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Cryogenic Liquids, Revisions; Final Rule; Petitions for Reconsideration

DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

49 CFR Parts 171, 172, 173, 176, 178, and 179

[Docket No. HM-115, Amdt. Nos. 171-74, 172-82, 173-166, 176-17, 178-77, 179-32]

Cryogenic Liquids, Revisions

AGENCY: Materials Transportation Bureau (MTB), Research and Special Programs Administration, Department of Transportation.

ACTION: Final rule; petitions for reconsideration.

SUMMARY: This document makes additional revisions to a final rule published under Docket HM-115 (48 FR 27674; June 16, 1983), which amended the Hazardous Materials Regulation (HMR) (49 CFR Parts 171-179) by establishing requirements for the transportation of certain cryogenic liquids. These revisions are made in response to 18 petitions for reconsideration to the final rule.

Some significant changes to the rule are provisions—

1. To allow the installation of rubbing or abrading, anodized aluminum parts in cylinders and cargo tanks in cryogenic oxygen service;
2. To allow the installation of an aluminum valve, pipe or fitting external to the jacket of a cargo tank provided that no lading is retained in these parts during transportation;
3. To exclude cargo tanks in atmospheric gas (except oxygen) service and helium service from the requirement of a primary and a secondary pressure relief device system of equal capacities;
4. To allow a secondary system of frangible discs or pressure relief valves on cargo tanks in other than carbon monoxide service;
5. To authorize additional pressure control valve settings for DOT-4L cylinders;
6. To authorize construction of a 22 gauge stainless steel non-evacuated jacket on MC-338 cargo tanks;
7. To authorize evacuated jackets constructed of materials meeting ASME or ASTM specifications on MC-338 cargo tanks;
8. To authorize a minimum steel thickness of 0.110-inch for the tank of vacuum insulated MC-338 cargo tanks; and
9. To authorize alternate procedures for determining the heat transfer rate and holding time of MC-338 cargo tanks used in nonflammable cryogenic liquid service.

EFFECTIVE DATE: October 1, 1984. However, compliance with the regulations as amended herein is authorized on and after June 12, 1984. The incorporation by reference was approved by the Director of the Federal Register effective on June 12, 1984.

FOR FURTHER INFORMATION CONTACT: Jose Pena, (202) 755-4906 or Hattie Mitchell, (202) 426-2075, Office of Hazardous Materials Regulation, 400 Seventh Street, S.W., Washington, D.C. 20590. Office hours are 8:30 a.m. to 5:00 p.m., Monday through Friday, except holidays.

SUPPLEMENTARY INFORMATION: On June 16, 1983, MTB published a final rule in the **Federal Register** under Docket No. HM-115 (48 FR 27674). MTB received 18 petitions for reconsideration to certain provisions of the final rule. A majority of the requested changes were contained in a petition submitted by the Compressed Gas Association (CGA).

Several petitioners objected, among other issues, to changes to proper shipping names and identification number prefixes to certain entries of the Hazardous Materials Table (the Table), in § 172.101, and requested the effective date of the final rule be postponed. MTB believed those issues warranted immediate handling so that changes could be included in the 1983 edition of Title 49, Code of Federal Regulations, Parts 100-199. Therefore, MTB separated those issues from other issues raised in the petitions and handled them in a document which was published in the **Federal Register** on November 1, 1983 (48 FR 50440). In that document, MTB postponed the mandatory effective date of the final rule until October 1, 1984. MTB also revised the proper shipping names for the cryogenic liquids and cold form gases to include the international descriptor, "refrigerated liquid" and the identification number prefix was changed from "NA" to "UN". Entries for cryogenic liquid were designated *"(cryogenic liquid)"*, in the Table, to distinguish those gases from cold form gases such as carbon dioxide, nitrous oxide, and hydrogen chloride. For compressed gases, MTB provided for continued use of the descriptions as presently found in the HMR as well as for the optional use of the international descriptions which include the word "compressed". For example, "Argon, compressed" and, for domestic transportation only, "Argon" are acceptable descriptions. Other substantive issues raised in the petitions are addressed in this document.

Several issues raised by the petitioners are addressed in earlier preamble discussions. For additional information, readers are referred to preamble discussions which appeared in the notice of proposed rulemaking (NPRM) (44 FR 12826, March 8, 1979), and related correction documents (44 FR 20461, April 5, 1979; 44 FR 36211, June 21, 1979), the final rule (48 FR 27674, June 16, 1983) and the correction and revision document of November 1, 1983 (48 FR 50440).

Tanks Operating Under DOT Exemptions

Under the final rule, the owner or person using a cargo tank or tank car under, "and in compliance with," a DOT exemption issued before October 1, 1984, if required to remove the DOT exemption number stenciled on the cargo tank or tank car and stamp the identification plate, as specified by § 173.31(a)(8) or § 173.33(b)(2), with the proper specification.

Several petitioners pointed out that the phrasing of §§ 173.31(a)(8) and 173.33(b)(2) implies that tank cars and cargo tanks must continue to be used in conformance with the terms of the exemptions. This is not MTB's intention. Tank cars and cargo tanks which are remarked as specification packagings cease to be governed by their previous exemption. Instead, they are subject to the applicable requirements, conditions, and limitations prescribed in the HMR. Sections 173.31(a)(8) and 173.33(b)(2) are revised for clarity. Section 173.33(b)(2) is revised for consistency with §§ 173.31(a)(8) and 173.33(b)(3).

Sections 173.31(a)(8), 173.33 (b)(2) and (b)(3) require the owner or the operator, if not the owner, to retain a copy of the exemption that was in effect on September 30, 1984. It is not MTB's intention to require renewal of an exemption for the purpose of having a valid exemption on September 30, 1984. Also MTB did not specify where the exemption must be retained. The rule is revised to require that the exemption in effect at the time a tank car or cargo tank is remarked as a DOT specification packaging be retained on file during the period the tank car or cargo tank is in service. MTB does not agree with a petitioner who suggested that it is necessary for a copy of the exemption to be carried with each cargo tank as was required under the exemption. However, this does not prevent any person from carrying a copy of the exemption on a cargo tank.

After October 1, 1984, an exemption affecting a cargo tank or tank car of a type covered by the final rule will not be renewed unless the holder of the exemption submits information to the Associate Director for Hazardous

Materials Regulation stating the reason why the tank does not qualify for remarking as a specification packaging.

All applicable DOT exemptions are listed in the preamble on page 27678 of the final rule. Other exemptions affected by the rule are as follows:

Exemptions—MC-338 type Cargo Tanks

E-7227
E-8602 (Model HL 1920M)
E-8644

Exemptions—Class DOT-105 Tank Cars

E-3992

Exemptions—MC-330 or MC-331 Cargo Tanks

E-6215
E-8199

Pressure Relief Device Systems

CGA and several other petitioners took exception to the requirement for a primary system of one or more spring loaded pressure relief valves and, except for tanks in carbon monoxide service, a secondary system of one or more frangible discs. CGA requested that the requirement be revised to permit cargo tanks to be equipped with a primary system consisting of spring loaded *or pilot-operated pressure relief valves* and a secondary system consisting of frangible discs *or pressure relief valves.* CGA mantains that a complete blowdown of certain ladings may present a greater hazard than controlled relief of the hazardous material through a spring loaded pressure relief valve. After further consideration, MTB agrees, in part, with CGA and other petitioners. MTB has revised § 173.318(b)(1)(i) to provide for a primary consisting of one or more pressure relief valves and a secondary system of one or more frangible discs or pressure relief valves. The pressure relief valves of the primary and secondary systems may be any type of pressure relief valve designed to automatically open and close at predetermined pressure. This option on use of frangible discs does not apply to the secondary system on cargo tanks in carbon monoxide service which are required to be equipped only with pressure relief valves.

CGA and other petitioners requested revision of subparagraph 173.318(b)(1)(viii) which contains a requirement that any shut-off valve or device that interferes with the proper operation of a pressure control valve must be designed and installed so that the cargo tank may not be operated for transportation purposes when the pressure control valve operation is impeded.

In its comments to the requirement, CGA stated:

The present wording would require an interlock so that the vehicle could not be operated if the pressure control operation is impeded. This would lead to an unsafe condition at the time of final unloading of a flammable refrigerated liquid. Even though the liquid has been completely drained and the gas pressure has been reduced to atmospheric pressure on the return trip, there is the hazard of venting flammable gas if the pressure is controlled by the low pressure road valve rather than by the higher set pressure relief valve. This is because the refrigeration heat sink of liquid is no longer present to absorb the constant incoming steady heat leak. The heat leak instead goes into warming the residual cold gas, and the gas pressure can rise quite rapidly as a result, possibly exceeding the road relief valve setting before the return is completed. Current industry practice is usually to transfer from the road relief valve to the pressure relief valve on the return trip.

The present wording also precludes the provision for multiple deliveries at increasingly higher pressure levels between deliveries without venting gas to the lowest pressure level at which the cargo tank was loaded. This is contrary to a number of present exemptions that allow this type of operation. Such exemptions include E-2708, E-4490 and E-7192.

In addition to this revision to Section 173.318(b)(1)(viii), corresponding revisions should be made to Section 173.318(g), 173.318(g)(3), 177.840(i), 177.840(j), 177.840(k), 177.840(k)(3), 178.338-9(a), 178.338-9(a)(1), 178.338-9(b)(1), 178.338-9(b)(2), and 178.338-18(b)(9).

On further consideration, MTB agrees that the provision in subparagraph 173.318(b)(1)(viii) may require that the residual lading be reduced to impracticable levels at final unloading in order to prevent venting when pressure is controlled (limited) by the pressure control valve. MTB also agrees that the interlock requirement would preclude multiple deliveries without venting appreciable quantities of lading at each delivery point. Accordingly, subparagraph (b)(1)(viii) is removed. Remaining subparagraphs (ix) and (x) are renumbered as subparagraphs (viii) and (ix), respectively. Paragraph (g)(3) is removed and a revision is made to the introductory text of paragrapnh 173.318(g) to permit the display of more than one one-way-travel-time (OWTT) marking on a cargo tank. CGA's other requests for reconsideration are denied since they are not necessary with the removal of subparagraph 173.318(b)(1)(viii).

CGA requested a revision to § 173.318(b)(2)(i) to exclude cargo tanks in atmospheric gas (except oxygen) service and helium service from the requirement of primary and secondary pressure relief device systems of equal capacities. CGA maintained that MTB made distinctions in other sections between nonflammable ladings versus flammable and oxygen ladings based on the fact that atmospheric gases (except oxygen) and helium do not intensify a fire in fire exposure incidents. Thus, CGA asserts that it is unnecessary to apply the redundancy for flow capacity based on fire conditions for both the primary and secondary systems for atmospheric gases (except oxygen) and helium. MTB agrees and grants the request for reconsideration by revising subparagraph (b)(2)(i) to allow cargo tanks used in atmospheric gas (except oxygen) and helium service to be equipped with the primary system only.

CGA requested that the secondary system have a minimum total capacity at a pressure not to exceed 120% of the tank design pressure in place of 150% as prescribed by § 173.318(b)(2)(iii). CGA maintained that the change in the setting would provide a greater margin of safety. MTB believes the change is unnecessary and the request for reconsideration is denied. Section 173.318(b)(2)(iii) specifies that the pressure of the secondary system may not exceed 150 percent of the tank design pressure. Therefore, a pressure at 120 percent of the tank design pressure is permitted. MTB specified the secondary system at a minimum total capacity of 150 percent to allow the secondary system to function after the primary system which relieves at a pressure of 120% of the tank design pressure. MTB believes these systems should operate in sequence to provide for a controlled release of the lading.

CGA requested revision of the requirement that the primary system of pressure relief valves must have a liquid flow capacity equal to or exceeding the maximum rate at which the tank is to be filled at a pressure not to exceed 120% of the tank design pressure in subparagraph (b)(2)(iv). CGA maintained that a tank filled by pumping equipment which is capable of producing pressures in excess of the design pressure of the tank may be equipped with a by-pass on the pump discharge or other suitable method to prevent accumulation of pressures in the tank in excess of 120% of the tank design pressure. MTB does not agree and the request for reconsideration is denied. MTB believes that the design and construction of the primary pressure relief valves should be capable of sustaining a flow capacity at pressures not to exceed 120% of the tank design pressure during filling operations. CGA provided no information on the adequacy or fail-safe function of a by-

pass on a discharge pump or other special controls that will prevent excessive pressure build-up in tanks used for cryogenic liquids. Therefore, no change is being made to the provision.

Section 171.7. MTB is adding in paragraph (d)(5) certain ASTM Standards which are referenced in §§ 173.316(a)(4), 173.318(a)(4) and 178.338–2(a).

Section 171.8. A petitioner requested that the temperature reference in the definition of "SCF" (Standard Cubic Foot) be changed from 60°F. to 70°F. for consistency with the U.S. industry standard contained in CGA Pamphlet P–11, "Metric Practice Guide" and the temperature used to define a compressed gas in § 173.300. MTB does not agree and the request for reconsideration is denied. The term "SCF" defines the standard conditions used to determine the relieving capacity of pressure relief devices. These standard conditions of 60°F. and 14.7 psia are presently contained in the HMR and are consistent with those used by CGA for determining and sizing pressure relief devices in CGA Pamphlets S–1.1 and S–1.2. No change is made in the definition.

Section 172.101. A petitioner stated that the provision for ethylene, refrigerated liquid to be stowed "below deck" on cargo vessels is unsafe and is inconsistent with stowage requirements applicable to other flammable cryogenic liquids. MTB agrees with the petitioner and grants the request for reconsideration by removing the "3" in column 7(a) of the Table.

A petitioner objected to the provision prohibiting the transportation of hydrogen, refrigerated liquid on a cargo vessel. The petitioner argued that the prohibition on hydrogen, refrigerated liquid is inconsistent with requirements that apply to other flammable cryogenic liquids, such as natural gas and carbon monoxide, and that the "light density of hydrogen vapor and up-and-away venting provide an adequate margin of safety." The petitioner argued that there is exemption experience to support transporting cargo tanks and portable tanks containing hydrogen, refrigerated liquid on a cargo vessel "on deck". MTB and Coast Guard, which assisted MTB in the preparation of the final rule, maintain that because of its very wide flammability range and the fact that it burns with an invisible flame, hydrogen poses a greater potential hazard than other flammable cryogenic liquids. MTB considers it necessary to apply special safety controls for hydrogen when transported on board a cargo vessel or a case-by-case basis by exemption. To allow transportation fo hydrogen under regulations of general applicability would not assure adequate safety and, therefore, the request for consideration is denied.

A petitioner requested that the quantity limitation in one package of argon, refrigerated liquid be increased from 300 pounds to 1,100 pounds by cargo aircraft for consistency with the quantity limitation authorized for nitrogen, neon, and helium, and for consistency with the quantity limitation for argon, refrigerated liquid adopted by the Dangerous Goods Panel of the International Civil Aviation Organization (ICAO). MTB agrees with the petitioner that the quantity limitation should be consistent with that recommended by ICAO. MTB is granting the request for reconsideration by revising the Table to provide for 1,100 pounds of argon, refrigerated liquid to be transported by cargo aircraft.

Section 173.23. A petitioner correctly pointed out that cylinders meeting the DOT–4L specification are not required to be retested and, therefore, the schedule for remarking cylinders manufactured under DOT E–6668 or E–8404 should be changed. MTB grants the request for reconsideration by revising paragraph (e) to require the cylinders be remarked "DOT–4L" by January 1, 1986. (This requirement appeared as paragraph (d) in the rule and was redesignated paragraph (e) under Docket HM–189 which was published in the **Federal Register** on November 1, 1983; 48 FR 50444.)

Section 173.31. Two petitioners took exception to the prohibition in paragraph (a)(9) against new construction of DOT–113D120W tank cars made with nickel alloy steel inner tanks which are authorized under DOT exemption. One of the petitioners maintained that there is no technical reason or unsatisfactory exemption experience to support prohibiting new construction of DOT–113D120W tank cars. The other petitioner alleged that MTB based its decision on disallowing new construction of DOT–113D120W tank cars merely on the fact that there has been no new construction of the tank car since 1973. MTB agrees, in part, with both petitioners. MTB conducts continuing reviews of packagings authorized for use in the HMR to remove specifications which are no longer being manufactured. MTB does not believe these efforts would be well-served by providing for new construction of a tank car in the HMR when there is no evidence of demand for its construction. Therefore, the petitioner's request for reconsideration is denied. However, because of the satisfactory safety record of existing DOT–113D120W tank cars, MTB believes continued use of existing tank cars should be authorized.

The Association of American Railroads (AAR) pointed out that requirements for the retest of the alternate pressure relief valve on DOT–113D120W tank cars were omitted in the final rule. MTB is revising subparagraph (c)(13)(v) to correct this oversight and specify the same test procedure as is required for DOT–113C120W tank cars.

Three petitioners pointed out that new § 173.314(c) authorizes DOT–105A600W tank cars for hydrogen chloride service, but does not provide for DOT–105 tank cars in hydrogen chloride service that are authorized under DOT E–3992. MTB agrees with the petitioners. Omission of existing tank cars, built with ASTM a 212B steel to low temperature ASTM A300 testing qualifications, under DOT E–3992 was an oversight. MTB grants the petitioners' request for reconsideration by adding a new paragraph (a)(10) to authorize continued use of these tank cars.

Section 173.33. Changes to this section are addressed earlier in this preamble under the heading "Tanks Operating Under DOT Exemptions".

Section 173.300. CGA requested that the definition of ' cryogenic liquid" in paragraph (f) be removed and a new definition for "refrigerated liquid" be added to read: "A refrigerated liquid is a cold liquefied gas which, when charged into an insulated transport container, cannot be held indefinitely due to vaporization or pressure rise caused by heat transfer from the surroundings." CGA also requested that the descriptor "cryogenic liquid ' be changed to "refrigerated liquid" each time it appears in the HMR. MTB is denying the request for reconsideration because CGA's suggested definition provides no distinction between the so-called "cold form gases", such as carbon dioxide, nitrous oxide, hydrogen chloride and vinyl chloride, which are not regulated as cryogenic liquids.

CGA also suggested a second alternative to adding the above definition of "refrigerated liquid". The alternative provided for adding a sentence at the end of the present definition of "cryogenic liquid" to read: "A material meeting this definition is described as a 'Refrigerated liquid' in Part 172 of this subchapter". MTB agrees and grants the request for consideration. In the November 1 correction document, MTB authorized the international descriptor, "refrigerated liquid", to be a part of the proper shipping name for cryogenic liquids and the cold form gases. The cryogenic liquid descriptions were

specifically identified in italics in the Table to distinguish the cryogenic gases from the cold form gases. Therefore, at the end of the definition for cryogenic liquid, MTB is adding a clarification that materials meeting the definition are described, in part, as "* * *, refrigerated liquid (*cryogenic liquid*)" in the Table.

MTB is revising the definition of a cryogenic liquid to clarify that these materials may not meet the definition of a compressed gas in paragraph (a).

Section 173.314. MTB is revising the entry for vinyl fluoride in the table in § 173.314(c) to continue the applicability of Note 23. Note 23, as amended under Docket HM-175 (49 FR 3468, January 27, 1984), requires each class 105 tank car built after August 31, 1981, to conform to specification 105J. Tank cars built before September 1, 1981, with a capacity exceeding 18,500 gallons and used to transport flammable gases are required to be retrofitted by December 3, 1986, to conform to specification 105J.

The AAR and another petitioner requested that paragraph (g)(2) be revised by adding a provision that appears in DOT E-3992 that requires tank cars in hydrogen chloride service to be weighed when full and when empty. Prior to offering an empty tank car for transportation, the car must be emptied below three percent of weight of the original load. The requirement is similar to Rule 35 of the Uniform Freight Classification. MTB is considering addressing tank cars containing a residue of a hazardous material in a proposed rule in the future and, therefore, the request for reconsideration is denied. Upon consideration, MTB also believes the requirement that the pressure in a empty tank car may not exceed 70 psig is unnecessary in view of requirements in § 173.29(c). Accordingly, paragraph (g)(2) is removed and paragraph (g)(3) is redesignated paragraph (g)(2).

Section 173.316. Two petitioners objected to a provision in paragraph (a)(4) prohibiting cylinders in oxygen service from having aluminum valves or fittings with internal rubbing or abrading aluminum parts which may come in contact with cryogenic oxygen. One petitioner believed it was MTB's intention to apply the provision prohibiting rubbing or abrading aluminum parts to cargo tanks in oxygen service and not to cylinders in oxygen service. Both petitioners maintained that safety experience has been satisfactory in using "* * * an anodized aluminum body with an internal anodized aluminum piston * * *."

MTB believes that internal rubbing or abrading aluminum parts which may come in contact with cryogenic oxygen must not be used in any cylinder used to transport cryogenic oxygen. The prohibition is needed because of the potential for ignition and subsequent rapid burning of aluminum when subject to fire engulfment temperatures, to friction heat from abrasion, or high oxygen flow velocities over surfaces with sharp projections or abrupt directional changes. However, MTB agrees with the petitioners that anodized aluminum has a lower friction coefficient than non-anodized aluminum. Therefore, MTB is granting the request for reconsideration by revising paragraph (a)(4) to allow the use of rubbing or abrading aluminum parts that have been anodized in conformance with ASTM Standard B 580 in cylinders used in oxygen service. A similar change is made to § 173.318(a)(4) for cargo tanks in oxygen service.

A petitioner requested that paragraph (b) be revised by referencing § 173.304(b)(2) for requirements on pressure control valves. MTB agrees with the petitioner that the paragraph should be clarified. However, MTB would be in error to reference paragraph 173.304(b)(2) since it was removed in the final rule. The requirements pertaining to pressure control valves on cylinders which appeared in paragraph 173.304(b)(2) are contained in CGA Pamphlet S-1.1. These requirements are made applicable by § 173.34(d), which incorporates CGA Pamphlet S-1.1. For clarity, MTB is revising paragraph (b) by replacing the words "pressure control valve" with the words "pressure control system" in the paragraph heading and text.

MTB is revising the introductory text of paragraph (c) to clarify that DOT-4L cylinders containing a cryogenic liquid must be transported in the vertical position.

Two petitioners requested that the table in paragraph (c)(2) be amended by adding additional filling densities to allow for pressure control valve settings at 1¼ times a marked service pressure of 500 psi for DOT-4L cylinders. MTB received data supporting filling densities at settings of 450, 540, and 625 psig from one petitioner. The petitioner argued against reducing pressure control valve settings on DOT-4L cylinders by 15 psi. The petitioner contends: "The control valve pressure settings in the table represent ranges of pressure. Thus, if a control valve setting of 235 psig for a vacuum insulated DOT-4L200 cylinder were required ($200 \times 1.25 = 250 - 15 = 235$), the value of the filling density of 295 psig would be used because an entry for 235 psig does not exist." Also, the petitioner argued that "[i]t is possible to have a cryogenic 4L cylinder without a vacuum jacket in which case the control valve setting, as per paragraph 173.304(b)(2), is one and one-fourth times the service pressure without subtracting the 15 psi." MTB agrees and grants the request for reconsideration by revising the table to add additional pressure control valve settings. The settings must be in conformance with paragraph 173.316(c)(2) for the named gases and § 173.34(d), which incorporates CGA Pamphlet S-1.1. Paragraph 5.9.3 of CGA Pamphlet S-1.1 specifies that a pressure control valve setting must be set 15 psi lower than 1¼ times the marked service pressure on DOT-4L cylinders insulated by a vacuum.

Petitioners requested that the filling density entry for nitrogen at a pressure control valve setting at "295" be revised by removing "69" and adding "68". MTB agrees and grants the request for reconsideration.

Section 173.318. Two petitioners urged MTB to reconsider the requirement in paragraph (a)(3)(i) which prohibits the use of aluminum outer jackets on cargo tanks in oxygen service. The petitioners argued that MTB's position on this matter for cargo tanks is inconsistent with action taken by MTB in allowing aluminum jackets on oxygen cylinders, that the reasons used by MTB to justify allowing aluminum jackets on cylinders can be used also to support aluminum jackets on cargo tanks, and that the operating experience of aluminum jacketed non-specification cargo tanks in oxygen service has been excellent for over 50 years. Neither petitioner submitted any test data on cargo tanks demonstrating the survivability of aluminum in a fire environment which was a significant factor in MTB's decision to allow aluminum jackets on cylinders in oxygen service. MTB strongly believes that aluminum as a material of construction for the cargo tank jacket must not be used because it loses strength and melts at much lower temperatures than steel in a fire situation. Increase influx of heat and the attendant pressure buildup resulting from loss of jacket integrity would accelerate the rate of oxygen release and intensify the fire. A steel jacketed tank's relative survival time in fire engulfment is over two times that of an aluminum jacketed tank, as was discussed by MTB in the preamble of the final rule under the heading "Use of Aluminum" (48 FR 27674). The request for reconsideration is denied. However, as discussed above under § 173.316, MTB is revising paragraph (a)(4) to

allow the use of aluminum parts that have been anodized in accordance with ASTM Standard B 580 on cargo tanks in oxygen service.

MTB is relaxing the provision in paragraph (a)(5) to allow use of aluminum valves, pipes and fittings external to the jacket provided no lading is retained in these parts during transportation.

See preamble discussion in this document under the heading "Pressure Relief Device Systems" for changes made to the provisions on pressure relief valves in paragraph (b).

A petitioner requested that the words "pressure control valve" be deleted in subparagraph (b)(1)(iii) because a pressure control valve is not a pressure relief device. The petitioner's request for reconsideration is denied. MTB believes that when a cargo tank is filled to the pressure setting of the pressure control valve, the pressure control valve acts as a pressure relief device to relieve pressure. The paragraph is revised for clarity. Also, subparagraph (b)(1)(iii) is revised to reference requirements in flow capacities in subparagraph (b)(2)(i).

A petitioner requested that subparagraph (b)(5)(ii) be revised by deleting the word "actual" preceding the words "discharge rate" and that the words "of free air" be added immediately following "(SCFM)". The petitioner stated that the changes would permit the flow capacity to be marked using the standard flow rating method. MTB agrees and grants the petitioner's request for reconsideration.

A petitioner requested that paragraph (g) be revised to allow for the display of more than one one-way-travel-time (OWTT) marking on the tank when it is used to transport a cryogenic liquid at different pressure levels. MTB agrees and grants the request for reconsideration by revising the introductory text of paragraph (g) and paragraph (g)(3) to allow more than one OWTT marking on a cargo tank.

Section 173.319. AAR recommended that the word "flammable" be deleted in paragraph (a)(4) thereby making the requirements applicable to all cryogenic liquids transported by rail. AAR did not explain why it believed atmospheric gases and helium which are transported by rail at pressures less than 25.3 psig should be regulated to an extent greater than specified in § 173.320. MTB is denying the request for reconsideration because it is outside the scope of this rulemaking. Further consideration will be given to the matter upon receipt of a petition for rulemaking.

Section 173.320. A petitioner requested that MTB add a provision requiring Dewar flasks be equipped with a suitable pressure relief device when used for helium or neon, refrigerated liquid at pressures below 25.3 psig. The petitioner maintained that the neck of the Dewar flask may freeze with solid air thereby allowing internal pressure buildup and rupture of the packaging. MTB is denying the request for reconsideration because it is outside the scope of this rulemaking. Further consideration will be given to the matter upon receipt of a petition for rulemaking. Further, shippers are reminded that it is their responsibility to determine the suitability of packagings in conformance with § 173.24.

Paragraph (b) is removed and redesignated paragraph (g) in § 176.11. MTB takes this opportunity to clarify in a new paragraph (b) that atmospheric gases and helium at pressure below 25.3 psig may be offered for carriage aboard an aircraft in conformance with § 171.11.

Section 176.11. Paragraph 173.320(b) which excepts atmospheric gases used in a refrigeration system from regulation by vessel is redesignation paragraph 176.11(g).

Section 176.76. A petitioner requested that paragraph (h)(2) be revised for clarification by adding the words "during transportation" immediately after the words "cryogenic liquid". The petitioner's request for reconsideration is denied because the introductory text to paragraph (h) makes it clear that the regulations apply to cryogenic liquids transported by vessel.

Section 178.57-2. Two petitioners requested that the maximum authorized service pressure on DOT 4L cylinders be continued at 500 psi in place of 360 psi as specified in the final rule. MTB agrees and grants the request for reconsideration by specifying a pressure at 500 psi to correspond with the additional filling densities authorized in the table in § 173.316(c)(2).

Section 178.57-13. A petitioner requested revison of this section to reference § 173.304(b)(2) for requirements on pressure control valves. The request for reconsideration is denied because § 173.304(b)(2) which contained requirements on pressure control valves on DOT-4L cylinders was removed under the final rule. The requirements previously contained in § 173.304(b)(2) are contained in CGA Pamphlet S-1-1, which is incorported by reference in § 173.34(d). The last sentence in § 173.57-13 containing an incorrect reference to CGA Pamphlet S-1.1 for requirements on flow capacity of relief devices is removed.

Section 178.57-20. A petitioner requested revision of paragraph (a)(9) to allow the letters "AL" to be added immediately following the specification markings in place of stamping the words, "ALUMINUM JACKET", on the jacket. The petitioner maintained that the two-letter marking appropriately identifies aluminum jacketed cylinders and is less expensive. The petitioner also contended that the material of construction of the jacket may not be known at the time of manufacture of the inner containment vessel (cylinder) and, therefore, marking the jacket material designation on the cylinder should not be required under paragraph (b). MTB agrees and grants the request for reconsideration by revising paragraphs (a)(9) and (b) accordingly.

Section 178.57-22. A petitioner requested a revisions of the information required in the inspector's report to clarify that the materials of construction of the inner container must conform to paragraph (a) of § 178.57-21. MTB agrees and grants the request for reconsideration.

Section 178.337-11. The National LP-Gas Association and another petitioner objected to the requirement in paragraph (c) permitting liquid or vapor discharge openings sized at 1¼ NPT to be equipped with an excess flow valve and a manually operated external valve. The petitioners maintain discharge openings sized at 1¼ inches are better protected by a remotely controlled internal shut-off valve. MTB revised the paragraph under the final rule due to claims of limited availability of internal valves sized at 1¼ inches. However, MTB has since confirmed that the 1¼ NPT internal valve is readily available. MTB is granting the petitioners' request for reconsideration by revising paragraph (c) to require that MC-331 cargo tanks must be equipped with internal valves on vapor or liquid discharge openings that are 1¼ NPT or larger in size after September 30, 1984.

Section 178.338-1. A petitioner requested that 22 gauge stainless steel in place of 20 gauge stainless steel be allowed for construction of non-evacuated jackets. The petitioner stated that 22 gauge steel offers the same protection as 20 gauge steel, is less costly and adds less weight. A review of exemptions reveals that many of the older exemptions authorized 22 gauge stainless steel jacket and MTB has no record of incidents caused by puncture or the influx of moisture. Therefore, MTB is granting the request for reconsideration by authorizing stainless steel jackets having a minimum thickness of 22 gauge.

A petitioner agreed to the requirement, in pargraph (f)(1), of a 30 psi critical collapsing pressure for evacuated jackets but took exception to

the requirement that jacket heads, shell and stiffening rings must be designed in accordance with the ASME Code. The petitioner maintained that the ASME does not provide a minimum collapsing pressure format and, therefore, references to the ASME Code should be deleted. MTB agrees and grants the request reconsideration by removing the references.

Section 178.338–2. A petitioner objected to the requirement that the jacket material of a MC–338 cargo tank be in conformance with the ASME Code as being too restrictive and that it eliminates presently used materials. The petitioner argued that ASME materials are intended primarily for pressure vessels subjected to internal pressure and that the availability of the sheet materials is extremely limited. The petitioner requested that paragraph (a) be revised to allow evacuated jackets to be constructed of ASME materials or materials meeting ASTM specifications A 242, A 441, A 514, A 572, A 588, A 606, A 607, A 633, A 715. MTB agrees with the petitioner's request for reconsideration and has made the change.

Two petitioners objected to the requirement, in paragraph (c), for impact testing of all tank material, except aluminum. One petitioner stated that impact testing is not necessary on materials when not required by the ASME Code, especially for stainless steels, such as Type 304 stainless steel. MTB does not agree. The ASME Code basically establishes standards for stationary pressure vessels and it does not consider the dynamic forces encountered in the transportation environment. In order to assure adequate strength and toughness of the materials throughout the range of service temperatures encountered, the petitioner's request for reconsideration is denied.

Section 178.338–3. A petitioner requested that paragraph (a) be revised to specify a minimum thickness of not less than 0.090-inch for the tank. The petitioner contends that 0.090-inch thick stainless steel permits a tank design pressure of 40 psi and is approximately 40 percent thicker than the ASME minimum thickness for stainless steel. The present requirement specifies a thickness of not less than ⅛ or 0.125-inch.

Several exemptions for vacuum insulated cryogenic cargo tanks authorize the use of a stainless steel inner tank of 0.110-inch thickness. These tanks with pressure control valves set below 25 psig are used for atmospheric gasses and, therefore, are not specification regulated except when transported by vessel. There has been no adverse experience reported on the operation of these tanks.

There is a thickness threshold, particularly in large diameter tanks, below which distortions from welding and handling are likely to occur, and where reasonable shape rigidity is compromised. Even though reinforcing members are attached to provide rigidity in thin wall vessels, a point is reached where any attachment disturbs the ideal tank contours and provides a source for fatigue stresses. MTB has not been provided an analysis of these factors and, therefore, a minimum thickness threshold has not been convincingly established. MTB must assume, lacking an engineering and safety analysis, that the minimum thickness should be in the vicinity of 0.125-inch based on experience in this thickness. Considering the experience with 0.110-inch thickness, the fact that the inner tank is well protected and is not subjected to any corrosive atmosphere, and the fact that the strength must meet the dynamic force requirements of § 178.338–3(b), the petitioner's request for a minimum thickness of 0.090-inch is denied. However, MTB believes 0.110-inch minimum thickness for the inner tank of a vacuum insulated cargo tank is acceptable and is revising paragraph (a) accordingly.

Section 178.338–4. A petitioner requested revision of paragraphs (a) and (f) to remove the requirement that welds in evacuated jackets be in conformance with the ASME Code. MTB takes the position that the evacuated jacket is a load bearing member and should have acceptable welds. Therefore, MTB believes these welds should meet recognized standards in the ASME Code and MTB is denying the petitioner's request for reconsideration. However, MTB is revising paragraph (a) to remove a duplicative requirement that all undercutting in shell and head material must be repaired as specified in the ASME Code. Paragraph (f) is revised to remove the duplicative requirement to paragraph (a) that all joints must be in accordance with the ASME Code.

Section 178.338–6. A petitioner requested that paragraph (c) be revised to allow location of a welded manhole on the front head of an MC–338 cargo tank. The petitioner argued that no strength reduction would occur due to required reinforcement of openings in the tank. In light of the petitioner's comment and upon further consideration, MTB agrees and grants the petitioner's request for reconsideration. The rationale for the original requirement, developed from a detailed study of an accident involving an MC–331 cargo tank, was that the design and location of the bolted manhole cover assembly in the front tank head allowed the manhole assembly to transmit accident impact loadings that caused failures in the tank head and shell. Most manholes used in MC–338 cargo tank are *welded* manholes fabricated nearly flush with the tank shell and located beneath the insulation jacket. Because such designs are unlikely to transmit and concentrate accident impact loads as occurred in the MC–331 cargo tank failure, MTB has decided that it is not necessary to restrict the location of such manholes. However, a manhole with a *bolted* closure when impacted is likely to transmit and concentrate accident loads into the tank. For this reason, MTB continues to prohibit manholes with *bolted* closures on the front head of MC–338 cargo tanks.

Section 178.338–9. A petitioner requested that MTB add a procedure for determining heat transfer rate and hold time requirements similar to that used for class DOT–113 tank cars. MTB agrees and grants the request for reconsideration by adding a new paragraph (c)(3) containing alternate procedures for determining the heat transfer rate and holding time of cargo tanks used in nonflammable cryogenic liquid service.

Section 178.338–10. A petitioner stated that the term "ultimate strength" is obsolete and should be replaced with the term "tensile strength". MTB agrees and grants the petitioner's request for reconsideration by revising paragraphs (b) and (c) accordingly. Similar changes are made in § 178.338–13.

Section 178.338–12. A petitioner stated that a shear section may be of questionable value outboard of valves located forward of the tandem, but has no useful purpose if the valves are within a rear cabinet forward of, and protected by, the bumper. MTB agrees that protection of valves provided by the bumper arrangements should be recognized and MTB is granting the request for reconsideration by revising the section, as suggested by the petitioner.

Section 178.338–13. In comments on paragraph (c), a petitioner stated that increased tensile strengths of materials at operating temperatures should be defined using values contained in the ASME Code. The petitioner also pointed out that the higher strength that materials have at low temperatures should not be recognized in applications where the material may not be at the low temperature. MTB agrees and grants the petitioner's request for

reconsideration by revising paragraph (c) accordingly.

Section 178.338–14. A petitioner requested revision of the last sentence in paragraph (a)(3) by replacing the parenthetical words "(percent outage)" with the words "(water capacity in pounds)". The petitioner stated that a setting expressed as a percentage does not reflect the actual outage for loading conditions and may be misleading. It is MTB's position that if a fix-length dip tube or trycock line gauging device is used to establish the maximum permitted liquid level at the loading pressure, it must be designed to assure conformance with the maximum permitted filling density prescribed in § 173.318. Therefore, after further consideration, MTB believes the requirement specifying the type of setting is unnecessary and it is removed. Accordingly, the petitioner's request for reconsideration is denied since it is unnecessary with the removal of paragraph (a)(3).

One petitioner objected to the placement of the pressure gauge on the tank jacket but provided no substantive data to justify removal of this requirement from paragraph (b). Therefore, the request for reconsideration is denied.

Also, a petitioner requested that the requirement on orifices in paragraph (c) be revised to limit applicability to tanks in flammable cryogenic liquid service, and to remove trycock lines from the restriction of openings not greater than 0.060 inch diameter. The petitioner maintained that larger openings are needed for trycock lines to ensure proper operation. MTB agrees with the petitioner in both cases and the requests for reconsideration are granted. The requirements are limited to tanks in flammable cryogenic service, and openings for trycock lines, if provided, may be no larger than ½-inch nominal pipe size.

Section 178.338–16. Paragraph (a) is revised to remove the requirement that the material of construction for the evacuated jacket must be in conformance with the ASME Code. This revision is consistent with the changes in § 178.338–2(a) to allow ASTM materials, as requested by a petitioner.

Section 178.338–18. A petitioner requested that the requirement in paragraph (a) be revised to permit ⅛-inch lettering in place of ⅜-inch lettering on nameplates. MTB believes ⅜-inch letters provide more legible markings at negligible cost. The petitioner's request for reconsideration is denied.

A petitioner stated that in paragraphs (b) (1) and (2) the abbreviation "veh." is unnecessary and should be removed, in paragraph (b)(5) the "certificate date" is unnecessary as the "date of manufacture" is sufficient, in paragraph (b)(8) the correct abbreviation for weight is "wt." and not "wgt.", and in paragraph (b)(9) the word "cryogen" is not defined.

The petitioner's first two requests for reconsideration are denied. MTB believes the abbreviation "veh." is needed to clarify that the vehicle manufacturer is the final manufacturer of a portion of the vehicle, such as the tank or jacket. The "certificate date" is the date that the completed cargo tank is certified as conforming to all applicable requirements of the MC–338 specification as prescribed in § 178.338–19(a), and because it may differ from the manufacture date, it is retained. Relative to the petitioner's latter two requests for reconsideration, MTB agrees "wt." is the acceptable abbreviation for weight and revises paragraph (b)(8) accordingly. In paragraph (b)(9), the term "cryogen" is replaced with the term "cryogenic liquid".

Section 179.102–1. In response to petitioners' request for reconsideration, MTB is revising paragraph (a)(6) to remove the requirement that the tank anchor-to-tank shell fillet welds must be examined by radioscopy. A similar revision is made to §§ 179.102–(l) and 179.102–17(m.).

Sections 179.102–4 and 179.102–17. MTB is revising paragraph 179.102–4(a) to incorporate an amendment adopted under Docket HM–175 [49 FR 3468, January 27, 1984 which requires that each specification 105 tank car built after August 31, 1981, be in conformance with specification 105J.

Three petitioners requested revisions to paragraphs 179.102–4(b) and 179.102–17(b) to clarify that stainless steel is not authorized for use as the material of construction for the tank. MTB agrees and grants the requests for reconsideration by revising the two paragraphs.

Several petitioners objected to the requirement, in paragraphs 179.102–4(g) and 179.102–17(g), permitting the installation on a tank car of a gaging device if it is a fixed length dip tube. The petitioners pointed out that most tank cars are equipped with a closed magnetic level gaging device and the use of these gaging devices should be continued as they are also authorized under DOT E–3992. MTB agrees and grants the petitioners' request for reconsideration by revising the paragraphs to permit gaging devices that are approved by the AAR Committee on Tank Cars. The term "gaging device" is used in place of the term "gauging device" for consistency with the usage of this term in Part 179.

A petitioner requested that, in paragraphs 179.102–17 (d) and (i), the term "fluorinated hydrocarbon polymer" be removed and replaced with the more specific term "PTFE". MTB agrees and grants the petitioner's request for reconsideration. However, the term "polytetrafluoroethylene" is used in place of its abbreviation.

Another petitioner objected to the restriction in paragraph 179.102–4(i) that precludes use of steels containing certain elements in tank cars used in vinyl fluoride service. Of principal concern is the restriction against aluminum and copper because of their presence in the type of steel used in the construction of valves. The petitioners' request for reconsideration is denied. MTB will not change the restriction until compatability data that specifically relates to vinyl fluoride are developed and reviewed since vinyl fluoride is known to be reactive with certain alloys.

Petitioners took exception to the requirement, in paragraphs 179.102–4(j) and 179.102–17(k), that the jacket of a tank car be stenciled with the words, "COLDEST LADING TEMPERATURE". The petitioners requested that the present wording of "MINIMUM OPERATING TEMPERATURE" continue to be authorized. One petitioner stated that "MINIMUM OPERATING TEMPERATURE" is more meaningful for the design and operating condition of the tank; whereas, "COLDEST LADING TEMPERATURE" may be misunderstood as being the temperature to the lading at any given time. MTB agrees and grants the petitioners' request for reconsideration by revising the paragraphs to permit continued use of the present marking.

Petitioners requested removal of the requirement, in paragraphs 179.102–4(1) and 179.102–17(m), that tank anchor-to-tank shell fillet welds must be examined by radioscopy. The petitioners maintained that radioscopy is not used to examine tank car fillet welds. MTB agrees and grants the petitioners' request for reconsideration by revising the paragraphs. A similar change is made in § 179.102–1(a)(6) for tanks in carbon dioxide, refrigerated liquid service.

Section 179.400–4. A petitioner requested revision of paragraph (a)(1) and the expression "q" in paragraph (a)(5) by adding "of water capacity" immediately following "Btu/day/lb." MTB agrees and grants the request for reconsideration.

Section 179.400–8. A petitioner indicated that in paragraph (c) the formula for minimum thickness should read "$t = PL/8SE(3 + \sqrt{L/r})$. MTB disagrees with the petitioner. In the November 1 publication, MTB corrected the formula to read "$t = [PL(3 + \sqrt{(L/r)})]/(8SE)$". In the corrected formula, only the term "(8SE)" is the denominator and the term "(L/r)" is the square root expression.

A petitioner requested revision of paragraph (d) to allow the minimum wall thickness of the outer jacket head to be ½ inch "before forming" in place of the required ½ inch "after forming". The requirement that jacket heads be at least ½ inch thick is intended to provide head puncture resistance and is equivalent to the requirement for head shields on certain other classes of tank cars which are used to transport flammable gases. Therefore, the petitioner's request for reconsideration is denied.

Section 179.401–1. Editorial changes have been made to certain entries in the table to § 179.401–1.

This document does not impose additional requirements and has the net result of reducing costs imposed under the final rule published in the **Federal Register** on June 16, 1983 (48 FR 27674). A regulatory evaluation and environmental assessment of the final rule is available for review in the docket. The regulatory evaluation was not modified to include the changes made under this document.

List of Subjects

49 CFR Part 171

Hazardous materials transportation, Incorporation by reference.

49 CFR Part 172

Hazardous materials transportation.

49 CFR Part 173

Gases, Hazardous materials transportation, Packaging and containers, Reporting and recordkeeping requirements.

49 CFR Part 176

Hazardous materials transportation, Maritime carriers, Cargo vessels.

49 CFR Part 178

Hazardous materials transportation, Packaging and containers.

49 CFR Part 179

Hazardous materials transportation, Packaging and containers.

In consideration of the foregoing, Parts 171, 172, 173, 176, 178 and 179 of Title 49 Code of Federal Regulations are amended as follows:

PART 171—GENERAL INFORMATION, REGULATIONS, AND DEFINITIONS

1. In § 171.7, paragraphs (d)(5) (xxiv) through (xxxiii) are added to read as follows:

§ 171.7 Matter incorporated by reference.

* * * * *

(d) * * *

(5) * * *

(xxiv) ASTM A 242–81 is titled "Standard Specification for High-Strength Low-Alloy Structural Steel," 1981 edition.

(xxv) ASTM A 441–81 is titled "Standard Specification for High-Strength Low-Alloy Structural Manganese Vanadium Steel," 1981 edition.

(xxvi) ASTM A 514–81 is titled "Standard Specification for High-Yield-Strength, Quenched and Tempered Alloy Steel Plate, Suitable for Welding," 1981 edition.

(xxvii) ASTM A 572–82 is titled "Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Steels of Structural Quality," 1982 edition.

(xxviii) ASTM A 588–81 is titled "Standard Specification for High-Strength Low-Alloy Structural Steel with 50 ksi Minimum Yield Point to 4 in. Thick," 1981 edition.

(xxix) ASTM A 606–75 (Reapproved 1981) "Standard Specification for Steel Sheet and Strip, Hot-Rolled and Cold-Rolled, High Strength, Low-Alloy, with Improved Atmospheric Corrosion Resistance," 1981 edition.

(xxx) ASTM A 607–75 is titled "Standard Specification for Sheet and Strip, Hot-Rolled and Cold-Rolled, High-Strength, Low-Alloy Columbium and/or Vanadium," 1975 edition.

(xxxi) ASTM A 633–79a is titled "Standard Specification for Normalized High-Strength Low-Alloy Structural Steel," 1979 edition.

(xxxii) ASTM A 715–81 is titled "Standard Specification for Steel Sheet and Strip, Hot-Rolled, High-Strength, Low-Alloy, with Improved Formability," 1981 edition.

(xxxiii) ASTM B 580–79 is titled "Standard Specification for Anodic Oxide Coatings on Aluminum," 1979 edition.

* * * * *

PART 172—HAZARDOUS MATERIALS TABLES AND HAZARDOUS MATERIALS COMMUNICATIONS REGULATIONS

2. In § 172.101, the Hazardous Materials Table is amended by revising entries, in alphabetical sequence, to read as follows:

§ 172.101 Hazardous materials table.

±EAW	Hazardous materials descriptions and proper shipping names	Hazard class	Identification number	Label(s) required (if not excepted)	Packaging		Maximum net quantity in one package		Water shipments		
					Exceptions	Specific requirements	Passenger carrying aircraft or railcar	Cargo aircraft only	Cargo vessel	Passenger vessel	Other requirements
(1)	(2)	(3)	3(a)	(4)	5(a)	5(b)	6(a)	6(b)	7(a)	7(b)	7(c)
	* * *										
	Argon, refrigerated liquid (*cryogenic liquid*).	Nonflammable gas.	UN 1951	Nonflammable gas	173.320	173.316 173.318	100 pounds	1,100 pounds.	1,3	1,3	
	* * *										
	Ethylene, refrigerated liquid (*cryogenic liquid*).	Flammable gas	UN 1038	Flammable gas	None	173.318 173.319	Forbidden	Forbidden	1	5	Stow away from living quarters.

PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

3. In § 173.23, paragraph (e) is revised to read as follows:

§ 173.23 Previously authorized packaging.

* * * * *

(e) After October 1, 1984, cylinders manufactured for use under exemptions DOT E-6668 or E-8404 may be continued in use, and must be marked "DOT-4L" in compliance with Specification 4L (§ 178.57 of this subchapter) on or before January 1, 1986. The "DOT-4L" marking must appear in proximity to other required specification markings.

4. In § 173.31, paragraphs (a)(8) and (c)(13)(v) are revised and paragraph (a)(10) is added to read as follows:

§ 173.31 Qualification, maintenance, and use of tank cars.

(a) * * *

(8) For each tank car conforming to and used under an exemption issued before October 1, 1984, which authorized the transportation of a cryogenic liquid in a tank car, the owner or operator, if not the owner, shall remove the exemption number stenciled on the car and stamp the tank car with the appropriate Class DOT-113 Specification followed by the applicable exemption number, for example, "DOT-113D60W-E * * * *". (Asterisks to be replaced by the exemption number.) The owner or operator, if not the owner, of a tank car that is remarked in this manner shall retain on file a copy of the last exemption in effect during the period the tank car is in service. No modification of a tank car remarked under this paragraph is authorized unless made in conformance with an applicable requirement or provision of this subchapter.

(9) * * *

(10) Class DOT 105A and 105S tank cars, constructed of ASTM A212B steel to ASTM A300 low temperature requirements, that were authorized under DOT E-3992 may continue in service but new construction is not authorized.

* * * * *

(c) * * *

(13) * * *

(v) An alternate pressure relief valve must be retested at the same time interval prescribed for the required pressure relief valve. The start-to-discharge pressure and vapor tight pressure requirements for the alternate pressure relief valve must be as specified in § 179.401-1 of this subchapter. The alternate pressure relief valve values specified in § 179.401-1 of this subchapter for the DOT-113C120W tank car apply to the DOT-113D120W tank car.

* * * * *

5. In § 173.33, the introduction text of paragraph (b)(2) and paragraph (b)(3) are revised to read as follows:

§ 173.33 Qualification, maintenance, and use of cargo tanks.

(b) * * *

(2) For each cargo tank conforming to and used under an exemption issued before October 1, 1984, which authorized the transportation of a cryogenic liquid in a cargo tank, the owner or operator, if not the owner, shall remove the exemption number stenciled on the cargo tank and stamp the specification plate (or a placed adjacent to the specification plate) "DOT MC-338" followed by the applicable exemption number, for example, "DOT MC-338-E * * * *". (Asterisks to be replaced by the exemption number.) The owner or operator, if not the owner, of a cargo tank that is remarked in this manner shall retain on file a copy of the last exemption in effect during the period the cargo tank is in service. No modification of a cargo tank remarked under this paragraph is authorized unless made in conformance with an applicable requirement of provision of this subchapter. No new construction of such cargo tanks may be initiated after September 30, 1984.

* * * * *

(3) For each MC-331 cargo tank (§ 178.337 of this subchapter) conforming to and used under an exemption issued before October 1, 1984, which authorized the transportation of ethane, refrigerated liquid, ethane-propane mixture, refrigerated liquid, or hydrogen chloride, refrigerated liquid, the owner or operator, if not the owner, shall remove the exemption number stenciled on the cargo tank and stamp the exemption number on the specification plate immediately after the DOT Specification, for example, "DOT MC-331-E * * * *". (Asterisks to be replaced by the exemption number.) If there is not adequate room on the specification plate, the exemption number must be stamped on a plate placed adjacent to the specification plate. The owner or operator, if not the owner, of a cargo tank that is remarked in this manner shall retain on file a copy of the last exemption in effect during the period the cargo tank is in service.

* * * * *

6. The heading to subpart G and paragraph (f) in § 173.300 are revised to read as follows:

* * * * *

Subpart G—Gases; Definition and Preparation

* * * * *

§ 173.300 Definitions.

* * * * *

(f) *Cryogenic liquid.* A "cryogenic liquid" is a refrigerated liquefied gas having a boiling point colder than −130°F. (−90°C.) at one atmosphere, absolute. A material meeting this definition is subject to requirements of this subchapter without regard to whether it meets the definition of a compressed gas in paragraph (a) of this section. The material is partially described as "* * *, refrigerated liquid (*cryogenic liquid*)" in § 172.101 of this subchapter.

* * * * *

7. In § 173.314, paragraph (g)(2) is removed and paragraph (g)(3) is redesignated paragraph (g)(2), and the entry for "vinyl fluoride, inhibited" in the table in paragraph (c) is revised to read as follows:

§ 173.314 Requirements for compressed gases in tank cars.

* * * * *

(c) * * *

Kind of gas	Maximum permitted filling density, Note 1	Required tank car see § 173.31(a) (2) and (3)
(Revise) Vinyl fluoride, inhibited.	59.6 maximum to 53.6 minimum at maximum 105 psig, when offered for transportation.	DOT-105A600W, Notes 17 and 23.

* * * * *

8. In § 173.316, paragraphs (a)(4) and (b), the introductory text of paragraph (c) and the table in paragraph (c)(2) are revised to read as follows:

§ 173.316 Cryogenic liquids in cylinders.

(a) * * *

(4) A valve or fitting made of aluminum with internal rubbing or abrading aluminum parts that may come in contact with oxygen in the cryogenic liquid form may not be installed on any cylinder used to transport oxygen, cryogenic liquid unless the parts are anodized in accordance with ASTM Standard B 580.

* * * * *

(b) *Pressure control systems.* Each cylinder containing a cryogenic liquid must have a pressure control system that conforms to § 173.34(d) and is

designed and installed so that it will prevent the cylinder from becoming liquid full.

(c) *Specification cylinder requirements and filling limits.* Specification DOT–4L cylinders (§ 178.57 of this subchapter) are authorized for the transportation of cryogenic liquids when carried in the vertical position as follows:

* * * * *

2 * * *

Pressure control valve setting (maximum start-to-discharge pressure, psig)	Maximum permitted filling density (percent by weight)				
	Argon	Nitrogen	Oxygen	Helium	Neon
45	133	76	108	12.5	109
75	130	74	105	12.5	104
105	127	72	103	12.5	100
170	122	70	100	12.5	92
295	115	68	96	12.5	77
360	113	65	93	12.5	.....
450	111	61	91	12.5	.....
540	107	58	88	12.5	.....
625	104	55	86	12.5	.....
Design service temperature (°F)	−320	−320	−452	−452	−411

* * * * *

9. In § 173.318, paragraph (b)(1)(viii) is removed and paragraphs (ix) and (x) are redesignated paragraphs (viii) and (ix), respectively; paragraph (g)(3) is removed; paragraphs (a)(3)(i), (a)(4), (a)(5), (b)(1)(i), (b)(1)(iii), (b)(2)(i), (b)(5)(ii), and the introductory text of paragraph (g) are revised to read as follows:

§ 173.318 Cryogenic liquids in cargo tanks.

(a) * * *

(3) * * *

(i) Is to be transported by vessel (see § 176.76(h)(1) of this subchapter); or

(ii) * * *

(4) A valve or fitting made of aluminum with internal rubbing or abrading aluminum parts that may come in contact with oxygen in the cryogenic liquid form may not be installed on any cargo tank used to transport oxygen, cryogenic liquid unless the parts are anodized in accordance with ASTM Standard B 580.

(5) An aluminum valve, pipe or fitting, external to the jacket that retains lading during transportation may not be installed on any cargo tank used to transport oxygen, cryogenic liquid or any flammable cryogenic liquid.

* * * * *

(b) * * *

(1) * * *

(i) Each tank must be protected by a primary system of one or more pressure relief valves. Except for tanks in carbon monoxide, atmospheric gas (excluding oxygen) or helium service, each tank must be protected by a secondary system of one or more frangible discs or pressure relief valves arranged to discharge upward and unobstructed to the outside of the protective housing in such a manner as to prevent impingement of gas upon the jacket or any structural part of the vehicle. The primary and secondary systems of pressure relief valves must be the type that automatically open and close at predetermined pressures. For a tank in carbon monoxide service, the secondary system must be comprised of one or more pressure relief valves instead of frangible discs. A secondary system is not required on tank in atmospheric gas (excluding oxygen) or helium service.

(ii) * * *

(iii) The rated relieving capacity for each pressure relief valve, pressure control valve when used as a pressure relief valve, and frangible disc must be as determined by the flow formulas contained in paragraph (b)(2)(i) of this section.

* * * * *

(2) * * *

(i) The primary system of pressure relief valves for a tank in atmospheric gas (except oxygen) and helium, cryogenic liquid service must have a flow capacity equal to or greater than that calculated by the applicable formula in 5.3.2 or 5.3.3 of CGA Pamphlet S–1.2. The primary system of pressure relief valves for a tank in oxygen, cryogenic liquid or flammable cryogenic liquid service, and the secondary system of relief devices (when required for any cryogenic liquid) must each have a flow capacity equal to or greater than that calculated by the applicable formula in 5.3.2. or 5.3.3. of CGA Pamphlet S–1.2.

* * * * *

(5) * * *

(ii) Each pressure relief valve must be plainly and permanently marked with the pressure, in psig, at which it is set-to-discharge, the discharge rate of the device in SCF per minute (SCFM) of free air, and the manufacturer's name or trade name and catalog number. The marked set-to-discharge pressure value must be visible with the valve in its installed position. The rated discharge capacity of the device must be determined at a pressure of 120 percent of the design pressure of the tank.

* * * * *

(g) *One-way travel time; marking.* The jacket of a cargo tank used to transport a flammable cryogenic liquid must be marked on its right side near the front, in letters and numbers at least two inches high, "One-Way Travel Time —— hrs. —— psig to —— psig at —— percent filling density," with the first blank filled in with a number indicating the one-way travel time (OWTT), in hours, of the cargo tank for the flammable cryogenic liquid to be transported, the second and third blanks with the pressures used to determine the marked rated holding time corresponding to the filling density used, and the fourth blank with the actual filling density. Multiple OWTT markings for different pressure levels are permitted.

* * * * *

10. In § 173.320, paragraph (b) is revised to read as follows:

§ 173.320 Cryogenic liquids; exceptions.

* * * * *

(b) For transportation aboard aircraft, see § 171.11 of this subchapter.

PART 176—CARRIAGE BY VESSEL

11. In § 176.11, a new paragraph (g) is added to read as follows:

§ 176.11 Exceptions.

* * * * *

(g) The requirements of this subchapter do not apply to atmospheric gases used in a refrigeration system.

PART 178—SHIPPING CONTAINER SPECIFICATIONS

12. In § 178.57–2, paragraph (b) is revised to read as follows:

§ 178.57–2 Type, size, service pressure, and design service temperature.

* * * * *

(b) The service pressure must be at least 40 and not more than 500 pounds per square inch. The service pressure limits the use of the cylinder and is shown by markings on the cylinder. For example, DOT–4L200 indicates the authorized pressure is 200 pounds per square inch.

* * * * *

13. Section 178.57–13 is revised to read as follows:

§ 178.57–13 Pressure relief devices and pressure control valves.

Each cylinder must be equipped with pressure relief devices and pressure control valves as prescribed in §§ 173.34(d) and 173.316 of this subchapter.

14. In § 178.57–20, paragraph (a)(9) and (b) are revised to read as follows:

§ 178.57-20 Marking.

(a) * * *

(9) If the jacket of the cylinder is constructed of aluminum, add "AL" after the service pressure marking. Example: DOT-4L150 AL.

(b) Except for serial number and jacket material designation, each marking prescribed in paragraph (a) of this section must be duplicated on each cylinder by any suitable means.

§ 178.57-22 [Amended]

15. In § 178.57-22, paragraph (a) is amended by changing the reference to "§ 178.57-21" to read "§ 178.57-21(a)".

16. In § 178.337-11, paragraph (c) is revised to read as follows:

§ 178.337-11 Emergency discharge control.

* * * * *

(c) *Liquid or vapor discharge openings.* Each liquid or vapor discharge opening in a tank intended to be used for a flammable liquid; flammable compressed gas; hydrogen chloride, refrigerated liquid; or anhydrous ammonia, must be equipped with a remotely controlled internal shut-off valve. However, on any liquid or vapor discharge opening of less than 1¼ inches NPT, an excess flow valve together with a manually operated external valve may be used in place of a remotely controlled internal shut-off valve. The requirements of this paragraph do not apply to a liquid or vapor discharge opening 1¼ inch NPT equipped with an excess flow valve together with a manually operated external valve before October 1, 1984, or to an engine fuel line on a truck-mounted tank of not over ¾ inch NPT and equipped with a valve having an integral excess flow valve. Each remotely controlled internal valve must comply with the following requirements:

17. In § 178.338-1, the table in paragraph (e), and paragraph (f)(1) are revised to read as follows:

§ 178.338-1 General requirements.

* * * * *

(e) * * *

Type metal	Jacket evacuated		Jacket not evacuated	
	Gauge	Inches	Gauge	Inches
Stainless steel	18	0.0428	22	0.0269
Low carbon mild steel	12	0.0946	14	0.0677
Aluminum		0.125		0.1000

(f) * * *

(1) The jacket must be designed to sustain a minimum critical collapsing pressure of 30 psi.

* * * * *

18. In § 178.338-2, paragraph (a) is revised to read as follows:

§ 178.338-2 Material.

(a) All material used in the construction of a tank and its appurtenances that may come in contact with the lading must be compatible with the lading to be transported. All material used for tank pressure parts must conform to the requirements of the ASME Code. All material used for evacuated jacket pressure parts must conform to the chemistry and steelmaking practices of one of the material specifications of Section II of the ASME Code or the following ASTM Specifications: A 242, A 441, A 514, A 572, A 588, A 606, A 607, A 633, A 715.

* * * * *

19. In § 178.338-3, paragraph (a) is revised to read as follows:

§ 178.338-3 Metal thickness.

(a) The metal thickness of the tank must be as prescribed in the ASME Code and paragraph (b) of this section. Metal less than 0.187 inch thick may not be used for the shell or heads of a tank unless the tank is enclosed in an evacuated or load-bearing jacket. Metal less than 0.110 inch thick may not be used for the shell or heads of the tank under any circumstances.

* * * * *

20. In § 178.338-4, paragraphs (a) and (f) are revised to read as follows:

§ 178.338-4 Joints.

(a) All joints in the tank, and in the jacket if evacuated, must be as prescribed in the ASME Code, except that a butt weld with one plate edge offset is not authorized.

* * * * *

(f) All tank nozzle-to-shell and nozzle-to-head welds must be full penetration welds.

21. In § 178.338-6, paragraph (c) is revised to read as follows:

§ 178.338-6 Manholes.

* * * * *

(c) A manhole with a bolted closure may not be located on the front head of the tank.

22. In § 178.338-9, a new paragraph (c)(3) is added to read as follows:

§ 178.338-9 Holding time.

* * * * *

(c) * * *

(3) For a cargo tank used in nonflammable cryogenic liquid service, in place of the holding time tests prescribed in paragraph (b) of this section, the marked rated holding time (MRHT) may be determined as follows:

(i) While the cargo tank is stationary, the heat transfer rate must be determined by measuring the normal evaporation rate (NER) of the test cryogenic liquid (preferably the lading, where feasible) maintained at approximately one atmosphere. The calculated heat transfer rate must be determined from:

$$q=[n(\Delta h)(85-t_l)]/[t_a t_f]$$

Where:

q = calculated heat transfer rate to cargo tank with lading, Btu/hr.

n = normal evaporation rate (NER), which is the rate of evaporation, determined by the test of a test cryogenic liquid in a cargo tank maintained at a pressure of approximately one atmosphere, absolute, lb/hr.

Δh = latent heat of vaporization of test fluid at test pressure, Btu/lb.

t_a = average temperature of outer shell during test, °F.

t_l = equilibrium temperature of lading at maximum loading pressure, °F.

t_f = equilibrium temperature of test fluid at one atmosphere, °F.

(ii) The rated holding time (RHT) must be calculated as follows:

$$RHT=[(U_2-U_1)\,W]/q$$

Where:

RHT = rated holding time, in hours

U_1 and U_2 = internal energy for the combined liquid and vapor lading at the pressure offered for transportation, and the set pressure of the applicable pressure control valve or pressure relief valve, respectively, Btu/lb.

W = total weight of the combined liquid and vapor lading in the cargo tank, pounds.

q = calculated heat transfer rate to cargo tank with lading, Btu/hr.

(iii) The MRHT (see § 178.338-18(b)(9) of this subchapter) may not exceed the RHT.

§ 178.338-10 [Amended]

23. In § 178.338-10, paragraphs (b) and (c) are amended by revising the words "ultimate strength" each time they appear to read "tensile strength."

24. In § 178.338-12 is revised to read:

§ 178.338-12 Shear section.

Unless the valve is located in a rear cabinet forward of and protected by the bumper (see § 178.338-10(c)), the design and installation of each valve, damage to which could result in loss of liquid or vapor, must incorporate a shear section or breakage groove adjacent to, and outboard of, the valve. The shear section or breakage groove must yield or break under strain without damage to the valve that would allow the loss of liquid

or vapor. The protection specified in § 178.338–10 is not a substitute for a shear section or breakage groove.

25. In § 178.338–13, the fourth sentence in paragraph (b) is amended by revising "ultimate strength" to read "tensile strength"; and paragraph (c) is revised to read as follows:

§ 178.338–13 Supports and anchoring.

* * * * *

(c) When a loaded tank is supported within the vacuum jacket by structural members, the design calculations for the tank and its structural members must be based on a safety factor of four and the tensile strength of the material at ambient temperature. The enhanced tensile strength of the material at actual operating temperature may be substituted for the tensile strength at ambient temperature to the extent recognized in the ASME Code for static loadings. Static loadings must take into consideration the weight of the tank and the structural members when the tank is filled to the design weight of lading (see Appendix G of the ASME Code). When load rings in the jacket are used for supporting the tank, they must be designed to carry the fully loaded tank at the specified static loadings, plus external pressure. Minimum static loadings must be as follows:

(1) Vertically downward of 2;

(2) Vertically upward of 1½;

(3) Longitudinally of 1½; and,

(4) Laterally of 1½.

26. In § 178.338–14, paragraph (a)(3) is amended by removing the last sentence which reads "The setting (percent outage) must be indicated in a visible location at or adjacent to the valve."; paragraph (c) is revised to read as follows:

§ 178.338–14 Gauging devices.

* * * * *

(c) *Orifices.* All openings for dip tube gauging devices and pressure gauges in flammable cryogenic liquid service must be restricted at or inside the jacket by orifices no larger than 0.060-inch diameter. Trycock lines, if provided, may not be greater than ½-inch nominal pipe size.

27. In § 178.338–16, paragraph (a) is revised to read as follows:

§ 178.338–16 Inspection and testing.

(a) *General.* The material of construction of a cargo tank and its appurtenances must be inspected for conformance to the ASME Code. The tank must be subjected to either a hydrostatic or pneumatic test. The test pressure must be one and one-half times the sum of the design pressure, plus static head of lading, plus 14.7 psi if subjected to external vacuum, except that for tanks constructed in accordance with Part UHT of the ASME Code the test pressure must be twice the design pressure.

* * * * *

28. In § 178.338–18, paragraphs (b)(8) and (b)(9) are revised to read as follows:

§ 178.338–18 Marking.

* * * * *

(b) * * *

(8) Maximum weight of lading for which the cargo tank is designed, in pounds (Max. Net Wt. —— lbs.);

(9) Marked rated holding time for at least one cryogenic liquid, in hours, and the name of that cryogenic liquid (MRHT —— hrs. name of cryogenic liquid). MRHT markings for additional cryogenic liquids may be displayed on or adjacent to the specification plate.

* * * * *

PART 179—SPECIFICATIONS FOR TANK CARS

29. In § 179.102–1, paragraph (a)(6) is revised to read as follows:

§ 179.102–1 Carbon dioxide, refrigerated liquid.

(a) * * *

(6) Tank anchor-to-tank shell fillet welds must be examined by non-destructive testing techniques and must meet the acceptance standards of AAR Specifications for Tank Cars, Appendix W, paragraph W11.06.

30. In § 179.102–4, the introductory text of paragraph (b) and, paragraphs (a), (b)(2)(ii), (g), (j) and (l) are revised to read as follows:

§ 179.102–4 Vinyl fluoride, inhibited.

* * * * *

(a) The tank must conform with specification DOT–105A600W and must be designed for loading at minus 50°F. or colder. After December 31, 1986, each tank built before September 1, 1981, having a water capacity (shell full volume, including manways) exceeding 18,500 U.S. gallons and used for the transportation of vinyl fluoride, inhibited must conform to class DOT–105J.

(b) All plates for the tank must be fabricated of material listed in paragraph (b)(2) of this section, and appurtenances must be fabricated of material listed in paragraph (b)(1) or (b)(2) of this section.

(1) * * *

(2) * * *

(i) * * *

(ii) AAR Specification TC128 material must meet the Charpy V-notch test requirements, in longitudinal direction of rolling, of 15 ft.-lb. minimum average for 3 specimens, with a 10 ft.-lb. minimum for any one specimen, at minus 50°F. or colder, in accordance with ASTM Specification A 370.

* * * * *

(g) Only an approved gaging device may be installed.

* * * * *

(j) The jacket must be stenciled, adjacent to the water capacity stencil, "MINIMUM OPERATING TEMPERATURE —— °F."

* * * * *

(l) Tank anchor-to-tank shell fillet welds must be examined by non-destructive testing technique and must meet the acceptance standards of AAR Specifications for Tank Cars, Appendix W, paragraph W11.06.

31. In § 179.102–17, the introductory text to paragraph (b), and paragraphs (b)(2)(ii), (d), (g), (i), (k) and (m) are revised to read as follows:

§ 179.102–17 Hydrogen chloride, refrigerated liquid.

* * * * *

(b) All plates for the tank must be fabricated of material listed in paragraph (b)(2) of this section, and appurtenances must be fabricated of material listed in paragraph (b)(1) or (b)(2) of this section.

(1) * * *

(2) * * *

(i) * * *

(ii) AAR Specification TC128 material must meet the Charpy V-notch test requirements, in longitudinal direction of rolling of 15 ft.-lb. minimum average for 3 specimens, with a 10 ft.-lb. minimum for any one specimen, at minus 50°F. or colder, in accordance with ASTM Specification A 370.

* * * * *

(d) Safety relief valves must be trimmed with monel or other approved material and equipped with a frangible disc of silver, polytetrafluoroethylene coated monel., or tantalum. Each safety relief device shall have the space between the frangible disc and the relief valve vented with a suitable auxiliary valve. The discharge from each safety relief valve must be directed outside the protective housing.

* * * * *

(g) Only an approved gaging device may be installed.

* * * * *

(i) All gaskets must be made of, or coated with, polytetrafluoroethylene or other approved material.

* * * * *

(k) The jacket must be stenciled, adjacent to the water capacity stencil.

"MINIMUM OPERATING TEMPERATURE——°F."

* * * * *

(m) Tank anchor-to-tank shell fillet welds must be examined by non-destructive testing techniques and must meet the acceptance standards of AAR Specifications for Tank Cars, Appendix W, paragraph W11.06.

32. In § 179.400–4, paragraphs (a)(1), (d) and the expression "q" in paragraph (a)(5) are revised to read as follows:

§ 179.400–4 Insulation system and performance standard.

(a) * * *

(1) *Standard Heat Transfer Rate* (SHTR), expressed in Btu/day/lb of water capacity, means the rate of heat transfer used for determining the satisfactory performance of the insulation system of a cryogenic tank car tank in cryogenic liquid service (see § 179.401–1 Table).

* * * * *

(5) * * *

q = CHTR, in Btu/day/lb., of water capacity;

* * * * *

(d) Insulating materials must be approved.

* * * * *

33. In § 179.400–8(c), the formula is revised to read "$t=[PL\ 3+\sqrt{(L/r)}]/(8SE)$".

34. In the table in § 179.401–1, the last four entries are revised to read as follows:

§ 179.401–1 Individual specification requirements.

DOT specification	113A60W	113C120W
*	*	*
Alternate pressure relief valve flow rating pressure, max. psi.		100.
Pressure control valve Start-to-vent, max. psi (see § 179.400–20(c)(4)).	17	Not required.
Relief device discharge restrictions.	§ 179.400–20	179.400–20.
Transfer line insulation	§ 179.400–17	Not required.

(49 U.S.C. 1803, 1804, 1808; 49 CFR 1.53 and App. A to Part 1)

Note.—The Materials Transportation Bureau has determined that this document 1) will not result in a "major rule" under the terms of Executive Order 12291, 2) is not a significant regulation under DOT's regulatory policy and procedures (44 FR 11034), and 3) does not require an environmental impact statement under the National Environmental Policy Act (49 U.S.C. 4321 et seq.). The regulatory evaluation and environmental assessment is available for review in the docket.

Issued in Washington, D.C., on May 29, 1984.

L. D. Santman,

Director, Materials Transportation Bureau.

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