DEPARTMENT OF TRANSPORTATION

Pipeline and Hazardous Materials Safety Administration

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

[Docket No. PHMSA–2011–0140 (HM–234)]

RIN 2137–AE80

Hazardous Materials: Miscellaneous Amendments Pertaining to DOT-Specification Cylinders

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

ACTION: Final rule.

SUMMARY: PHMSA is amending the Hazardous Materials Regulations (HMR) 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 agency review of compressed gas cylinder regulations. Specifically, PHMSA is incorporating by reference or updating the references to several Compressed Gas Association publications, amending the filling requirements for compressed and liquefied gases, expanding the use of salvage cylinders, and revising and clarifying the manufacture and requalification requirements for cylinders.

DATES:

Effective date: January 27, 2021.

Incorporation by reference date: The incorporation by reference of certain publications listed in this rule is approved by the Director of the Federal Register as of January 27, 2021. The incorporation by reference of other publications listed in this rule were previously approved by the Director of the Federal Register as of January 1, 2004 (ASTM E 8–99 and Welding Aluminum: Theory and Practice, Fourth Edition) and May 11, 2020 (Transport Canada TDG Regulations).

Compliance Date: Unless otherwise specified, compliance with the amendments adopted in this final rule is required beginning December 28, 2021.

FOR FURTHER INFORMATION CONTACT: Eamonn Patrick, 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) or other hazardous materials and offered for transportation must comply with various requirements 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 repair, maintenance, and periodic requalification of cylinders. Additionally, cylinders must meet other requirements in the HMR, such as regulations that address the modal requirements on cylinders in transportation including general handling, loading, unloading, and stowage.

PHMSA (also referred to herein as ''we'' or ''us''), in response to petitions for rulemaking submitted by stakeholders and an Agency initiated review of the regulations, is making 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; and revising and clarifying the manufacture and requalification requirements for cylinders. This final rule is also presenting minor and miscellaneous regulatory editorial corrections. These revisions are collectively intended to result in a net reduction of regulatory burdens while maintaining or enhancing the existing level of safety of hazardous materials transported in cylinders. Based on the regulatory impact analysis conducted in support of this final rule, PHMSA estimates that adoption of this final rule will result in net cost savings of approximately $.70 million over 10 years, or $70,000 annualized (undiscounted).

II. ANPRM Background

On May 29, 2012, PHMSA published an Advance Notice of Proposed Rulemaking (ANPRM) to obtain public comment from those likely to be affected by the possible adoption of ten petitions for rulemaking and three special permits (SP) into the HMR (77 FR 31551). Commenters included cylinder manufacturers, 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. The ANPRM proposed adopting the petitions for rulemaking and special permits to 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 a 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 supportive for all of the petitions, with the exception of P–1515. PHMSA received four comments regarding the 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 COMMENT DOCKET NO.

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 (CGA)	PHMSA–2011–0140–0005
	PHMSA–2011–0140–0012
	PHMSA–2011–0140–0013
	PHMSA–2011–0140–0020
Council on Safe Transportation of Hazardous Articles, Inc. (COSTHA)	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

Please see the HM–234 notice of proposed rulemaking (NPRM) published on July 26, 2016 (81 FR 48978) for a detailed discussion of comments made to the ANPRM.

III. NPRM Background

On July 26, 2016, PHMSA published an NPRM to obtain public comment on changes proposed to the HMR (81 FR 48978). The NPRM addressed 20 total petitions, one special permit, and several PHMSA-initiated editorial changes intended to clarify HMR requirements. After publication of the NPRM, PHMSA received comments from 44 stakeholders on the proposed changes. A table of commenters is shown in Table 2 below:

TABLE 2—NPRM COMMENTERS AND ASSOCIATED COMMENT DOCKET NO.

Company	Docket ID No.
Alaska Airlines	PHMSA–2011–0140–0036
Amerex	PHMSA–2011–0140–0061
AmeriGas Propane, L.P	PHMSA–2011–0140–0066
Amtrol	PHMSA–2011–0140–0063
	PHMSA–2011–0140–0058
Bancroft Hinchey Inc	PHMSA–2011–0140–0071
Compressed Gas Association (CGA)	PHMSA–2011–0140–0052
Council on Safe Transportation of Hazardous Articles (COSTHA)	PHMSA–2011–0140–0083
CTC (Certified Training Co.)	PHMSA–2011–0140–0057
	PHMSA–2011–0140–0042
Danko Emergency Equipment Co	PHMSA–2011–0140–0044
Dow Chemical Company	PHMSA–2011–0140–0060
Entegris	PHMSA–2011–0140–0082
FIBA	PHMSA–2011–0140–0074
	PHMSA–2011–0140–0041
Fike Corporation	PHMSA–2011–0140–0077
Fire Suppression Systems Association (FSSA)	PHMSA–2011–0140–0047
Firehouse Hydro Sales and Service	PHMSA–2011–0140–0067
Ford Motor Company	PHMSA–2011–0140–0055
Galiso Incorporated	PHMSA–2011–0140–0062
Hidroprob S.A	PHMSA–2011–0140–0079
HMT Associates, LLC	PHMSA–2011–0140–0049
Honeywell	PHMSA–2011–0140–0084
Hydro-Test Products Inc	PHMSA–2011–0140–0033
Independent Cylinder Training (ICT)	PHMSA–2011–0140–0068
Janus Fire Systems	PHMSA–2011–0140–0069
Kidde-Fenwal, Inc	PHMSA–2011–0140–0065
Manchester Tank	PHMSA–2011–0140–0050
Wesley Scott	PHMSA–2011–0140–0080
Chart, Inc	PHMSA–2011–0140–0078
Guardian Services, Inc	PHMSA–2011–0140–0072
Joshua Blake	PHMSA–2011–0140–0059
Jeff Elliot	PHMSA–2011–0140–0043
David Felkins	PHMSA–2011–0140–0035
W Andrews	PHMSA–2011–0140–0034

TABLE 2—NPRM COMMENTERS AND ASSOCIATED COMMENT DOCKET NO.—Continued

Company	Docket ID No.
Katherine Bowman	PHMSA–2011–0140–0032
National Association of Fire Equipment Distributors	PHMSA–2011–0140–0053
National Propane Gas Association	PHMSA–2011–0140–0070
Noble Gas Solutions	PHMSA–2011–0140–0045
Northeast Pressure Vessel Testing	PHMSA–2011–0140–0046
Praxair	PHMSA–2011–0140–0073
Quality Safety Solutions, LLC	PHMSA–2011–0140–0040
Scuba Do	PHMSA–2011–0140–0081
Steve Gentry	PHMSA–2011–0140–0086
The Chemours Company FC, LLC	PHMSA–2011–0140–0054
Thunderbird Cylinder	PHMSA–2011–0140–0037
Worthington Cylinder	PHMSA–2011–0140–0064

Most comments addressed more than one change proposed in the NPRM. The comments are discussed below in the context of each petition or other proposed changes it addresses.

IV. Petitions for Rulemaking and Comments Received

Table 3 lists the petitions included in the docket for this proceeding. The NPRM addressed 20 total petitions. The table below provides the petition number, the petitioner's name, the docket number on *www.regulations.gov,* a summary of the request(s), the affected 49 CFR sections, whether PHMSA proposed to adopt the petition in the NPRM, and the decision to adopt, adopt in part, or not adopt the petition in this final rule.

TABLE 3—PETITION SUMMARY

Petition No.	Petitioner	Docket No.	Summary	Affected sections	Proposed to adopt?	Adopted?
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).	Proposed to adopt	Adopted.
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.	Proposed to adopt in part.	Adopted 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, and 180.215 and appendices C and E to part 180.	Proposed to adopt, except those changes not necessary because of incorporation by reference of CGA C–1 under P–1626.	Adopted in part.
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)	Proposed to adopt	n/a; addressed by another rulemaking.
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)	Not proposed to adopt	Not adopted.
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)	Not proposed to adopt	Not adopted.
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)	Proposed to adopt	Adopted.
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)	Proposed to adopt	Adopted in part.

TABLE 3—PETITION SUMMARY—Continued

Petition No.	Petitioner	Docket No.	Summary	Affected sections	Proposed to adopt?	Adopted?
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)	Not proposed to adopt. Addressed by revisions made under rulemaking HM–233F [81 FR 3635].	Not adopted.
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)	n/a; We asked for further comment.	Not adopted.
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.	Proposed to adopt, in part.	Adopted, 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'' for DOT 39 cylinders containing oxidizing gas transported by aircraft.	§§ 173.301(f)(4), 173.302(f)(2), 173.304(f)(2).	Proposed to adopt	Adopted.
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)	Proposed to adopt	Adopted.
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), 173.302a(c), 173.304a(e), 178.75(f).	Proposed to adopt	Adopted.
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)(1)	Proposed to adopt	Adopted.
P–1622	Worthington Cylinder.	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(a)(2) and (3)	Proposed to adopt	Adopted in part.
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.	Proposed to adopt	Adopted.
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.	Proposed to adopt	Adopted.

TABLE 3—PETITION SUMMARY—Continued

Petition No.	Petitioner	Docket No.	Summary	Affected sections	Proposed to adopt?	Adopted?
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.	Proposed to adopt	Adopted.
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 and 180.211(c) and (e).	Proposed to adopt	Not adopted.

P–1499

The Compressed Gas Association (CGA) submitted P–1499 requesting that PHMSA incorporate by reference the Tenth Edition of its publication C–6, dated 2005, *Standards for Visual Inspection of Steel Compressed Gas Cylinders* (CGA C–6), replacing the Seventh Edition, and update the appropriate references throughout the HMR. The Tenth Edition of the CGA C–6 provides enhanced guidance for cylinder requalifiers—including guidance on the inspection of Multiple-Element Gas Containers (MEGCs) and thread inspection for cylinders used in corrosive gas service—and clarifies maximum allowable depths and measuring techniques for various types of corrosion.

PHMSA agrees that the CGA C–6 Tenth Edition provides improved and updated guidance on inspecting MEGCs. After the submission of this petition, the Eleventh Edition of the CGA C–6, dated 2013, was made available. PHMSA, therefore, proposed in the NPRM to update the incorporated by reference version of CGA C–6 to the Eleventh Edition. PHMSA determined that the changes from the Tenth to the Eleventh Editions were minor and improved safety, while not imposing any additional burdens on the regulated community.

Comments. Bancroft Hinchey, Worthington Cylinder, the National Association of Fire Equipment Distributors (NAFED) and CGA submitted comments supporting incorporation by reference of the Eleventh Edition of CGA C–6. Thunderbird Cylinder submitted a comment requesting revisions to CGA publication C–6.1, *Standards for Visual Inspection of High Pressure Aluminum Compressed Gas Cylinders* and CGA publication C–11, *Recommended Practices for Inspection of Compressed Gas Cylinders at Time of Manufacture.*

PHMSA response. In this final rule, PHMSA is incorporating by reference the Eleventh Edition of the CGA C–6, as proposed. The Tenth Edition of the CGA C–6 provides enhanced guidance for cylinder requalifiers—including guidance on the inspection of Multiple-Element Gas Containers (MEGCs) and thread inspection for cylinders used in corrosive gas service—and clarifies maximum allowable depths and measuring techniques for various types of corrosion. PHMSA has determined that the changes from the Tenth to the Eleventh Editions were minor and improved safety, while not imposing any additional burdens on the regulated community. The Eleventh edition of CGA C–6 is available for purchase online and will be available for public inspection at the Hazardous Material Information Center after publication of the final rule.

Thunderbird Cylinder's comment is beyond the scope of this rulemaking, but we encourage Thunderbird Cylinder or other interested parties to reach out to CGA regarding potential revisions to its publications and then, if warranted, to submit separate petitions for rulemaking requesting that PHMSA incorporate by reference the revised versions of CGA C–6.1 and C–11, respectively.

P–1501

CGA submitted P–1501 requesting that PHMSA revise the manufacturing requirements for DOT 4B, 4BA, 4BW, and 4E specification cylinders. CGA contends in their petition that the DOT 4-series welded cylinder manufacturing specification standards in the HMR are unclear in some respects and result in varied interpretations of what is required of manufacturers by both manufacturers and enforcement personnel. CGA states in the petition that their proposed changes do not present a significant economic impact to any single manufacturer or user, yet 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* (ISO 4706–1), which is referenced in the UN Model Regulations. The HMR currently incorporates ISO 4706–1 into § 178.71 as an authorized standard for the design and construction of UN pressure receptacles.

Comments. CGA submitted a comment reiterating their support for adoption of P–1501. Bancroft Hinchey submitted a comment supporting all proposed changes to the manufacturing specifications in §§ 178.36–178.70.

A summary of the specific changes proposed by P–1501, the comments received relative to the proposed changes, if any, and PHMSA's position and/or action 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.

Comments. We did not receive any comments regarding either proposal.

PHMSA response. The provision regarding materials manufactured outside the United States having a ladle analysis confirmed by a check analysis is not necessary because § 178.35(c)(2) requires inspectors to verify that 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. A cylinder made of material within specified tolerances is less susceptible to deterioration or failure from the wear and tear on a cylinder from pressure cycling and exposure to pressurized gases.

PHMSA, therefore, is adopting the requirement for manufacturers to maintain a record of intentionally added alloying elements, as proposed.

(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.

Given the added risk associated with pneumatic testing (*i.e.,* using pressurized gas for testing) and that there are suitable alternatives to determine whether a cylinder has a leak at the time of manufacture, PHMSA did not propose to permit the use of pneumatic proof pressure testing in the NPRM.

Comments. Fike Corporation, the National Propane Gas Association (NPGA), AmeriGas Propane, Amtrol, Worthington Cylinder (Worthington) and Manchester Tank (Manchester) submitted comments opposing PHMSA's decision to not permit the use of pneumatic proof pressure testing. Bancroft Hinchey and NAFED submitted comments supporting our decision to not permit the use of pneumatic proof pressure testing.

PHMSA response. This final rule allows manufacturers to conduct pneumatic proof pressure tests, when proof pressure tests are authorized in part 178, subpart C. PHMSA is convinced by the comments from Fike, NPGA, Amerigas, Amtrol, Worthington, and Manchester that manufacturers currently account for the additional risks created by pneumatic proof pressure testing. PHMSA would like to emphasize that pneumatic proof pressure test systems can present increased risks to test personnel due to the amount of energy stored in a cylinder filled to test pressure with a gas. This stored energy, if released due to a cylinder failure, is sufficient to cause serious injury or death. Manufacturers must take this risk into account and develop systems to prevent the death or injury of their employees in the event of a catastrophic cylinder rupture at test pressure. The use of additional safety equipment such as blast shields, test cages, etc., is advisable to prevent possible injury to testing personnel and equipment.

(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.

(a) Elongation Criteria

Fike Corporation submitted a comment requesting that we review the proposed revisions to the elongation criteria for specimens taken from DOT 4B, 4BA and 4BW cylinders under §§ 178.50, 178.51, and 178.61, based on its opinion that we should not revise the criteria at this time.

PHMSA response. We agree with Fike Corporation's comment that PHMSA should not revise the elongation criteria. In reviewing the proposed changes based on comments received, we solicited comment from Steve Gentry, the original submitter of the elongation criteria modification to CGA, to provide additional justification for changing the elongation requirement to 20 percent for all specimens, regardless of gauge length in making our final determination on the proposed language based on CGA's petition.

Mr. Gentry justified the requested change based on international harmonization and consistency with other elongation criteria calculations in the HMR. However, PHMSA does not believe these justifications warrant making the requested change. First, changing the elongation requirement will not assist in harmonizing with international standards at this time. A review of Transport Canada standard B339–18 shows that Canada has not revised cylinder manufacturing standards to require a 20 percent elongation for all specimens (*e.g.* see CSA B339–18 5.8.3). Second, we believe that changing the elongation criteria will introduce confusion to the detriment of compliance with no measurable safety benefit. Current elongation criteria are well understood in the industry and we do not believe we have enough information at this time to make the requested change.

Additionally, in response to Mr. Gentry's final justification, we do not believe that the current elongation criteria for two inch specimens conflicts with the ''24t'' formula in §§ 178.50(k)(2), 178.51(j)(2), and 178.61(k)(2). In §§ 178.50(k)(2), 178.51(j)(2), and 178.61(k)(2), cylinder manufacturers may choose to conduct elongation tests on cylinder specimens with a set length of eight inches or two inches with width not over 1.5 inches, or use a cylinder specimen with a gauge length of 24 times the thickness of the wall with width not over 6 times the thickness, commonly known as a ''24t'' gauge length. Cylinder specimens with a gauge length of 2 inches must achieve elongation of at least 40 percent, while all other gauge lengths (*i.e.,* the 24t gauge length) must achieve an elongation of at least 20 percent. Mr. Gentry identified several specific instances where a cylinder manufacturer utilizing the 24t gauge length option would use a calculated gauge length very close to 2 inches (*e.g.* a cylinder with a wall thickness of .0835 inches would, using the 24t formula, have a specimen 2.004 inches long) which would be subject to an elongation requirement of 20 percent, rather than the 40 percent requirement for a standard 2-inch gauge specimen. Mr. Gentry believes that the 20 percent elongation requirement for the 2.004 inch x .501-inch specimen calculated using the 24t method conflicts with the 40 percent elongation requirement for the 2 inch x 1½ inch specimen.

A direct elongation comparison between specimens with 24t gauge length (GL) x 6t wide, and 2″ GL x 1½″ width, however, is not valid because the load resisting cross-sectional areas are not the same even when nearly the same gauge lengths are used for both specimens. Essentially the ''24t'' gauge length specimen and the 2-inch specimen cannot be directly compared because their cross-sectional areas are different; therefore, it is correct to have different elongation criteria even when the ''24t'' specimen is very nearly 2 inches long. PHMSA acknowledges that there may be room for improvement of the DOT 4-series cylinder elongation criteria associated with the physical and flattening tests and plans to continue reviewing the criteria for possible changes.

(b) Non-Destructive Examination

Fike Corporation submitted an additional comment opposing the proposed requirement to examine circumferential welds in addition to longitudinal welds using radioscopic or radiographic examination under proposed § 178.61(f), indicating that it believes this is a significant change. Regarding Fike Corporation's comments on radioscopic or radiographic examination applicability, we agree.

The current requirements in § 178.61(d)(3)(ii) require radioscopic or radiographic examination of the longitudinal weld only, except in the case of spot radioscopy or radiography. It was not our intent to impose new weld radioscopy or radiography requirements in this final rule. Therefore, in this final rule we are modifying the requirements in § 178.61(d)(5) to clarify that radioscopic or radiographic examination of the circumferential weld is not required, except as part of spot radioscopy or radiography. Additionally, we are moving the proposed radiography examination language from § 178.61(f) to § 178.61(d)(5) in order to improve the organization of, and therefore, understanding of the section.

(c) Specimen Test Failure

In the NPRM, we proposed to amend the rejected cylinder paragraphs for 4B, 4BA and 4E cylinders to align them with the provisions for 4BW cylinders. Specifically, we proposed to add a provision to §§ 178.50(n), 178.51(m), and 178.68(m) that would allow two additional specimens to be selected from the same lot and subjected to the prescribed test. If either of the two specimens failed the test, the entire lot would be rejected.

No rationale was presented in P–1501 for this change. Moreover, we received no comments on these specific provisions. We do not believe that a change to cylinder rejection criteria is warranted at this time because we do not have enough supporting information to justify the change, and therefore we will not amend the rejected cylinder language in this final rule. We may consider this action in a future rulemaking.

(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.

We received no comments regarding this item and are adopting the revision as proposed.

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

We received no comments regarding this item and are adopting the addition as proposed.

(6) Determination of Expansion.

Related to P–1501, Worthington Cylinder submitted a comment requesting that we eliminate the requirement to determine expansion for non-spherical 4B, 4BA, and 4BW cylinders at time of manufacture. This comment is beyond the scope of this rulemaking. We encourage Worthington Cylinder or other interested parties to submit petitions on this issue.

(7) Correction.

In the review of the NPRM, PHMSA determined that we inadvertently replaced the word ''rejected'' with ''condemned'' in several places in §§ 178.50, 178.51, 178.61, and 178.68. This was not our intent. In this final rule, we will maintain the HMR's existing language for cylinders rejected during manufacture.

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. Part 180, subpart C includes 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. Many changes proposed in P–1515 were intended to align the requirements in part 180, subpart C with an industry standard for the requalification of gas cylinders known as CGA C–1, *Methods for Pressure Testing Compressed Gas Cylinders* (CGA C–1). CTC acknowledged that the preferred outcome would be to incorporate by reference CGA C–1 into part 180, subpart C, but the petitioner presented an option whereby PHMSA could adopt many of the provisions of CGA C–1 into the current structure of the HMR without incorporating CGA C–1.

Many of P–1515's proposed changes were only requested in the event that PHMSA chose not to adopt P–1626. P–1626 requested that PHMSA incorporate by reference CGA C–1 into part 180, subpart C. In the NPRM, PHMSA proposed to incorporate CGA C–1 (Eleventh Edition) into part 180, subpart C in addition to the numerous changes suggested by P–1515. CTC, along with numerous others, submitted extensive comments regarding this action. In this final rule, we will incorporate the Eleventh Edition of CGA C–1 for the requalification of compressed gas cylinders, which renders many of P–1515's proposed changes moot. Please see our discussion of P–1626 for additional discussion of CGA C–1 and revisions to the structure of part 180, subpart C.

(1) Comments Related to the Incorporation by Reference of CGA C–1

(a) Definitions

Certified Training Company (CTC) and Bancroft Hinchey submitted comments opposing our proposed inclusion of additional definitions for cylinder requalification terms in § 180.203, which were intended to bring the HMR into alignment with CGA C–1. CTC also suggested we delete other long-standing definitions in § 180.203 because they did not align with CGA C–1's definitions.

PHMSA response. We agree with CTC and Bancroft Hinchey's comments to remove the definitions of ''Accuracy,'' ''Accuracy grade,'' ''Actual test pressure,'' ''Calibrated cylinder,'' ''Defect,'' ''Elastic expansion,'' ''Error,'' ''Master gauge,'' ''Percent permanent expansion,'' ''Permanent expansion,'' ''Reference gauge,'' ''Rejected,'' ''Service pressure,'' ''Test pressure,'' ''Total expansion,'' ''Visual inspection,'' and ''Volumetric expansion test'' from § 180.203. We are incorporating by reference CGA C–1 into the HMR and these terms are all defined in this industry standard; thus, codification of the definitions in § 180.203 is redundant and this provides us an opportunity to reduce the size of the HMR. However, PHMSA has decided to keep the definition of ''condemn'' because § 180.205(i) will continue to discuss condemnation criteria in greater detail than CGA C–1 does and we believe maintaining the definition in § 180.203 will increase clarity for cylinder requalifiers.

(b) Incorporation of CGA C–1 Into § 180.205(g)

CTC and Bancroft Hinchey noted that the NPRM did not incorporate by reference CGA C–1 into § 180.205(g), which was PHMSA's stated intent in the NPRM preamble. Section 180.205(g) is a crucial paragraph for cylinder requalifications that contains instructions on how to conduct the pressure test that is used to requalify a cylinder for future use or condemn it. By incorporating CGA C–1 into § 180.205(g), we will require cylinder requalifiers to comply with the instructions in CGA C–1 when conducting pressure tests. These instructions offer more guidance and include helpful diagrams and examples that decrease compliance burdens compared to the current instructions in § 180.205(g).

PHMSA response. We agree with CTC and Bancroft Hinchey's comments. It was our intent to incorporate CGA C–1 for the requalification of DOT

specification cylinders, therefore, in this final rule we are including a reference to CGA C–1 (Eleventh Edition) in § 180.205(g).

(c) Streamlining of Existing Regulatory Text

CTC and CGA noted that since we proposed to adopt P–1626, there was an opportunity to streamline the HMR's cylinder requalification instructions significantly by revising § 180.205(g) to require compliance with CGA C–1, rather than maintaining the existing instructions for pressure tests. CTC and CGA commented that maintaining two sets of instructions would generate confusion and frustration.

PHMSA response. We agree with CTC and CGA's comments to revise existing § 180.205(g). This final rule removes the existing language in the HMR on conducting volumetric expansion testing from § 180.205(g) and replaces it with instructions to conduct requalification in accordance with CGA C–1. These revisions will help to reduce confusion and improve compliance without increasing burdens on the regulated community while meeting our stated intent in the NPRM to adopt the CGA C–1 standard as the industry standard for performance of inspection and testing for requalification and continued service of cylinders.

(d) Accuracy Requirements

In the NPRM, PHMSA proposed to align with ISO requirements by requiring the pressure indicating device (PID) to meet ''Industrial Class 1 (±1% deviation from the end value).'' CGA, Hidroprob SA, Bancroft Hinchey, and Galiso identified this change as problematic because it conflicts with the accuracy grade requirements for PIDs found in CGA C–1.

PHMSA response. Hidroprob S.A., Bancroft Hinchey, Galiso, and CGA's comments regarding device accuracy are correct, and contributed to our decision to not adopt the proposed changes in § 180.205(g) and simplify requirements by adopting CGA C–1 into the section. In this final rule, we will not adopt the proposed changes to device accuracy in § 180.205(g). In this final rule, we will maintain the HMR's current PID accuracy requirements in § 180.205(g)(3)(i). Voluntary compliance with CGA C–1 5.3.2.2 is authorized and will meet the HMR's accuracy requirements for PIDs used for cylinder requalification, as will the practice of demonstrating accuracy through maintenance of a calibration certificate showing the gauge has been certified to meet the accuracy requirements at lower points. See discussion of PID accuracy in P–1626 for further information on this decision.

(e) Condemnation Criteria for Repeat Tests

CTC and Bancroft Hinchey submitted comments requesting we revise the condemnation criteria for cylinders that are subjected to a repeated test due to equipment malfunction or operator error to 5 percent permanent expansion, rather than 10 percent. CTC states that increasing the pressure by 10 percent, or 100 psig for the repeat test, is not enough to ensure that an unsafe cylinder exhibits a permanent expansion over 10 percent. Bancroft Hinchey states that an increase of 10 percent/100psi can be insufficient to give measurable plastic deformation and resultant permanent expansion >10 percent due to the gradient of the load/extension curve immediately after yield point. An increase of 100psi at a (minimum) test pressure of 3000 psi (the lowest pressure above 3000) represents a pressure increase of only 3100/3000 = 3.3 percent and is unlikely to give a resultant 10 percent plastic deformation.

PHMSA response. We do not agree with CTC and Bancroft Hinchey's comments to change the condemnation criteria for cylinders in this case. CGA C–1 limits cylinder requalifiers to only two repeated tests in the event of equipment malfunction or operator error, and we do not believe that there is a safety justification to change the condemnation criteria to permanent expansion that is 5 percent of total expansion in cases where a repeat test is conducted. We acknowledge that repeated tests may result in some stretching of the cylinder, resulting in cylinders passing requalification that may have otherwise failed; however, this risk is minimized by limiting requalifiers to a maximum of two repeat tests in the event of equipment failure or operator error. Further, this provision does not authorize the retest of a cylinder otherwise required to be condemned by § 180.205(i). The final rule, therefore, does not change the condemnation criteria for cylinders subjected to a repeat test.

(f) Letters of Interpretation

In P–1515, CTC further requested that PHMSA rescind two letters of interpretation (Reference Nos. 00–0309 and 05–0087) that discuss the number of repeat tests allowed in the event of equipment malfunction and required hold time for pressure tests, respectively. Bancroft Hinchey supports retracting these letters of interpretation.

PHMSA response. We agree that adopting CGA C–1 will eliminate the confusion regarding the number of permitted repeat tests in case of system failure or operator error, as well as the required pressure hold time, that the letters of interpretation attempted to clarify. This final rule supersedes the two letters of interpretation. Affected entities should not rely on 00–0309 and 05–0087 because they are no longer valid and will be removed from our website.

(2) Comments Related to § 180.205

(a) Grinding and Sanding

NPGA and Amerigas opposed the proposed changes in § 180.205(d)(4) and (f)(5) regarding grinding and sanding of cylinders. Bancroft Hinchey submitted a comment supporting the proposed changes in § 180.205(d)(4).

PHMSA response. Our intent in § 180.205(d)(4) and (f)(5) is to address methods of cleaning or repair that remove wall thickness from the cylinder. Cleaning methods, regardless of the tool used, that only remove loose debris or paint from the cylinder while not removing wall thickness are not considered ''grinding.'' In this final rule we modify § 180.205(d)(4) and (f)(5) to clarify our intent and to authorize grinding or sanding performed by any authorized repair facility.

(b) Reordering of Condemnation Criteria

CTC submitted a comment requesting that we swap § 180.205(i)(1)(v) and (vi) in order to have the condemnation criteria for DOT 4E cylinders immediately follow the general requirements in § 180.205(i)(1)(iv).

PHMSA response. We do not agree with CTC's comment to re-order § 180.205(i)(1). Changing the citations for the condemnation criteria section will result in increased confusion and we do not believe it is in the best interest of safety.

(c) Additional Condemnation Criteria

Bancroft-Hinchey commented that we should add one additional criterion to § 180.205(d), *Conditions requiring tests and inspections of cylinders,* for cases where a cylinder is discovered with incorrect markings.

PHMSA response. We are not adopting the suggested change in Bancroft-Hinchey's comment. They did not provide enough information to make a judgement on the merits of the proposal. The public may make a separate petition further explaining the issue.

(3) Comments Related to § 180.207

(a) Deletion of § 180.207(a) and (b)

Certified Training Company (CTC) submitted a comment requesting that we delete § 180.207(a) and (b), because these instructions could be combined with § 180.205(c).

PHMSA response. While we agree with CTC that these paragraphs serve similar purposes, we do not agree with CTC's comment to delete § 180.207(a) and (b) and consolidate them into § 180.205(c). The current structure of the HMR generally separates instructions for DOT specification cylinders and UN ISO pressure receptacles because of differences in their design and construction. These paragraphs in § 180.207 are necessary to provide enforceable instructions for shippers and fillers of UN pressure receptacles separately from shippers and fillers of DOT specification cylinders.

(b) Ultrasonic Examination for High Tensile Strength UN Pressure Receptacles

CTC and Worthington submitted a comment requesting that we remove language from § 180.207(d) that requires ultrasonic examination (UE) of certain UN pressure receptacles.

PHMSA response. We do not agree with CTC and Worthington's comment to remove the requirement that UN cylinders with a tensile strength greater than or equal to 950 MPa must be requalified by UE in accordance with ISO 6406 in § 180.207(d)(1). This requirement serves an important safety purpose. High strength steels exhibit a reduction of fatigue stress endurance during requalification and are therefore unsuitable for pressure testing. In general, the fatigue stress endurance limits increase with increasing ultimate tensile strength (the specifics are alloy dependent). At a certain ultimate tensile strength level, the fatigue stress endurance limit is drastically reduced with increasing tensile strength due to notch sensitivity. Increased notch sensitivity is a result of finer microstructural features that lead microstructural damage evolution (dislocation slips eventually accumulating to micro void coalescence and the initiation of a fatigue crack). Performing UE of high-strength seamless steel during requalification will detect fatigue cracks in cylinders/tubes while hydrostatic testing coupled with visual inspection has a significantly lower probability of detecting any fatigue cracks in cylinders/tubes. Therefore, we are continuing to require UE for UN cylinders with a tensile strength greater than or equal to 950 MPa.

(c) Acetylene Test Interval

During review of the NPRM, we noted that the proposed revisions to § 180.207(d)(3) for dissolved acetylene UN cylinders were not in alignment with the suggested test intervals in ISO 10462(E) or ISO 10462 2013(E). Therefore, in the final rule, we will not make the proposed changes to § 180.207(d)(3).

(4) Comments Related to § 180.209

(a) Revisions to Requalification of Cylinders Table

CTC and Independent Cylinder Training (ICT) submitted comments requesting we replace ''DOT 3'' with ''ICC 3'' and CTC and Bancroft Hinchey's comment to re-insert ''10'' for DOT 3A and 3AA and ''7'' for 4B, 4BA, 4BW cylinders in § 180.209(a) Table 1.

PHMSA response. We agree with CTC, ICT, and Bancroft Hinchey that there are errors in the table in § 180.209(a) Table 1. However, we proposed changes to § 180.209(a) Table 1 in a different rulemaking [1] and will take no action in this rulemaking to avoid potential for complication and confusion.

(b) Foreign Cylinders

CTC and Wesley Scott submitted comments requesting that we change the requalification requirements for foreign cylinders in § 180.209 Table 1.

PHMSA response. We do not agree with CTC and Wesley Scott's comments regarding test pressure of foreign cylinders in § 180.209(a) Table 1. Foreign-marked ISO cylinders are subject to the requirements of § 180.207, and would not be subject to test at 5/3 of service pressure. Therefore, we will not change this requirement in Table 1.

(c) Footnote 1

CTC, ICT, Hydro-Test Products and COSTHA's comments noted that we inadvertently deleted Footnote 1 of Table 1 in § 180.209 and requested that we reinsert the footnote.

PHMSA response. It was not our intent to change the requirements applicable to these small cylinders. In this final rule, we are not making any of the proposed changes to the table in § 180.209 to avoid conflicts with other rulemaking efforts. In this final rule, we are not removing Footnote 1 of Table 1 in § 180.209.

[1] See Response to an Industry Petition to Reduce Regulatory Burden for Cylinder Requalification Requirements, NPRM, 84 FR 38180 (Aug. 6, 2019).

(d) Special Filling Limits (''+'' Mark) Relocation

In P–1515, CTC requested that we move the requirements for special filling limits for DOT 3A, 3AX, 3AA, 3AAX and 3T cylinders found in § 173.302a(b) to § 180.209. We did not propose to take this action in the NPRM. CTC submitted a comment to the NPRM requesting that we reconsider our decision not to propose the change.

PHMSA response. We disagree with CTC's request to move the current requirements in § 173.302a(b) (''Special filling limits for DOT 3A, 3AX, 3AA, 3AAX and 3T cylinders'') to § 180.209. The requirements in § 173.302a(b) deal with filling, and are properly placed in a filling section rather than a requalification section. Moving the requirements to a requalification section in part 180 would create unnecessary confusion. We additionally disagree with CTC's request to modify the language in § 173.302a(b) to remove the table of steel types, average wall stress limitation, and maximum wall stress limitation. We acknowledge that this information can be found in CGA C–5, which is incorporated by reference into the section, but we continue to see value in reproducing the table in the HMR for accessibility purposes. We did not propose this change in the NPRM, and we will not adopt this change in the final rule.

(e) 10-Year Requalification Condition Revisions (''Star'' Mark)

CTC submitted a comment regarding the applicability of the ''star'' marking for 10-year requalification in § 180.209(b), specifically requesting that we modify the change proposed in the NPRM to allow cylinders used in vehicles to continue to take the exception.

PHMSA response. PHMSA is not changing the applicability of the 10-year requalification to prohibit cylinders used in clusters, banks, groups, racks, or vehicles. If fillers are not removing these cylinders from the cluster, bank, group, rack, or vehicle, as stated by CTC in P–1515, then they may not use the exception unless they have been issued a special permit. Changing the applicability of the exception is not an appropriate way to deal with this supposed compliance problem. We encourage cylinder users and fillers to re-familiarize themselves with the conditions for the 10-year requalification for DOT 3A and 3AA cylinders.

(f) 10-Year Requalification Expansion Limit

ICT and Bancroft Hinchey also commented about their opposition to another part of this proposed change to § 180.209(b), namely the new limit of 5 percent permanent expansion for these cylinders.

PHMSA response. In this final rule, we are not modifying the applicability of the exception or creating a new permanent expansion limit. We are, however, modifying the exception by removing the ''hammer test,'' as requested in P–1515 and proposed in the NPRM. The hammer test is outmoded and no longer provides relevant information regarding the continued strength of the cylinder. We may consider further modifying this exception in the future.

(5) Eddy Current Testing

In the NPRM we proposed to change the applicability of the eddy current test, eddy current condemnation criteria, and eddy current record keeping requirements, as requested in P–1515. We do not believe the change and possible increase in cost is justified by data at this time. Therefore, in this final rule, we are not making any changes related to eddy current testing applicability, condemnation criteria, or recordkeeping.

(a) Test Applicability

Currently, eddy current testing is required for 3AL cylinders made of aluminum alloy 6351–T6 in SCUBA, SCBA, or oxygen service. 3AL 6351–T6 cylinders have been shown to be susceptible to sustained load cracking (SLC) in the neck and thread area of the cylinder. Eddy current testing combined with a detailed visual examination can identify SLC before it poses an immediate danger. We have required eddy current testing since the publication of HM–220F (71 FR 51122; 8/29/2006). P–1515 requested that we change the applicability of the eddy current test to any DOT 3AL cylinder made of 6351–T6 alloy with a service pressure at or above 1,800 psig. We received one comment in support of this change from ICT. We did not discuss the proposed change in detail in the preamble to the NPRM, only stating, ''Specifically we plan to revise . . . the paragraph (m) requalification conditions for DOT 3AL cylinders made of 6351–T6 aluminum alloy.'' We are concerned that the change from a gas service-based testing applicability to a pressure-based testing applicability may significantly increase the number of cylinders subject to eddy current testing, without adequate notice to the regulated community or safety justification.

Since the imposition of the eddy current test requirement in 2006, we are not aware of any catastrophic failures of DOT 3AL cylinders involving sustained load cracking. In this final rule, we are not making the proposed change to eddy current test applicability. We welcome further petitions on the matter, but we do not believe the change and possible increase in cost is justified by data at this time.

(b) Condemnation Criteria

Similarly, we are not making any change to eddy current condemnation criteria. The current criteria in the HMR have proved successful in identifying cylinders prone to sustained load cracking, facilitating their removal from service before cracks can cause catastrophic failure. We may consider revising the condemnation criteria in a future rulemaking, but will make no change to eddy current condemnation criteria at this time.

(c) Record-Keeping

In the NPRM, we proposed changes to eddy current recordkeeping requirements. We proposed to move eddy current recordkeeping requirements currently found in appendix C to part 180 to new § 180.215(b)(5). We received a comment from ICT opposed to the relocation of requirements from appendix C to part 180 into § 180.215(b)(5). We agree with ICT and are not making the proposed change to relocate requirements out of appendix C to part 180 at this time. Eddy current testers are familiar with the requirements found in appendix C to part 180 and moving the requirements to a new section would create unnecessary confusion. We may review eddy current recordkeeping requirements in a future rulemaking.

(6) Comments Related to § 180.209(j)

(a) Incorporation by Reference of CGA C–1

CTC commented on the proposed language in § 180.209(j) and stated their opinion that the language was unnecessarily confusing and redundant following the incorporation of CGA C–1.

PHMSA response. We agree with CTC's comment that there are redundant instructions in § 180.209(j), and the requirements could be simplified by referring to the test procedures in CGA C–1. Additionally, COSTHA noted an error in the structure of § 180.209(j), where it appeared the proposed paragraphs (j)(2) and (3) overlapped in applicability and contradicted each other. We appreciate this comment, and have re-structured § 180.209(j) to make clear that paragraph (j)(1)(i) applies to smaller 4B, 4BA, 4B240ET, or 4BW cylinders, paragraph (j)(1)(ii) to larger 4B, 4BA, 4B240ET, or 4BW cylinders, and (j)(2) to 3A, 3AA, or 3AL cylinders.

(b) Increased Pressure for Repeat Tests

ICT commented on our proposed requirement to increase the pressure by 10 percent for a repeated proof pressure test for fire extinguishers, noting this was not in accordance with CGA C–1 requirements.

PHMSA response. We agree, and are removing this provision and replacing it with instructions to conduct the proof pressure test in accordance with CGA C–1.

(c) 4E Cylinders

While reviewing § 180.209(j), we noted erroneous references to DOT 4E cylinder condemnation criteria. DOT 4E cylinders are generally not eligible to be transported or requalified as fire extinguishers, so we have removed the reference to 4E condemnation criteria from § 180.209(j).

In the final rule, we are revising § 180.209(j) as discussed above to simplify and clarify the requirements for the requalification of specification fire extinguishers.

(7) Comments Related to § 180.212

Bancroft Hinchey commented in support of the proposed requirement in § 180.212(a)(3) to require ultrasonic testing (UT) after a repair facility conducts a repair involving grinding.

PHMSA response. In this final rule, we are adopting this requirement as proposed.

(8) Comments Related to § 180.213

(a) Requalification Label Embedded in Epoxy

Numerous commenters, including NPGA, Amerigas, Firehouse Hydro Sales and Service, Joshua Blake, Hydro-Test Products, and Scuba Do noted that we made an error in § 180.213(c) for requalification marking methods by removing the authorization for a label embedded in epoxy.

PHMSA response. The commenters are correct that we inadvertently did not include the provision allowing for applying a label embedded in epoxy. This was not our intent as part of the HM–234 NPRM. Therefore, in this final rule we are including the label in epoxy marking method in § 180.213(c) as is currently allowed under the HMR. We appreciate the commenters' attentiveness in addressing this unintentional omission in the NPRM.

(b) Requalification Marking Location

Independent Cylinder Training (ICT), Amerigas, and NPGA oppose the proposed requirement in § 180.213(c)(1)(i) that would require requalification marks be placed in a specific location adjacent to the original manufacturing markings. ICT, Amerigas, and NPGA state that this requirement is too restrictive, and in certain cases impossible to meet due to the size and type of cylinders involved. Bancroft Hinchey supports a requirement to ''lay out requalification markings neatly and consistently.''

PHMSA response. We agree with the comments submitted by ICT, Amerigas, and NPGA. While we would have liked to provide a consistent location for requalification markings for shippers and fillers, we recognize the diversity of cylinder types and sizes makes this effort difficult. Therefore, in this final rule we are not adopting the change to § 180.213(c) that was proposed in the NPRM. Requalification markings must be applied in a legible and durable manner and may be placed on any portion of the upper end of the cylinder excluding the sidewall. We welcome petitions on this requirement for possible inclusion in a future rulemaking.

(c) Requalification Marking Depth

Bancroft Hinchey commented that § 180.213(c) should be modified to provide guidance on requalification marking depth when the cylinder specification does not provide any information on accepting marking depth.

PHMSA response. While PHMSA agrees that cylinder requalifiers should not mark cylinders to a depth greater than the original manufacturer's markings, we do not agree with Bancroft Hinchey's comment to modify § 180.213(c). PHMSA believes that including the phrase ''or the original manufacturer's markings'' to § 180.213(c) will increase confusion among cylinder requalifiers.

(9) Comments Related to § 180.215

(a) Use of Symbols for Cylinder Dimension

Bancroft Hinchey requested clarification of the revision to § 180.215 to permit use of symbols for actual dimensions.

PHMSA response. The use of a symbol in place of the written dimensions of the cylinder is permitted by § 180.215(b) as long as the symbols on the reference chart available at the requalifier's facility are accurate for the actual measured dimensions of each cylinder requalified. It is PHMSA's understanding that some cylinder requalifiers maintain reference charts with symbols cross-referenced to the actual measured dimensions of common cylinder models. As long as the facility has an accurate reference document that cross-references the symbol entered on the requalification record with the actual measured dimensions of the cylinder requalified, they may use that symbol to meet the requirement to enter the actual dimensions of a cylinder on the requalification record. This will increase flexibility and reduce burdens for requalifiers without compromising safety.

(b) Gas Service and Year of Manufacture

Hydro-Test Products commented on the proposed change to cylinder requalification recordkeeping requirements. They noted that in the NPRM we did not discuss the additional requirement to record the cylinder's year of manufacture or gas service in § 180.215(b)(2). Hydro-Test Products is opposed to the proposed change to cylinder requalification recordkeeping requirements and believes it would impose an undue burden on cylinder requalifiers.

PHMSA response. We disagree with Hydro-Test Products' comment. The requirement for cylinder requalifiers to keep a record of the cylinder's date of manufacture and gas service is useful for several reasons. The eligibility for the ''star'' mark in § 180.209(b), allowing a 10-year requalification period instead of 5 years, depends on the year of manufacture and gas service, as does the ''+'' mark for 10 percent overfilling in § 173.302a(b). The applicability of the option to requalify a cylinder via external visual inspection in § 180.209(g) is also dependent on the particular gas service in which the cylinder is used. The year of manufacture is also helpful in determining whether a 3AL cylinder was constructed from 6351–T6 aluminum alloy, and therefore subject to eddy current examination. Use of 6351–T6 aluminum alloy in DOT 3AL cylinders was discontinued in 1990. We believe that the addition of these two pieces of information to cylinder requalification records creates only a minimal reporting burden on the regulated community while aligning recordkeeping requirements with operational practice. See further discussion in Section VIII.G in this rulemaking document regarding the information collection burden of this requirement. In this final rule, we are adopting the changes as proposed, and modifying § 180.215(b)(2) to require cylinder requalifiers to record the year of manufacture and gas service of each cylinder they requalify.

(10) Reclaimed Refrigerant Gas

Section 180.209(e) authorizes proof pressure testing for DOT 4-series cylinders in non-corrosive gas service. In the NPRM we proposed to add the following sentences to this paragraph: ''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.'' In this final rule, we are not adding these sentences to § 180.209(e). Although we believe that cylinders used for reclaimed refrigerant gases are generally not eligible for the exception in § 180.209(e) because of the contaminants encountered in this service, we are uncertain whether this is always the case. Therefore, PHMSA has decided that the most practical regulatory alternative at this time is to leave the § 180.209(e) exception allowing a 10-year testing interval for DOT 4-series cylinders used in non-corrosive gas service unchanged. As provided in § 173.22, it is the shipper's responsibility to classify a hazardous material properly.

(11) RIN Markings for Foreign Cylinders

In the HMR, foreign cylinders not manufactured to a DOT, UN, TC, CTC, BTC or CRC specification may be filled and transported for export or for use on board a vessel in accordance with § 171.23(a)(5) (note that this reference was originally § 171.23(a)(4), and has changed to § 171.23(a)(5) after publication of final rule HM–219C). Requalification for these cylinders is discussed in § 180.209(l), which prohibits the marking of the cylinder with a requalifier's RIN, instead requiring only the month and year of requalification. In the NPRM, we proposed to require a RIN marking for these foreign cylinders, along with the symbol ''EX,'' to reduce confusion among fillers and clarify that these foreign cylinders had been requalified in accordance with part 180, subpart C. We received no comments on this proposal. In this final rule, we will adopt this requirement. We believe that the symbol ''EX'' in association with the RIN provides necessary information to inspectors and users that these cylinders are limited to export or vessel service in accordance with § 171.23(a)(5). The inclusion of a RIN marking, which signifies compliance with part 180 subpart C, will increase clarity for fillers

that the cylinders have been properly requalified.

P–1521

CGA submitted P–1521 requesting that PHMSA modify a provision in § 172.400a(a)(1) (specifically § 172.400a(a)(1)(i) at the time the petition was submitted) 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. In the NPRM, PHMSA proposed 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. National Association of Fire Equipment Distributors (NAFED) and Worthington Cylinder submitted comments supporting this change.

On January 21, 2016, PHMSA published HM–233F (81 FR 3635), which adopted numerous special permits into the HMR. In particular, we adopted DOT SP 14251, which authorizes the transportation of overpacked cylinders marked in accordance with CGA publication C–7 provided the overpacks are properly labeled. Therefore, the intent of P–1521 has already been accomplished. We appreciate CGA's petition and COSTHA's comment highlighting that HM–233F already addressed this issue.

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). Historically, 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 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, PHMSA did not propose to adopt the petition. We received one comment on this topic. Worthington Cylinder submitted a comment supporting PHMSA's proposal to deny the petition and not amend § 173.306(a)(1). Therefore, as reasoned in the NPRM, we are not adopting P–1538 in this final rule.

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 requested 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 requested 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 percent 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 (HM–220; 63 FR 58460) 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.

Based on concerns about increasing the risk of cylinder failure by lengthening the timeframe between periodic qualifications, PHMSA did not 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 received three comments on this topic. Bancroft Hinchey, NAFED, and CGA all supported our decision not to adopt the petition. Therefore, as reasoned in the NPRM, we are not adopting P–1539.

P–1540

CGA submitted P–1540 requesting that PHMSA require newly manufactured DOT 4B, 4BA, 4BW, and 4E cylinders to be marked with the mass weight or tare weight, and the 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 (the weight of the empty cylinder and appurtenances) or the mass weight (the weight of the empty cylinder), and the water capacity must be known by the filler to fill the cylinder properly. 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 has incorporated by reference the National Fire Protection Association's ''58-Liquefied Petroleum Gas Code, 2001 edition'' (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 the ANPRM that these are not the only cylinder types used for liquefied compressed gas transport. PHMSA understands that many in the compressed gas industry, especially the liquefied petroleum gas industry, already request manufacturers to mark cylinders with the tare weight or water capacity 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 applying these markings voluntarily.

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 submitted a comment to the ANPRM that supported the petition but they did not discuss the basis for their support. CGA submitted a comment to the ANPRM supporting 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 did 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 believed that the HMR must further clarify that no cylinder may 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, to 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 to 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 DOT 3-series cylinders where the additional marking would not fit onto the dome of the cylinder.
- The economic impact estimated for marking all cylinders is significantly greater than the estimates submitted by PHMSA.

Manchester Tank submitted a comment to the ANPRM expressing concern that numerous variations in stamped weights could cause confusion in the field among fillers. They stated 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 asked PHMSA to clarify who would have responsibility to assign the duty to mark tare weight to the valve installer and indicated that there are many cylinders that are not valved by the manufacturer, and 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 the NPRM, PHMSA proposed to revise § 178.35(f) to require that tare weight or mass weight, and water capacity be marked on all DOT 4B, 4BA, 4BW, and 4E specification cylinders.

We received nine comments to the NPRM related to this issue. Fike Corporation, Janus Fire Systems, Amerex, NAFED, and FSSA submitted comments opposing the requirement to mark all DOT 4B, 4BA, 4BW, and 4E cylinders with tare weight or mass weight, and water capacity. Bancroft Hinchey, Kidde-Fenwal, Worthington Cylinder and CGA submitted comments generally supportive of the requirement, but requested certain modifications. Bancroft Hinchey requested that § 180.215 be modified to require tare weight be added to a 4-series cylinder if it changes service to liquefied gas. Kidde-Fenwal requested that the marking requirements only apply to cylinders filled with liquefied gas, and not 4-series cylinders used for other services, such as fire extinguishers containing an extinguishing agent and charged with a non-liquefied gas. Worthington Cylinder requested that the requirement only apply to cylinders filled with liquefied gas and that the regulations require specific acronyms for mass weight, tare weight, and water capacity to reduce confusion. CGA requested a minor change to the wording in § 178.35(f)(7)(iii) to ensure proper tolerance requirements as requested in P–1540.

PHMSA response. We agree with the commenters that there is no value in requiring the tare weight or mass weight, and water capacity markings for 4-series cylinders that are not used for liquefied compressed gases, as these materials are not filled by weight. However, we do not agree that relying on voluntary industry standards that may require the tare weight or water capacity on a cylinder label is adequate to alleviate our safety concerns regarding proper filling of liquefied compressed gases. We do not believe that NFPA 58 is universally followed in the cylinder industry. Additionally, the NFPA 58 does not assign a particular

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

party to apply the marks, or any accuracy requirements for the measurements. Therefore, the creation of a Federal standard for tare weight/mass weight and water capacity markings on DOT 4B, 4BA, 4BW and 4E cylinders used for only liquefied compressed gases provides a higher level of safety and oversight than the NFPA 58 standard while limiting burdens to the cylinder industry.

PHMSA expects this marking requirement to play a role in preventing overfilling incidents, which can result in explosions and fatalities. For example, in 2014, an overfilled propane cylinder ruptured, exploded, and fatally injured two people and injured others in Philadelphia.[3] Specifically, a cylinder filler, using the tare/mass weight and water capacity markings to guide their filling practice, is expected to be significantly less likely to overfill a cylinder. Adding tare weight or mass weight, and water capacity markings is expected to improve safety for cylinder fillers, transporters, and the general public by decreasing the incidence of overfilled cylinders entering transportation. Cylinders filled with liquefied gases must be filled by weight (see § 173.304a(c)). The filler must determine the weight of the cylinder in order to fill the cylinder with the proper amount of liquefied gas. The most direct way to ensure that the filler knows the weight of the cylinder being filled is to require that the cylinder's weight be marked on the cylinder itself.

By requiring these markings, PHMSA will help to eliminate confusion and guesswork while providing a potentially quicker and more efficient way to determine the cylinder weight than relying solely on reference materials listing cylinder weights. Cylinder fillers may not always have easy access to cylinder tare/mass weight and water capacity reference materials; the materials may become outdated; or the reference materials that are available may have been created by a cylinder manufacturer other than the manufacturer of the cylinder being filled.

In addition, providing the markings may prevent a cylinder filler from being required to weigh the purportedly empty cylinder to determine the tare weight, removing errors due to residue material that would overstate the tare weight when weighed manually, and also reducing burden. Further, PHMSA believes that the addition of these markings could reduce the occurrence of non-compliant filling methods, such as informally relying on auditory cues (*e.g.,* shaking the cylinder).

Increasing availability of cylinder weight and capacity information on the cylinder itself will decrease the chances of operator error leading to overfilled cylinders. Therefore, in this final rule, we are modifying the proposed requirement from the NPRM that DOT 4B, 4BA, 4BW and 4E cylinders used for only liquefied compressed gases must be marked with tare weight or mass weight, and water capacity. The details are discussed in the VII. Section-by-Section Review. We are also adopting the upper and lower tolerances for the tare weight/mass weight marking as proposed by CGA. We agree that additional markings on a cylinder may be a source of confusion, but we believe that this can be mitigated by using standardizing abbreviations. Accordingly, in this final rule we are requiring that tare weight be abbreviated ''TW'', mass weight ''MW'', and water capacity ''WC.'' The responsibility for meeting this requirement is placed on the owner of the cylinder, as they are best positioned to understand the eventual use of the cylinder at the time of manufacture. 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.

In accordance with § 173.304a(c), liquefied gases must be filled by weight, or when the gas is lower in pressure than required for liquefaction, a pressure-temperature chart for the specific gas may be used to ensure that the service pressure at 55 °C (131 °F) will not exceed ⅝ of the service pressure at 21 °C (70 °F). An accurate scale must be used to check the weight of liquefied gas filled in the cylinder. These requirements apply to all types of cylinders, not only the 4B, 4BA, 4BW and 4E cylinders whose marking requirements we are amending in this final rule. We believe that by requiring TW, MW and WC markings for these cylinders which are most commonly used for liquefied gases, we will create the greatest safety benefit while minimizing costs to the regulated community.

We note that COSTHA submitted a comment that we left the word ''no'' out of the phrase ''[no] upper [tolerance]'' in the proposed § 178.35(f)(7)(iii) for the criteria for the water capacity marking for a cylinder exceeding 25 pounds. COSTHA is correct in its understanding. This was an inadvertent omission and we are correcting § 178.35(f)(8)(iii) (please note that the original regulatory text proposed in § 178.35(f)(7) has been redesignated as paragraph (f)(8) due to changes made to the HMR since the publication of the HM–234 NPRM) such that it reads ''with a tolerance of minus 0.5 percent and *no* upper tolerance'' in this final rule.

Lastly, we are making an editorial change in the final rule and deleting the metric units from § 178.35(f)(8) to increase clarity and decrease confusion for manufacturers, fillers, and users of these cylinders.

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.[4] 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 interpretation regarding the applicability of § 173.309 to fire extinguishers. Notably on March 9, 2005, PHMSA wrote a letter of interpretation (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

[3] This incident resulted in a Federal judge ordering the company who filled the cylinder to pay a $1 million criminal. In addition, the company entered into an historic civil settlement, agreeing to pay victims and the family of those fatally injured $160 million, plus an additional confidential sum. See Moselle, Aaron. *U-Haul fined $1 million after fatal food truck explosion in North Philly.* May 7, 2019. *WHHY.org.* Available at: *https://whyy.org/articles/uhaul-fined-1-million-after-fatal-food-truck-explosion-in-north-philly/.*

[4] 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.

vehicles and stated that the cylinders used in the fire suppression system appeared to meet the requirements of § 173.309. PHMSA issued another letter of interpretation (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 because these cylinders were not equipped to function as fire extinguishers. This latter clarification effectively required 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 suggested 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 the NPRM, PHMSA proposed to revise the § 173.309 introductory text to include ''fire extinguishers for installation as part of a fire suppression system'' as a fire extinguisher type authorized for transport in accordance with authorized packaging requirements as assigned to the HMT entry for fire extinguishers.

Comments. Guardian Services, Inc., Janus Fire Systems, Amerex, Worthington Cylinder and the Fire Suppression Systems Association commented in support of this proposal. Kidde-Fenwal commented in support of the proposal, but also stated that ''not all cylinders intended for use as a component of a fire suppression system should utilize the 'Fire extinguisher, UN 1044 designation' as suppression agents with their own HMT designation (example, UN 3296) should continue to be identified as such.'' That is, those fire suppression agents listed by name should continue to be described and packaged as provided in the HMT rather that as UN1044, Fire extinguishers.

The National Association of Fire Equipment Distributors (NAFED) commented in opposition to the proposal, specifically noting its concerns with allowing high pressure, inert gas cylinders used in ''engineered-type'' fire suppression systems to be transported and requalified as ''UN1044, Fire extinguishers.'' The ''engineered-type'' fire suppression systems that NAFED described are large fire suppression systems used in industrial settings that may consist of a vessel that contains an extinguishing agent and separate compressed gas ''charging'' cylinders that provide the pressure to inject the agent into the system upon activation. Other engineered systems may consist of a fire extinguishing agent pressurized with an inert gas, or consist of cylinders that contain only an inert gas.

PHMSA response. We disagree with Kidde-Fenwal. The classification of ''UN1044, Fire extinguisher'' is based on the intended use of the cylinder, and should not necessarily exclude gases listed by name in the § 172.101 HMT if the conditions of § 173.309 are met. However, we agree with NAFED's concerns regarding ''charging'' cylinders transported separately from fire suppression systems. Our intent in the NPRM was to propose allowing fire extinguishers that are charged with a compressed gas and an extinguishing agent and that are intended for installation into fire suppression systems to be described as ''UN1044, Fire extinguishers.'' We did not intend to allow cylinders charged with an inert gas and used only to pressurize a fire suppression system to be described as ''UN1044, Fire extinguishers'' when offered for transportation separately from the suppression system. These ''charging'' cylinders must be described based on the compressed gas they contain, for example ''UN1066, Nitrogen.'' or ''UN1006, Argon.''

In this final rule, we are adopting the proposed change to § 173.309, and further clarifying our meaning. A fire extinguisher charged with a compressed gas and an extinguishing agent that is intended for installation into a fire suppression system may be described as ''UN1044, Fire extinguisher'' if it meets the conditions of § 173.309. A fire extinguisher charged with a compressed gas that is the sole extinguishing agent in the system that is intended for installation into a fire suppression system may also be described as ''UN1044, Fire extinguisher'' if it meets the conditions of § 173.309. A cylinder charged with a gas and used only to pressurize or expel an extinguishing agent as part of a fire suppression system may not be described as ''UN1044, Fire extinguisher'' for purposes of the HMR.

Section 173.309(a) requires the use of a DOT-specification cylinder, as is generally required for a compressed gas, and further requires the use of dry gas and extinguishing agents that are commercially free from corroding components. The safety and performance of DOT specification cylinders filled with dry gas and an extinguishing agent commercially free of corroding components and requalified as provided in § 180.209(j) is expected to be the same for manual use (*i.e.,* handheld) and for use in fixed fire suppression system service. Section 173.309(b) requires the use of Specification 2P or 2Q non-refillable inside metal containers, filled with a non-corrosive extinguishing agent. DOT 2P and 2Q containers are very limited in size and service pressure by their design specification in §§ 178.33 and 178.33a, and therefore would have limited utility for a fixed fire suppression system. Finally, with respect to authorizing use of non-DOT specification cylinders, we believe the requirements in § 173.309(c) provide for the safe transportation of compressed or liquefied gas regardless of whether the cylinder is equipped for manual use as a fire extinguisher (*i.e.,* handheld) or for use as a fire-extinguishing component of a fire suppression system.

Section 173.309(c) allows the use of non-specification cylinders filled with a non-corrosive extinguishing agent as fire extinguishers. These non-specification cylinders are limited in size to 1,100 cubic inches, or 55 cubic inches if they contain any liquefied compressed gas. The cylinders must be pressure tested to three times (3x) their charged pressure prior to initial shipment, and must be designed with a burst pressure six times (6x) their charged pressure. This exceeds the burst pressure ratio of DOT-specification cylinders authorized under § 173.309(a). These non-DOT specification cylinders must additionally be periodically requalified in accordance with the requirements of the Department of Labor's Occupational Safety and Health Administration regulations pertaining to ''portable fire extinguishers'', 29 CFR 1910.157. The combination of size restriction, higher than normal initial test pressure requirements, and much higher than normal burst pressure capability creates an equivalent level of safety for these non-DOT specification fire extinguishers when compared to DOT

specification cylinders. We expect the same level of safety will be achieved in handheld and fire suppression system service.

Note that the changes made in this final rule do not affect the description and classification of large fire extinguishers (see HM–215M, 80 FR 1075, 1/8/2015 for background), which may contain ''charging'' cylinders when transported as a completed fire extinguishing system provided they meet the conditions of § 173.309.

P–1560

Air Products and Chemicals Inc. (Air Products) submitted a petition for rulemaking (P–1560) requesting that PHMSA revise § 173.304a(a)(2) to adopt the provisions of SP 13599. SP 13599 authorizes additional maximum filling densities for carbon dioxide and nitrous oxide to include 70.3 percent, 73.2 percent, and 74.5 percent respectively in DOT 3A, 3AA, 3AX, 3AAX, 3AL, and 3T cylinders with marked service pressures of 2000, 2265, and 2400 psig, subject to operational controls. In the NPRM, we did not propose to adopt this provision because it was already adopted in the HMR by HM–233F (81 FR 3635).

We received two comments related to P–1560 in this docket. Worthington Cylinder agreed with our determination in the NPRM that we had already adopted these provisions and therefore do not need to address them again. Independent Cylinder Training (ICT) submitted a comment proposing additional changes to § 173.304a(a)(2). ICT requested that cylinders with a service pressure of 2015 psig be authorized for 70.3% fill density, like those with a service pressure of 2000 psig. Additionally, ICT requested that PHMSA add a provision to require that cylinders filled according to fill density be marked with the water weight of the cylinder to aid in the filling process.

PHMSA response. ICT's understanding of filling density requirements for carbon dioxide is not correct. In the scenario it presents, a cylinder with a service pressure of 2015 psig is already authorized for a filling density of 70.3 percent for carbon dioxide. ICT's other proposal regarding marking of water weight on a cylinder is beyond the scope of this rulemaking and we suggest that ICT submit a separate petition for rulemaking on the issue. As previously stated, P–1560 provisions were adopted into the HMR by rulemaking HM–233F, and therefore we are not addressing it in this final rule.

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 the NPRM, we recognized 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 proposed 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 agreed 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 did not propose to include 2P and 2Q in the allowance for the ''OVERPACK'' marking. We proposed additional instructional language that the combination package is not to be considered an ''overpack.''

We received two comments on this issue. Alaska Air stated their opposition to the proposed changes. Alaska Air states that the proposed change is at variance with the existing § 171.8 definition of combination package, which will result in additional confusion by the hazmat community, and that most shipments marked as proposed will be rejected by air carriers because the ''overpack'' mark will be placed on outer packages that are not overpacks.

COSTHA also submitted comments regarding this issue. COSTHA ''supports this [revision] in principle and agrees with PHMSA and the petitioner, 3M, that the differing marking requirements in § 173.25 and § 173.301(a)(9) to communicate similar conditions may be causing confusion without enhancing safety.'' However, COSTHA also notes that the sentence, ''[d]isplay of the 'Overpack' marking is not an indication that this combination package is an overpack'' is confusing, and recommends that it be deleted.

PHMSA response. PHMSA agrees with Alaska Airlines and COSTHA that the proposed change could result in more confusion than it would resolve and would not promote compliance with the HMR. Upon further consideration, we do not believe a regulatory change is warranted. The marking requirement in § 173.301(a)(9) applies to a completed package. The requirements in § 173.25 apply to an enclosure used to protect or consolidate completed packages. The ''OVERPACK'' applies to the enclosure when specification packages are required and are not visible. We do not view this as overly confusing. Therefore, in this final rule we are not adopting any changes proposed in the NPRM based on P–1563.

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).[5] The definition of MEGC in § 171.8 states DOT-specification cylinders are not authorized as part of MEGCs and accordingly, we are not including the petitioned language referring to DOT-specification cylinders in § 173.312. DOT-specification cylinders filled with liquefied compressed gas must be filled in accordance with the instructions found in § 173.304 and § 173.304a, including filling density limitations.

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

[5] Note that the petition specifically referenced the 17th edition 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.

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 the NPRM, we proposed to specify the filling ratio requirements for pressure receptacles.

We received comments supporting this proposal from CGA and Worthington Cylinder, and comments requesting modification to the proposed language from FIBA Technologies (FIBA).

(1) Manifolding While Filling

We received a comment from FIBA stating their opposition to the sentence ''Manifolding while filling is not authorized.'' FIBA states there would be no safety benefit to removing the manifold for many MEGCs during filling because the MEGCs can be filled safely with the manifold in place.

PHMSA response. We agree with FIBA's comment. It was not our intent to require the disconnection of the manifold during filling. Rather, our intent is to require that each pressure receptacle is filled individually when loading liquefied compressed gases. We acknowledge that the manifold may remain in place as long as there are measures in place to prevent more than one cylinder from being filled at a time when loading liquefied compressed gas. Therefore, in the final rule we will remove the sentence ''[m]anifolding during filling is not authorized.''

(2) Filling With Non-Liquefied Gases

FIBA also noted that our proposed revision accidently removed the language currently in § 173.312(b)(1) relevant to the filling of MEGCs with ''permanent'' or non-liquefied gas.

PHMSA response. This was not our intent; therefore, in the final rule we will move the current language for permanent gases in § 173.312(b)(1) to new § 173.312(b)(1)(i) and insert the language appropriate for filling with liquefied compressed gases in the new § 173.312(b)(1)(ii). Additionally, we agree with FIBA's suggestion that there is value in specifying that § 173.312(b)(1)(i) applies to filling MEGCs with permanent, non-liquefied compressed gases, which are filled by pressure, while § 173.312(b)(2)(ii) applies to liquefied gases, which are filled by weight.

In this final rule, we are adopting P–1572, with the modifications noted above. PHMSA emphasizes that this change does not impose a new burden, as adoption of this proposal only emphasizes an important safety requirement already stated in § 173.304b for UN pressure receptacles.

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 align with CGA S–1.1 for DOT 39 cylinders filled with an oxidizing gas and offered for transportation by air. Specifically, as prescribed in 4.2.2 of CGA S–1.1, the required burst pressure of the rupture disc ''shall not exceed 80 percent of the minimum cylinder burst pressure and shall not be less than 105 percent 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 the NPRM, PHMSA proposed 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 liquefied oxidizing gases by air.

We received comments from HMT Associates and Worthington Cylinder regarding P–1580. Both comments correctly noted that in the NPRM we failed to amend the regulatory text in §§ 173.302 and 173.304 as we stated in our NPRM discussion.

PHMSA response. We agree with HMT Associates' comment noting that the proposed language in § 173.301(f)(4)(iv) is not strictly necessary, because by revising §§ 173.302(f)(2) and 173.304(f)(2) we will have brought the HMR into alignment with CGA S–1.1 requirements. However, we will maintain the reference to the new requirements in § 173.301(f)(4)(iv) to increase the visibility of the new requirements. We did not receive any comments opposed to the proposed change. Therefore, in the final rule, we are amending §§ 173.302 and 173.304 to align with CGA S–1.1 requirements for DOT 39 cylinders for oxidizing gases transported by air. To avoid placing cylinders in conformance with the current requirements of §§ 173.302(f)(2) and 173.304(f)(2) out of service, we will allow cylinders filled prior to the effective date of this rulemaking that meet the current requirements of the HMR to remain in service until the end of their useful lives.

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)/Water Systems Council (WSC) standard PST 2000–2005 (2009) to be authorized for transport.

The ANSI/WSC standard PST 2000–2005 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. Aligning the HMR with this industry standard 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.

The revised requirements for water pump system tanks in this final rule authorize tanks to be tested to the manufacturer's specified maximum working pressure instead of the current one size fits all requirement of 100 psig. Further, it allows water pump system tanks to be charged with helium in addition to the currently authorized nitrogen. The requirements in this final rule allow additional flexibility for manufacturers compared to current requirements. Therefore, PHMSA does not expect this amendment to impose costs. PHMSA received one comment in support of this proposal from Worthington Cylinder.

In the NPRM, we proposed to change the pneumatic test requirement from 100 psig to the manufacturer's specified maximum working pressure because the industry standard allows for maximum working pressures greater than 100 psig (*i.e.,* up to 150 psig as stated above). In this final rule, we will specify that the pneumatic test may not exceed 150 psig, which aligns with ANSI/WSC PST 2000–2005 maximum working pressure for a water pump system tank. Pneumatic pressure tests present additional risks to testing personnel, and this modification is intended to reduce risk by clarifying the maximum test pressure allowed while remaining aligned with the industry standard.

We are making several additional editorial changes to the layout and language of § 173.306(g) in order to clarify the intent of the provision. Specifically, we are modifying the introductory paragraph of § 173.306(g) to clarify our intent to allow the tanks to be filled with air, nitrogen, or helium up to 40 psig at time of manufacture, referred to in ANSI/WSC PST 2000–2005 as a ''pre-charge.'' Further, we are replacing the word ''charged'' with ''pre-charge'' throughout the paragraph to clarify that the manufacturer's pre-charge pressure is the pressure that should be used in calculations, where appropriate.

We are modifying § 173.306(g)(1) to explain clearly the maximum allowable working pressure limits of water pump system tanks. The requirement that these tanks may be operated in ambient air temperatures of up to 49 °C (120 °F) with a maximum working pressure not less than 517.1 kPa (75 psig) and not greater than 1034.2 kPa (150 psig) is taken from the ANSI/WSC PST 2000–2005 standard. Our intent is to impose a limit on the marked maximum working pressure for a water pump tank system at 150 psig, (*i.e.,* the upper end of the maximum working pressure), to ensure pneumatic testing is not conducted above this pressure at time of manufacture to prevent increased dangers for testing employees. Given that the new MAWP limit in § 173.306(g)(1) aligns with the industry standard and is above the limit for water distribution piping operations, PHMSA does not believe that this requirement will introduce any additional burdens on manufacturers.

We are removing the phrase ''concave dome tanks'' from § 173.306(g)(3) for clarity because we consider this language to be redundant to the requirement in § 173.306(g)(1) that requires all tanks to have heads concave to pressure.

Finally, we are not adopting proposed paragraph (g)(4), which discussed a design leakproofness test for composite tanks. We do not believe that requiring this test for composite tanks is necessary in the HMR. Our main transportation safety concern with water pump system tanks remains their burst pressure, and we believe that inclusion of the proposed design hydrostatic leakproofness test for composite tanks will increase confusion. All tanks, steel and composite, are subject to a pneumatic proof pressure test at the manufacturer's maximum allowable working pressure at time of manufacture (see § 173.306(g)(1)). All tank designs, both steel and composite, must also have a burst pressure at least 6x the pre-charge pressure at 21.1 °C (70 °F) or 3x the manufacturer's specified maximum working pressure, whichever is greater, as proposed. These modifications to the proposed language are intended to increase clarity without making any substantive changes to the provisions proposed in the NPRM.

In this final rule, PHMSA will adopt provisions of P–1582 as proposed with the modification noted above.

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 (PRD) 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 pressure relief device manufacture, testing, operational parameters, and maintenance. CGA S–1.1 is available for purchase online and will be available for public inspection at the Hazardous Material Information Center after publication of the final rule.

This minor update to the regulations improves the timeliness and clarity of industry standards that are incorporated by reference. It supports the goal of facilitating the use of industry standards and reducing the burdens associated with references to outdated material.

Bancroft Hinchey, Worthington Cylinder, NAFED, CGA and FIBA Technologies submitted comments supporting incorporation by reference of the 2011 edition of CGA S–1.1. FIBA Technologies additionally identified an inconsistency with the HMR and new S–1.1 requirements. FIBA Technologies correctly noted that the requirements for pressure relief devices in § 173.302a(c)(4)(ii) conflict with the 2011 edition of CGA S–1.1 that we are incorporating by reference in this rulemaking. Accordingly, we are amending § 173.302a(c)(4)(ii) to reflect that PRDs are optional for hydrogen tube trailers. Shippers are not required to install PRDs on tubes (cylinders longer than 12 feet) shipped in accordance with this paragraph, however their continued use and installation is authorized. This change maintains regulatory flexibility and alignment with accepted industry practice. This change does not impose any new requirements and increases regulatory flexibility by allowing hydrogen tube trailer shippers the option of continuing to use PRDs. In this final rule, we are incorporating by reference CGA S–1.1, 2011 as proposed.

P–1596

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

Three commenters commented on this proposal. Dow Chemical Company and Worthington Cylinder supported the adoption of the petition as proposed. CGA opposed the adoption of the petition on the basis of safety, stating that they do not support revising salvage drum provisions in the HMR to allow Class 4 and Class 5 to be placed in salvage vessels because chemically reactive materials may produce pressures exceeding their pressure ratings. CGA suggests that a special permit or approval should be required for this activity.

PHMSA response. We agree with Dow and Worthington and do not agree with CGA's comment. We proposed to allow the use of salvage *cylinders* (emphasis added), which are much more robust packagings than the salvage *drums* that CGA mentions. PHMSA acknowledges that the NPRM discussion of this proposal may have led to CGA's overly broad interpretation PHMSA's intent because we used the term ''drum'' even though the petition only applies to salvage cylinders. There is currently no restriction preventing shippers from placing Class 4 and Class 5 materials in salvage drums. Salvage cylinders are currently authorized to transport liquefied gases (such as carbon dioxide) and many toxic gases (Division 2.3). These materials are both high and low pressure so the salvage cylinders must be constructed and designed to handle the possible pressures of the packaged materials at temperatures up to 55 °C. Salvage cylinder design criteria ensure safety and containment of a leaking cylinder so it can be transported to a disposal facility. Adding Class 4 and Class 5 materials will not create any significant change in the risk when using salvage cylinders as long all the requirements of § 173.3(d) are met. No Class 4 and Class 5 materials can be as toxic as the Division 2.3 or Division 6.1 materials currently allowed, nor can they generate pressure that would exceed the pressures of the Division 2.1, 2.2, or 2.3 materials currently allowed. Thus, we believe adding these materials as authorized in salvage cylinders will maintain the same level of safety established by the regulations.

CGA also suggested allowing Class 4 and Class 5 materials to be placed in salvage cylinders under the provision of an approval.

PHMSA response. We believe a requirement to receive an approval to use a salvage cylinder for Class 4 and Class 5 materials to be impractical in emergency situations. Additionally, as we have not identified any increased risk by providing this general allowance, imposing a burden on users to obtain an approval would also not be practical. We do not believe there will be any decrease in safety by allowing shippers to place Class 4 and Class 5 materials in more robust salvage cylinders. Therefore, we are adopting P–1596 as proposed, and amending § 173.3(d) accordingly.

P–1622

Worthington Cylinder submitted P–1622 requesting that PHMSA limit the internal volume of DOT 39 cylinders containing liquefied flammable gas to 75 cubic inches (in^3), to correct an error dating to 2002.

(1) 75 Cubic Inch Limit

Prior to the publication of HM–220D (67 FR 51626; Aug. 8, 2002), the HMR restricted the internal volume of DOT 39 cylinders to 75 in^3 for all non-liquefied flammable compressed gases and the following flammable liquefied gases: Cyclopropane, ethane, ethylene and liquefied petroleum gas. In the HM–220 NPRM (63 FR 58460; Oct. 30, 1998), we proposed to increase the applicability of this restriction to all flammable liquefied gases, but did not adopt the change on the basis of negative comments in the HM–220D final rule. The HM–220D final rule, however, contained a drafting error that removed the 75 in^3 restriction from liquefied gases completely, which was not our intent.

Worthington Cylinder submitted P–1622 on July 19, 2013, requesting that PHMSA impose a volume restriction of 75 in^3 on DOT 39 cylinders containing the liquefied gases cyclopropane, ethane, ethylene, and liquefied petroleum gas. On October 10, 2014, Worthington Cylinder submitted a supplement to P–1622, requesting that PHMSA restrict the volume of DOT 39 cylinders containing any liquefied flammable gas to 75 cubic inches. In the NPRM, we proposed to adopt this second proposal and restrict the volume of DOT 39 cylinders containing any liquefied flammable gas to 75 cubic inches.

CGA and Worthington Cylinder submitted comments supporting our proposed action to restrict the volume of DOT 39 cylinders containing any liquefied flammable gas to 75 cubic inches. We received comments from Worthington Cylinder, Ford Motor Company, Amtrol, Chemours, COSTHA, and Honeywell requesting that we create an exception to the proposed 75 in^3 limit for ASHRAE A2L ''mildly flammable'' gases. We did not receive any comments directly opposed to the creation of a general 75 in^3 limit for liquefied flammable gases in DOT 39 cylinders. The commenters explained that, in the years since the 75 in^3 restriction was inadvertantly deleted, they have begun safely transporting certain Division 2.1 refrigerant gases in DOT 39 cylinders larger than 75 in^3. They also submitted technical data describing the properties of ASHRAE A2L ''mildly flammable'' gases and demonstrated the performance of a DOT 39 cylinder with a capacity over 75 in^3 filled with an A2L gas in a bonfire test.

PHMSA response. In this final rule, we are modifying our proposed change to § 173.304a and imposing a 75 in^3 limit on the capacity of DOT 39 cylinders containing the following liquefied flammable gases: Cyclopropane, ethane, ethylene and liquefied petroleum gas. This course of action will correct the inadvertent error we made in HM–220D and aligns with PHMSA's safety advisory notice published April 24, 2017 (PHMSA–2016–14; 82 FR 18967). This will also sufficiently address the economic concerns raised by Worthington Cylinder, Ford Motor Company, Amtrol, Chemours, COSTHA, and Honeywell regarding the applicability of the 75 in^3 limit for hydrofluoroolefin and dihalogenoalkane refrigerants.

(2) Chemicals Under Pressure

Dow Chemical Company submitted a comment requesting clarification about the size limitation for chemicals under pressure in § 173.302a(a)(3).

PHMSA response. The limit is only intended to apply to Division 2.1 (flammable gas) chemical under pressure. However, as we noted in the NPRM, the 50 L limit is much larger than the maximum size authorized for the DOT 39 specification in § 178.65. This discrepancy was an unintentional outcome of a harmonization effort with international requirements for non-refillable cylinders, which allow larger sizes than the HMR allow (see Docket No. PHMSA–2012–0027 (HM–215L); 78 FR 988). To reduce confusion introduced by the conflict of the 50 L quantity in § 173.302a(a)(3) and the capacity limts of the specification, we are deleting the reference to ''50 L (3050 in^3)'' and replacing it with reference to the DOT 39 specification capacity limits—1526 in^3 for a service pressure of 500 psig or less, and 277 in^3 for a service pressure of greater than 500 psig.

P–1626

The CGA submitted P–1626 requesting that PHMSA incorporate by reference (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. In the NPRM, PHMSA proposed to incorporate by reference this most current version and requested comment regarding this action. We received no adverse comments related to adoption of the newest edition (*i.e.,* CGA C–1–2016 (11th Ed.)) of the standard versus the Tenth Edition. However, we did receive numerous comments regarding the incorporation by reference of CGA C–1–2016 (11th Ed.) (''CGA C–1'') and associated revisions, which we will discuss in depth as follows.

In this final rule, PHMSA is adopting clarifying language and incorporating by reference the CGA C–1 standard, as proposed in P–1626. CGA C–1 provides more detailed instructions and illustrations for use by cylinder requalifiers and manufacturers than what is possible in the HMR and addresses the deficiencies detailed in the petition. This incorporation by reference applies to the following sections: §§ 178.36, 178.37, 178.38, 178.39, 178.42, 178.44, 178.45, 178.46, 178.47, 178.50, 178.51, 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 supports the goal of increasing compliance and improving overall safety as its reference increases clarity and provides enhanced guidance compared to the current language in the HMR. Cylinder requalifiers and manufacturers must comply with CGA C–1 requirements for pressure testing cylinders, as well as equipment accuracy and calibration. 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 and re-naming the ''hydrostatic test'' paragraph to ''pressure test'' to align more with industry accepted nomenclature. PHMSA believes that CGA C–1's inclusion of ''operator error'' as a condition allowing a repeated test at a higher pressure will prevent the condemnation of cylinders that are safe for continued use. Revising the HMR to incorporate by reference CGA C–1 will provide the desired clarification without imposing requirements that are potentially costly or unnecessarily difficult.

(1) Response to Hydro-Test Products

We received numerous comments regarding incorporation by reference of CGA C–1, and about interpretation of CGA C–1 requirements. Hydro-Test Products [6] submitted a comment requesting clarification of CGA C–1 requalification requirements compared to the current requalification requirements in part 180, subpart C, of the HMR. Hydro-Test Products states,

> The authors of the CGA C–1 pamphlet have included definitions and examples of calibration and accuracy for Expansion Indicating Devices (EID) and Pressure Indicating Devices (PID) that will restrict most all current licensed cylinder re-qualifiers from performing cylinder re-qualification. Furthermore, there are statements in the C–1 that discriminate against procedures and equipment components that have been utilized in a safe, consistent and accurate manner for many years.

PHMSA response. We disagree with Hydro-Test Products and address the issues they raise below.

(a) Expansion Indicating Device Accuracy

Hydro-Test Products describes a burette arrangement with 4 burettes with full scales of 0–25, 0–50, 0–125 and 0–360 cubic centimeters (cc) and explains their belief that incorporation by reference of CGA C–1 will significantly restrict the usable range of the burettes to half of the burette's scale, instead of the much broader range that they believe are authorized under the current HMR.

PHMSA response. Hydro-Test Products understanding of the HMR's current requirements is not correct. The HMR currently require use of burettes in the same manner prescribed in CGA C–1. Hydro-Test Products misunderstanding appears to be grounded in the final rule published on May 28, 1996, known as HM–220A, (61 FR 26750). HM–220A created the requirement that expansion indicating devices (EID), such as burettes or scales, must be certified as having an accuracy of ±0.5 percent, of its full range, and must be accurate to ±1.0 percent of the total expansion of any cylinder tested or 0.1 cubic centimeter, whichever is larger. These accuracy requirements, as discussed in the HM–220A final rule (61 FR 26751), are separate and distinct from the requirement that the EID permit reading to ±1 percent of the total expansion. The reading requirements are intended to address the resolution of the EID, which is not the same as the accuracy of the EID. In the example of the burette with a full scale of 50 cc, with an accuracy grade of ±0.5 percent and increments of 0.1 cc (mid-point interpolation allowed to 0.05), the resolution would permit reading down to 5 cc (*i.e.,* interpolation to 0.05 is 1 percent of 5 cc), but the accuracy of the device would not. A burette with a full scale of 50 cc and full-scale accuracy of ±0.5 percent has an expected deviation of ±0.25 cc. The device may only be used to measure total expansion greater than 25 cc, because at total expansions lower than 25 cc, the expected deviation will be greater than ±1 percent of the total expansion. Using the 5 cc example, a 0.25 cc deviation (*i.e.,* the expected deviation for a 50 cc burette with an accuracy grade of ±0.5 percent) at a total expansion of 5 cc would be a 5% deviation, and would not meet the requirement that the EID is accurate to ±1% of the total expansion.

Moreover, we do not agree that incorporation by reference of CGA C–1 will impose new cost burdens upon cylinder requalifiers because the current regulatory standard has been in place since 1996, and the requirements will not change with incorporation by reference of CGA C–1. Hydro-Test Products states that a similar issue exists for requalifiers using a scale as their EID. Our response is the same: The current regulatory standard has been in place since 1996, and the requirements will not change with incorporation by reference of CGA C–1.

(b) Total and Permanent Expansion Accuracy

Hydro-Test Products asks how EIDs can be used to measure permanent expansion when that permanent expansion is a much lower value that the total expansion, *i.e.* the permanent expansion is out of the range allowed for the total expansion.

PHMSA response. Hydro-Test Products is correct that permanent expansion values are much lower than total expansion values. The HMR has always accepted a greater accuracy deviation for permanent expansion, and this does not change in CGA C–1. Accuracy requirements for EIDs continue to be expressed in terms of the total expansion value.

(c) Foreknowledge of Total Expansion

Hydro-Test Products asks, ''[s]ince there is no indication of the total expansion value on DOT specification

[6] PHMSA notes that Jeff Elliot, Noble Gas Solutions, Anthony King, W Andrews, and Scuba Do submitted comments supporting the Hydro-Test Products comment and opposing the incorporation of CGA C–1. While the discussion below focuses on the specific comments from Hydro-Test Products, it also addresses the subject matter raised by these other comments supporting the Hydro-Test Products comment.

cylinders, how is a re-qualifier supposed to know what burette or scale is applicable and within the proposed regulations for a given test?''

PHMSA response. If a requalifier is completely unaware of the approximate expected total expansion for a cylinder, the requalifier may pressurize the cylinder at or below 90 percent of test pressure, which will give an approximate value for total expansion, allowing the requalifier to select the proper EID for the test. If the operator errs and the cylinder is tested using an EID that cannot measure the total expansion to ±1 percent, he or she may repeat the test up to two times, in accordance with CGA C–1 section 5.7.1. Note that pressurizing the cylinder at or below 90 percent of test pressure does not constitute a test.

(d) Pressure Indicating Device Accuracy

Hydro-Test Products describes a scenario with four pressure indicating devices (PIDs) with the understanding that CGA C–1 will significantly limit the usable range of the gauges.

PHMSA response. We acknowledge that there are other ways to demonstrate compliance with the accuracy requirements for PIDs (*e.g.* certifying gauges at pressures lower than their manufacturer's rated full scale). We believe this practice is in accordance with the HMR and with CGA C–1 because a gauge calibrator has, in effect, certified a gauge to better than a ±0.5 percent full scale accuracy when he or she calibrates the gauge to demonstrate ±1 percent accuracy at points lower than the normally usable range of the gauge based on the manufacturer's rated accuracy. The ±1 percent accuracy requirement is only a minimum standard, and gauge manufacturers or other entities certifying the accuracy are free to demonstrate that the gauge meets the ±1 percent requirement at other, lower points on the gauge.

The examples provided in CGA C–1 are only a guide, and should not be used to prevent the use of PIDs at lower pressures provided the gauge calibrator documents the calibration points on the calibration certificate. The minimum accuracy and readability standards are such that it limits the use of any PID to (the upper) half the gauge, however, there is no limitation on using a gauge certified to be more accurate across its full range, thus allowing broader use of the gauge. PHMSA reviewed this practice in Letter of Interpretation Ref. No. 14–0112, and at this time we have no reason to believe that this practice is unsafe. To clarify our intent further to continue to allow this practice, in this final rule we are not requiring compliance with CGA C–1 paragraph 5.3.2.2, which discusses accuracy requirements for PIDs, if the required accuracy of the PID can be demonstrated by other recognized means such as calibration certificates.

Rather we are maintaining the HMR's current PID accuracy requirements in § 180.205(g)(3)(i). Voluntary compliance with CGA C–1 5.3.2.2 is authorized and will meet the HMR's accuracy requirements for PIDs used for cylinder requalification, as will the practice of demonstrating accuracy through maintenance of a calibration certificate showing the gauge has been certified to meet the accuracy requirements at lower points. Regardless of the method used to determine the usable range of the gauge, the cylinder requalifier must verify that the system is accurate to within 1 percent of the test pressures to be tested that day, as provided in CGA C–1 paragraph 5.5.

(e) Reference Zero Expansion

Hydro-Test Products requests clarification of the term ''reference zero expansion'' in CGA C–1, sections 3.2.22.

PHMSA response. In the verification process, it is critical that the calibrated cylinder show zero expansion to indicate that the system set-up is accurate and ready for testing. The term ''reference zero expansion'' is intended to clarify that when reading the calibrated cylinder's permanent expansion during verification, an expansion reading of ±0.1cc or ±0.1 percent of total expansion, whichever is larger, is accepted as zero.

(f) Daily Verification

Hydro-Test Products states that the requirement to verify all test equipment to be used that day is impossible for those companies that are utilizing burette systems on the volumetric tester and generally unnecessary.

PHMSA response. We disagree. This is a long-standing requirement that is currently found in the HMR in § 180.205(g)(4). All PIDs, EIDs, and water jackets that are to be used that day must be verified under the current requirements of the HMR. We do not believe any additional costs will be imposed by incorporating CGA C–1 because this industry standard has the same requirements as are already required for cylinder requalifiers under the HMR.

(g) Calibrated Cylinders as Surge Tanks

Hydro-Test Products and Galiso question the reasoning for CGA C–1's prohibition on the use of a calibrated cylinder as a ''surge tank'' used to slow pumping speeds when testing smaller cylinders.

PHMSA response. Observations from PHMSA field investigators suggest that industry already largely complies with this requirement. We have safety concerns that exposure to unregulated pressure surges and high temperatures may render the calibrated cylinder unsuitable for its intended purpose. If repeatedly exposed to unregulated pressure surges, the calibrated cylinder may experience additional permanent expansion, rendering it incapable of being used to verify the system's accuracy on a daily basis. The daily verification process depends on the calibrated cylinder giving a precisely known expansion value at a given pressure. If the calibrated cylinder begins stretching too much, for example, a cylinder requalifier may adjust the equipment so that the reading returns to the expected value, not realizing that he has just brought his equipment out of alignment in his attempt to calibrate with an overstretched cylinder. This would cause inaccurate tests whenever that calibrated cylinder is used to verify the system before a day of tests.

(h) Conclusion

Finally, Hydro-Test Products states, ''[a]s we have hoped to have presented in these comments, the incorporation of the C–1 into the regulations will only confuse cylinder re-qualifiers more, while imposing nearly impossible accuracy requirements at a greater cost with absolutely no benefit in safety.''

PHMSA response. We disagree with Hydro-Test Products' conclusion. As we have shown, incorporation of CGA C–1 will not impose additional regulatory burdens on requalifiers. CGA C–1 combines the HMR's current regulatory requirements for pressure testing with diagrams, illustrations, step-by-step guidelines, trouble-shooting procedures, and technical appendices that provide requalifiers with all the information they need to requalify cylinders safely and successfully. The creation of flexibility for reference zero expansion will decrease the time wasted by requalifiers calibrating their systems every day without compromising accuracy. PHMSA believes, based on experience conducting compliance inspections at cylinder requalification facilities, that the additional guidance provided by CGA C–1 (diagrams, troubleshooting guides, technical appendices) will encourage compliance with cylinder requalification standards.

(2) Response to Other Commenters

(a) System Failure or Operator Error

FIBA submitted a comment requesting that we reevaluate the requirements related to system failures or operator error during the pressure test required after cylinder manufacture.

PHMSA response. We agree that the requirements need further clarification. It was our intention to align with the requirements in CGA C–1, section 5.7.2 for cylinder manufacture. In the event of equipment failure or operator error, cylinders may be repeat tested more than twice at time of manufacture, as long as the actual test pressure does not exceed 110 percent of the minimum test pressure and the stresses developed in the cylinder remain within its specification and design limitations. Therefore, we are inserting a reference to that provision in each cylinder manufacture pressure testing paragraph. Note that this does not apply to 3AL cylinders, which, due to the differences in ductility between aluminum and steel, are limited to a single repeat test.

(b) Clarification of § 178.42(f)

COSTHA submitted a comment requesting grammatical changes to the proposed § 178.42(f) to clarify our intent. Section 178.42 specifies two tests for DOT 3E cylinders. One cylinder from each lot must be burst tested, and must burst at a pressure of 6,000 psig without fragmenting or otherwise showing lack of ductility. Then following a successful burst test, each remaining cylinder in the lot must be examined under pressure of at least 3,000 psig, and not above 4,500 psig, and show no defect. The cylinder manufacturer may only examine the cylinders at a pressure of 3,600 psig or greater if the cylinder that was burst-tested at 7,500 psig or greater.

PHMSA response. We agree with COSTHA's comment that the proposed language in § 178.42(f)(3)(ii) was ambiguous. In this final rule, we are reverting the language in § 178.42(f) to the previous layout and language and adding the incorporation of CGA C–1. In our attempt to clarify the requirements in § 178.42(f) we inadvertently made them more ambiguous.

(c) CGA C–1.1

Hydro-Test Products, Bancroft Hinchey, ICT, Noble Gas Solutions, and FIBA noted that the CGA C–1.1 training material we cited in § 180.205(j), has been retracted by CGA and requested that we remove reference to it.

PHMSA response. We agree with the commenters and will remove reference to CGA C–1.1 from § 180.205(j), as it no longer applies as a resource.

(d) Burst Testing Accuracy

Worthington Cylinder submitted a comment requesting clarification about whether CGA C–1 accuracy requirements apply to PIDs used when burst testing cylinders during manufacturing.

PHMSA response. The answer is yes. In this final rule, we will modify the relevant sections of the part 178 specifications for cylinders to indicate that PIDs used for burst tests must meet the requirements of CGA C–1.

(e) Reference Zero Expansion

Galiso submitted a comment requesting that we accept a value within ±1 percent of readability as zero for daily verification. PHMSA does not agree. The allowance of ±.1 percent of total expansion will decrease time spent by requalifiers during daily verification while ensuring that their system continues to meet accuracy requirements. PHMSA will not consider a new ''zero'' standard in this final rule.

(f) Repeat Tests for System Failure or Operator Error

Galiso submitted a comment requesting an explanation for the limitation of two repeat tests in the case of system failure or operator error. When a cylinder is pressurized, it expands. This property is the basis of the volumetric expansion testing program. Volumetric expansion testing measures the volume of the cylinder at test pressure (elastic expansion), and compares it to the volume of the cylinder after pressure is removed (permanent expansion). When permanent expansion is more than 10 percent (or 12 percent for certain cylinders) of elastic expansion, the cylinder must be condemned. If a cylinder is pressurized to over 90 percent of test pressure and then the system fails or the operator errs, it will not return to its original state, rather it will exhibit permanent expansion and reduced expandability because the metal has been stretched. When the test is repeated the next day, the cylinder will exhibit less permanent expansion than the day before, because it started the test in an expanded state. PHMSA is concerned that allowing more than two repeat tests cycles will allow cylinders that should have been condemned to re-enter transportation.

(3) Corrections

(a) DOT 39 Burst Test

In the review of the NPRM, PHMSA determined that we inadvertently removed the requirements for burst-testing DOT 39 cylinders from § 178.65(f). In this final rule, we are re-inserting burst test requirements with language incorporating CGA C–1 calibration and accuracy requirements for burst testing into § 178.65(f).

(b) Incorrect Usage of the Word ''Condemn''

In the review of the NPRM, PHMSA determined that we inadvertently replaced the word ''rejected'' with ''condemned'' in several cylinder manufacture pressure testing sections, specifically §§ 178.46, 178.47, 178.55, 178.56, and 178.65. This was not our intent. In this final rule, we will maintain the HMR's existing instructions for cylinders rejected during manufacture.

(4) Pneumatic and Hydraulic Proof Pressure Tests

CGA C–1 provides instructions for conducting proof pressure tests both pneumatically (gaseous-based system) and hydraulically (liquid-based system). For the purposes of part 178, subpart C, a manufacturer may choose either system when a proof pressure test is authorized. PHMSA would like to emphasize that pneumatic proof pressure test systems can present increased risks to test personnel due to the amount of energy stored in a cylinder filled to test pressure with a gas. Manufacturers must take this risk into account and develop systems to prevent the injury or death of their employees in the event of a catastrophic cylinder rupture at test pressure. The use of additional safety equipment such as blast shields, test cages, etc., is advisable to prevent possible injury to testing personnel and equipment.

P–1628

CGA submitted P–1628 requesting that PHMSA incorporate by reference (IBR) CGA C–3–2005, Reaffirmed 2011, *Standards for Welding on Thin-Walled, Steel Cylinders,* Seventh Edition into the HMR. Presently, the HMR incorporate the Fourth Edition of this standard, CGA C–3–1994. This publication contains information on welding process qualification, welding operator qualifications, tensile testing, bend testing, and radiographic inspection. The changes between the Fourth Edition and the Seventh Edition 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 petition P–1628:[7]

- 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 a tolerance section that indicates the plus and minus tolerances when a specific dimensional tolerance is indicated in the publication.
- Added drawings to illustrate different weld joint designs.

Bancroft Hinchey, Worthington Cylinder, NAFED, and CGA submitted comments supporting the incorporation of the Seventh Edition of CGA C–3. Therefore, in this final rule, PHMSA is incorporating by reference CGA C–3–2005, Reaffirmed 2011, as proposed.

Bancroft Hinchey requested clarification of training requirements for cylinder requalifiers.

PHMSA response. Cylinder requalifiers meet the definition of ''hazmat employee'' found in § 171.8. All hazmat employees must be trained in accordance with 49 CFR part 172, subpart H, including function specific training. An employee working as a cylinder requalifier must be trained to perform that job function properly, including visual inspection of cylinders, but would not necessarily need welding training unless also performing a welding function subject to the HMR.

P–1629

The CGA submitted P–1629 requesting that PHMSA incorporate by reference (IBR) CGA C–14–2005, Reaffirmed 2010, *Procedures for Fire Testing of DOT Cylinder Pressure Relief Device Systems,* Fourth Edition, into the HMR. Presently, the HMR incorporates the First Edition of CGA C–14–1979. 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) and current § 173.301(f) of the HMR. The procedures are 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 petition P–1629:[8]

- 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 pounds water capacity to 1000 pounds water capacity to permit a test method for all DOT 4-series cylinders.

Worthington Cylinder and CGA submitted comments supporting the adoption of CGA C–14–2005, Reaffirmed 2010. Therefore, in this final rule, PHMSA is adopting CGA C–14–2005, Reaffirmed 2010 as proposed.

P–1630

CGA submitted P–1630 requesting that PHMSA revise the HMR requirements for DOT 4L welded insulated cylinders. Specifically, the CGA requested PHMSA make two changes to add a definition of ''recondition'' to § 180.203 and 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.

CGA submitted a comment to the NPRM requesting that we take no action on their petition. We received no other comments to the proposed changes based on P–1630, and therefore, we see no need to revise the HMR based on this petition and will not adopt any changes proposed by P–1630.

V. Special Permits and Comments Received

This final rule addresses one special permit. 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. In the NPRM, PHMSA did not propose changes 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).

In the NPRM, we proposed to adopt provisions from DOT–SP 14237 to allow for the transportation of adsorbed gases in DOT specification cylinders by creating a new section, § 173.302d, in the HMR. The HMR currently only authorizes the transportation of adsorbed gases in UN pressure receptacles under the provisions of § 173.302c. The use of DOT cylinders containing adsorbed gases is currently authorized under various special permits. In the NPRM, we proposed to authorize the transportation of adsorbed gases in DOT–3E1800, DOT–3AA2015, and DOT–3AA2265 cylinders with a capacity between 0.4 and 7.3 liters. Additionally, the proposed § 173.302d included a requirement to place the DOT specification cylinder into a non-DOT specification full-opening, hinged-head or fully removable head, steel overpack cylinder constructed to meet the requirements of ASME Code Section VIII, Division 1 with a minimum design margin of 4 to 1.[9]

We received several comments regarding this proposal. Praxair submitted a comment requesting that, rather than adopting DOT–SP 14237, we harmonize DOT cylinder adsorbed gas requirements with UN pressure receptacle requirements found in § 173.302c, authorize all gases for use as adsorbed service instead of the ''short list'' proposed in § 173.302d, eliminate the proposed overpack cylinder requirement, and, if we did not eliminate the overpack requirement, require the overpack be tested in a DOT-approved facility subject to the requirements of part 107, subpart I. CGA submitted a comment suggesting that rather than adopt the proposed special permit, we should align the proposed requirements for adsorbed gases in DOT cylinders in § 173.302d with the existing requirements for adsorbed gases in UN pressure receptacles currently found in § 173.302c. COSTHA submitted a comment supporting the adoption of requirements for adsorbed gases in DOT cylinders, but noted that some of the gas entries we listed in the

[7] PHMSA Docket ID: PHMSA–2013–0278.

[8] PHMSA Docket ID: PHMSA–2014–0012.

[9] These are all provisions carried over from DOT–SP 14237.

proposed table in § 173.302d had separate UN ID numbers for their adsorbed version in the § 172.101 Hazardous Materials Table that should be cited instead of the non-adsorbed gas entry.

Entegris submitted a comment requesting that rather than adopting DOT–SP 14237, we should adopt DOT SP–16485, which allows for transportation of adsorbed gases in DOT–3AA and DOT–3E cylinders in a manner harmonized with the current requirements for UN pressure receptacles in § 173.302c. Entegris noted that the overpack requirement in DOT–SP 14237 was created to address the unique risks associated with transportation by aircraft, and presents a significant obstacle to efficient transportation by other modes. They noted that § 173.302c does not require the use of overpacks for UN pressure receptacles containing adsorbed gas, nor does DOT–SP 16485.

PHMSA response. We appreciate the comments we received on this topic. In this final rule, we are not adopting DOT–SP 14237, nor are we inserting requirements for adsorbed gases in DOT specification cylinders into the HMR in § 173.302c. PHMSA's decision is based on the lack of consensus on this subject and technical concerns we have surrounding the modal requirements, minimum test pressure criteria, and authorized requalification. There are multiple existing DOT SPs that authorize the transportation of adsorbed gases in DOT specification cylinders. These permits authorize different adsorbed gases and utilize different DOT specification cylinders to contain the substrate and adsorbed gas, and have different operational controls. Incorporating the provisions of multiple special permits that authorize different materials, multiple specification and non-specification cylinders, and have differing operational controls, is challenging for PHMSA to attempt at the final rule stage without soliciting comments on the regulatory solution that melds the provisions and conditions of multiple permits together. The incorporation of adsorbed gases presents additional difficulties due to the risks presented by the highly toxic nature of the gases currently transported in adsorbed form, leading us to proceed with caution in adopting a standard into the HMR.

Therefore, PHMSA believes that the most appropriate way to authorize adsorbed gases in DOT specification cylinders in the HMR is to conduct a more thorough review of existing systems authorized by special permit and propose a solution in a separate rulemaking, rather than risk creating imperfect regulatory requirements. We will further evaluate international standards for adsorbed gas transportation and existing DOT special permits for determination on how best to adopt provisions for adsorbed gases in DOT specification cylinders into the HMR. Adsorbed gases may continue to be transported in UN pressure receptacles in accordance with existing instructions in § 173.302c, or in DOT cylinders under the terms of a special permit. We will consider revisiting this issue in a future rulemaking.

VI. Agency Initiated Editorial Corrections

PHMSA regularly reviews and revises the HMR to correct errors and clarify any regulations that are unclear or confusing. PHMSA is making the following changes in this final rule.

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 verify inspections. However, at present, the application information requirements of § 107.803(c)(3) only reference part 178. In the NPRM, PHMSA proposed to revise § 107.803(c)(3) to include part 180, subpart C, for consistency.

We received one comment on this topic. Bancroft Hinchey supports this revision. Therefore, in this final rule are adopting this change as proposed in the NPRM.

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 revising 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.

We received one comment on this topic. Bancroft Hinchey supports this revision. Therefore, in this final rule we are adopting this change as proposed in the NPRM.

Section 178.70

Section 178.70 provides approval for the manufacture of UN pressure receptacles (*i.e.,* cylinders). Currently, § 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 the NPRM, PHMSA proposed to adopt language consistent with UN/ISO standards to reduce the need for approvals.

We received one comment on this topic. Bancroft Hinchey supports this revision. Therefore, in this final rule we are adopting this change as proposed in the NPRM.

Section 180.203

Section 180.203 specifies definitions that apply to cylinder use, qualification, and maintenance. In the NPRM, PHMSA proposed two revisions to definitions in § 180.203. In this final rule, we are adopting the definition for ''mobile unit'' with modifications based on comments received, and we are not adopting a new definition for ''proof pressure test.''

(1) Define and Adopt ''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 type of approval is to allow a cylinder requalifier to perform its requalifying function away from the primary place of business to better serve cylinder owners who need requalification testing and inspection of cylinders. In the NPRM, we proposed to limit the operations of a mobile unit to a 100-mile radius from the primary place of business. Eleven commenters objected to this limit based on economic, safety, and fairness grounds.

PHMSA response. PHMSA will not place a distance limit on the operations of a mobile unit. However, an applicant for a mobile requalifier identification number (RIN) must specify the geographic area(s) in which they are requesting approval to operate. The requirement to provide geographic information on the operating range of a mobile unit is a part of the current approval process for mobile units. However, it is not codified in the language of Part 107 for cylinder

requalification approvals. The intent of this final rule is to codify the geographic information requirement in the text of part 107 to increase clarity, not create a new requirement. A mobile cylinder requalifier must adhere to the requirements in a PHMSA-issued approval letter to operate. Note that a mobile unit owned or operated by a previously approved requalifier must still receive a separate approval.

(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.[10] In the NPRM, we proposed to modify the definition of ''proof pressure test'' to indicate that it could be performed with either liquid or a gas. We received 9 comments opposed to this change, and no comments in support.

Our description of the advantages of pneumatic, or gas-based, proof pressure testing in the NPRM was not entirely correct. In certain instances, pneumatic testing may not be faster, less expensive, less corrosive to the cylinder, or less environmentally harmful than hydrostatic testing. Pressurizing a cylinder to test pressure and then de-pressurizing it with air or another gas may take significantly longer than using water. Regarding corrosion concerns, use of compressed air for a pneumatic proof pressure test will generally introduce water into the cylinder, and use of dry gases would generally be cost-prohibitive except in very limited circumstances. Regarding environmental concerns, as several commenters noted, many cylinder requalifiers recycle the water they use.

PHMSA response. When we removed the modified hydrostatic pressure test from the HMR and added the proof pressure test into part 180, we intended that the test be conducted with a liquid, except in special circumstances subject to a special permit. We do not believe that a general authorization for pneumatic proof pressure tests for cylinder requalification is in the public interest. Companies requesting authorization to perform pneumatic proof pressure tests for cylinder requalification may request special permits that detail the methods put in place to prevent death and serious injury in the event of a cylinder rupture at test pressure (*i.e.,* much more energy is needed to pressurize a cylinder with a gas than liquid, thus presenting a safety risk to persons performing the test should a rupture occur). Therefore, we will not adopt the proposed modified definition of a proof pressure test in § 180.203. Rather, we will modify the definition of the test based on comments to indicate clearly that the test is to be conducted with a liquid medium, unless otherwise authorized by a special permit.

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). Pressure tests and ultrasonic examination are authorized for UN cylinders with tensile strength below 950 MPa, and only ultrasonic examination is authorized for UN cylinders with a tensile strength greater than or equal to 950 MPa. 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.

We received two comments on this topic. Bancroft Hinchey supports the revision to include the phrase ''larger than 150 liters.'' FIBA submitted a comment requesting that we delete the reference to MEGCs from § 180.207(d) because pressure receptacles exceeding 150 liters (*e.g.* UN refillable seamless steel tubes) may be used for the transportation of hazardous materials not only in MEGCs, but also in other bulk packages, such as a tube trailer motor vehicle.

PHMSA response. We agree with FIBA that UN seamless steel cylinders larger than 150 liters may be found in other packaging configurations besides MEGCs. Our intent is to clarify that all UN seamless steel cylinders, regardless of size or service must be requalified in accordance with ISO 6406. However, we believe there is value in referencing MEGCs as an example of a scenario where users, fillers, or requalifiers may encounter these larger UN cylinders. Therefore, in this final rule we will amend the proposed § 180.207(d)(1) to indicate that all UN seamless steel pressure receptacles, including those with a capacity over 150 liters, must be requalified in accordance with ISO 6406 whether installed in a MEGC or used in other service.

Section 180.213

Section 180.213 prescribes marking requirements for the visual inspection of cylinders (see 49 CFR 180.213(f)(5), (8), and (9)). In the past, PHMSA has allowed a visual (V) requalifier identification number (''V-number'' or ''VIN'') 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. PHMSA issues approval letters that permit a V number marking, but only provide for three of the four available marking options and do not reference § 180.213.

Including all the marking requirements for V-numbers into § 180.213 will make authorized options for these identification numbers to be placed on a cylinder more widely understood.

Amerigas noted that when we inserted examples of acceptable ways to mark a VIN, we omitted one acceptable marking combination that is found in the VIN approval document. Bancroft Hinchey submitted a comment supporting inserting VIN marking examples into the HMR.

PHMSA response. We agree with Amerigas, and will add the additional method that shows the month and year directly above the VIN. In this final rule, PHMSA is amending § 180.213(g) to include examples of V-number markings, as proposed, as well as the method showing the month and year directly above the VIN.

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 the NPRM, PHMSA proposed 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.

We received one comment on this topic. Bancroft Hinchey submitted a comment supporting this change. Therefore, in this final rule we will adopt it as proposed. COSTHA submitted a comment requesting that PHMSA revise the language in § 180.215(c)(2)(vii) to delete the phrase ''(permanent expansion may not exceed ten percent (10 percent) of total

[10] PHMSA removed this from the HMR under HM–220D (67 FR 51626).

expansion)'' because this requirement does not apply to all cylinders. We note the comment but consider it beyond the scope of this rulemaking. We will consider the topic for possible inclusion in a future rulemaking.

VII. 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 final rule, we revise § 107.803(c)(3) as proposed to clarify that the applicant's description of his or her ability to perform and verify inspections must include those required under part 180 as well, consistent with the general requirements in paragraph (a) that refer to part 180.

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 final rule, we are adding paragraph (c)(5) as proposed 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 make a conforming edit to paragraphs (c)(3) and (4) by moving the ''and'' clause from paragraph (c)(3) to paragraph (c)(4).

Section 171.7

Section 171.7 lists reference standards incorporated by reference into the HMR that are not specifically set forth in the HMR.

Paragraph (n) specifically incorporates into the HMR publications issued by the CGA, an industrial and medical gas association that, among others, develops standards and practices for the safe transportation of gases and their containers. In this final rule, we add the Eleventh edition (2016) of CGA publication C–1, *Methods for Pressure Testing Compressed Gas Cylinders* to § 171.7(n). We also 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. The documents are summarized below.

The CGA publications include the following:

(1) CGA C–1, *Methods for Pressure Testing Compressed Gas Cylinders* (2016; Eleventh edition). 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; Seventh edition). 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; Eleventh edition). 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; Fourth edition). 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 have 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; Fourteenth edition). 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. In this final rule, we are removing the phrase ''with the exception of paragraph 9.1.1'' from § 171.7(n)(18). Compliance with paragraph 9.1.1 is still not required; however, we have moved this instruction to each place S–1.1 is incorporated in Part 173 and Part 178 for clarity.

All of these CGA standards are available for purchase on the CGA website.[11] Additionally, these standards are available for public inspection at the Hazardous Material Information Center ((202) 366–4488; *infocntr@dot.gov*) by appointment.

The regulatory text of this rule references ASTM E 8–99, The Aluminum Association's ''Welding Aluminum: Theory and Practice, Fourth Edition, 2002'', and Transport Canada's TDG Regulations. These standards are already approved for the sections that are being amended.

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)(5) outlines requirements for filling of cylinders for export or use onboard a vessel. In this final rule, we revise the marking requirements consistent with changes made to § 180.213.

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 final rule, we are amending § 173.3(d)(1) to permit cylinders that contain Class 4 or 5 materials to use this exception as well. In addition, because of the inclusion of 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.

[11] *https://www.cganet.com/what-we-do/standards-publications/.*

Section 173.301

Section 173.301 provides the general requirements for shipment of compressed gases and other hazardous material in cylinders. In this final rule in paragraphs (c) and (f), we make an editorial revision to correct the section citation of CGA S–1.1 to read 9.1.1. Additionally, we are revising paragraph (f) to clarify the pressure relief requirements for DOT 39 cylinders. See the discussion of P–1580 for further details.

Section 173.302

Section 173.302(f) prescribes the requirements for transporting non-liquefied or ''permanent'' oxidizing gases by air. We are amending § 173.302(f)(2)(i) and adding a new § 173.302(f)(2)(iii) to align with CGA S–1.1 requirements for DOT 39 cylinders. See the discussion of P–1580 for further details.

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 the NPRM, we proposed to clarify the capacity (internal volume) requirements, to make it clear that the 1.23 liter limit applies to Division 2.1 material, and specification size limits of a DOT 39 cylinder apply to chemicals under pressure classed as Division 2.1 (see 49 CFR 172.102, special provision 362). As we noted in the NPRM, the previous 50 L limit for chemical under pressure in a DOT 39 cylinder is much larger than the actual maximum size authorized for the DOT 39 specification in § 178.65. This discrepancy was an unintentional outcome of a harmonization effort with international requirements for non-refillable cylinders, which allow larger sizes than the HMR (see Docket No. PHMSA–2012–0027 (HM–215L); 78 FR 988). To reduce confusion introduced by the conflict of the 50 L quantity in § 173.302a(a)(3) and the capacity limts of the specification, we are deleting the reference to ''50 L (3050 in^3)'' and replacing it with reference to the DOT 39 specification capacity limits—1526 in^3 for a service pressure of 500 psig or less, and 277 in^3 for a service pressure of greater than 500 psig.

We also proposed an editorial correction to the start of paragraph (a)(3) by removing the non-italicized ''DOT 39.''

Section 173.302a(c) provides special filling limits for DOT 3A, 3AX, 3AA, and 3AAX cylinders filled with hydrogen and mixtures of hydrogen with helium, argon, or nitrogen. We are modifying § 173.302a(c)(4) to harmonize with CGA S–1.1. Shippers are not required to install pressure relief devices on tubes (cylinders longer than 144 inches, or 12 feet) shipped in accordance with this paragraph, however their continued use and installation is authorized. This change maintains regulatory flexibility and alignment with accepted industry practice. See discussion of P–1592 for further details.

Section 173.304

Section 173.304(f) prescribes the requirements for transporting liquefied compressed oxidizing gases by air. In this final rule, we are amending § 173.304(f)(2)(i) and adding a new § 173.304(f)(2)(iii) to align with CGA S–1.1 pressure relieve device requirements for DOT 39 cylinders. See the discussion of P–1580 for further details.

Section 173.304a

Section 173.304a prescribes the maximum permitted filling density and authorized cylinders for specific gases. In the NPRM, we proposed to add new paragraph (a)(3) to § 173.304a to state clearly that the maximum capacity (internal volume) of a DOT 39 cylinder containing liquefied flammable gas is 1.23 liters (75 in^3). We also proposed 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.

In this final rule we are modifying our proposed change to § 173.304a and imposing a 75 in^3 limit on the capacity of DOT 39 cylinders containing the following liquefied flammable gases: Cyclopropane, ethane, ethylene, and liquefied petroleum gas. We are also adopting the requirement that a DOT 39 cylinder containing a liquefied gas not listed by name in CGA S–1.1 must be equipped with a CG–7 pressure relief valve, as proposed. See discussion of P–1622 for further details.

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 final rule, we revise § 173.306(g) to authorize composite as well as steel tanks, to require a more flexible testing regime at the manufacturers MAWP rather than a set 100 psig, to allow water pump system tanks to be charged with helium, and to clarify that transportation by aircraft is not an authorized mode of transport. See discussion of P–1582 for more details.

Section 173.309

In the NPRM, we proposed 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. In this final rule, we are adopting the change as proposed, while clarifying our intent as to what is considered a ''fire extinguisher.'' We are allowing cylinders charged with a compressed gas and an extinguishing agent that are intended for installation into fire suppression systems to be described as ''UN1044, Fire extinguishers.'' We are not allowing cylinders charged with an inert gas and used only to pressurize a fire suppression system to be described as ''UN1044, Fire extinguishers'' when offered for transportation separately from the suppression system. See discussion of P–1546 for further details.

Section 173.312

Section 173.312(b)(1) prescribes the filling requirements for multiple element gas containers (MEGCs). In this this final rule, we are clarifying requirements for filling MEGC pressure receptacles containing liquefied compressed gas by weight to emphasize that each pressure receptacle must be filled individually. See discussion of P–1572 for further details.

Section 173.323

Section 173.323 is the packaging section for ethylene oxide. In this final rule, we are making an editorial revision to this section to add a reference to the central IBR section, § 171.7, for the existing references to CGA Pamphlet C–14. CGA C–14 was previously approved for inclusion in this section, but through an oversight, § 171.7 was not referenced as required for approved IBRs. This final rule corrects that oversight.

Section 178.35

Section 178.35(f) prescribes the marking requirements that apply to DOT-specification cylinders. In this final rule, we are adding new paragraph (f)(8) to § 178.35 to require that cylinder tare weight or mass weight, and water capacity be marked on certain DOT-specification cylinders that are filled by weight. See discussion of P–1540 for further details.

Although we did not discuss the above in the petition discussion section,

we note Dow Chemical submitted a comment requesting that we add a paragraph to § 178.35 stating that a cylinder manufactured under this subpart prior to publication of HM–234 may continue to be filled and offered for transportation until its authorized service life has expired. We do not believe such a statement is necessary. Section 173.301(a)(1) addresses this situation by providing that compressed gases must be in UN pressure receptacles built in accordance with the UN standards or in metal cylinders and containers built in accordance with the DOT and ICC specifications and part 178 *in effect at the time of manufacture* or CRC, BTC, CTC or TC specification, and requalified and marked as prescribed in subpart C in part 180, if applicable.

Cylinders manufactured prior to the publication of HM–234 may continue in service, subject to the requalification provisions of part 180, subpart C, and other applicable requirements of the subchapter.

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 final rule, we 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. In this final rule, we also revise the format of the pressure testing paragraphs for greater consistency, including adding notification that any pressurization in excess of 90% of test pressure constitutes a test, and that operator error (*i.e.* selecting the wrong test pressure) is an acceptable reason to allow a repeated test in accordance with CGA C–1 requirements. See the discussions of P–1515 and P–1626 for further details on the requirements in CGA C–1. A detailed discussion of changes to each section follows.

Section 178.36 Specification 3A and 3AX Seamless Steel Cylinders

The paragraph (i) title ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference into (i)(1) and (3) for volumetric expansion testing as proposed.

Section 178.37 Specification 3AA and 3AAX Seamless Steel Cylinders

The paragraph (i) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference into paragraphs (i)(1) and (3) for volumetric expansion testing as proposed.

Section 178.38 Specification 3B Seamless Steel Cylinders

The paragraph (i) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference into paragraphs (i)(1) and (3) for volumetric expansion testing as proposed. To increase clarity, in this final rule we move the instructions for proof pressure testing of cylinders after a selected cylinder from a lot is volumetrically expansion tested at 3 times service pressure from the proposed paragraph (i)(5) to paragraph (i)(2)(ii) to ensure cylinder manufactures are aware of the requirement when reading through paragraph (i). As a result, we also incorporate CGA C–1 into paragraph (i)(2) for proof pressure testing.

Section 178.39 Specification 3BN Seamless Nickel Cylinders

The paragraph (i) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference into paragraphs (i)(1) and (3) as proposed.

Section 178.42 Specification 3E Seamless Steel Cylinders

The paragraph (f) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' as proposed. As discussed in our discussion of P–1626 we are not adopting the proposed re-organization of § 178.42(f) based on comments received that the new layout would generate confusion for regulated entities. Further, CGA C–1 is incorporated by reference for burst testing in paragraph (f)(2) and proof pressure testing in paragraph (f)(3).

Section 178.44 Specification 3HT Seamless Steel Cylinders for Aircraft Use

The paragraph (i) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference into paragraphs (i)(1) and (3) for volumetric expansion testing as proposed.

Section 178.45 Specification 3T Seamless Steel Cylinder

The paragraph (i) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference into paragraphs (i)(1) and (3) for volumetric expansion testing as proposed.

Section 178.46 Specification 3AL Seamless Aluminum Cylinders

The paragraph (g) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference into paragraphs (g)(1) and (3) for volumetric expansion testing as proposed. The HMR currently only allows one repeat test for 3AL cylinders in the case of equipment failure. As proposed, we maintain this requirement in this final rule. 3AL cylinders may only be subjected to one repeat test, rather than the two allowed under CGA C–1. This is due to the different expansion properties of aluminum compared to steel, which would render the expansion measured during a 2nd repeated test at increased pressure an invalid measurement of the cylinder's suitability.

Section 178.47 Specification 4DS Welded Stainless Steel Cylinders for Aircraft Use

The paragraph (j) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference into paragraphs (j)(1) and (3) for volumetric expansion testing as proposed. As proposed, the final rule adds an option for direct expansion testing for 4DS cylinders. PHMSA believes that including the hydrostatic testing direct expansion method in addition to the water jacket method provides for greater flexibility for the tester by allowing an alternative hydrostatic testing method for determining permanent expansion. PHMSA believes that direct expansion will provide an equivalent level of safety when performed in accordance with CGA C–1.

Section 178.50 Specification 4B Welded or Brazed Steel Cylinders

The paragraph (i) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference in paragraph (i)(1) for volumetric expansion testing of one selected cylinder per lot, and (i)(2) for pressure testing the remainder of the lot as proposed.

Section 178.51 Specification 4BA Welded or Brazed Steel Cylinders

The paragraph (i) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference in paragraph (i)(1) for volumetric expansion testing of one selected cylinder per lot, and paragraph (i)(2) for pressure testing the remainder of the lot as proposed.

Section 178.53 Specification 4D Welded Steel Cylinders for Aircraft Use

The paragraph (i) ''*Hydrostatic test*'' is renamed ''*Pressure test*'' and CGA C–1 is incorporated by reference as proposed. In this final rule, we are re-inserting the option to conduct a volumetric expansion test on each cylinder at 2 times service pressure. It was not our intent to remove this option for cylinder manufacturers.

Section 178.55 Specification 4B240ET Welded or Brazed Cylinders

The paragraph (i) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference in paragraph (i)(1) for volumetric expansion testing, paragraph (i)(2) for pressure testing, and paragraph (i)(3) for burst testing as proposed.

Section 178.56 Specification 4AA480 Welded Steel Cylinders

The paragraph (i) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference in paragraph (i)(1) for volumetric expansion testing and paragraph (i)(2) for pressure testing as proposed.

Section 178.57 Specification 4L Welded Insulated Cylinders

The paragraph (i) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference in paragraphs (i)(1) and (3) for pressure testing as proposed.

Section 178.58 Specification 4DA Welded Steel Cylinders for Aircraft Use

The paragraph (i) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference in paragraphs (i)(1) and (3) for volumetric expansion testing as proposed.

Section 178.59 Specification 8 Steel Cylinders With Porous Fillings for Acetylene

The paragraph (h) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated in paragraph (h)(1) for volumetric expansion testing and paragraph (h)(2) for pressure testing as proposed. Additionally, we have editorially revised paragraph (h) to clarify that if the randomly selected cylinder from each lot fails the volumetric expansion test, the remaining cylinders in the lot are not eligible for proof pressure testing and each cylinder must pass a volumetric expansion test at 750 psig to be accepted.

Section 178.60 Specification 8AL Steel Cylinders With Porous Fillings for Acetylene

The paragraph (j) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference in paragraph (j)(1) for volumetric expansion testing and paragraph (j)(2) for proof pressure testing as proposed. Additionally, we have editorially revised paragraph (j) to clarify that if the randomly selected cylinder from each lot fails the volumetric expansion test, the remaining cylinders in the lot are not eligible for proof pressure testing and must pass a volumetric expansion test at 750 psig to be accepted.

Section 178.61 Specification 4BW Welded Steel Cylinders With Electric-Arc Welded Longitudinal Seam

The paragraph (i) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference in paragraph (i)(1) for volumetric expansion testing and paragraph (i)(2) for pressure testing as proposed.

Section 178.65 Specification 39 Non-Reusable (Non-Refillable) Cylinders

The paragraph (f) ''*Pressure tests*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference in paragraph (f)(1) for proof pressure testing and paragraph (f)(2) for burst testing as proposed.

Section 178.68 Specification 4E Welded Aluminum Cylinders

The paragraph (h) ''*Hydrostatic test*'' is renamed ''*Pressure testing*'' and CGA C–1 is incorporated by reference in paragraphs (h)(1) and (2) for volumetric expansion testing and paragraph (h)(3) for pressure testing as proposed.

Sections 178.50, 178.51, 178.61, and 178.68

These sections prescribe DOT 4-series specification requirements. As written these specifications are at times unclear to manufacturers and enforcement personnel. In this final rule, we are revising the specification requirements to promote consistent and uniform manufacturing practices for DOT 4-series cylinders to improve understanding by these entities. See the discussion of P–1501 for further details. Below we will discuss changes to each section in detail.

Section 178.50 Specification 4B Welded or Brazed Steel Cylinders

For steel requirements, we are requiring that manufacturers keep a record of intentionally added alloying elements, as proposed.

For material identification, the final rule makes an editorial clarification that the method used to identify the material must not compromise the integrity of the cylinder, as proposed.

For heat treatment, we are making an editorial clarification to direct cylinder manufacturers to table 1 to appendix A of part 178 for details on suitable heat treatment.

For cylinder attachments, we have moved thread requirements to their own paragraph, (h)(h), without making any changes to thread requirements.

For elongation requirements, we are allowing reduction in elongation percentage based on cylinder tensile strength to align with requirements for DOT 4BA and 4BW cylinder requirements.

For rejected cylinders, we are adopting as proposed heat treatment after seam repairs requirements as follows:

- 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.

The HMR current manufacturing standards require heat treatment after any welding repair, but we believe this additional flexibility for manufacturers will maintain the same high level of safety for repaired cylinders.

Finally, we are removing discussion of embossing the head or sidewall of the cylinder from § 178.50(o)(2). PHMSA has concerns with defining ''embossing.'' Markings must be stamped plainly and permanently on the cylinder as prescribed in § 178.50(o)(1).

Section 178.51 Specification 4BA Welded or Brazed Steel Cylinders

For steel, we are requiring that manufacturers keep a record of intentionally added alloying elements, as proposed.

For material identification, the final rule makes an editorial clarification that the method used to identify the material must not compromise the integrity of the cylinder, as proposed.

For head attachment, we are allowing heads to be attached by welding, as proposed. The previous restriction to brazing only was not PHMSA's intent.

For seams, we are making an editorial revision to paragraph (a) to clarify that longitudinal seams are permitted for cylindrical-type cylinders as proposed.

For welding, we are making an editorial revision to paragraph (e), as proposed, to clarify allowable welding operations on the cylinder.

For yield strengths, tensile strengths, elongations and reduction of area of material, we are re-naming paragraph (j) from ''*Physical tests*'' to ''*Mechanical tests*'' as proposed. Additionally, we are removing the language requiring that the mechanical tests be conducted on a cylinder that has passed the hydrostatic testing because the mechanical tests are unrelated to the pressure test requirements. During our review of the final rule, we noted we inadvertently omitted the requirement that mechanical tests must be conducted after heat treatment. This was not our intent; therefore, we are re-inserting the statement that mechanical tests must be conducted after heat treatment is performed.

For mechanical test samples for spherical cylinders, we are now allowing samples to be taken directly from the formed sphere, if the manufacturer desires, in order ensure the mechanical test samples are as representative as possible of the spheres themselves.

In this final rule, we require that manufacturers remove samples for mechanical tests as provided in appendix A to subpart C of part 178 as proposed in order to improve consistency of cylinder mechanical tests. PHMSA believes that all manufacturers were previously removing samples as recommended in appendix A to subpart C of part 178, therefore this will not create any new burdens for industry.

For rejected cylinders, we are adopting as proposed heat treatment after seam repairs requirements as follows:

- 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.

The HMR current manufacturing standards require heat treatment after any welding repair, but we believe this additional flexibility for manufacturers will maintain the same high level of safety for repaired cylinders.

Finally, we are removing discussion of embossing the head or sidewall of the cylinder from § 178.51(n)(2). PHMSA has concerns with defining ''embossing.'' Markings must be stamped plainly and permanently on the cylinder as prescribed in § 178.51(n)(1).

Section 178.61 Specification 4BW Welded Steel Cylinders With Electric-Arc Welded Longitudinal Seam

For steel, we are requiring that manufacturers keep a record of intentionally added alloying elements, as proposed.

For identification of material, the final rule makes an editorial clarification that the method used to identify the material must not compromise the integrity of the cylinder, and that plates and billets for hotdrawn cylinders must be marked with the heat number, as proposed. PHMSA believes that cylinder manufacturers are already in compliance with this requirement and this does not impose any new burden on industry.

For examination of welds, we are adding reference to radioscopic examination, when conducted in accordance with CGA C–3, to increase flexibility for manufacturers while not compromising examination of welds.

For heat treatment, we are aligning the heat treatment requirements with those for DOT 4BA cylinders and clarifying that heat treatment may occur before, during, or after brazing operations.

For yield strengths, tensile strengths, elongations and reduction of area of material, we are re-naming paragraph (j) from ''*Physical tests*'' to ''*Mechanical tests*'' and adding introductory text as proposed. This editorial change is intended to align the 4BW specification language with the similar DOT 4B and 4BA cylinders language. Additionally, we are requiring that manufacturers remove samples for mechanical tests as provided in appendix A to subpart C of part 178, as proposed, in order to improve consistency of cylinder mechanical tests. PHMSA believes that all manufacturers were previously removing samples as recommended in appendix A to subpart C of part 178, therefore this will not create any new burdens for industry. Finally, for the guided bend test we are aligning the DOT 4BW requirements with the 4BA and allowing specimens to be taken from welded test plates and additional specimen testing if the original specimen fails.

For openings to cylinders, we are aligning the DOT 4BW requirements with the existing requirements for DOT 4B and 4BA cylinders as proposed to promote consistency and simplify compliance for manufacturers producing these similar cylinders. Additionally, we are aligning the 4BW with the 4B specification by adding an allowance to attach brass fittings that are components of handheld fire extinguishers.

For rejected cylinders, we are adopting as proposed heat treatment after seam repairs requirements as follows:

- 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.

The HMR current manufacturing standards require heat treatment after any welding repair, but we believe this additional flexibility for manufacturers will maintain the same high level of safety for repaired cylinders.

For marking, we are adding the following marking locations:

1. On side wall adjacent to top head for side walls not less than 0.090 inch thick.
2. 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.
3. Neckring.

These new locations for the 4BW are already allowed for the very similar 4BA cylinder, are intended to align the 4BW with the 4BA with no decrease in safety.

Finally, we are removing discussion of embossing the head or sidewall of the cylinder from § 178.61(n)(2). PHMSA has concerns with defining ''embossing.'' Markings must be stamped plainly and permanently on the cylinder as prescribed in § 178.61(n)(1).

Section 178.68 Specification 4E Welded Aluminum Cylinders

For aluminum material in § 178.68(b), we are requiring that manufacturers keep a record of intentionally added alloying elements, as proposed. Additionally, we are revising Note 1 to Table 1 to maintain the requirement to conduct regular analysis of the material. It was our intent for the requirement to record intentionally added alloying elements to complement the regular analysis of the material, not replace it.

For yield strengths, tensile strengths, elongations and reduction of area of material, we are re-naming paragraph (j) from ''*Physical tests*'' to ''*Mechanical tests*'' as proposed. For acceptable results for mechanical tests we are not adding the phrase ''a minimum tensile strength as defined in paragraph (f)(1)(ii)

of this section'' to paragraph (k). This text is unnecessary, therefore we are not adopting it. For the alternate guided bend test, we are revising requirements to align with the standards of the Aluminum Association and similar low-pressure steel cylinders.

Finally, we are removing discussion of embossing the head or sidewall of the cylinder from § 178.68(n)(2). PHMSA has concerns with defining ''embossing.'' Markings must be stamped plainly and permanently on the cylinder as prescribed in § 178.68(n)(1).

Section 178.70

Section 178.70(d) prescribes the requirements to obtain design approval of a UN pressure receptacle. In this final rule, we are revising paragraph (d) as proposed 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.

In our review of the NPRM, we discovered we inadvertently deleted the sentence ''An audit may be required as part of the process to modify an approval'' from § 178.70(d). This was not our intent, therefore in this final rule we are reinserting this sentence.

Section 178.75

Section 178.75 contains the requirements for construction of Multi-Element Gas Containers (MEGCs). In this final rule, we are making two editorial revisions to § 178.75. First, we are correcting a spacing error that made paragraphs (e)(3)(i) and (ii) appear to be part of the same paragraph. Additionally, we are clarifying that compliance with CGA S–1.1 paragraph 9.1.1 is not required for PRDs installed on MEGCs. This editorial change is necessary because we have removed the phrase ''except 9.1.1'' from the central § 171.7 IBR reference for CGA S–1.1.

Section 180.203

Section 180.203 prescribes definitions that apply to the qualification, maintenance, and use of cylinders under the HMR. In this final rule, we add new definitions for the terms or phrases ''mobile unit'' and ''over-pressurized,'' and revise the definitions for ''commercially free of corrosive components'' and ''proof pressure test.'' We previously discussed the definitions for ''mobile unit'' and ''proof pressure test'' in Section VII. Agency Initiated Editorial Corrections. The revision to ''commerically free of corrosive components'' is an editorial revision to express the allowable water content in parts per million (ppm) rather than dew point. We added a definition for ''over-pressurized'' because it is now included as a condition for condemnation of a cylinder under § 180.205(i)—*i.e.,* a cylinder that is known to have been or shows evidence of being ''over-pressurized.'' We received no comments related to the new definition for ''over-pressurized'' and therefore will adopt as proposed. We delete the definitions for ''defect,'' ''elastic expansion,'' ''permanent expansion,'' ''rejected cylinder,'' ''test pressure,'' ''total expansion,'' ''visual inspection,'' and ''volumetric expansion test.'' These new and revised definitions will clarify the cylinder requirements prescribed in part 180, subpart C. The deletion of definitions is intended to remove conflicts and redundancies with the newly incorporated by reference CGA C–1 definitions. See discussion of P–1515 and P–1626 for further discussion of CGA C–1.

Section 180.205

Section 180.205 prescribes the general requirements for requalifying DOT-specification cylinders. In this final rule, we are revising and adding new regulatory text for clarity, and incorporating CGA C–1 into the HMR. Specifically, we clarify the conditions requiring test and inspection of cylinders under paragraph (d) by including a reference to thermal damage as proposed by P–1515 (discussed above in Section IV) to identify cylinders weakened by exposure to heat and evidence of grinding; revise the paragraph (f) visual inspection requirements to include reference to shot blasting and ''chasing'' of cylinders as proposed by P–1515 in accordance with previous PHMSA guidance; revise the paragraph (g) requirements for pressure tests by incorporating by reference CGA C–1; editorially revise paragraph (h) to clarify that rejected cylinders must be repaired or rebuilt as provided in § 180.211 prior to further use, not just requalified; revise paragraph (i) to clarify the responsibilities of the requalifier and add conditions under which a cylinder must be condemned, including arc burns on aluminium cylinders, known over-pressurization, end of service life, and stamping on sidewalls as proposed by P–1515; and move the reference of training materials to its own paragraph (j). See discussion of P–1515 and P–1626 for additional information on the incorporation of CGA C–1.

Section 180.207

Section 180.207 prescribes requirements for requalifying UN pressure receptacles. In this final rule, we revise and add new regulatory text for clarity. In the NPRM, we proposed to remove language authorizing approvals for the extension of the service life of a composite ISO pressure receptacle and require condemnation in accordance with § 180.205(i)(1)(x). In this final rule, we will not adopt these changes, but we will remove reference to a 15-year service life because it does not apply to all ISO composite cylinders. Approval may still be sought to extend the life of ISO composite pressure receptacles and each request will be considered on a case by case basis. Additionally, we clarify language in the introduction to the requalification table to confirm that UN pressure receptacles must be requalified prior to filling the cylinders beyond the marked requalification date; editorially revise paragraph (d) for clarity; and revise the requalification procedures for seamless steel cylinders to include MEGC and other pressure receptacles larger than 150 liters water capacity.

Section 180.209

Section 180.209 prescribes requirements for requalifying specification cylinders. In this final rule, we are revising and adding new regulatory text for clarity and incorporating by reference the 2016 version of CGA C–1, *Methods for Pressure Testing Compressed Gas Cylinders.* Specifically, we revise: The requirement for a hammer test in § 180.209(b); the paragraph (c) tare weight marking requirements; the paragraph (e) proof pressure testing requirements to incorporate by reference CGA C–1; the paragraph (g) visual inspection requirements to remove the obsolete reference to a delayed compliance period that ended in 2004 and to create an entry for cylinders containing propylene, commercially free from corroding components to be requalified visually as proposed by P–1626; the paragraph (j) requirements for fire extinguisher requalification to align with CGA C–1, including allowing direct expansion tests for 4-series cylinders used as fire extinguishers because we believe the direct expansion method is an equivalent method for requalifying fire extinguishers; and the paragraph (l) requirements for marking foreign cylinders. See discussion of P–1626 and P–1515 for additional information on the incorporation of CGA C–1 and additional editorial revisions to § 180.209.

Section 180.212

Section 180.212(a) prescribes requirements to repair seamless DOT 3-

series specification cylinders and seamless UN pressure receptacles. In this final rule, we are revising paragraph (a) to require an ultrasonic examination on DOT 3-series cylinders and seamless UN pressure receptacles after any grinding is performed on these cylinders. Additionally, we are adopting as proposed prohibitions from removing arc burns from cylinders. The presence of arc burns requires cylinder rejection at time of visual inspection, and repair facilities may not remove this evidence from a cylinder. We are adopting ultrasonic examination requirements when grinding is conducted, as proposed. It is PHMSA's understanding that cylinder repair facilities already regularly conduct ultrasonic examination whenever wall thickness is removed or in question, therefore this requirement should not impose any additional burden on cylinder repairers. Finally, we are adopting as proposed a new marking requirement for repaired cylinders to indicate compliance with the repair requirements.

Section 180.213

Section 180.213 prescribes requirements for marking DOT-specification cylinders and UN pressure receptacles that are successfully requalified. In this final rule, we also clarify the marking requirements for foreign cylinders filled for export under paragraph (d). The final rule includes two new marking requirements under paragraph (f):

- Designation of grinding with ultrasonic wall thickness examination; and
- designation of requalification of a foreign cylinder for export only requalified in conformance with §§ 171.23(a)(5) and 180.209(l) of the HMR. The ''EX'' marking for foreign cylinders requalified for export only should not be confused with explosive approvals numbers.

Finally, we add visual inspection identifier number marking requirements under a new paragraph (g) that codify the requirements already found in visual requalifier approval documents.

Section 180.215

Section 180.215 prescribes reporting and retention requirements for a person who requalifies, repairs, or rebuilds cylinders. In this final rule, we revise what information these documents must contain: For calibration certificates, requalifiers must now retain a copy of the most recent calibration certificate for their pressure indicating device and expansion indicating device, to align with CGA C–1 requirements incorporated by reference under this final rule; correcting an ambiguity in § 180.215(c)(2)(vii) to clarify that records for both proof pressure and volumetric expansion tests after re-building a 4-series cylinder must be preserved; and for DOT 3-series cylinders repaired using grinding, a record of the performance of grinding repairs and ultrasonic examination.

VIII. Regulatory Analyses and Notices

A. Statutory/Legal Authority for This Final Rule

This rulemaking responds to 20 petitions for rulemaking, one special permit, and several agency-identified issues that have a potential effect on hazardous materials transportation safety. 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.'' The Secretary's authority is delegated to PHMSA at 49 CFR 1.97.

B. Executive Order 12866 and DOT Policies and Procedures for Rulemakings

This final rule is not considered a significant regulatory action under section 3(f) of Executive Order (E.O.) 12866, ''Regulatory Planning and Review,'' 58 FR 51735, and was not reviewed by the Office of Management and Budget (OMB). This rule is also not significant under the Department of Transportation's Policies and Procedures for Rulemakings (DOT Order 2100.6; Dec. 20, 2018).

E.O. 12866 requires agencies to design regulations ''in the most cost-effective manner,'' to make a ''reasoned determination that the benefits of the intended regulation justify its costs,'' and to develop regulations that ''impose the least burden on society.'' In this final rule, PHMSA accomplishes the directives of E.O. 12866 by involving the public and exercising its own independent judgment in responding to 20 petitions for rulemaking submitted by stakeholders in the compressed gas industry. The final rule clarifies the regulatory text in the HMR and incorporates widely used consensus standards to addresses specific safety concerns, thus enhancing the safe transportation of compressed gases while limiting the impact on the regulated community. Additionally, some of the provisions will provide shippers and carriers with additional flexibility to comply with established safety requirements, thereby reducing burdens and costs and increasing productivity.

Overall, the issues discussed in this final rule promote the continued safe transportation of hazardous materials while producing net cost savings. PHMSA estimates the net cost savings associated with this rule is approximately $70,000 per year, at a 7 percent discount rate, over a ten-year analysis period from 2019 to 2028. Details on the estimated cost savings of this final rule can be found in the rule's economic analysis, which is available in the public docket.

C. Executive Order 13771

This final rule is considered a deregulatory action under E.O. 13771. Details on the estimated cost savings of this final rule can be found in the rule's Regulatory Impact Analysis, available at *www.regulations.gov.*

D. Executive Order 13132

This final rule was analyzed in accordance with the principles and criteria contained in Executive Order 13132, ''Federalism,'' 64 FR 43255. E.O. 13132 requires agencies to assure meaningful and timely input by State and local officials in the development of regulatory policies that may have ''substantial direct effects on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.'' This final rule may preempt State, local, and Native American 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 contains an express preemption provision, 49 U.S.C. 5125(b), that preempts State, local, and Native American tribal requirements on the following subjects unless the non-Federal requirements are ''substantively the same'' as the Federal requirements:

(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.

This final rule addresses subjects (1), (2), and (5) above. Therefore, this final rule will preempt any State, local, or tribal requirements concerning these subjects unless the non-Federal requirements are ''substantively the same'' as the Federal requirements. PHMSA received no comments on the NPRM regarding the effect of the adoption of the specific proposals would have on State or local governments.

E. Executive Order 13175

This final rule was analyzed in accordance with the principles and criteria contained in Executive Order 13175, ''Consultation and Coordination with Indian Tribal Governments,'' 79 FR 4748. E.O. 13175 requires agencies to assure meaningful and timely input from Indian tribal government representatives in the development of rules that significantly or uniquely affect Tribal communities by imposing ''substantial direct compliance costs'' or ''substantial direct effects'' on such communities or the relationship and distribution of power between the Federal Government and Indian tribes. This final rule is generally directed at offerors and shippers of DOT-specification cylinders and UN pressure receptacles that transport hazardous materials in U.S. commerce. The final rule is also likely to affect cylinder manufacturers; cylinder requalifiers; independent inspection agencies; commercial establishments that own and use DOT-specification cylinders and UN pressure receptacles. It does not impose substantial direct compliance costs and does not have substantial direct effects on Native American tribal governments. Therefore, the funding and consultation requirements of E.O. 13175 do not apply, and a tribal summary impact statement is not required. Further, PHMSA did not receive comments on the tribal implications of the rulemaking.

F. 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. Executive Order 13272, ''Proper Consideration of Small Entities in Agency Rulemaking,'' 68 FR 7990, requires agencies to establish procedures and policies to promote compliance with the Regulatory Flexibility Act and to ''thoroughly review draft rules to assess and take appropriate account of the potential impact'' of the rules on small businesses, governmental jurisdictions and small organizations. This rule was developed in accordance with this E.O. and DOT's procedures and policies to promote compliance with the Regulatory Flexibility Act to ensure that potential impacts on small entities of a regulatory action were properly considered.

Section 603(b) of the Regulatory Flexibility Act requires an analysis of the possible impact of the 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 final rule is as follows:

1. Need for the Final Rule

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 final rule is part of an agency effort to conduct a retrospective review of existing regulations. The final rule attempts to modify and streamline existing requirements that are outmoded, ineffective, insufficient, or excessively burdensome. As part of this effort, this rulemaking introduces new provisions suggested or developed by industry representatives, groups that develop consensus standards, and international regulatory bodies.

2. Description of Action

This final rule responds to 20 petitions for rulemaking, clarifies other requirements in the HMR, and addresses areas of concern that are currently left out of the HMR. The amendments discussed in this final rule 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 term ''small entities,'' as described in 5 U.S.C. 601, 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. 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, and 541380). Nearly all of these companies, particularly cylinder requalification facilities (approximately 5,000 in total) are small entities based on the criteria developed by the Small Business Administration.

4. Reporting and Recordkeeping Requirements

This final rule includes very minor reporting and 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 final rule 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 OSHA regulations. 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

The Regulatory Flexibility Act directs agencies to establish exceptions and differing compliance standards for small businesses, where it is possible to do so and still meet the objectives of applicable regulatory statutes. The proposed changes are generally intended to provide cost savings to industry members. PHMSA received no

comments from small entities on specific small business impacts from these additional requirements.

7. Conclusion

This final rule reduces burdens for most persons and any costs resulting from adoption of new requirements will be minimal and will be offset by cost savings. Additionally, the rule will create additional unquantified ancillary benefits and cost savings derived from increasing regulatory flexibility and improving safety through enhanced clarity.

G. Paperwork Reduction Act

PHMSA has analyzed this rule in accordance with the Paperwork Reduction Act of 1995 (PRA) (Pub. L. 96–511). PHMSA stated in the NPRM that the proposals did not impose new information collection requirements. However, PHMSA did receive a comment from Hydro-Test Products related to proposed changes to § 180.215 on the addition of the date of manufacture to test record forms. The commenter noted that PHMSA did not address the paperwork burden for the proposed requirement in § 180.215. To address this comment PHMSA is accounting for a minor adjustment to information on a requalification test report under OMB control number 2137–0022 titled ''Testing, Inspection, and Marking Requirements for Cylinders.'' PHMSA estimates based on our experience observing the activities of cylinder requalifiers during compliance inspections that it will take one additional second to write the date of manufacture on the cylinder requalification record. PHMSA currently estimates there are 6,790,000 cylinder requalifications conducted each year. The additional one second of burden to these reports will result in additional time burden of 1,886 hours (6,790,000 annual reports × 1 second).

Furthermore, upon review of this rule, PHMSA is accounting for additional burden in this rulemaking. In the NPRM, PHMSA also proposed a requirement in § 178.35 to mark the tare weight, mass weight, and water capacity on DOT 4B, 4BA, 4BW, or 4E cylinders. The language in the final rule will codify language in § 178.35 to require that DOT-specification 4B, 4BA, 4BW, and 4E cylinders used in liquefied compressed gas service manufactured two years after publication of this rule to be marked with the tare weight, mass weight, and water capacity. PHMSA already accounts for the marking of new cylinders under § 178.35 under the previously mentioned OMB Control Number 2137–0022. PHMSA estimates based on our knowledge of modern automated cylinder manufacturing processes from direct observation during compliance inspections that this additional marking information will take an additional 3 minutes, for an increase in approximately 3,472 hours on an annual basis.

Additionally, PHMSA proposed a requirement in § 180.215(b)(4) to require cylinder requalifiers to retain the most recent calibration certificate for their pressure indicating device (PID) and expansion indicating device (EID). PHMSA already accounts for creation of records related to cylinder requalification under § 180.215 under OMB Control Number 2137–0022. After the incorporation of CGA C–1, each requalifier will be required to re-calibrate their PID every 6 months. There are approximately 2,300 cylinder requalifiers approved by PHMSA to conduct pressure tests on cylinders, therefore we estimate that 4,600 PID calibration certificates will be generated each year. We estimate that it will take the gauge calibration facility 5 minutes to generate each certificate, based on our knowledge of the information contained on the certificate. This results in a new information collection burden of approximately 383 hours for gauge calibration facilities. Based on our experience inspecting cylinder requalification facilities, we believe that gauge calibration facilities already provide this record as part of their business practices and there will be no additional cost burden associated with this requirement.

Expansion indicating devices (EIDs) are either burette systems or scale-based systems. Burette systems do not require recalibration because their accuracy is fixed at the time the glass burette tube is measured and printed with volume graduations. CGA C–1 requires that scale-based EID systems are recalibrated as provided in the manufacturer's manual. PHMSA has reviewed a manufacturer's manual for a scale-based system and determined that scale calibration is only required when the scale cannot display an accurate weight when tested with an object of known mass (*e.g.* a 100-gram test weight provided with the system). Based on our experience conducting inspections at cylinder requalification facilities, this is an uncommon occurrence. Based on our experience inspecting cylinder requalification facilities, we estimate that 10% of cylinder requalifiers need to recalibrate their scale-based EID systems each year, resulting in the generation of 230 re-calibration certificates annually. We estimate that it will take the scale calibration facility 5 minutes to generate each certificate, based on our knowledge of the information contained on the certificate, which results in an increase of approximate 19 hours in burden. Based on our experience inspecting cylinder requalification facilities, we believe that scale calibration facilities already provide this record as part of their business practices and there will be no additional cost burden associated with this requirement.

Finally, PHMSA proposed a requirement in §§ 178.50(b), 178.51(b), 178.61(b), and 178.68(b) to require manufacturers of DOT 4B, 4BA, 4BW, and 4E cylinders to keep a record of intentionally added alloying elements in the steel or aluminum used to produce the cylinders. PHMSA already accounts for recordkeeping related to the production of cylinders under OMB Control Number 2137–0022. PHMSA estimates based on our knowledge of cylinder manufacturer practices from direct observation during compliance inspections that this additional recordkeeping will take an additional 23 hours affecting 23 manufacturers.

This rulemaking identifies revised information collection requests that PHMSA will submit to OMB for approval based on the requirements in this final rule. PHMSA has developed burden estimates to reflect changes in this final rule and estimates the information collection and recordkeeping burdens in this rule are as follows:

Annual Increase in Number of Respondents: 4,623.

Annual Increase in Annual Number of Responses: 4,853.

Annual Increase in Annual Burden Hours: 5,783.

H. 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.

I. Unfunded Mandates Reform Act of 1995

The Unfunded Mandates Reform Act (UMRA) of 1995, Public Law 104–4, establishes significance thresholds for the direct costs of regulations on State, local, or tribal governments or the private sector that trigger certain agency reporting requirements. The statutory thresholds established in UMRA were $50 million for intergovernmental mandates and $100 million for private-

sector mandates in 1996. According to the Congressional Budget Office, the thresholds for 2019, which are adjusted annually for inflation, are $82 million and $164 million, respectively, for intergovernmental and private-sector mandates.[12] This final rule results in cost savings and is the least burdensome alternative that achieves the objective of the rule. It is not significant under UMRA. Therefore, PHMSA is not required to prepare a written statement.

J. 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 final rule responds to 20 petitions for rulemaking submitted by the regulated community. The issues discussed in this final rule will 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 requirements for cylinders.

This final rule 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 Eleventh 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* (Tenth edition currently incorporated by reference in the HMR) Appendix A on cylinders contained in overpacks.
- Require manufacturers to mark certain 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, under certain conditions and limitations.
- 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.

2. Alternatives Considered

Alternative (1) No Action: Under this alternative, the current regulatory standards would remain in effect. PHMSA would not adopt any of the petitions or incorporate any of the special permits under consideration. As a result, PHMSA would not 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 no action alternative.

Alternative (2) Preferred Alternative: With this alternative, PHMSA responds to 20 petitions for rulemaking, clarifies other requirements in the HMR, and addresses areas of concern that are currently left out of the HMR.

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. Under the HMR, hazardous materials are transported by aircraft, vessel, rail, and highway. 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. 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.

Anticipated Impact under Alternative (1) No Action: Potential for increased releases of hazardous materials due to unclear regulatory language and use of outdated industry standards.

Anticipated Impact under Alternative (2) Preferred Alternative: Decreased releases of hazardous materials due to increased clarity of regulatory requirements and updated industry standards. Specifically, increased clarity for MEGC filling requirements will decrease the chances of pressure receptacle overfill which can result in catastrophic releases of hazardous materials. It is anticipated that the petitions discussed in this final rule 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 final rule and determined that no significant environmental impact will result from this final rule. The amendments would provide protection against the release of hazardous materials based on sound scientific methods and would not result in unusual stresses on the cylinders used to contain these hazardous materials or adversely impact human health or the environment. PHMSA received no comments specifically addressing the environmental impacts of changes made in this final rule.

K. 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.*

[12] *https://www.cbo.gov/publication/51335.*

L. International Trade Analysis and Executive Order 13609

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 final rule to ensure that it does not exclude imports that meet this objective. The final rule may have positive impacts on international trade because it increases the level of harmonization between U.S. regulations and international standards, which is also consistent with the policy in Executive Order 13609, ''Promoting International Regulatory Cooperation,'' 77 FR 26413. As a result, this final rule is not considered as creating an unnecessary obstacle to foreign commerce.

M. National Technology Transfer and Advancement Act

The National Technology Transfer and Advancement Act of 1995 (15 U.S.C. 272 note) directs Federal agencies to use voluntary consensus standards in their regulatory activities unless doing so would be inconsistent with applicable law or otherwise impractical. Voluntary consensus standards are technical standards (*e.g.,* specification of materials, test methods, or performance requirements) that are developed or adopted by voluntary consensus standards bodies. This final rule adopts five voluntary consensus standards developed by the Compressed Gas Association, which are discussed in detail in the ''Section-by-Section Review'' for § 171.7.

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 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, Incorporation by reference, Motor vehicle safety, Packaging and containers, Railroad safety, Reporting and recordkeeping requirements.

In consideration of the foregoing, PHMSA amends 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; Pub. L. 104–121, Sections 212–213; Pub. L. 104–134, Section 31001; Pub. L. 114–74, Section 4 (28 U.S.C. 2461 note); 49 CFR 1.81 and 1.97; 33 U.S.C. 1321.

■ 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 parts 178 and 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 (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; Pub. L. 104–134, Section 31001; Pub. L. 114–74, Section 4 (28 U.S.C. 2461 note); 49 CFR 1.81 and 1.97.

■ 5. In § 171.7:

■ a. Revise paragraph (a)(2)(ii);

■ b. Remove paragraph (n)(16) and redesignate paragraphs (n)(1) through (15) as paragraphs (n)(2) through (16);

■ c. Add new paragraph (n)(1) and revise newly redesignated paragraphs (n)(2), (4), and (13) and paragraph (n)(18).

The revisions and addition read as follows:

§ 171.7 Reference material.

(a) * * *

(2) * * *

(ii) The National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email *fedreg.legal@nara.gov,* or go to *www.archives.gov/federal-register/cfr/ibr-locations.html.*

* * * * *

(n) * * *

(1) CGA C–1—2016, Methods for Pressure Testing Compressed Gas Cylinders, Eleventh edition, copyright 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—2005 (Reaffirmed 2011), Standards for Welding on Thin-Walled Steel Cylinders, Seventh edition, copyright 2005, 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.

* * * * *

(4) CGA C–6—2013, Standards for Visual Inspection of Steel Compressed

Gas Cylinders, Eleventh edition, copyright 2013, into §§ 172.102, 173.3, 173.198, 180.205, 180.209, 180.211, 180.411, 180.519.

* * * * *

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

* * * * *

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

* * * * *

■ 6. In § 171.23, revise paragraph (a)(5)(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) * * *

(5) * * *

(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 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

■ 7. 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.

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

§ 173.3 Packaging and exceptions.

* * * * *

(d) * * *

(1) Except for Class 1, Division 6.2, Class 7, or acetylene material, a cylinder containing a hazardous material may be overpacked in a salvage cylinder.

* * * * *

■ 9. In § 173.301:

■ a. In paragraphs (c) and (f), remove ''9.1.1.1'' and add in its place ''9.1.1'' in each place it appears; and

■ b. Revise paragraph (f)(4).

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.

* * * * *

(f) * * *

(4)(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) A pressure relief device for oxidizing gases transported by air in a DOT 39 cylinder must meet the requirements of § 173.302(f)(2)(iii) of this subpart for permanent gases and § 173.304(f)(2)(iii) for liquefied compressed gases.

* * * * *

■ 10. In § 173.302, revise paragraphs (f)(2)(i) and (ii) and add paragraph (f)(2)(iii) to read as follows:

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

* * * * *

(f) * * *

(2) * * *

(i) The rated burst pressure of a rupture disc for DOT 3A, 3AA, 3AL, and 3E cylinders, and UN pressure receptacles ISO 9809–1, ISO 9809–2, ISO 9809–3 and ISO 7866 cylinders must be 100% of the cylinder minimum test pressure with a tolerance of plus zero to minus 10%;

(ii) The rated burst pressure of a rupture disc for a DOT 3HT cylinder must be 90% of the cylinder minimum test pressure with a tolerance of plus zero to minus 10%; and

(iii) The rated burst pressure of a rupture disc for a DOT 39 cylinder must be not more than 80 percent of cylinder burst pressure but not less than 105 percent of cylinder test pressure. Cylinders filled and offered for transportation in accordance with the requirements of the section before January 27, 2021 may continue to be used for the life of the packaging.

* * * * *

■ 11. In § 173.302a, revise paragraphs (a)(3) and (c)(4)(i) and (ii) and add paragraph (c)(4)(iii) 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 1.23 L (75 in^3). For chemical under pressure (see § 172.102 of this subchapter (special provision 362)), the internal volume may not exceed the size limits of the specification as provided in § 178.65(a)(1) of this subchapter.

* * * * *

(c) * * *

(4) * * *

(i) Cylinders less than 1.7 m (65 inches) in length must be equipped with fusible metal backed frangible disc devices;

(ii) Cylinders 1.7 m (65 inches) or greater in length and 24.5 cm (9.63 inches) in diameter or larger must be equipped with fusible metal backed frangible disc devices or frangible disc devices, except as provided in paragraph (c)(4)(iii) of this section. Cylinders with a diameter of 0.56 m (22 inches) or larger must be equipped with frangible disc devices except as provided in paragraph (c)(4)(iii) of this section.

(iii) Cylinders greater than 3.66 m (144 inches) in length that are horizontally mounted on a motor vehicle, in an ISO framework, or other framework of equivalent structural integrity are not required to be equipped with pressure relief devices. If such devices are installed, they must be selected in accordance with § 173.301(f).

* * * * *

■ 12. In § 173.304, revise paragraphs (f)(2)(i) and (ii) and add paragraph (f)(2)(iii) to read as follows:

§ 173.304 Filling of cylinders with liquefied compressed gases.

* * * * *

(f) * * *

(2) * * *

(i) The rated burst pressure of a rupture disc for DOT 3A, 3AA, 3AL, and 3E cylinders, and UN pressure receptacles ISO 9809–1, ISO 9809–2, ISO 9809–3, and ISO 7866 cylinders must be 100% of the cylinder minimum test pressure with a tolerance of plus zero to minus 10%;

(ii) The rated burst pressure of a rupture disc for a DOT 3HT cylinder must be 90% of the cylinder minimum test pressure with a tolerance of plus zero to minus 10%; and

(iii) The rated burst pressure of a rupture disc for a DOT 39 cylinder must be not more than 80 percent of cylinder burst pressure but not less than 105 percent of cylinder test pressure. Cylinders filled and offered for transportation in accordance with the requirements of the section before January 27, 2021 may continue to be used for the life of the packaging.

■ 13. In § 173.304a:

■ a. Revise paragraph (a)(2); and

■ b. Add paragraph (a)(3); and

■ c. Revise paragraph (d)(3)(i).

The revisions and addition read as follows:

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

(a) * * *

(2) For the gases named, the requirements in table 1 to paragraph (a)(2) apply (for cryogenic liquids, see § 173.316):

TABLE 1 TO PARAGRAPH (a)(2)

Kind of gas	Maximum permitted filling density (percent) (see Note 1)	Packaging marked as shown in this column or of the same type with higher service pressure must be used, except as provided in §§ 173.301(l), 173.301a(e), and 180.205(a) (see notes following table)
Anhydrous ammonia	54	DOT–3A480; DOT–3AA480; DOT–3A480X; DOT–4AA480; DOT–3; DOT–3E1800; DOT–3AL480.
Bromotrifluoromethane (R–13B1 or H–1301)	124	DOT–3A400; DOT–3AA400; DOT–3B400; DOT–4AA480; DOT–4B400; DOT–4BA400; DOT–4BW400; DOT–3E1800; DOT–39; DOT–3AL400.
Carbon dioxide (see Notes 4, 7, and 8)	68	DOT–3A1800; DOT–3AX1800; DOT–3AA1800; DOT–3AAX1800; DOT–3; DOT–3E1800; DOT–3T1800; DOT–3HT2000; DOT–39; DOT–3AL1800.
Carbon dioxide (see Notes 4, 7, and 8)	70.3	DOT–3A2000, DOT–3AA2000, DOT–3AX2000, DOT–3AAX2000, DOT–3T2000.
Carbon dioxide (see Notes 4, 7, and 8)	73.2	DOT–3A2265, DOT–3AA2265, DOT–3AX2265, DOT–3AAX2265, DOT–3T2265.
Carbon dioxide (see Notes 4, 7, and 8)	74.5	DOT–3A2400, DOT–3AA2400, DOT–3AX2400, DOT–3AAX2400, DOT–3T2400.
Carbon dioxide, refrigerated liquid (see paragraph (e) of this section).		DOT–4L.
Chlorine (see Note 2)	125	DOT–3A480; DOT–3AA480; DOT–3; DOT–3BN480; DOT–3E1800.
Chlorodifluroethane or 1-Chloro-1, 1-difluoroethane (R–142b).	100	DOT–3A150; DOT–3AA150; DOT–3B150; DOT–4B150; DOT–4BA225; DOT–4BW225; DOT–3E1800; DOT–39; DOT–3AL150.
Chlorodifluoromethane (R–22) (see Note 8)	105	DOT–3A240; DOT–3AA240; DOT–3B240; DOT–4B240; DOT–4BA240; DOT–4BW240; DOT–4B240ET; DOT–4E240; DOT–39; DOT–3E1800; DOT–3AL240.
Chloropentafluorethane (R–115)	110	DOT–3A225; DOT–3AA225; DOT–3B225; DOT–4BA225; DOT–4B225; DOT–4BW225; DOT–3E1800; DOT–39; DOT–3AL225.
Chlorotrifluoromethane (R–13) (see Note 8)	100	DOT–3A1800; DOT–3AA1800; DOT–3; DOT–3E1800; DOT–39; DOT–3AL1800.
Cyclopropane (see Notes 8 and 9)	55	DOT–3A225; DOT–3A480X; DOT–3AA225; DOT–3B225; DOT–4AA480; DOT4B225; DOT–4BA225; DOT–4BW225; DOT–4B240ET; DOT–3; DOT–3E1800; DOT–39; DOT–3AL225.
Dichlorodifluoromethane (R–12) (see Note 8)	119	DOT–3A225; DOT–3AA225; DOT–3B225; DOT–4B225; DOT–4BA225; DOT–4BW225; DOT–4B240ET; DOT–4E225; DOT–39; DOT–3E1800; DOT–3AL225.
Dichlorodifluoromethane and difluoroethane mixture (constant boiling mixture) (R–500) (see Note 8).	Not liquid full at 131 °F	DOT–3A240; DOT–3AA240; DOT–3B240; DOT–3E1800; DOT–4B240; DOT–4BA240; DOT–4BW240; DOT–4E240; DOT–39.
1,1-Difluoroethane (R–152a) (see Note 8)	79	DOT–3A150; DOT–3AA150; DOT–3B150; DOT–4B150; DOT–4BA225; DOT–4BW225; DOT–3E1800; DOT–3AL150.
1,1-Difluoroethylene (R–1132A)	73	DOT–3A2200; DOT–3AA2200; DOT–3AX2200; DOT–3AAX2200; DOT–3T2200; DOT–39.
Dimethylamine, anhydrous	59	DOT–3A150; DOT–3AA150; DOT–3B150; DOT–4B150; DOT–4BA225; DOT–4BW225; ICC–3E1800.
Ethane (see Notes 8 and 9)	35.8	DOT–3A1800; DOT–3AX1800; DOT–3AA1800; DOT–3AAX1800; DOT–3; DOT–3E1800; DOT–3T1800; DOT–39; DOT–3AL1800.
Ethane (see Notes 8 and 9)	36.8	DOT–3A2000; DOT–3AX2000; DOT–3AA2000; DOT–3AAX2000; DOT–3T2000; DOT–39; DOT–3AL2000.
Ethylene (see Notes 8 and 9)	31.0	DOT–3A1800; DOT–3AX1800; DOT–3AA1800; DOT–3AAX1800; DOT–3; DOT–3E1800; DOT–3T1800; DOT–39; DOT–3AL1800.
Ethylene (see Notes 8 and 9)	32.5	DOT–3A2000; DOT–3AX2000; DOT–3AA2000; DOT–3AAX2000; DOT–3T2000; DOT–39; DOT–3AL2000.
Ethylene (see Notes 8 and 9)	35.5	DOT–3A2400; DOT–3AX2400; DOT–3AA2400; DOT–3AAX2400; DOT–3T2400; DOT–39; DOT–3AL2400.
Hydrogen chloride, anhydrous	65	DOT–3A1800; DOT–3AA1800; DOT–3AX1800; DOT–3AAX1800; DOT–3; DOT–3T1800; DOT–3E1800.
Hydrogen sulfide (Note 10)	62.5	DOT–3A; DOT–3AA; DOT–3B; DOT–4B; DOT–4BA; DOT–4BW; DOT–3E1800; DOT–3AL.

TABLE 1 TO PARAGRAPH (a)(2)—Continued

Kind of gas	Maximum permitted filling density (percent) (see Note 1)	Packaging marked as shown in this column or of the same type with higher service pressure must be used, except as provided in §§ 173.301(l), 173.301a(e), and 180.205(a) (see notes following table)
Insecticide, gases liquefied (see Notes 8 and 12)	Not liquid full at 131 °F	DOT–3A300; DOT–3AA300; DOT–3B300; DOT–4B300; DOT–4BA300; DOT–4BW300; DOT–3E1800.
Liquefied nonflammable gases, other than classified flammable, corrosive, toxic & mixtures or solution thereof filled w/nitrogen, carbon dioxide, or air (see Notes 7 and 8)..	Not liquid full at 131 °F	Specification packaging authorized in paragraph (a)(1) of this section and DOT–3HT; DOT–4D; DOT–4DA; DOT–4DS.
Methyl acetylene-propadiene, mixtures, stabilized; (see Note 5)..	Not liquid at 131 °F	DOT–4B240 without brazed seams; DOT–4BA240 without brazed seams; DOT–3A240; DOT–3AA240; DOT–3B240; DOT–3E1800; DOT–4BW240; DOT–4E240; DOT–4B240ET; DOT–3AL240.
Methyl chloride	84	DOT–3A225; DOT–3AA225; DOT–3B225; DOT–4B225; DOT–4BA225; DOT–4BW225; DOT–3; DOT–3E1800; DOT–4B240ET. Cylinders complying with DOT–3A150; DOT–3B150; and DOT–4B150 manufactured prior to Dec. 7, 1936 are also authorized.
Methyl mercaptan	80	DOT–3A240; DOT–3AA240; DOT–3B240; OT–4B240; DOT–4B240ET; DOT–3E1800; DOT–4BA240; DOT–4BW240.
Nitrosyl chloride	110	DOT–3BN400 only.
Nitrous oxide (see Notes 7, 8, and 11)	68	DOT–3A1800; DOT–3AX1800; DOT–3AA1800; DOT–3AAX1800; DOT–3; DOT–3E1800; DOT–3T1800; DOT–3HT2000; DOT–39; DOT–3AL1800.
Nitrous oxide (see Notes 7, 8, and 11)	70.3	DOT–3A2000, DOT–3AA2000, DOT–3AX2000, DOT–3AAX2000, DOT–3T2000.
Nitrous oxide (see Notes 7, 8, and 11)	73.2	DOT–3A2265, DOT–3AA2265, DOT–3AX2265, DOT–3AAX2265, DOT–3T2265.
Nitrous oxide (see Notes 7, 8, and 11)	74.5	DOT–3A2400, DOT–3AA2400, DOT–3AX2400, DOT–3AAX2400, DOT–3T2400.
Nitrous oxide, refrigerated liquid (see paragraph (e) of this section.).		DOT–4L.
Refrigerant gas, n.o.s. or Dispersant gas, n.o.s. (see Notes 8 and 13).	Not liquid full at 130 °F	DOT–3A240; DOT–3AA240; DOT–3B240; DOT–3E1800; DOT–4B240; DOT–4BA240; DOT–4BW240; DOT–4E240; DOT–39; DOT–3AL240.
Sulfur dioxide (see note 8)	125	DOT–3A225; DOT–3AA225; DOT–3B225; DOT–4B225; DOT–4BA225; DOT–4BW225; DOT–4B240ET; DOT–3; DOT–39; DOT–3E1800; DOT–3AL225.
Sulfur hexafluoride	120	DOT–3A1000; DOT–3AA1000; DOT–AAX2400; DOT–3; DOT–3AL1000; DOT–3E1800; DOT–3T1800.
Sulfuryl fluoride	106	DOT–3A480; DOT–3AA480; DOT–3E1800; DOT–4B480; DOT–4BA480; DOT–4BW480.
Tetrafluoroethylene, stabilized	90	DOT–3A1200; DOT–3AA1200; DOT–3E1800.
Trifluorochloroethylene, stabilized	115	DOT–3A300; DOT–3AA300; DOT–3B300; DOT–4B300; DOT–4BA300; DOT–4BW300; DOT–3E1800.
Trimethylamine, anhydrous	57	DOT–3A150; DOT–3AA150; DOT–3B150; DOT–4B150; DOT–4BA225; DOT–4BW225; DOT–3E1800.
Vinyl chloride (see Note 5)	84	DOT–4B150 without brazed seams; DOT–4BA225 without brazed seams; DOT–4BW225; DOT–3A150; DOT–3AA150; DOT–3E1800; DOT–3AL150.
Vinyl fluoride, stabilized	62	DOT–3A1800; DOT–3AA1800; DOT–3E1800; DOT–3AL1800.
Vinyl methyl ether, stabilized (see Note 5)	68	DOT–4B150, without brazed seams; DOT–4BA225 without brazed seams; DOT–4BW225; DOT–3A150; DOT–3AA150; DOT–3B1800; DOT–3E1800.

Note 1 to paragraph (a)(2): ''Filling density'' means the percent ratio of the weight of gas in a packaging to the weight of water that the container will hold at 16 °C (60 °F). (1 lb of water = 27.737 in^3 at 60 °F.).

Note 2 to paragraph (a)(2): Cylinders purchased after Oct. 1, 1944, for the transportation of chlorine must contain no aperture other than that provided in the neck of the cylinder for attachment of a valve equipped with an approved pressure relief device. Cylinders purchased after Nov. 1, 1935, and filled with chlorine may not contain over 68.04 kg (150 lb) of gas.

Note 4 to paragraph (a)(2): Special carbon dioxide mining devices containing a heating element and filled with not over 2.72 kg (6 lb) of carbon dioxide may be filled to a density of not over 85 percent, provided the cylinder is made of steel with a calculated bursting pressure in excess of 39000 psig, fitted with a frangible disc that will operate at not over 57 percent of that pressure, and is able to withstand a drop of 10 feet when striking crosswise on a steel rail while under a pressure of at least 3000 psig. Such devices must be shipped in strong boxes or must be wrapped in heavy burlap and bound by 12-gauge wire with the wire completely covered by friction tape. Wrapping must be applied so as not to interfere with the functioning of the frangible disc pressure relief device. Shipments must be described as ''liquefied carbon dioxide gas (mining device)'' and marked, labeled, and certified as prescribed for liquefied carbon dioxide.

Note 5 to paragraph (a)(2): All parts of valve and pressure relief devices in contact with contents of cylinders must be of a metal or other material, suitably treated if necessary, that will not cause formation of any acetylides.

Note 7 to paragraph (a)(2): Specification 3HT cylinders for aircraft use only, having a maximum service life of 24 years. Authorized only for nonflammable gases. Cylinders must be equipped with pressure relief devices of the frangible disc type that meet the requirements of § 173.301(f). Each frangible disc must have a rated bursting pressure that does not exceed 90 percent of the minimum required test pressure of the cylinder. Discs with fusible metal backing are not permitted. Cylinders may be offered for transportation only when packaged in accordance with § 173.301(a)(9).

Note 8 to paragraph (a)(2): See § 173.301(a)(9).

Note 9 to paragraph (a)(2): When used for shipment of flammable gases, the internal volume of a specification 39 cylinder must not exceed 75 cubic inches.

Note 10 to paragraph (a)(2): Each valve outlet must be sealed by a threaded cap or a threaded solid plug.

Note 11 to paragraph (a)(2): Must meet the valve and cleaning requirements in § 173.302(b).

Note 12 to paragraph (a)(2): For an insecticide gas that is nontoxic and nonflammable, see § 173.305(c).

Note 13 to paragraph (a)(2): For a refrigerant or dispersant gas that is nontoxic and nonflammable, see § 173.304(d).

(3) A DOT 39 cylinder shall be equipped with a pressure relief device as defined by the commodity in CGA S–1.1, excluding paragraph 9.1.1 (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.

* * * * *

(d) * * *

(3) * * *

(i) DOT 3, 3A, 3AA, 3B, 3E, 3AL, 4B, 4BA, 4B240ET, 4BW, 4E, or 39 cylinders. The internal volume of a Specification 39 cylinder must not exceed 75 cubic inches. Shipments of flammable gases in DOT 3AL cylinders are authorized only when transported by motor vehicle, rail car, or cargo-only aircraft.

* * * * *

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

§ 173.306 Limited quantities of compressed gases.

* * * * *

(g) *Water pump system tank.* Water pump system tanks pre-charged at time of manufacture with compressed air or limited quantities of nitrogen or helium to not over 275.79 kPa gauge pressure (40 psig) for single-trip shipment to installation sites are 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 the placarding requirements of subpart F 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 construction, with heads concave to pressure, having a rated water capacity not exceeding 455 L (120 gallons) and with an outside diameter not exceeding 61 cm (24 inches). These tanks may be operated in ambient air temperatures of up to 49 °C (120 °F) with a maximum working pressure not less than 75 psig and not greater than 150 psig. Safety relief devices are not required.

(2) Each tank must be pneumatically tested to the manufacturer's specified maximum working pressure. The test pressure must be permanently marked on the tank. In any case, the pneumatic test must not be conducted to a pressure exceeding 150 psig.

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

$S = Pd/2t$

Where:

S = wall stress in psi;

P = prescribed pressure for the tank is at least the manufacturer's rated maximum working pressure or three (3) times the pre-charged pressure at 21.1 °C (70 °F), whichever is greater;

d = inside diameter in inches; and

t = minimum wall thickness, in inches.

(4) For steel and composite tanks, the burst pressure must be at least six (6) times the pre-charge pressure at 21.1 °C (70 °F) or three (3) times the manufacturer's specified maximum working pressure, whichever is greater.

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

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

* * * * *

■ 15. 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. Fire extinguishers for installation as part of a fire suppression system include cylinders charged with either a compressed gas and an extinguishing agent or a gas which comprises the sole fire extinguishing agent in the system. A fire extinguisher does not include cylinders pressurized with a gas for purposes of expelling a separately stored extinguishing agent in the fire suppression system. 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 fork lift or crane when loaded or unloaded. Cylinders filled with a compressed gas whose purpose is to expel a separately stored extinguishing agent may not be transported under this section when offered for transportation or transported apart from a suppression system.

* * * * *

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

§ 173.312 Requirements for shipment of MEGCs.

* * * * *

(b) * * *

(1) A MEGC may not be filled above its marked maximum permissible gross mass. Additionally, MEGCs must be filled in accordance with the following:

(i) A MEGC being filled with non-liquefied (permanent) compressed gas may not be filled to a pressure greater than the lowest marked working pressure of any cylinder (pressure receptacle).

(ii) An MEGC being filled with a liquefied compressed gas must have each pressure receptacle filled separately by weight and must be filled by a means to ensure that only one pressure receptacle is filled at a time.

(iii) The filling density for UN pressure receptacles may not exceed the values in accordance with § 173.304b(b).

* * * * *

§ 173.323 [AMENDED]

■ 17. In § 173.323(b)(2), immediately following the words ''Pamphlet C–14'' in the last sentence, add the phrase ''(IBR, see § 171.7 of this subchapter)''.

PART 178—SPECIFICATIONS FOR PACKAGINGS

■ 18. 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.

■ 19. In § 178.35, add paragraph (f)(8) to read as follows:

§ 178.35 General requirements for specification cylinders.

* * * * *

(f) * * *

(8) *Tare weight or mass weight, and water capacity marking.* DOT-specification 4B, 4BA, 4BW, and 4E cylinders used in liquefied compressed gas service manufactured after December 28, 2022, 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 must ensure it is marked with the following information, as applicable:

(i) *Tare weight.* The tare weight for a cylinder 25 pounds 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 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. Tare weight shall be abbreviated ''TW''; or

(ii) *Mass weight.* The mass weight for a cylinder 25 pounds 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 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). Mass weight shall be abbreviated ''MW''; and

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

* * * * *

■ 20. 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 in accordance with CGA C–1, section 5.7.2.

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

* * * * *

■ 21. 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 in accordance with CGA C–1, section 5.7.2.

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

* * * * *

■ 22. 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 C–1. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA 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. 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 proof pressure, water-jacket or direct expansion test method as prescribed in CGA C–1. The cylinders must be subjected to at least 2 times service pressure and show no defect. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated in accordance with CGA C–1 5.7.2 or 7.1.2, as appropriate. Determination of expansion properties is not required.

(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 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 in accordance with CGA C–1, section 5.7.2.

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

* * * * *

■ 23. 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 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 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 in accordance with CGA C–1, section 5.7.2.

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

* * * * *

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

§ 178.42 Specification 3E seamless steel cylinders.

* * * * *

(f) *Pressure testing.* Cylinders must be tested as follows:

(1) One cylinder out of each lot of 500 or fewer must be subjected to a hydrostatic test pressure of 6,000 psig or higher.

(2) The cylinder referred to 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 times wall thickness between knife edges, wedge shaped 60 degree angle, rounded out to a ½ inch radius. The inspector's report must be suitably changed to show results of latter alternate and flattening test. The testing equipment must be calibrated as prescribed in CGA C–1 (IBR, see § 171.7 of this subchapter). All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(3) The remaining cylinders of the lot must be pressure tested by the proof pressure water-jacket or direct expansion test method as prescribed in CGA C–1. Cylinders must be examined under pressure of at least 3,000 psig and not to exceed 4,500 psig and show no defect. Cylinders tested at a pressure in excess of 3,600 psig must burst at a pressure higher than 7,500 psig when tested as specified in paragraph (f)(2) of this section. The pressure must be maintained for at least 30 seconds and sufficiently longer to ensure complete examination. 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. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated in accordance with CGA C–1 5.7.2 or 7.1.2, as appropriate. Determination of expansion properties is not required.

* * * * *

■ 25. 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 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 in accordance with CGA C–1, section 5.7.2.

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

* * * * *

■ 26. 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 in accordance with CGA C–1, section 5.7.2.

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

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

§ 178.46 Specification 3AL seamless aluminum cylinders.

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(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 in accordance with CGA C–1, section 5.7.2, however, if a second failure to maintain the test pressure occurs the cylinder being tested must be rejected.

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

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■ 28. 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 in accordance with CGA C–1, section 5.7.2.

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

(5) The cylinder must then be inspected. Any wall thickness lower than that required by paragraph (f) of this section must be cause for rejection. Bulges and cracks must be cause for rejection. Welded joint defects exceeding requirements of paragraph (k) of this section are cause for rejection.

* * * * *

■ 29. 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 psig for cylinders without longitudinal seam.

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

(iii) 18,000 psig 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 psig;

P = minimum test pressure prescribed for water jacket test or 450 psig whichever is the greater;

D = outside diameter in inches; and

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 in accordance with CGA C–1, section 5.7.2.

(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 proof pressure, water-jacket, or direct expansion test method as prescribed in CGA C–1. The minimum test pressure must be maintained for the 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. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated in accordance with CGA C–1, sections 5.7.2 or 7.1.2, as appropriate. 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 this subpart. 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 treatment 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 strain measurement, the initial strain reference must be set while the specimen is under a stress of 12,000 psig, and 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.

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

(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 psig increase of tensile strength above 50,000 psig. The tensile strength may be incrementally increased by four increments of 7,500 psig for a maximum total of 30,000 psig.

(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-degree 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 the same heat treatment 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 rejected.

(n) *Rejected cylinders.* Reheat treatment is authorized for a rejected cylinder in accordance with this paragraph (n). 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 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.

■ 30. 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 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.

(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 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 psig; 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 psig;

P = minimum test pressure prescribed for water jacket test;

D = outside diameter in inches; and

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 psig;

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 circumferential weld area and heat affected zones which zone must extend a distance of 6 times wall thickness from center line of weld); and

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 paragraph (m) of this section 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) The selected 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 in accordance with CGA C–1, section 5.7.2.

(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 proof pressure, water-jacket, or direct expansion test method as prescribed in CGA C–1. The minimum test pressure must be maintained for the 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.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure and show no defect. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated in accordance with CGA C–1 5.7.2 or 7.1.2, as appropriate. Determination of expansion properties is not required.

(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 after heat treatment as illustrated in appendix A to this subpart.

(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 treatment as the spheres themselves. Samples must be removed after heat treatment as illustrated in appendix A to this subpart.

(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 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 ''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 strain measurement, the initial strain reference must be set while the specimen is under a stress of 12,000 psig, 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 psig increase of tensile strength above 50,000 psig. The tensile strength may be incrementally increased by four increments of 7,500 psig for a maximum total of 30,000 psig.

(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 treatment 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. 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 either of these latter two specimens fail to meet the requirements, the entire lot represented must be rejected.

(2) *Guided bend test.* A root bend test specimen must be removed from the cylinder or welded test plate that was 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 either of these latter two specimens fail to meet the requirements, the entire lot represented must be rejected.

(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 rejected.

(m) *Rejected cylinders.* Reheat treatment is authorized for a rejected cylinder in accordance with this paragraph (m). 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 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) [Reserved]

■ 31. 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) The selected 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 in accordance with CGA C–1, section 5.7.2.

(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 proof pressure water-jacket or direct expansion test method as prescribed in CGA C–1. The minimum test pressure must be maintained for the 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. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated in accordance with CGA C–1 5.7.2 or 7.1.2, as appropriate.

(3) *Alternative volumetric expansion testing.* As an alternative to the testing prescribed in paragraphs (h)(1) and (2) of this section, every cylinder may be volumetrically expansion tested by the water jacket or direct expansion test method. 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 at least two (2) times its 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 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 in accordance with CGA C–1, section 5.7.2.

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

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■ 32. 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 in accordance with CGA C–1, section 5.7.2.

(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 proof pressure water-jacket or direct expansion test method as prescribed in

CGA C–1. The minimum test pressure must be maintained for the 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.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure and show no defect. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated in accordance with CGA C–1 5.7.2 or 7.1.2. Determination of expansion properties is not required.

(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 rejected. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

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■ 33. 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) The selected 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 in accordance with CGA C–1, section 5.7.2.

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

(v) If the 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 proof pressure, water-jacket, or direct expansion test method as prescribed in CGA C–1. The minimum test pressure must be maintained for the 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.

(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 rejected unless it may be requalified under paragraph (m) of this section. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated in accordance with CGA C–1 5.7.2 or 7.1.2, as appropriate. Determination of expansion properties is not required.

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■ 34. 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 the proof pressure, water-jacket, or direct expansion test 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. 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 in accordance with CGA C–1 5.7.2 or 7.1.2. Determination of expansion properties is not required.

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

* * * * *

■ 35. 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 in accordance with CGA C–1, section 5.7.2.

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

* * * * *

■ 36. 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) The selected 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 in accordance with CGA C–1, section 5.7.2.

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

(v) If the selected cylinder passes the volumetric expansion test, each remaining cylinder in the lot must be pressure tested in accordance with paragraph (h)(2) of this section. If the selected cylinder fails, each cylinder in the lot must be tested by water-jacket or direct expansion method as prescribed in CGA C–1 at 750 psig. Each cylinder with a permanent expansion that does not exceed 10% is acceptable.

(2) *Pressure testing.* (i) If the selected cylinder passes the water-jacket or direct expansion test, the remaining cylinders in each lot must be pressure tested by the proof pressure, water-jacket or direct expansion test method as prescribed in CGA C–1. The minimum test pressure must be maintained for the 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.

(ii) Each cylinder must be tested between 500 and 600 psig and show no defect. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated in accordance with CGA C–1 section 5.7.2 or 7.1.2, as appropriate. Determination of expansion properties is not required.

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■ 37. 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) The selected 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 in accordance with CGA C–1, section 5.7.2.

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

(v) If the selected cylinder passes the volumetric expansion test, each remaining cylinder in the lot must be pressure tested in accordance with paragraph (h)(2) of this section. If the selected cylinder fails, each cylinder in the lot must be tested by water-jacket or direct expansion method as prescribed in CGA C–1 at 750 psig. Each cylinder with a permanent expansion that does not exceed 10% is acceptable.

(2) *Pressure testing.* (i) If the selected cylinder passes the water-jacket or direct expansion test, the remaining cylinders in each lot must be pressure tested by the proof pressure water-jacket or direct expansion test method as prescribed in CGA C–1. The minimum test pressure must be maintained for the 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.

(ii) Each cylinder must be tested between 500 and 600 psig and show no defect. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated in accordance with CGA C–1 section 5.7.2 or 7.1.2, as appropriate. Determination of expansion properties is not required.

* * * * *

■ 38. 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 (f)(2) 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. 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 1/6 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 ⅛ 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).

(5)(i) Welds of the cylinders must be subjected to radioscopic or radiographic examination as follows:

(ii) 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 longitudinal 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 circumferential weld for 2 inches in both directions from the intersection of the longitudinal and circumferential welds and include at least 6 inches of the longitudinal weld. Maximum joint efficiency of 0.75 will be permissible without radiography or radioscopy. When fluoroscopic examination is used, permanent film records need not be retained. Circumferential welds need not be examined, except as part of spot examination.

(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) *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 (f)(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 (j) of this section.

(iii) 35,000 psig.

(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, psig;
P = service pressure, psig;
D = outside diameter, inches;
d = inside diameter, inches; and
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).

(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 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 paragraph (n) of this section 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.

(h) *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.

(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 selected 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 in accordance with CGA C–1, section 5.7.2.

(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 proof pressure, water-jacket or direct expansion test method as prescribed in CGA C–1. The minimum test pressure must be maintained for the 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.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure and show no defect. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated in accordance with CGA C–1 5.7.2 or 7.1.2, as appropriate. Determination of expansion properties is not required.

(3) *Burst testing.* One finished cylinder selected at random out of each lot of 500 or less successively produced must be hydrostatically tested to four (4) times service pressure without bursting. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

(j) *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 this subpart, chosen at random from each lot of 200 or fewer, as follows:

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

(ii) 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 strain measurement, the initial strain reference must be set while the specimen is under a stress of 12,000 psig, 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.

(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 psig. The tensile strength may be incrementally increased by four increments of 7,500 psig for a maximum total of 30,000 psig.

(l) *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 rejected.

(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 psig, as provided in paragraph (k) of this section. 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 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 rejected.

(m) *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 rejected cylinders.* Reheat treatment is authorized for a rejected cylinder in accordance with this paragraph (m)(2). 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.

(n) *Markings.* (1) Markings must be as required in § 178.35 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 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.

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

■ 39. 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 the 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.

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

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

(iii) If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated in accordance with CGA, C–1 section 7.1.2.

(2) One cylinder taken from the beginning of each lot, and one from each 1,000 or less successively produced within the lot thereafter, must be hydrostatically tested to destruction. The 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 entire lot must be rejected (see paragraph (h) of this section) if:

(i) A failure occurs at a gage pressure less than 2.0 times the test pressure;

(ii) A failure initiates in a braze or a weld or the heat affected zone thereof;

(iii) A failure is other than in the sidewall of a cylinder longitudinal with its long axis; or

(iv) In a sphere, a failure occurs in any opening, reinforcement, or at a point of attachment.

(3) A ''lot'' is defined as the quantity of cylinders successively produced per production shift (not exceeding 10 hours) having identical size, design, construction, material, heat treatment, finish, and quality.

* * * * *

■ 40. In § 178.68:

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

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

■ c. Add new paragraph (n).

The revisions and addition read as follows:

§ 178.68 Specification 4E welded aluminum cylinders.

* * * * *

(b) *Authorized material.* (1) The cylinder must be constructed of aluminum of uniform quality. The following chemical analyses are authorized:

TABLE 1 TO PARAGRAPH (b)(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.

(2) The aluminum used in the construction of the cylinder must be as specified in Table 1 to paragraph (b)(1) of this section. Analyses must regularly be made only for the elements specifically mentioned in the table. If, however, the presence of other elements is indicated in the course of routine analysis, further analysis should be made to determine conformance with the limits specified for other elements. 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) *Pressure test.* All cylinders with a wall stress greater than 18,000 psig 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 in accordance with CGA C–1, section 5.7.2.

(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 psig or less may be lot tested. At least one (1) 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. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated in accordance with CGA C–1, section 5.7.2.

(ii) Each selected 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.

(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 psig or less, the remaining cylinders of the lot must be pressure tested by the proof pressure, water-jacket, or direct expansion test method as defined in CGA C–1. The minimum test pressure must be maintained for the 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.

(ii) Each cylinder must be tested to a minimum of two (2) times service pressure and show no defect. If, due to failure of the test apparatus or operator error, the test pressure cannot be maintained, the test may be repeated in accordance with CGA C–1 5.7.2 or 7.1.2, as appropriate. Determination of expansion properties is not required.

(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 rejection of the lot. All testing equipment and pressure indicating devices must be accurate within the parameters defined in CGA C–1.

* * * * *

(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 this subpart 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 at least 7 percent and yield strength not over 80 percent of tensile strength.

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

(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 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 rejected 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 rejected.

(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) *Standard guided bend test.* 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 rejected.

(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 rejected.

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

(n) *Markings.* (1) Markings must be as required in § 178.35 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.

* * * * *

■ 41. 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. An audit may be required as part of the process to modify an approval.

* * * * *

■ 42. In § 178.75, revise paragraphs (e)(3)(i) and (ii) and (f)(1) to read as follows:

§ 178.75 Specifications for MEGCs.

* * * * *

(e) * * *

(3) * * *

(i) Two valves in series must be placed in an accessible position on each discharge and filling pipe. One of the valves may be a backflow prevention valve.

(ii) The filling and discharge devices may be equipped to a manifold.

* * * * *

(f) * * *

(1) The size of the pressure relief devices: CGA S–1.1, excluding paragraph 9.1.1, (IBR, see § 171.7 of this subchapter) must be used to determine the relief capacity of individual pressure receptacles.

* * * * *

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. Revise the definition for ''Commercially free of corrosive components;''

■ b. Remove the definitions ''Defect'' and ''Elastic expansion;''

■ c. Add definitions for ''Mobile unit'' and ''Over-pressurized'' in alphabetical order;

■ d. Remove the definition of ''Permanent expansion;''

■ e. Revise the definition for ''Proof pressure test;'' and

■ f. Remove the definitions of ''Rejected cylinder,'' ''Test pressure,'' ''Total expansion,'' ''Visual inspection,'' and ''Volumetric expansion test.''

The additions and revisions read as follows:

§ 180.203 Definitions.

* * * * *

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).

* * * * *

Mobile unit means a vehicle specifically authorized under a RIN to carry out requalification operations

identified under the RIN within specified geographic areas away from the principle place of business. 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.

* * * * *

Proof pressure test means a liquid-based pressure test by interior pressurization without the determination of a cylinder's expansion.

* * * * *

■ 45. In § 180.205:
■ a. Revise paragraphs (c) introductory text and (d);
■ b. Add paragraphs (f)(5) and (6);
■ c. Revise paragraphs (g), (h)(3), and (i)(1)(viii);
■ d. Add paragraphs (i)(1)(ix) through (xi);
■ e. Revise paragraphs (i)(2) and (3); and
■ f. Add paragraph (j).

The revisions and additions read as follows:

§ 180.205 General requirements for requalification of specification cylinders.

* * * * *

(c) *Periodic requalification of cylinders.* Each cylinder bearing a DOT, CRC, BTC, or CTC specification marking must be requalified and marked as specified in the requalification table in § 180.209(a) or requalified and marked by a facility registered by Transport Canada in accordance with the Transport Canada TDG Regulations (IBR, see § 171.7 of this subchapter). Each cylinder bearing both a TC specification marking and also marked with a corresponding DOT specification marking must be requalified and marked as specified in the requalification table in § 180.209(a) or requalified and marked by a facility registered by Transport Canada in accordance with the Transport Canada TDG Regulations. 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). Each cylinder bearing only a TC mark must be requalified and marked as specified in the Transport Canada TDG Regulations, except that registration with Transport Canada is not required and cylinders must be marked with the requalifier's DOT issued requalifier identification number. 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 accordance 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 in association with an authorized repair, evidence of removal of wall thickness via grinding, sanding or other means; or

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

* * * * *

(f) * * *

(5) Except in association with an authorized repair, removal of wall thickness via grinding, sanding or other means is not permitted. Removal of paint or loose material to prepare the cylinder for inspection is permitted (*e.g.,* shot blasting).

(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.

* * * * *

(g) *Pressure test.* (1) Unless otherwise provided, each cylinder required to be retested under this subpart must be retested by means suitable for measuring the expansion of the cylinder under pressure. Testing must be performed in accordance with CGA C–1 (except for paragraph 5.3.2.2, if the required accuracy of the pressure indicating device can be demonstrated by other recognized means such as calibration certificates) (IBR, see § 171.7 of this subchapter).

(2) The pressure indicating device and expansion indicating device must meet the resolution requirements of CGA C–1. Midpoint visual interpolation is allowed.

(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, as part of the retest apparatus, is accurate within ±1.0% of the prescribed test pressure of any cylinder tested that day. The pressure indicating device, itself, must be certified as having an accuracy of ±0.5%, or better, of its full range, and must permit readings of pressure from 90%–110% of the minimum prescribed test pressure of the cylinder to be tested. The accuracy of the pressure indicating device within the test system can be demonstrated at any point within 500 psig of the actual test pressure for test pressures at or above 3000 psig, or 10% of the actual test pressure for test pressures below 3000 psig.

(ii) The expansion-indicating device, as part of the retest apparatus, meets the accuracy requirements of CGA C–1.

(4) Test equipment must be verified each day before retesting as required in CGA C–1.

(i) The retester must demonstrate calibration in conformance with this paragraph (g) to an authorized inspector on any day that it retests cylinders.

(ii) A retester must maintain calibrated cylinder certificates in conformance with § 180.215(b)(4).

(5) A system check may be performed at or below 90% of test pressure prior to the retest. In the case of a malfunction of the test equipment or operator error, the test may be repeated in accordance with CGA C–1, section 5.7.1. This paragraph (g) does not authorize retest of a cylinder otherwise required to be condemned under paragraph (i) of this section.

(h) * * *

(3) Unless the cylinder is repaired or rebuilt in conformance with requirements in § 180.211, 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 Xs 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 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, and (d)(1) 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. A pressure receptacle with a specified service life may not be refilled and offered for transportation after its authorized service life has expired unless approval has been obtained in writing from the Associate Administrator.

(b) * * *

(2) Each pressure receptacle that fails requalification must be rejected or condemned in accordance with 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). 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 pressure receptacles exceeding 150 L capacity installed in MEGCs or in other service, must be requalified in accordance with ISO 6406:2005(E) (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 accordance with ISO 6406:2005(E). For seamless steel cylinders and tubes, the internal inspection and hydraulic pressure test may be replaced by a procedure conforming to ISO 16148:2016(E) (IBR, see § 171.1).

* * * * *

■ 47. In § 180.209:

■ a. Remove and reserve paragraph (b)(1)(iii); and

■ b. Revise paragraphs (c), (e), (g), (j), and (l)(1).

The revisions read as follows:

§ 180.209 Requirements for requalification of specification cylinders.

* * * * *

(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) *Cylinders in non-corrosive gas service.* 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 every 12 years instead of every 5 years. As an alternative, the cylinder may be subjected to a proof pressure test at least two times the marked service pressure, but this latter type of test must be repeated every 10 years after expiration of the initial 12-year period. When subjected to a proof pressure test, as prescribed in CGA C–1 (IBR, see § 171.7 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 (g) 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. 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. 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. Specification cylinders must be in exclusive service as shown in table 2 to this paragraph (g):

TABLE 2 TO PARAGRAPH (g)

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 (incorporated by reference; see § 171.7 of this subchapter) 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	Propylene that is commercially free from corroding components.
DOT 3A, DOT 3AA, DOT 3B, DOT 4B, DOT 4BA, DOT 4BW	Anhydrous mono, di, trimethylamines 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). 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.

(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. A requalification must be performed by the end of 12 years after the original test date and at 12-year intervals thereafter.

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

(B) When testing using the water-jacket or direct expansion test method, the permanent volumetric expansion may not exceed 10 percent of total volumetric expansion at test pressure.

(C) When testing using the proof pressure test method, the cylinder must be carefully examined under test pressure and removed from service if a leak or defect is found.

(ii) 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.

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

(B) When testing using the water-jacket or direct expansion test method, the permanent volumetric expansion may not exceed 10 percent of total volumetric expansion at test pressure.

(C) When testing using the proof pressure test method, the cylinder must be carefully examined under test pressure and removed from service if a leak or defect is found.

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

(iii) When testing using the water-jacket or direct expansion test method, the permanent volumetric expansion may not exceed 10 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

* * * * *

■ 48. 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.

(iii) The cylinder must be marked in accordance with § 180.213(f)(10) to indicate compliance with this paragraph (a)(3).

* * * * *

■ 49. In § 180.213, revise paragraphs (c) and (d)(2) and add paragraphs (f)(10) and (11) and (g) to read as follows:

§ 180.213 Requalification markings.

* * * * *

(c) *Requalification marking method.* 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 applying a label embedded in epoxy that will remain legible and durable throughout the life of the cylinder, or by other methods that produce a legible, durable mark.

(1) A cylinder used as a fire extinguisher (see § 180.209(j)) may be marked by using a pressure sensitive label.

(2) 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.

(3) 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)(5) 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)(5)(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)(5) of this subchapter and 180.209(l), the marking is as illustrated in paragraph (d) of this section, except that the ''X'' is replaced with the letters ''EX'' to indicate that the cylinder is for export only.

(g) *Visual inspection requalification markings.* (1) Alternative to the marking requirements of paragraphs (d) and (f)(5) of this section, each cylinder successfully passing a visual inspection only, in accordance with § 180.209(g), may be marked with the visual inspection number (*e.g.,* V123456) issued to a person performing visual inspections. Examples of the way the markings may be applied are as follows:

Figure 2 to Paragraph (g)(1)

V123 03 14 E 654	V123456 0314 E
0314 E V123456	V123456 0314E
0314 E V123456	

(2) Where:

(i) ''03'' is the month of requalification (the additional numeral ''0'' is optional'');

(ii) ''V123456'' is the RIN;

(iii) ''14'' is the year of requalification; and

(iv) ''E'' to indicate visual inspection.

■ 50. In § 180.215, revise paragraphs (a)(6), (b), and (c)(2)(vii) and add paragraph (c)(3) to read as follows:

§ 180.215 Reporting and record retention requirements.

(a) * * *

(6) The information contained in each applicable CGA or ASTM standard incorporated by reference in § 171.7 of this subchapter applicable to the requalifier's activities.

(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; year 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) 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.

(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) 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).

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Drue Pearce,

Deputy Administrator, Pipeline and Hazardous Materials Safety Administration.

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