If this cylinder bursts below five (5) times the service pressure, then two additional cylinders from the same lot as the previously tested cylinder must be selected and subjected to this test. If either of these cylinders fails by bursting below five (5) times the service pressure then the entire lot must be condemned.

* * * * *

■ 34. In § 178.56, revise paragraph (i) to read as follows:

§ 178.56 Specification 4AA480 welded steel cylinders.

* * * * *

(i) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) *Lot testing.* (i) At least one (1) cylinder selected at random out of each lot of 200 or fewer must be tested by water-jacket or direct expansion method as prescribed in CGA C–1 (IBR; *see* § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure.

(iii) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

(v) If a selected cylinder fails, then two (2) additional specimens must be selected at random from the same lot and subjected to the prescribed testing. If either of these fails the test, then each cylinder in that lot must be tested as prescribed in paragraph (i)(l) of this section.

(2) *Pressure testing.* (i) The remaining cylinders in each lot must be tested by the water-jacket, direct expansion or proof pressure test methods as prescribed in CGA C–1. The minimum test pressure must be maintained for a specific timeframe, and the testing equipment must be calibrated as prescribed in CGA C–1. Further, all testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1. Determination of expansion properties is not required.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure and show no defect. A cylinder showing a defect must be condemned unless it may be requalified under paragraph (m) of this section.

* * * * *

■ 35. In § 178.57, revise paragraph (i) to read as follows:

§ 178.57 Specification 4L welded insulated cylinders.

* * * * *

(i) *Pressure testing.* Each cylinder, before insulating and jacketing, must successfully withstand a pressure test as follows:

(1) The cylinder must be tested by water-jacket, direct expansion, or proof pressure test methods as prescribed in CGA C–1 (IBR; *see* § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(2) Each cylinder must be tested to a minimum of two (2) times service pressure.

(3) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

(4) There must be no evidence of leakage, visible distortion or other defect.

* * * * *

■ 36. In § 178.58, revise paragraph (i) to read as follows:

§ 178.58 Specification 4DA welded steel cylinders for aircraft use.

* * * * *

(i) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) The test must be by water-jacket or direct expansion method as prescribed in CGA C–1 (IBR; *see* § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(2) Each cylinder must be tested to a minimum of two (2) times service pressure.

(3) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

* * * * *

■ 37. In § 178.59, revise paragraph (h) to read as follows:

§ 178.59 Specification 8 steel cylinders with porous fillings for acetylene.

* * * * *

(h) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) *Lot testing.* (i) At least one (1) cylinder selected at random out of each lot of 200 or fewer must be tested by water-jacket or direct expansion method

as prescribed in CGA C–1 (IBR; *see* § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(ii) Each cylinder must be tested to a minimum of 750 psig.

(iii) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

(v) If the tested cylinder fails, each cylinder remaining in the lot may be tested in lieu of paragraph (h)(2) of this section by the water-jacket or direct expansion method as prescribed in CGA C–1. Those passing are acceptable.

(2) *Pressure testing.* (i) The remaining cylinders in each lot must be pressure tested by the water-jacket, direct expansion or proof pressure test methods as prescribed in CGA C–1. The minimum test pressure must be maintained for a specific timeframe, and the testing equipment must be calibrated as prescribed in CGA C–1. Further, all testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1. Determination of expansion properties is not required.

(ii) Each cylinder must be tested between 500 and 600 psig and show no defect.

* * * * *

■ 38. In § 178.60, revise paragraph (j) to read as follows:

§ 178.60 Specification 8AL steel cylinders with porous fillings for acetylene.

* * * * *

(j) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) *Lot Testing.* (i) At least one (1) cylinder selected at random out of each lot of 200 or less must be tested by water-jacket or direct expansion method as prescribed in CGA C–1 (IBR; *see* § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(ii) Each cylinder must be tested to a minimum of 750 psig.

(iii) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

(v) If the tested cylinder fails, each remaining cylinder in the lot may be tested in lieu of paragraph (j)(2) of this section by the water-jacket or direct expansion method as prescribed in CGA C–1. Those passing are acceptable.

(2) *Pressure testing.* (i) The remaining cylinders in each lot must be pressure tested by the water-jacket, direct expansion or proof pressure test methods as prescribed in CGA C–1. The minimum test pressure must be maintained for a specific timeframe, and the testing equipment must be calibrated as prescribed in CGA C–1. Further, all testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1. Determination of expansion properties is not required.

(ii) Each cylinder must be tested between 500 and 600 psig and show no defect.

* * * * *

■ 39. Revise § 178.61 to read as follows:

§ 178.61 Specification 4BW welded steel cylinders with electric-arc welded seam.

(a) *Type, size, pressure, and application.* A DOT 4BW cylinder has a spherical or cylindrical design, a water capacity of 1,000 pounds or less, and a service pressure range of 225 to 500 psig. Closures made by the spinning process are not authorized.

(1) Spherical designs are permitted to have only one circumferentially electric-arc welded seam.

(2) Cylindrical designs must be of circumferentially welded electric-arc construction; longitudinally electric-arc welded seams are permitted.

(b) *Steel.* (1) The steel used in the construction of the cylinder must be as specified in table 1 of appendix A to this part. The cylinder manufacturer must maintain a record of intentionally added alloying elements.

(2) Material for heads must meet the requirements of paragraph (b)(1) of this section or be open hearth, electric or basic oxygen carbon steel of uniform quality. Content percent may not exceed the following: Carbon 0.25, Manganese 0.60, Phosphorus 0.045, Sulfur 0.050. Heads must be hemispherical or ellipsoidal in shape with a maximum ratio of 2:1. If low carbon steel is used, the thickness of such heads must be determined by using a maximum wall stress of 24,000 psi in the formula described in paragraph (g)(4) of this section.

(c) *Identification of material.* Pressure-retaining materials must be identified by any suitable method that does not compromise the integrity of the cylinder. Plates and billets for hotdrawn cylinders must be marked with the heat number.

(d) *Manufacture.* Cylinders must be manufactured using equipment and processes adequate to ensure that each cylinder produced conforms to the requirements of this subpart and the following:

(1) No defect is permitted that is likely to weaken the finished cylinder appreciably. A reasonably smooth and uniform surface is required. Exposed bottom welds on cylinders over 18 inches long must be protected by footrings. Minimum thickness of heads may not be less than 90 percent of the required thickness of the sidewall. Heads must be concave to pressure.

(2) Circumferential seams must be by electric-arc welding. Joints must be butt with one member offset (joggle butt) or with a lap joint. Lap joints must have a minimum overlap of at least four (4) times nominal sheet thickness.

(3) Longitudinal electric-arc welded seams (in shells) must be of the butt welded type. Welds must be made by a machine process including automatic feed and welding guidance mechanisms. Longitudinal seams must have complete joint penetration, and must be free from undercuts, overlaps or abrupt ridges or valleys. Misalignment of mating butt edges may not exceed 1/16 inch of nominal sheet thickness or 1/32 inch whichever is less. All joints with nominal sheet thickness up to and including 1/8 inch must be tightly butted. When nominal sheet thickness is greater than 1/8 inch, the joint must be gapped with maximum distance equal to one-half the nominal sheet thickness or 1/32 inch whichever is less. Joint design, preparation, and fit-up must be such that requirements of this paragraph (d) are satisfied.

(4) Welding procedures and operators must be qualified in accordance with CGA C–3 (IBR, see § 171.7 of this subchapter).

(e) *Welding of attachments.* The attachment to the tops and bottoms only of cylinders by welding of neckrings,

footrings, handles, bosses, pads and valve protection rings is authorized provided that such attachments and the portion of the container to which they are attached are made of weldable steel, the carbon content of which may not exceed 0.25 percent.

(f) *Non-destructive examination.* (1) Welds of the cylinders must be subjected to radioscopic or radiographic examination as follows:

(2) Radioscopy or radiography must be in conformance with CGA C–3 (IBR; *see* § 171.7 of this subchapter). Maximum joint efficiency will be 1.0 when each seam is examined completely. Maximum joint efficiency will be 0.90 when one cylinder from each lot of 50 consecutively welded cylinders is spot examined. In addition, one out of the first five cylinders welded following a shutdown of welding operations exceeding four hours must be spot examined. Spot radiographs, when required, must be made of a finished welded cylinder and must include the girth weld for 2 inches in both directions from the intersection of the longitudinal and girth welds and include at least 6 inches of the longitudinal weld. Maximum joint efficiency of 0.75 will be permissible without radiography. When fluoroscopic examination is used, permanent film records need not be retained.

(g) *Wall thickness.* (1) For outside diameters over 6 inches the minimum wall thickness must be 0.078 inch. In any case, the minimum wall thickness must be such that the wall stress calculated by the formula listed in paragraph (g)(2) of this section may not exceed the lesser value of any of the following:

(i) The value referenced in paragraph (b) of this section for the particular material under consideration.

(ii) One-half of the minimum tensile strength of the material determined as required in paragraph (k) of this section.

(iii) 35,000 psi.

(2) Stress must be calculated by the following formula:

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

Where:

S = wall stress, psi;
P = service pressure, psig;
D = outside diameter, inches;
d = inside diameter, inches;
E = joint efficiency of the longitudinal seam (from paragraph (d) of this section).

(3) For a cylinder with a wall thickness less than 0.100 inch, the ratio of tangential length to outside diameter may not exceed 4 to 1 (4:1).

(h) *Heat treatment.* Cylinders must be heat treated in accordance with the following requirements:

(1) Each cylinder must be uniformly and properly heat treated prior to test by the applicable method referenced in table 1 of appendix A to this part. Heat treatment must be accomplished after all forming and welding operations, except that when brazed joints are used, heat treatment must follow any forming and welding operations, but may be done before, during or after the brazing operations (*see* § 178.51(m) of this subpart for weld repairs).

(2) Heat treatment is not required after welding of weldable low-carbon parts to attachments of similar material which have been previously welded to the top or bottom of cylinders and properly heat treated, provided such subsequent welding does not produce a temperature in excess of 400 °F in any part of the top or bottom material.

(i) *Openings in cylinders.* Openings in cylinders must comply with the following requirements:

(1) All openings must be in heads or bases.

(2) Each opening in a spherical-type cylinder must be provided with a fitting, boss, or pad of weldable steel securely attached to the cylinder by fusion welding.

(3) Each opening in a cylindrical-type cylinder must be provided with a fitting, boss, or pad securely attached to the cylinder by welding.

(4) 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 length not less than as specified for American Standard Taper Pipe Threads.

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

(iv) A brass fitting may be brazed to the steel boss or flange on cylinders used as component parts of handheld fire extinguishers.

(j) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) *Lot testing.* (i) At least one cylinder randomly selected out of each lot of 200 or less must be tested by the water-jacket or direct expansion method as prescribed in CGA C–1 (IBR, see § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure.

(iii) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

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

(2) *Pressure testing.* (i) The remaining cylinders in each lot must be pressure tested by the water-jacket, direct expansion or proof pressure test methods as prescribed in CGA C–1. The minimum test pressure must be maintained for a specific timeframe, and the testing equipment must be calibrated as prescribed in CGA C–1. Further, all testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1. Determination of expansion properties is not required.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure and show no defect.

(3) *Burst testing.* (i) One finished cylinder selected at random out of each lot of 500 or less must be hydrostatically tested to four (4) times service pressure without bursting.

(k) *Mechanical tests.* Mechanical tests must be conducted to determine yield strength, tensile strength, elongation as a percentage, and reduction of area of material as a percentage, as follows:

(1) Specimens must be taken from one cylinder after heat treatment as illustrated in appendix A to subpart C of this part, chosen at random from each lot of 200 or fewer, as follows:

(i) Body specimen. One specimen must be taken longitudinally from the body section at least 90 degrees away from the weld.

(ii) Head specimen. One specimen must be taken from either head on a cylinder when both heads are made of the same material. However, if the two heads are made of differing materials, a specimen must be taken from each head.

(iii) If due to welded attachments on the top head there is insufficient surface from which to take a specimen, it may be taken from a representative head of the same heat treatment as the test cylinder.

(2) Specimens must conform to the following:

(i) When a cylinder wall is 3⁄16 inch thick or less, one the following gauge lengths is authorized: A gauge length of 8 inches with a width not over 1½

inches, a gauge length of 2 inches with a width not over 1½ inches, or a gauge length at least twenty-four (24) times the thickness with a width not over six (6) times the thickness.

(ii) The specimen, exclusive of grip ends, may not be flattened. Grip ends may be flattened to within 1 inch of each end of the reduced section.

(iii) When size of the 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 specimens are taken and prepared in this manner, the inspector's report must show in connection with the record of physical tests detailed information in regard to such specimens.

(iv) Heating of a specimen for any purpose is not authorized.

(3) The yield strength in tension must be the stress corresponding to a permanent strain of 0.2 percent of the gauge length. The following conditions apply:

(i) The yield strength must be determined by either the ''off-set'' method or the ''extension under load'' method as prescribed in ASTM E 8 (IBR, see § 171.7 of this subchapter).

(ii) In using the ''extension under load'' method, the total strain (or ''extension under load''), corresponding to the stress at which the 0.2-percent permanent strain occurs may be determined with sufficient accuracy by calculating the elastic extension of the gauge length under appropriate load and adding thereto 0.2 percent of the gauge length. Elastic extension calculations must be based on an elastic modulus of 30,000,000. In the event of controversy, the entire stress-strain diagram must be plotted and the yield strength determined from the 0.2-percent offset.

(iii) For the purpose of strain measurement, the initial strain reference must be set while the specimen is under a stress of 12,000 psi, and the strain indicator reading must be set at the calculated corresponding strain.

(iv) Cross-head speed of the testing machine may not exceed ⅛ inch per minute during yield strength determination.

(l) *Elongation.* Mechanical test specimens must show at least a 20 percent elongation. However, elongation percentages may be reduced numerically by one (1) for each 7,500 psi of tensile strength above 50,000 psi to a maximum of four (4) increments (*i.e.,* 30,000 psi).

(m) *Tests of welds.* Welds must be subjected to the following tests:

(1) *Tensile test.* A specimen must be removed from one cylinder of each lot of 200 or fewer. The specimen must be taken from across the longitudinal seam and must be prepared and tested in conformance with the requirements of CGA C–3 (IBR, *see* § 171.7 of this subchapter).

(2) *Guided bend test.* A root bend test specimen must be removed from the cylinder or welded test plate used for the tensile test specified in paragraph (m)(1) of this section. Specimens must be taken from across the longitudinal seam and must be prepared and tested in conformance with the requirements of CGA C–3. If the specimen fails to meet the requirements, one specimen each must be taken from two additional cylinders or welded test plates from the same lot as the previously tested cylinder or added test plate and tested. If either of these latter two specimens fails to meet the requirements, the entire lot represented must be condemned.

(3) *Alternate guided bend test.* This test may be used and must be as required by CGA C–3. The specimen must be bent until the elongation at the outer surface, adjacent to the root of the weld, between the lightly scribed gauge lines a to b, must be at least 20 percent, except that this percentage may be reduced for steels having a tensile strength in excess of 50,000 psi, as provided in paragraph (l) of this section. Should this specimen fail to meet the requirements, one additional specimen such must be taken from two additional cylinders or welded test plates from the same lot and tested as the previously tested cylinder or added test plate. If either of these latter two specimens fails to meet the requirements, the entire lot represented must be condemned.

(n) *Rejected cylinders.* (1) Unless otherwise stated, if a sample cylinder or specimen taken from a lot of cylinders fails the prescribed test, then two additional specimens must be selected from the same lot and subjected to the prescribed test. If either of these fails the test, then the entire lot must be rejected.

(2) *Reheat treatment of condemned cylinders.* Reheat treatment is authorized for a condemned cylinder in accordance with this paragraph. After reheat treatment, a cylinder must pass all prescribed tests in this section to be considered acceptable. Repair of welded seams by welding is authorized. For cylinders less than or equal to an outside diameter of 6 inches, welded seam repairs greater than 1 inch in length shall require reheat treatment of the cylinder. For cylinders greater than an outside diameter of 6 inches, welded seam repairs greater than 3 inches in length shall require reheat treatment.

(o) *Markings.* (1) Markings must be as required in § 178.35 of this subpart and in addition must be stamped plainly and permanently in one of the following locations on the cylinder:

(i) On shoulders and top heads whose wall thickness is not less than 0.087 inch thick.

(ii) On side wall adjacent to top head for side walls not less than 0.090 inch thick.

(iii) On a cylindrical portion of the shell that extends beyond the recessed bottom of the cylinder constituting an integral and non-pressure part of the cylinder.

(iv) On a plate attached to the top of the cylinder or permanent part thereof; sufficient space must be left on the plate to provide for stamping at least six retest dates; the plate must at least $^{1}/_{16}$-inch thick and must be attached by welding at a temperature of 1,100 °F, throughout all edges of the plate.

(v) On the neck, neckring, valve boss, valve protection sleeve, or similar part permanently attached to the top of the cylinder.

(vi) On the footring permanently attached to the cylinder, provided the water capacity of the cylinder does not exceed 30 pounds.

(2) Embossing the cylinder head or side wall is not permitted.

(p) *Inspector's report.* In addition to the information required by § 178.35 of this subpart, the inspector's report must indicate the type and amount of radiography.

■ 40. In § 178.65, revise paragraph (f) to read as follows:

§ 178.65 Specification 39 non-reusable (non-refillable) cylinders.

* * * * *

(f) *Pressure testing.* (1) Each cylinder must be proof pressure tested as prescribed in CGA C–1 (IBR, *see* § 171.7 of this subchapter). The minimum test pressure must be maintained for a specific timeframe, and the testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

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

(3) If the cylinder leaks, evidences visible distortion or evidences any other defect while under test, it must be condemned (*see* paragraph (h) of this section).

* * * * *

■ 41. In § 178.68:

■ a. Revise paragraphs (b), (e), (h), (j) introductory text, (j)(1), (k), (l) and (m);

■ b. Redesignate paragraph (n) as paragraph (o); and

■ c. Add new paragraph (n).

The revisions, redesignation, and addition read as follows:

§ 178.68 Specification 4E welded aluminum cylinders.

* * * * *

(b) *Authorized material.* The cylinder must be constructed of aluminum of uniform quality. The following chemical analyses are authorized:

TABLE 1—AUTHORIZED MATERIALS

Designation	Chemical analysis—limits in percent 5154
Iron plus silicon	0.45 maximum.
Copper	0.10 maximum.
Manganese	0.10 maximum.
Magnesium	3.10/3.90.
Chromium	0.15/0.35.
Zinc	0.20 maximum.
Titanium	0.20 maximum.
Others, each	0.05 maximum.
Others, total	0.15 maximum.
Aluminum	remainder.

Note to Table 1: The aluminum used in the construction of the cylinder must be as specified in Table 1. The cylinder manufacturer must maintain a record of intentionally added alloying elements.

* * * * *

(e) *Welding.* The attachment to the tops and bottoms only of cylinders by welding of neckrings, flanges, footrings, handles, bosses, pads, and valve protection rings is authorized. However, such attachments and the portion of the cylinder to which it is attached must be made of weldable aluminum alloys.

* * * * *

(h) *Pressure testing.* Each cylinder must successfully withstand a pressure test as follows:

(1) All cylinders with a wall stress greater than 18,000 psi must be tested by water-jacket or direct expansion method as prescribed in CGA C–1 (IBR, see § 171.7 of this subchapter). The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(i) Each cylinder must be tested to a minimum of two (2) times service pressure.

(ii) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

(iii) Permanent volumetric expansion may not exceed 12 percent of the total volumetric expansion at test pressure.

(2) *Lot testing.* (i) Cylinders with a wall stress of 18,000 psi or less may be lot tested. At least one cylinder randomly selected out of each lot of 200 or less must be tested by the water-jacket or direct expansion method as prescribed in CGA C–1. The testing equipment must be calibrated as prescribed in CGA C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure.

(iii) The minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied after heat-treatment and prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

(iv) Permanent volumetric expansion may not exceed 12 percent of the total volumetric expansion at test pressure.

(3) Pressure testing. (i) For cylinders with a wall stress of 18,000 psi or less, the remaining cylinders of the lot must be pressure tested by the water-jacket, direct expansion or proof pressure test methods as defined in CGA C–1. The minimum test pressure must be maintained for a specific timeframe, and the testing equipment must be calibrated as prescribed in CGA C–1. Further, all testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1. Determination of expansion properties is not required.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure and show no defect.

(4) *Burst Testing.* One (1) finished cylinder selected at random out of each lot of 1000 or less must be hydrostatically tested to four (4) times service pressure without bursting. Inability to meet this requirement must result in condemnation of the lot.

* * * * *

(j) *Mechanical test.* A mechanical test must be conducted to determine yield strength, tensile strength, elongation as a percentage, and reduction of area of material as a percentage as follows:

(1) The test is required on two (2) specimens removed from one cylinder or part thereof as illustrated in appendix A to subpart C of this part taken at random out of each lot of 200 or fewer.

* * * * *

(k) *Acceptable results for mechanical tests.* An acceptable result of the mechanical test requires a minimum tensile strength as defined in paragraph (f)(1)(ii) of this section, an elongation to at least 7 percent and yield strength not over 80 percent of tensile strength.

(l) *Weld tests.* Welds of the cylinder are required to successfully pass the following tests:

(1) *Reduced section tensile test.* A specimen must be removed from the cylinder used for the mechanical tests specified in paragraph (j) of this section. The specimen must be taken from across the seam; edges must be parallel for a distance of approximately 2 inches on either side of the weld. The specimen must be fractured in tension. The actual breaking stress must be a minimum of at least 30,000 psi. The apparent breaking stress calculated on the minimum design wall thickness must be a minimum of two (2) times the stress calculated under paragraph (f)(2) of this section. If the specimen fails to meet the requirements, the lot must be condemned except that specimens may be taken from two (2) additional cylinders from the same lot as the previously tested specimens. If either of the latter specimens fails to meet requirements, the entire lot represented must be condemned.

(2) *Guided bend test.* A bend test specimen must be removed from the cylinder used for the mechanical test specified in paragraph (j) of this section. The specimen must be taken across the circumferential seam, must be a minimum of 1½ inches wide, edges must be parallel and rounded with a file, and back-up strip, if used, must be removed by machining. The specimen must be tested as follows:

(i) The specimen must be bent to refusal in the guided bend test jig as illustrated in CGA C–3 (IBR, *see* § 171.7 of this subchapter). The root of the weld (inside surface of the cylinder) must be located away from the ram of the jig. The specimen must not show a crack or other open defect exceeding ⅛ inch in any direction upon completion of the test. Should this specimen fail to meet the requirements, one additional specimen must be taken from two additional cylinders from the same lot and tested. If either of the latter specimens fails to meet requirements, the entire lot represented must be condemned.

(ii) *Alternate guided bend test.* This test may be used as an alternate to the

guided bend test. The test specimen must be in conformance with The Aluminum Association's ''Welding Aluminum: Theory and Practice, Fourth Edition, 2002'' (IBR, *see* § 171.7 of this subchapter). If the specimen fails to meet the requirements, one additional specimen must be taken from two additional cylinders or welded test plates from the same lot and tested. If any of these latter two specimens fails to meet the requirements, the entire lot must be condemned.

(m) *Condemned cylinders.* (1) Unless otherwise stated, if a sample cylinder or specimen taken from a lot of cylinders fails the prescribed test, then two additional specimens must be selected from the same lot and subjected to the prescribed test. If either of these fails the test, then the entire lot must be condemned.

(2) Repair of welded seams is authorized. Acceptable cylinders must pass all prescribed tests.

(n) *Markings.* (1) Markings must be as required in § 178.35 of this subpart and in addition must be stamped plainly and permanently in one of the following locations on the cylinder:

(i) On the neck, neckring, valve boss, valve protection sleeve, or similar part permanently attached to the top of the cylinder.

(ii) On the footring permanently attached to the cylinder, provided the water capacity of the cylinder does not exceed 30 pounds.

(2) Embossing the cylinder head or side wall is not permitted.

* * * * *

■ 42. In § 178.70, revise paragraph (d) to read as follows:

§ 178.70 Approval of UN pressure receptacles.

* * * * *

(d) *Modification of approved pressure receptacle design type.* Modification of an approved UN/ISO pressure receptacle design type is not authorized without the approval of the Associate Administrator. However, modification of an approved UN/ISO pressure receptacle design type is authorized without an additional approval of the Associate Administrator provided the design modification is covered under the UN/ISO standard for the design type. A manufacturer seeking modification of an approved UN/ISO pressure receptacle design type may be required to submit design qualification test data to the Associate Administrator before production.

* * * * *

PART 180—CONTINUING QUALIFICATION AND MAINTENANCE OF PACKAGINGS

■ 43. The authority citation for part 180 continues to read as follows:

Authority: 49 U.S.C. 5101–5128; 49 CFR 1.81 and 1.97.

■ 44. In § 180.203:

■ a. Add definitions for the words ''accuracy,'' ''accuracy grade,'' ''actual test pressure,'' ''calibrated cylinder,'' ''error,'' ''master gauge,'' ''mobile unit,'' ''over-pressurized,'' ''percent permanent expansion,'' ''precision,'' ''proof pressure test,'' ''reference gauge,'' and ''service pressure'' in alphabetical order; and

■ b. Revise the definition for the words ''commercially free of corrosive components,'' ''defect,'' and ''test pressure.''

The additions and revisions read as follows:

§ 180.203 Definitions

* * * * *

Accuracy means the conformance of a particular reading to a known standard. Accuracy is expressed as the percentage of error from, or degree of closeness to, the true value, such as the difference between the measurement result displayed by the instrument and the value obtained when a measurement standard is used to perform the measurement. This value may be represented as a percent of full scale.

Accuracy grade means the inherent quality of the device. It expresses the maximum error allowed for the device at any reading. Accuracy grade is expressed as a percentage of the full scale of the device.

Actual test pressure means the pressure applied to a cylinder during a requalification test.

Calibrated cylinder means a cylinder that has certified calibration points of pressure with corresponding expansion values. It is a secondary, derived standard used for the verification and demonstration of test system accuracy and integrity.

Commercially free of corrosive components means a hazardous material having a moisture content less than 55 ppm and free of components that will adversely react with the cylinder (*e.g.* chemical stress corrosion).

* * * * *

Defect means an imperfection requiring a cylinder to be rejected or condemned.

* * * * *

Error means the difference between the measured values and the true value.

* * * * *

Master gauge means a pressure indicating device that is used as a calibration standard, has an inherent accuracy grade equal to or better than the requirement for the pressure indicating device in the test apparatus, and is an instrument not used in the daily performance of cylinder testing.

Mobile unit means a vehicle specifically authorized under a RIN to carry out requalification operations identified under the RIN within a geographic area no more than 100 miles from the principle place of business of the RIN holder. Mobile units must comply with the requirements outlined in the approval issuance letter from the Associate Administrator for Hazardous Materials Safety (see § 107.805 of subchapter A of this chapter).

* * * * *

Over-pressurized means a condition in which the internal pressure applied to a cylinder has reached or exceeded the yield point of the cylinder.

Percent permanent expansion means the ratio of permanent expansion to total expansion, expressed as a percentage. The calculation for percent permanent expansion is the permanent expansion divided by total expansion times 100.

* * * * *

Precision of a measurement means the degree of scatter of the recorded values when the measurement is repeated a number of times under the same conditions.

Proof pressure test means a pressure test by interior pressurization without the determination of a cylinder's expansion. A gas (*e.g.,* air) or a liquid (*e.g.,* water) is used as a means to achieve interior pressurization.

* * * * *

Reference gauge means a pressure indicating device that is used in the daily verification of a proof test system, and has an inherent accuracy equal to or better than the requirement for the device to be checked.

* * * * *

Service pressure means the rated service pressure marked on the cylinder.

Test pressure means the minimum prescribed pressure required for the requalification of a cylinder.

* * * * *

■ 45. In § 180.205:

■ a. Revise paragraphs (c) introductory text, (d), (g)(3), (h)(3), (i)(1)(viii), (i)(2), and (i)(3); and

■ b. Add paragraphs (f)(5), (f)(6), (i)(1)(ix), (i)(1)(x), (i)(1)(xi) and (j).

The additions and revisions read as follows:

§ 180.205 General requirements for requalification of specification cylinders.

* * * * *

(c) *Periodic requalification of cylinders.* Each cylinder bearing a DOT-specification marking must be requalified and marked as specified in the Requalification Table in this subpart. Each cylinder bearing a DOT special permit (or exemption) number must be requalified and marked in conformance with this section and the terms of the applicable special permit (or exemption). No cylinder may be filled with a hazardous material and offered for transportation in commerce unless that cylinder has been successfully requalified and marked in conformance with this subpart. A cylinder may be requalified at any time during or before the month and year that the requalification is due. However, a cylinder filled before the requalification becomes due may remain in service until it is emptied. A cylinder with a specified service life may not be refilled and offered for transportation after its authorized service life has expired.

* * * * *

(d) *Conditions requiring test and inspection of cylinders.* Without regard to any other periodic requalification requirements, a cylinder must be tested and inspected in accordance with this section prior to further use if—

(1) The cylinder shows evidence of dents, corrosion, cracked or abraded areas, leakage, or any other condition that might render it unsafe for use in transportation;

(2) The cylinder has been in an accident and has been damaged to an extent that may adversely affect its lading retention capability;

(3) The cylinder shows evidence of or is known to have thermal damage, or have been over-heated;

(4) Except as provided in § 180.212 of this subpart, the cylinder shows evidence of grinding; or

(5) The Associate Administrator determines that the cylinder may be in an unsafe condition.

* * * * *

(f) * * *

(5) Shot blasting of cylinders is permitted. Grinding, sanding, or any other removal of wall thickness of a cylinder is not permitted, except by an authorized facility, as provided in § 180.212 of this subpart for the removal of surface corrosion.

(6) Chasing of cylinder threads to clean them is permitted, but removal of metal must not occur. Re-tapping of cylinder threads is not permitted, except by the original manufacturer, as provided in § 180.212 of this subpart.

(g) * * *

(3) Each day before retesting, the retester shall confirm, by using a calibrated cylinder or other method authorized in writing by the Associate Administrator, that:

(i) The pressure-indicating device (PID), as part of the retest equipment, is accurate within ±1.0% of the prescribed test pressure of any cylinder tested that day. The PID must meet Industrial Class 1 (±1.0% deviation from the end value) with a scale appropriate to the test pressure of the cylinder. The accuracy of the PID within the test system can be demonstrated at any point within 500 psig of the actual test pressure for test pressures at or above 3,000 psig, or 10% of the actual test pressure for test pressures below 3,000 psig.

(ii) The expansion-indicating device (EID), as part of the retest equipment, gives a stable reading of expansion and is accurate to ±1.0% of the total expansion of any cylinder tested or 0.1 cc, whichever is larger. The EID must be accurate (±1.0% deviation from the end value) of its full scale. The weigh scales must be capable of providing total expansion measurements to an accuracy of ±1.0% or 0.05 ounce (1.5 g), whichever is greater.

* * * * *

(h) * * *

(3) Unless the cylinder is repaired or rebuilt in conformance with requirements in § 180.211of this subpart, it may not be filled with a hazardous material and offered for transportation where use of a specification packaging is required.

* * * * *

(i) * * *

(1) * * *

(viii) For an aluminum or an aluminum-lined composite special permit cylinder, the cylinder is known to have been or shows evidence of having been overheated. Arc burns must be considered evidence of overheating.

(ix) The cylinder is known to have been or shows evidence of having been over-pressurized.

(x) For a cylinder with a specified service life, its authorized service life has expired.

(xi) The cylinder has been stamped on the sidewall, except as provided in part 178 of this subchapter.

(2) When a cylinder must be condemned, the requalifier must—

(i) Communicate condemnation of the cylinder as follows: (A) Stamp a series of X's over the DOT-specification number and the marked pressure or stamp ''CONDEMNED'' on the shoulder, top head, or neck using a steel stamp;

(B) For composite cylinders, securely affix to the cylinder a label with the word ''CONDEMNED'' overcoated with epoxy near, but not obscuring, the original cylinder manufacturer's label; or

(C) As an alternative to the stamping or labeling as described in this paragraph (i)(2), at the direction of the owner, the requalifier may render the cylinder incapable of holding pressure; and

(ii) Notify the cylinder owner, in writing, that the cylinder is condemned and may not be filled with hazardous material and offered for transportation in commerce where use of a specification packaging is required.

(3) No person may remove, obliterate, or alter the required condemnation communication of paragraph (i)(2) of this section.

(j) *Training materials.* Training materials (such as CGA C–1.1; see § 171.7, Table I of this subchapter) may be used for training persons who requalify cylinders using the volumetric expansion test method.

■ 46. In § 180.207, revise paragraphs (a)(3), (b)(2), (c) introductory text, (d) introductory text, (d)(1), and (d)(3) to read as follows:

§ 180.207 Requirements for requalification of UN pressure receptacles.

(a) * * *

(3) A pressure receptacle with a specified service life may not be requalified after its authorized service life has expired, but must be condemned in accordance with § 180.205(i)(x) of this subpart.

(b) * * *

(2) Each pressure receptacle that fails requalification must be condemned in conformance with § 180.205(i) of this subpart or the applicable ISO requalification standard.

* * * * *

(c) *Requalification interval.* Each UN pressure receptacle that becomes due for periodic requalification must be requalified at the interval specified in the following table before it is filled:

* * *

* * * * *

(d) *Requalification procedures.* Each UN pressure receptacle must be requalified in conformance with the procedures contained in the following standards, as applicable. Furthermore, when a pressure test is performed on a UN pressure receptacle, the test must be a water jacket volumetric expansion test suitable for the determination of the cylinder expansion or a hydraulic proof pressure test. The test equipment must conform to the accuracy requirements in § 180.205(g) of this subpart. Alternative methods (*e.g.,* acoustic emission) or requalification procedures may be

performed if prior approval has been obtained in writing from the Associate Administrator.

(1) *Seamless steel:* Each seamless steel UN pressure receptacle, including MEGC's pressure receptacles exceeding 150 L capacity, must be requalified in conformance with ISO 6406 (IBR, *see* § 171.7 of this subchapter). However, UN cylinders with a tensile strength greater than or equal to 950 MPa must be requalified by ultrasonic examination in conformance with ISO 6406.

* * * * *

(3) *Dissolved acetylene UN cylinders:* Each dissolved acetylene cylinder must be requalified in conformance with ISO 10462 (IBR, *see* § 171.7 of this subchapter). The porous mass and the shell must be requalified no sooner than five (5) years and no later than ten (10) years from the date of manufacture. Thereafter, subsequent requalifications of the shell must be performed at least once every ten (10) years.

* * * * *

■ 47. In § 180.209, revise paragraphs (a), (b), (c), (e), (g), (l)(1) and (m) to read as follows:

§ 180.209 Requirements for requalification of specification cylinders.

(a) *Periodic qualification of cylinders.* Each specification cylinder that becomes due for periodic requalification, as specified in the following table, must be requalified and marked in conformance with the requirements of this subpart before it is filled. Requalification records must be maintained in conformance with § 180.215 of this subpart. Table 1 follows:

TABLE 1—REQUALIFICATION OF CYLINDERS

Specification under which cylinder was made	Minimum test pressure (psig) [1]	Requalification period (years)
DOT 3	3000 psig	5.
DOT 3A, 3AA	5/3 times service pressure, except noncorrosive service (*see* § 180.209(g)).	5, or 12 (*see* § 180.209(b), (f), (h), and (j)).
DOT 3AL[2]	5/3 times service pressure	5, or 12 (*see* §§ 180.209(j) and (m)).
DOT 3AX, 3AAX	5/3 times service pressure	5
3B, 3BN	2 times service pressure (*see* § 180.209(g))	5 or 10 (*see* § 180.209(f)).
3E	Test not required.	
3HT	5/3 times service pressure	3 (*see* §§ 180.209(k) and 180.213(c)).
3T	5/3 times service pressure	5.
4AA480	2 times service pressure (*see* § 180.209(g))	5 or 10 (*see* § 180.209(h)).
4B, 4BA, 4BW, 4B–240ET	2 times service pressure, except non-corrosive service (*see* § 180.209(g)).	5, 10, or 12 (*see* § 180.209(e), (f), and (j)).
4D, 4DA, 4DS	2 times service	5.
DOT 4E	2 times service pressure, except non-corrosive (*see* § 180.209(g)).	5 or 10 ((see §§ 180.209(e)).
4L	Test not required.	
8, 8AL		10 or 20 (*see* § 180.209(i)).
Exemption or special permit cylinder	See current exemption or special permit	See current exemption or special permit.
Foreign cylinder (*see* § 173.301(j) of this subchapter for restrictions on use).	As marked on cylinder, but not less than 5/3 of any service or working pressure marking.	5 (*see* §§ 180.209(l) and 180.213(d)(2)).

[1] For cylinders not marked with a service pressure, see § 173.301a(b) of this subchapter.
[2] For special permit (or exemption) aluminum cylinders marked DOT 3AL, see § 173.23(c) of this subchapter.

(b) *DOT 3A or 3AA cylinders.* (1) A cylinder conforming to specification DOT 3A or 3AA with a water capacity of 56.7 kg (125 pounds) or less may be marked with a star and requalified every 10 years instead of every 5 years, provided the cylinder conforms to all of the following conditions:

(i) The cylinder is used exclusively for air; argon; cyclopropane; ethylene; helium; hydrogen; krypton; neon; nitrogen; nitrous oxide; oxygen; sulfur hexafluoride; xenon; chlorinated hydrocarbons, fluorinated hydrocarbons, liquefied hydrocarbons, and mixtures thereof that are commercially free from corroding components; permitted mixtures of these gases (*see* § 173.301(d) of this subchapter); and permitted mixtures of these gases with up to 30 percent by volume of carbon dioxide, provided the gas has a moisture content less than 55 ppm.

(ii) The cylinder is not used in any cascade, bank, group, rack or vehicle. The cylinder is not used in self-contained underwater breathing apparatus (SCUBA), self-contained breathing apparatus (SCBA), or in an emergency respirator.

(iii) The permanent expansion does not exceed 5 percent of the total expansion.

(iv) The results of the hydrostatic test meet one of the following requirements:

(A) The elastic expansion does not exceed the manufacturer's marked rejection elastic expansion (REE) limit on the cylinder;

(B) The elastic expansion does not exceed the applicable rejection limit tabulated in CGA C–5 (IBR, *see* § 171.7 of this subchapter); or

(C) Either the average wall stress or the maximum wall stress does not exceed the corresponding wall stress limitation determined by computing the REE limit in conformance with CGA C–5.

(v) The cylinder is dried immediately after hydrostatic testing to remove all traces of water.

(vi) The cylinder is stamped with a five-pointed star at least one-fourth of an inch high immediately following the test date to indicate compliance with this paragraph (b)(1).

(2) If a cylinder has not been used exclusively for the gases specifically identified in paragraph (b)(1)(i) of this section, but currently conforms with all other provisions of paragraph (b)(1) of this section, it may be requalified every 10 years instead of every 5 years, only after the cylinder has been retested, marked, and placed into exclusive use and gas service in compliance with paragraph (b)(1) of this section.

(3) If, at any time, a cylinder marked with a five-pointed star is used in a manner other than as specified in paragraph (b)(1) of this section, the star following the most recent test date must be obliterated. The cylinder must be requalified within five years from the

marked test date, or if the required five-year requalification period has passed, the cylinder must be requalified prior to the first filling with a compressed gas.

(c) *DOT 4-series cylinders.* A DOT 4-series cylinder, except a 4L cylinder, that at any time shows evidence of a leak, internal or external corrosion, denting, bulging or rough usage to the extent that it is likely to be weakened appreciably, or that has lost 5 percent or more of its official tare weight must be requalified before being refilled and offered for transportation. [Refer to CGA C–6 or C–6.3 (IBR, *see* § 171.7 of this subchapter), as applicable, regarding cylinder weakening.] After testing, the actual tare weight must be recorded as the new tare weight on the test report and marked on the cylinder. The previous tare weight must be strike-lined through, but not obliterated.

* * * * *

(e) *Proof pressure test.* A cylinder made in conformance with DOT Specifications 4B, 4BA, 4BW, or 4E protected externally by a suitable corrosion-resistant coating and used exclusively for non-corrosive gas that is commercially free from corroding components may be requalified by volumetric expansion testing or proof pressure testing every 10 years instead of every 5 years. However, a cylinder used for reclaiming, recycling, or recovering refrigerant gases must be requalified by volumetric expansion testing every 5 years. Reclaimed, recycled, or recovered refrigerant gases are considered to be corrosive due to contamination. When subjected to a proof pressure test, as prescribed in CGA C–1 (IBR, see § 171.7 of this subchapter) and consistent with the applicable specification testing requirement in Part 178 of this subchapter, the cylinder must be carefully examined under test pressure and removed from service if a leak or defect is found.

* * * * *

(g) *Visual inspections.* A cylinder conforming to a specification listed in the table in this paragraph and used exclusively in the service indicated may, instead of a periodic hydrostatic test, be given a complete external visual inspection at the time periodic requalification becomes due. External visual inspection must be in conformance with CGA C–6 or C–6.3, as applicable (IBR, *see* § 171.7 of this subchapter). When this inspection is used instead of hydrostatic testing, subsequent inspections are required at five-year intervals after the first inspection. Inspections must be made only by persons holding a current RIN and the results recorded and maintained in conformance with § 180.215 of this subpart. Records must include: date of inspection (month and year); DOT-specification number; cylinder identification (registered symbol and serial number, date of manufacture, and owner); type of cylinder protective coating (including statement as to need of refinishing or recoating); conditions checked (*e.g.,* leakage, corrosion, gouges, dents or digs in shell or heads, broken or damaged footring or protective ring or fire damage); and disposition of cylinder (returned to service, returned to cylinder manufacturer for repairs or condemned). A cylinder passing requalification by the external visual inspection must be marked in conformance with § 180.213 of this subpart. Specification cylinders must be in exclusive service as shown in the following table:

Cylinders conforming to—	Used exclusively for—
DOT 3A, DOT 3AA, DOT 3A480X, DOT 4AA480	Anhydrous ammonia of at least 99.95% purity.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW.	Butadiene, inhibited, that is commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 3B, DOT 4AA480, DOT 4B, DOT 4BA, DOT 4BW.	Cyclopropane that is commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E.	Chlorinated hydrocarbons and mixtures thereof that are commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E.	Fluorinated hydrocarbons and mixtures thereof that are commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E.	Liquefied hydrocarbon gas that is commercially free of corroding components.
DOT 3A, DOT 3AA, DOT 3A480X, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E.	Liquefied petroleum gas that meets the detail requirements limits in Table 1 of ASTM 1835, Standard Specification for Liquefied Petroleum (LP) Gases or an equivalent standard containing the same limits.
DOT 3A, DOT 3AA, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Methylacetylene-propadiene, stabilized, that is commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Methylacetylene-propadiene, stabilized, that is commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW, DOT 4E	Propylene that is commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW	Anhydrous mono, ditrimethylamines that are commercially free from corroding components.
DOT 4B240, DOT 4BW240	Ethyleneimine, stabilized.
DOT 4BW	Alkali metal alloys, liquid, n.o.s., Alkali metal dispersions or Alkaline earth metal dispersions, Potassium, Potassium Sodium alloys and Sodium that are commercially free of corroding components.

* * * * *

(j) *Cylinder used as a fire extinguisher.* Only a DOT-specification cylinder used as a fire extinguisher in conformance with § 173.309(a) of this subchapter may be requalified in conformance with this paragraph (j).

(1) A DOT 4B, 4BA, 4B240ET or 4BW cylinder used as a fire extinguisher may be tested as follows:

(i) For a cylinder with a water capacity of 5.44 kg (12 pounds) or less, by the water-jacket, direct expansion or proof pressure test methods as prescribed in CGA C–1 (IBR, see § 171.7 of this subchapter). A requalification must be performed by the end of 12 years after the original test date and at 12-year intervals thereafter.

(ii) The testing procedures, calibration of the testing equipment, accuracy of the pressure indicating device, accuracy of the testing equipment must be as prescribed in CGA C–1.

(iii) Each cylinder must be tested to a minimum of two (2) times service pressure.

(iv) When testing using the water-jacket or direct expansion test method, the minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

(v) The permanent volumetric expansion may not exceed 10 percent of total volumetric expansion at test pressure.

(vi) When testing using the proof pressure test method, the minimum test pressure must be maintained for a specific time frame as prescribed in CGA C–1. Any internal pressure applied prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

(vii) When subjected to a proof pressure test, the cylinder must be carefully examined under test pressure and removed from service if a leak or defect is found.

(2) For a cylinder having a water capacity over 5.44 kg (12 pounds), by the water-jacket, direct expansion or proof pressure test methods as prescribed in CGA C–1. For the water-jacket or direct expansion test, the requalification must be performed by the end of 12 years after the original test date and at 12-year intervals theafter. For the proof-pressure test, a requalification must be performed by the end of 12 years after the original test date and at seven (7) year intervals.

(ii) The testing procedures, calibration of the testing equipment, accuracy of the pressure indicating device, and accuracy of the testing equipment must be as prescribed in CGA C–1.

(iii) Each cylinder must be tested to a minimum of two (2) times service pressure.

(iv) When testing using the water-jacket or direct expansion test method, the minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

(v) The permanent volumetric expansion may not exceed 10 percent of total volumetric expansion at test pressure. For DOT 4E cylinders, the permanent volumetric expansion may not exceed 12 percent of total volumetric expansion at test pressure.

(vi) When testing using the proof pressure test method, the minimum test pressure must be maintained for a specific timeframe as prescribed in CGA C–1 (IBR, see § 171.7 of this subchapter). Any internal pressure applied prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

(vii) When subjected to a proof pressure test, the cylinder must be carefully examined under test pressure and removed from service if a leak or defect is found.

(3) A DOT 3A, 3AA, or 3AL cylinder must be requalified by:

(i) The water-jacket or direct expansion method. A requalification must be performed 12 years after the original test date and at 12-year intervals thereafter.

(ii) The testing procedures, calibration of the testing equipment, accuracy of the pressure indicating device, accuracy of the testing equipment must be as prescribed in CGA C–1.

(iii) Each cylinder must be tested to a minimum of $\frac{5}{3}$ times service pressure.

(iv) When testing using the water-jacket or direct expansion test method, the minimum test pressure must be maintained at least 30 seconds and sufficiently longer to ensure complete expansion. Any internal pressure applied prior to the official test may not exceed 90 percent of the test pressure. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated at a pressure increased by 10 percent or 100 psig, whichever is lower.

(v) The permanent volumetric expansion may not exceed 10 percent of total volumetric expansion at test pressure. For DOT 4E cylinders, the permanent volumetric expansion may not exceed 12 percent of total volumetric expansion at test pressure.

* * * * *

(l) * * *

(1) It has been inspected, tested and marked in conformance with the procedures and requirements of this subpart or the Associate Administrator has authorized the filling company to fill foreign cylinders under an alternative method of qualification; and

* * * * *

(m) *DOT–3AL cylinders manufactured of 6351–T6 aluminum alloy.* In addition to the periodic requalification and marking described in § 180.205 of this subpart, each cylinder manufactured of aluminum alloy 6351–T6 with a marked service pressure equal to or exceeding 1,800 psi must be requalified and inspected for sustained load cracking in conformance with the non-destructive examination method described in the following table. A cylinder with cracks must be condemned in conformance with § 180.205(i) of this subpart.

REQUALIFICATION AND INSPECTION OF DOT–3AL CYLINDERS MADE OF ALUMINUM ALLOY 6351–T6

Requalification requirement	Examination procedure [1]	Sustained Load Cracking Condemnation Criteria [2]	Requalification period (years)
Eddy current examination combined with visual inspection.	Eddy current—In conformance with appendix C of this part. Visual inspection—In conformance with CGA C–6.1 (IBR; *see* § 171.7 of this subchapter).	Any crack in the neck of 2 thread lengths or more.	5

[1] The requalifier performing eddy current must be familiar with the eddy current equipment and must standardize (calibrate) the system in accordance with the requirements provided in appendix C to this part.

[2] The eddy current must be applied from the inside of the cylinder's neck to detect any sustained load cracking that has expanded into the neck threads.

(1) *Examination procedure.* Each facility performing eddy current examination with visual inspection must develop, update, and maintain a written examination procedure applicable to the test equipment it uses to perform eddy current examinations.

(2) *Visual examinations.* Visual examinations of the neck and shoulder area of the cylinder must be conducted in conformance with CGA C–6.1 (IBR, *see* § 171.7 of this subchapter).

(3) *Condemnation criteria.* A cylinder must be condemned if the eddy current examination combined with visual examination reveals any crack in the neck of two thread lengths or more, or if visual inspection reveals any crack in the neck or shoulder area.

■ 48. In § 180.211, revise paragraphs (c) and (e)(1) to read as follows:

§ 180.211 Repair, rebuilding and reheat treatment of DOT–4 series specification cylinders.

* * * * *

(c) *Additional requirements for the repair or recondition of a DOT–4L cylinder.* (1) Repairs to a DOT–4L welded insulated cylinder must be performed in conformance with paragraphs (a) and (b) of this section with the exception that other welding procedures permitted by CGA C–3 (IBR, *see* § 171.7 of this subchapter), and not excluded by the definition of ''rebuild,'' are authorized. DOT 4L cylinders must meet additional requirements for repair specified in § 180.211(c), including being pressure-tested in conformance with the specifications under which the cylinder was originally manufactured. DOT 4L cylinders that undergo procedures not defined as a repair in § 180.203 are not subject to the requirements of § 180.211(c), including the requirement to be pressure-tested in conformance with the specifications under which the cylinder was originally manufactured.

(2) After repair, the cylinder must be—

(i) Pressure tested in accordance with the specifications under which the cylinder was originally manufactured;

(ii) Leak tested before and after assembly of the insulation jacket using a mass spectrometer detection system; and

(iii) Tested for heat conductivity requirements.

(3) Reconditioning of a DOT 4L welded insulated cylinder must be performed in accordance with paragraphs (a) and (b) of this section. Reconditioning applies to the work other than repair as described in paragraphs (c)(1) and (c)(2) of this section and that work is performed on parts other than the inner containment vessel (cylinder). Work to recondition a DOT 4L welded insulated cylinder includes the following:

(i) The removal of either end of the insulation jacket.

(ii) The replacement of the neck tube. At least a 13 mm (0.51 inch) piece of the original neck tube must be protruding above the cylinder's top end. The original weld attaching the neck tube to the cylinder must be sound, and the replacement neck tube must be welded to this remaining piece of the original neck tube.

(iii) The replacement of material such as, but not limited to, the insulating material and the piping system within the insulation space with materials that are identical to those used in the original manufacture of the cylinder.

(4) After reconditioning as described in paragraph (c)(3) of this section, the welded cylinder must be:

(i) Pneumatically leak tested, to the closure point of all piping and gauging systems, to 90% of the service pressure or the relief valve set point, whichever is less;

(ii) Leak tested before and after assembly of the insulation jacket using a mass spectrometer detection system; and

(iii) Tested for heat conductivity requirements.

* * * * *

(e) * * *

(1) The rebuilding of a DOT 4L welded insulated cylinder must be performed in conformance with paragraph (d) of this section. DOT–4 series cylinders requiring rebuild (*e.g.,* when the inner vessel is compromised), as defined in § 180.203, must do so in conformance with § 180.211. DOT 4L cylinders which undergo procedures that are not defined as a rebuild in § 180.203 are not subject to the requirements of § 180.203(e). Rebuilding of a DOT–4L welded insulated cylinder also includes:

(i) Substituting or adding material in the insulation space not identical to that used in the original manufacture of that cylinder, or

(ii) Making a weld repair not to exceed 150 mm (5.9 inches) in length on the longitudinal seam of the cylinder or 300 mm (11.8 inches) in length on a circumferential weld joint of the cylinder.

* * * * *

■ 49. In § 180.212, add paragraph (a)(3) to read as follows:

§ 180.212 Repair of seamless DOT 3-series specification cylinders and seamless UN pressure receptacles.

(a) * * *

(3) If grinding is performed on a DOT 3-series cylinder or a seamless UN pressure receptacle, the following conditions apply after grinding has been completed. Grinding must not be used to remove arc burns from a cylinder as such a cylinder must be condemned:

(i) Ultrasonic examination must be conducted to ensure that the wall thickness is not less than the minimum design requirement. The wall thickness must be measured in at least 3 different areas for every 10 square inches of grinding area.

(ii) The cylinder must be requalified in conformance with § 180.205 of this subpart.

(iii) The cylinder must be marked in accordance with § 180.213(f)(10) of this subpart to indicate compliance with this paragraph (a)(3).

* * * * *

■ 50. In § 180.213, revise paragraphs (c) and (d)(2), and add paragraphs (f)(10), (f)(11), and (g) to read as follows:

§ 180.213 Requalification markings.

* * * * *

(c) *Requalification marking method.* (1) The depth of requalification markings may not be greater than specified in the applicable specification. The markings must be made by stamping, engraving, scribing or other method that produces a legible, durable mark.

(i) Requalification marks must begin at the top of the space provided, immediately to the right of the original manufacture date of the cylinder, as space allows. Subsequent retest dates must go immediately below the previous date, continuing down in sequential order to the bottom of the shoulder or area provided for marking. Retest marks must proceed further in columns to the right of the last column markings.

(ii) Except as provided in part 178 of this subchapter, stamping on the sidewall is prohibited.

(2) A cylinder used as a fire extinguisher (§ 180.209(j) of this subpart) may be marked by using a pressure sensitive label.

(3) For a DOT 3HT cylinder, when stamped, the test date and RIN must be applied by low-stress steel stamps to a depth no greater than that prescribed at the time of manufacture. Stamping on the sidewall is not authorized.

(4) For a composite cylinder, the requalification markings must be applied on a pressure sensitive label, securely affixed and overcoated with epoxy in a manner prescribed by the cylinder manufacturer, near the original manufacturer's label. Stamping of the composite surface is not authorized.

(d) * * *

(2) A cylinder subject to the requirements of § 171.23(a)(4) of this subchapter must be marked with the date and RIN in accordance with this paragraph (d) and paragraph (f)(11) of this section, or marked in accordance with the requalification authorized by the Associate Administrator in accordance with § 171.23(a)(4)(i) of this subchapter.

* * * * *

(f) * * *

(10) For designation of grinding with ultrasonic wall thickness examination, the marking is as illustrated in paragraph (d) of this section, except the ''X'' is replaced with the letter ''R''.

(11) For designation of requalification of a foreign cylinder requalified in conformance with §§ 171.23(a)(4) and 180.209(l) of this subchapter, the marking is as illustrated in paragraph (d) of this section, except that the ''X'' is replaced with the letters ''EX''.

(g) *Visual inspection requalification markings.* Alternative to the marking requirements of paragraph (d) and (f)(5) of this section, each cylinder successfully passing a visual inspection only, in accordance with § 180.209(g) of this subpart, may be marked with the visual inspection number (*e.g.,* V123456) issued to a person performing visual inspections. An example of the manner in which the markings may be applied is as follows:

V123 03 14E 654 0314 E V123456	V123456 0314 E V123456 0314E

Where:

''03'' is the month of requalification (the additional numeral ''0'' is optional'')
''V123456'' is the RIN
''14'' is the year of requalification; and
''E'' to indicate visual inspection

■ 51. In § 180.215, revise paragraph (b) and (c)(2)(vii), and add (c)(3) to read as follows:

§ 180.215 Reporting and record retention requirements.

* * * * *

(b) *Requalification records.* Daily records of visual inspection, pressure test, eddy current examination if required, and ultrasonic examination if permitted under a special permit, as applicable, must be maintained by the person who performs the requalification until either the expiration of the requalification period or until the cylinder is again requalified, whichever occurs first. A single date may be used for each test sheet, provided each test on the sheet was conducted on that date. Ditto marks or a solid vertical line may be used to indicate repetition of the preceding entry for the following entries only: date; actual dimensions; manufacturer's name or symbol, if present; owner's name or symbol, if present; and test operator. Blank spaces may not be used to indicate repetition of a prior entry. A symbol may be used for the actual dimensions if there is a reference chart available at the facility that lists the actual dimensions of every symbol used. The records must include the following information:

(1) *Calibration test records.* For each test to demonstrate calibration, the date; serial number of the calibrated cylinder; calibration test pressure; total, elastic and permanent expansions; and legible identification of test operator. The test operator must be able to demonstrate that the results of the daily calibration verification correspond to the hydrostatic tests performed on that day. The daily verification of calibration(s) may be recorded on the same sheets as, and with, test records for that date, or may be recorded on a separate sheet.

(2) *Pressure test and visual inspection records.* The date of requalification; serial number; DOT-specification or special permit number; marked pressure; actual dimensions; manufacturer's name or symbol, if present; date of manufacture; owner's name or symbol, if present; gas service; result of visual inspection; actual test pressure; total, elastic and permanent expansions; percent permanent expansion; disposition, with reason for any repeated test, rejection or condemnation; and legible identification of test operator. For each cylinder marked pursuant to § 173.302a(b)(5) of this subchapter, the test sheet must indicate the method by which any average or maximum wall stress was computed. Records must be kept for all completed, as well as unsuccessful tests. The entry for a repeated test must indicate the date of the earlier test, if conducted on a different day.

(3) *Wall stress.* Calculations of average and maximum wall stress pursuant to §§ 173.302a(b)(3) and 180.209(b)(1) of this subchapter, if performed.

(4) *Calibration certificates.* The most recent certificate of calibration must be maintained for each calibrated cylinder, pressure indicating device, and expansion indicating device.

(5) *Eddy current examination records.* (i) Records of eddy current inspection equipment must contain the following information:

(A) Equipment manufacturer, model number, and serial number.

(B) Probe description and unique identification (*e.g.,* serial number, part number, etc.).

(C) Specification of each standard reference ring used to perform the eddy current examination.

(ii) Eddy current examination records must contain the following information:

(A) DOT-specification or special permit number of the cylinder; manufacturer's name or symbol; owner's name or symbol, if present; serial number, and date of manufacture.

(B) Identification of each standard reference ring used to perform the eddy current examination.

(C) Name of test operator performing the eddy current examination.

(D) Date of eddy current examination.

(E) Acceptance/condemnation results (*e.g.,* pass or fail).

(F) Retester identification number.

(c) * * *

(2) * * *

(vii) Results of a test on a cylinder, including test method, test pressure, total expansion, permanent expansion, elastic expansion, percent permanent expansion (permanent expansion may not exceed ten percent (10 percent) of total expansion), and volumetric capacity (volumetric capacity of a rebuilt cylinder must be within ±3 percent of the calculated capacity);

* * * * *

(3) A record of grinding and ultrasonic examination in conformance with § 180.212(a)(3) of this subpart must be completed for each cylinder on which grinding is performed. The record must be clear, legible, and contain the following information:

(i) Name and address of the test facility, date of test report, and name or original manufacturer;

(ii) Marks stamped on cylinder to include specification number, service pressure, serial number, symbol of manufacturer, and date of manufacture;

(iii) Cylinder outside diameter and length in inches;

(iv) Detailed map of where the grinding was performed on the cylinder; and

(v) Wall thickness measurements in grind area in conformance with § 180.212(a)(3)(i).

* * * * *

■ 52. In appendix C to part 180, the heading and paragraph 1 are revised to read as follows:

APPENDIX C TO PART 180—EDDY CURRENT EQUIPMENT REQUIREMENTS FOR INSPECTION OF DOT 3AL CYLINDERS MANUFACTURED OF ALUMINUM ALLOY 6351–T6

1. *Equipment calibration.* Each facility performing an eddy current examination must develop, update, and maintain a written calibration procedure applicable to the test equipment it uses to perform eddy current examinations.

* * * * *

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William Schoonover,

Acting Associate Administrator for Hazardous Materials Safety, Pipeline and Hazardous Materials Safety Administration.

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