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Requirements for Cargo Tanks; Final Rule

DEPARTMENT OF TRANSPORTATION

Research and Special Programs Administration

49 CFR Parts 107, 171, 172, 173, 176, 177, 178, and 180

[Docket Nos. HM-183, 183A; Amdt. Nos. 107-20, 171-100, 172-115, 173-212, 176-27, 177-71, 178-89, 180-2]

RIN 2137-AA42

Requirements for Cargo Tanks

AGENCY: Research and Special Programs Administration (DOT).

ACTION: Final rule.

SUMMARY: This rule amends the Hazardous Materials Regulations (HMR) pertaining to the manufacture of cargo tanks and the operation, maintenance, repair and requalification of all specification cargo tanks (including specifications not authorized for new construction). This rule revises and clarifies certain commodity sections in Part 173, reorganizes the cargo tank specifications in Part 178, and provides for vacuum-loaded cargo tanks. It establishes a new Part 180 containing requirements governing the maintenance, use, inspection, repair, retest and requalification of cargo tanks used to transport hazardous materials. In response to comments, and as an alternative to another method included in the proposal, this rule establishes certain registration requirements in Part 107 for persons who are engaged in the manufacture, repair, or certification of any DOT specification cargo tank or any cargo tank manufactured under exemption to transport hazardous materials.

The intended effect of these regulatory changes is to improve safety in the transportation of bulk quantities of hazardous materials in cargo tank motor vehicles. This final rule includes improved standards for inspection and testing of cargo tanks, improved valves and closures to prevent leakage and the risk of fire in overturns and other accidents, and new qualification criteria for cargo tank manufacturers, repairers, and inspectors.

DATES: Effective December 12, 1989. See also specific applicability dates in the regulations adopted under this rulemaking. However, compliance with the regulations as amended in §§ 178.337, 178.338 and Part 180, with the exception of those concerning registration and design certification, is authorized from June 12, 1989.

For this final rule, the 30 day limitation for the receipt of a petition for reconsideration (49 CFR 106.35) is hereby waived and 90 days provided in place thereof. Petitions for reconsideration must be received on or before September 12, 1989.

The incorporation by reference of certain publications listed in this amendment is approved by the Director of the Federal Register as of December 12, 1989.

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SUPPLEMENTARY INFORMATION:

I. Background

On September 17, 1985, RSPA published a notice of proposed rulemaking (NPRM) in the **Federal Register** under Docket HM-183,183A (50 FR 37766). The NPRM contained proposals to revise and clarify the HMR pertaining to the manufacture, maintenance, requalification and use of all specification cargo tanks. These proposals were based on research findings, petitions for rule change, requests for interpretation of the regulations, recommendations from other agencies, and RSPA's and the Federal Highway Administration's (FHWA) efforts to eliminate certain exemptions and to correct discrepancies and deficiencies appearing in the requirements for cargo tanks in the HMR. On December 5, 1985, RSPA published a document making certain corrections and changes to the NPRM (50 FR 49866), and on January 23, 1986, RSPA extended the time for filing written comments on the NPRM (51 FR 3085). Interested readers should refer to the aforementioned documents for additional background discussion.

During 1985 and 1986, RSPA and FHWA held a public briefing and three public hearings to allow interested persons to participate in this rulemaking proceeding. In addition, RSPA received over 100 written comments on the proposals contained in the NPRM. These comments were from trade associations, cargo tank manufacturers and repairers, shippers, carriers, disinterested inspectors, insurance organizations, State and local agencies, etc. All comments, including late submission and hearing transcripts, were reviewed by RSPA and FHWA staff members. These comments contain many diverse views on how to improve the safe transportation of hazardous materials in cargo tanks. Some of the comments were vague or unsupported by data. RSPA and FHWA held a series of public working meetings with certain commenters to obtain clarification of their comments and additional supporting information on their alternate proposals. These meetings were held from March 1987 through February 1988.

Several well-defined aspects of the NPRM were the subject of most of the commentary. In some cases, a review of the costs and safety benefits involved has resulted in modification of the proposals. A listing of twenty-four of the most important proposals appeared in the preamble of the NPRM beginning at 50 FR 37766. These proposals are repeated below with an indication, in brackets, of whether the proposal is or is not adopted in this final rule. The NPRM proposed—

1. To require that each manufacturer of cargo tanks hold a current American Society of Mechanical Engineers (ASME) Certificate of Authorization. [adopted]

2. To require that each cargo tank designed with an internal design pressure of 15 pounds per square inch gauge (psig) or greater be "constructed and certified in conformance with the ASME Code", and each cargo tank with an internal design pressure less than 15 psig be "constructed in accordance with the ASME Code." [adopted with changes]

3. To require that all new specification cargo tanks be certified by an Authorized Inspector who is commissioned by the National Board of Boiler and Pressure Vessel Inspectors (National Board). [adopted with changes]

4. To require that ring stiffeners on a cargo tank be of a design that can be visually inspected. [adopted with changes]

5. To authorize the use of external self-closing stop valves in place of internal self-closing stop valves in certain circumstances. [adopted]

6. To require that the strength of connecting structures on a multi-tank cargo tank be equal to that required of the cargo tank motor vehicle. [adopted]

7. To specify minimum standards for the strength and size for a manhole on all new cargo tanks. [adopted with changes]

8. To require retrofit of any manhole closure not conforming to the prescribed

strength requirement, within five years from the date of this publication. [adopted with minor changes]

9. To specify the accident damage protection required for cargo tank motor vehicles [adopted with minor changes]

10. To specify in Parts 173 and 178 the relationship between the cargo tank and its lading to guide manufacturers and shippers. [adopted with changes]

11. To clarify that the prescribed minimum thickness for the tank shell and heads excludes materials added for cladding, lining or corrosion allowance. [adopted with changes]

12. To specify the parameters to be considered in determining the effective stresses on a cargo tank. [adopted with changes]

13. To clarify that a remote means of closure for all internal or external self-closing stop valves is required. [adopted with changes]

14. To require on all cargo tanks constructed after effective date of rule, all pressure relief devices be reclosing, except a frangible disc may be used in series with a reclosing pressure relief device. [adopted with changes]

15. To revise the MC 307 and MC 312 cargo tank specification to provide for the manufacture of vacuum-loaded cargo tanks. [adopted with changes]

16. To specify a minimum design pressure of 15 psig for Specification MC 312 cargo tanks. [adopted with changes]

17. To require that all specification cargo tanks be pressure retested. [adopted]

18. To require that all specification cargo tanks be visually inspected every year. [adopted with changes]

19. To require that the shell and head of an unlined cargo tank in a service corrosive to tank metal be thickness tested at least once every two years. [adopted]

20. To specify certain additional safety control measures for a cargo tank used to transport a lading having more than one hazard class. [adopted with changes]

21. To require that a cargo tank used to transport poisonous materials or certain hazardous materials having multiple hazards have a minimum design pressure of 25 psig. [adopted with changes]

22. To require that a cargo tank inspector or tester meet certain minimum knowledge and experience qualifications. [adopted with changes]

23. To require that major repairs on cargo tanks be performed by a facility that is a holder of an ASME U stamp, a National Board R stamp or be witnessed and certified by an Authorized Inspector. [adopted with changes]

24. To require that an owner of a cargo tank used in the transportation of hazardous materials keep certain records. [adopted]

Those proposed requirements which met with substantial objection by commenters are discussed in this preamble by subject. Following the subject-by-subject review is a review by section which briefly discusses each section of the rule and the significant changes that have been made since the NPRM. (As used in this preamble, "we" refers to "RSPA and FHWA".)

II. Specification Design And Construction Requirements—Part 178

Several commenters, including the Truck Trailer Manufacturers Association (TTMA) and the National Tank Truck Carriers (NTTC), stated that the proposed rule so fundamentally changes the design and construction of new cargo tanks that confusion will exist among inspectors, shippers, buyers, etc. unless designations other than MC 306, MC 307 and MC 312 are used. TTMA further stated that the MC specification numbers were changed in 1967 following minor changes in the specifications. We agree with these commenters and have revised the specification designations covering new cargo tank constructions. Instead of the "MC" prefix designation, these new specification designations are preceded with a "DOT" prefix for consistency with the prefix designations of other DOT packaging specifications. To eliminate confusion in the future to references for the now obsolete MC 306, MC 307 and MC 312 cargo tank specifications contained in §§ 178.340 through 178.343, we have revised the section numbering designations. These new individual specifications and section numbering designations are: DOT 406 (§ 178.346), DOT 407 (§ 178.347), and DOT 412 (§ 178.348). The general requirements applicable to these specification cargo tanks are contained in § 178.345.

In this preamble, we have used these specifications and section designations to distinguish between discussions of the existing cargo tanks and the new cargo tank construction requirements.

A. Application of the ASME Code to Low Pressure Cargo Tanks

Commenters objected to the proposed requirement that all new DOT specification cargo tanks be constructed in conformance with the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code (ASME Code), and that each cargo tank with an internal design pressure greater than 15 psig be "constructed and certified in conformance with the ASME Code." They argued that the ASME Code does not apply to low-pressure (i.e. pressures below 15 psig) non-stationary vessels. Several commenters, including the TTMA and the NTTC, stated that DOT 406 cargo tanks, and DOT 407 cargo tanks with a working pressure less than 50 psig should be constructed by a manufacturer holding a current ASME Certificate of Authorization, but should not be "constructed in accordance with the ASME Code." Commenters also stated that requiring the design and construction of DOT 406 cargo tanks in accordance with the ASME Code would in practice eliminate oval tank designs and require the construction of tanks with a cylindrical shell and heads, with a knuckle radius larger than that currently used. This circular cross section design would create cargo tanks with a higher center of gravity that are less stable than the currently designed oval cross-section tanks. Commenters stated that compliance with the ASME Code for low pressure DOT 407 cargo tanks (design pressure less than 50 psig) would also eliminate the practice of manufacturing multi-cargo tank motor vehicles with inserted ("stuffed") heads and require a redesign of these cargo tanks to incorporate heads with a 6% knuckle radius. Commenters claimed that if these proposals were adopted, manufacturers would no longer be able to shape their own heads and would have to purchase them. TTMA maintained there is no adverse accident experience data to substantiate that the current knuckle radius and the "stuffed head" configuration have presented any safety problems. TTMA listed a number of sections in the ASME Code which they stated should not apply to the construction of DOT 406 cargo tanks, which included those sections on head formation and installation.

Although the ASME Code allows an exception for pressure vessels with an internal design pressure of less than 15 psig from the requirements of the ASME Code, we believe these vessels can be constructed in accordance with the ASME Code. Extending the application of the ASME Code to DOT 406 cargo tanks should enhance the overall quality of construction of DOT 406 cargo tanks. However, we recognize there are certain design configurations and construction practices used in constructing MC 306 and MC 307 cargo tanks for many years that have been proven to be reliable. Therefore, as adopted in this final rule, DOT 406 cargo tanks must be constructed in accordance with the ASME Code, with certain exceptions.

These exceptions, found in § 178.346–1, will allow the continued use of the "stuffed head" configuration and permit a knuckle radius of three times the material thickness and not less than one-half inch. Similar exceptions are provided for DOT 407 cargo tanks with a working pressure of 35 psig or less.

Currently only DOT Specification MC 307 cargo tanks with a working pressure greater than 50 psig are required to be designed in accordance with the ASME Code. The NPRM proposed that all DOT Specification MC 307 cargo tanks be constructed and certified in conformance with the ASME Code. In considering the design requirements for DOT 407 cargo tanks, we reviewed the data submitted showing the number and pressure rating of current MC 307 cargo tanks.

A review of the data showed that 35 psig is a natural breakpoint for cargo tank construction in the current fleet. Cargo tanks with a maximum allowable working pressure greater than 35 psig are generally not constructed with stuffed heads. Because of this natural breakpoint and the fact that the hazard to the public increases with pressure, we have required that all DOT 407 cargo tanks with a maximum allowable working pressure greater than 35 psig be constructed and certified in conformance with the ASME Code. Commenters did not object to the application of the ASME Code to higher pressure DOT 407 and most DOT 412 cargo tanks. This requirement has been included in the final rule.

B. Cargo Tank: Manufacturer Qualification, Registration, Quality Control, and Certification

The existing DOT certification system for cargo tanks, except for ASME Code tanks, allows a manufacturer to certify that a cargo tank conforms to all requirements of the applicable specification. The HMR contain no criteria for assessment of a manufacturer's knowledge and skills in exercising the certification process. As we stated in the NPRM, most cargo tank manufacturers exhibit great knowledge, skills, and integrity; however, a number of manufacturers have demonstrated very limited knowledge and skill about matters such as stress analyses, welding, metallurgy, recognized good design and quality control practices, and the HMR. We believe that a qualification system is necessary for all cargo tank manufacturers to assure quality control. Further, we believe that a qualification system is needed for those who inspect and certify cargo tanks to assure a high level of compliance with the design, construction, and test requirements. To achieve this goal, the NPRM proposed:

—All cargo tank manufacturers hold a current ASME "U" Certificate of Authorization.

—An Authorized Inspector commissioned by the National Board must certify each DOT cargo tank in accordance with the ASME Code and the applicable specification.

—For repairs on cargo tanks involving welding on the tank wall, an Authorized Inspector certify the repair and the repair work must be performed by:

—Manufacturers who hold an ASME "U" Certificate of Authorization;

—Repairers who hold a National Board "R" Certificate of Authorization; or

—Persons who do not hold an ASME or National Board Certificate, provided that the work is performed under the direct supervision of an Authorized Inspector and the cargo tank has a design pressure of less than 15 psig.

Commenters generally supported the requirement that all cargo tank manufacturers hold a current ASME Certificate of Authorization on the basis that it will assure a minimum level of manufacturing qualification, particularly for welding and quality control procedures. However, some commenters argued that the cost of obtaining an ASME Certificate of Authorization for use of the "U" stamp would be excessive. We should point out that existing § 178.340–2(a) prescribes that cargo tanks are to be "* * * designed and constructed in accordance with the best known and available practices * * *." The ASME Code is a nationally recognized industry standard for the design and construction of pressure vessels and ASME quality control procedures and qualified welders are among the best known and available. We believe that the cost of obtaining a "U" stamp will be minimal for those manufacturers currently using the "best known and available practices" as currently prescribed in the HMR. A number of cargo tank manufacturers currently hold an ASME Certificate of Authorization. We believe that requiring all new DOT specification cargo tanks be constructed by a manufacturer holding a current ASME Certificate of Authorization is necessary to enhance the qualifications of cargo tank manufacturers. Therefore, this requirement is adopted as proposed.

Commenters objected to the proposed use of Authorized Inspectors, to the exclusion of all other possible inspectors, for the inspection and certification of cargo tanks. They argued that: (1) The manufacturer or the owner of a cargo tank is the person who is best qualified to certify that the cargo tank conforms to the applicable specification; (2) Authorized Inspectors are not knowledgeable in the DOT specification requirements and the experience of these persons is limited to stationary pressure vessels and not to cargo tank motor vehicles; and (3) requiring the use of an Authorized Inspector to certify each cargo tank would result in production delays due to inspection scheduling difficulties arising from the limited number of Authorized Inspectors currently commissioned by the National Board. In addition, commenters characterized the cost of employing an Authorized Inspector for cargo tank certification as excessive, adding as much as $1,000 to the cost of each cargo tank.

As an alternative to requiring that all DOT specification cargo tanks be constructed in accordance with the ASME Code and inspected and certified by an Authorized Inspector, commenters recommended that all cargo tank manufacturers hold a current ASME "U" stamp, follow quality control procedures according to the ASME Code, and register with the DOT. Commenters suggested variations of the registration alternative ranging from a simple notification of activities to DOT approval of all cargo tank manufacturing facilities. Commenters presented similar arguments and alternative proposals with regard to cargo tank repairers. The NTTC, in its comments, recommended that manufacturers and repairers, as well as hazardous materials shippers and carriers, be required to register a notification of their activities with the Department. This registration would include an annual report of the organization's activities and operations and the name of the corporate officer responsible for compliance with the regulations.

In its comments to the docket, the TTMA simply stated that "MC specification cargo tank manufacturers should be registered with DOT." In the public working meeting held between the DOT and the National Petroleum Gas Association (NPGA; formerly the National L–P Gas Association) and Compressed Gas Association (CGA), the participants proposed that the DOT inspect and approve cargo tank manufacturers and repairers as a condition of their doing business in the area of DOT specification cargo tanks. In other public working meetings, representatives from the NTTC, TTMA,

American Petroleum Institute (API), NPGA, and CGA suggested that, in conjunction with the registration program, inspection and certification of cargo tank manufacturers be conducted by DOT inspectors or by "DOT approved" inspectors, who could be employees of the manufacturer. In summary, commenters have supported DOT's belief that qualification standards are necessary for persons who manufacture, assemble, repair, inspect, or certify cargo tanks and cargo tank motor vehicles.

With respect to the qualifications for persons who manufacture or repair cargo tanks, we believe a basic competency evaluation and approval is demonstrated by the person's having an ASME or National Board Certificate of Authorization. To obtain an authorization, the applicant's employees, facilities, and quality assurance plan must be audited and approved. These approval processes by the ASME and National Board are nationally and internationally recognized systems. Most commenters have agreed that this would provide an acceptable qualification standard. Because of the quality and broad acceptance of the ASME's and National Board's approval processes, we believe it is not necessary for DOT to further audit and approve persons who hold these certificates as proposed by several commenters. DOT approval of persons holding these certificates would be unnecessarily costly and burdensome. Furthermore, because cargo tank motor vehicle assemblers do not manufacture cargo tanks but only assemble cargo tanks to motor vehicles, we believe it is unnecessary to require these assemblers to obtain an ASME Certificate of Authorization.

With respect to the qualifications for persons who inspect or certify cargo tanks and cargo tank motor vehicles, we still believe that the current system of self-certification is inadequate since no qualification requirements are placed on persons who inspect and certify cargo tank design, construction, repair, and testing for conformance with the applicable specifications. However, because of the stringent qualification standards for persons who manufacture or repair cargo tanks, we agree with many commenters that these functions can be adequately performed by individuals other than "disinterested" Authorized Inspectors who have the necessary qualifications. We believe these qualifications can be developed through a combination of education and work experience, particularly experience in cargo tank design, construction, or repair. To ease the economic and scheduling burden in requiring that the person performing the certification be an Authorized Inspector commissioned by the National Board, in this final rule we are allowing greater flexibility in the selection of inspectors, as recommended by commenters.

In place of the proposed requirement for independent review of each cargo tank by an Authorized Inspector, we have relaxed the provisions in the final rule to provide that the design be certified by a "design certifying engineer" and that construction, assembly, and repair of cargo tanks be certified by a "Registered Inspector." For certification of a cargo tank design, a design certifying engineer may be an Authorized Inspector who has the knowledge and ability to determine if a cargo tank design meets the applicable DOT specification, or a person other than an Authorized Inspector, such as a professional engineer (registered by the appropriate authority of a State of the United States or a Province of Canada) who has this knowledge and ability. The design certifying engineer must have at least one year of work experience in structural or mechanical design and an engineering degree. We believe these qualifications are necessary to ensure that the individual performing the functions of a design certifying engineer has knowledge and skill in areas such as stress analysis, welding, metallurgy, and recognized good design and quality control practices.

For certification of cargo tank construction, assembly or repairs, a Registered Inspector may be an Authorized Inspector who has the knowledge and ability to determine if a cargo tank conforms with the applicable DOT specification or a person other than an Authorized Inspector who has this ability. The Registered Inspector must have the following combination of work experience in cargo tank construction or repair, and education: One year of work experience and a bachelors degree in engineering, two years of work experience and an associate degree in engineering, or three years of work experience and a high school diploma. These qualifications are the same as those prescribed by the National Board for Authorized Inspectors. We believe these qualifications are necessary to ensure that the individual performing the functions of a Registered Inspector has knowledge and skill in areas such as welding, metallurgy, and recognized cargo tank design and quality control practices.

We agree with commenters that it is difficult at present for DOT to monitor compliance with and enforcement of the HMR, because it is difficult to identify and locate persons who manufacture, assemble, repair, inspect, or certify cargo tanks or cargo tank motor vehicles. The NPRM would have required that all DOT specification cargo tanks be constructed in conformance with the ASME Code, and inspected and certified by an Authorized Inspector who has been approved by the National Board. The repair of cargo tanks also would have been inspected and certified by an Authorized Inspector. This would have included an approval and registration process under both the ASME and the National Board but not with the DOT. We no longer believe this ASME and National Board approval process to be necessary for each cargo tank. We believe it is unnecessary for DOT to approve each cargo tank manufacturer or repairer, as suggested by some commenters, since as we have stated a basic competency evaluation and approval is demonstrated by having an ASME or National Board Certificate of Authorization. However, we believe that it is necessary for such persons to be identified to DOT. Therefore, in new Subpart F of Part 107, requirements for the registration by RSPA of cargo tank manufacturers, assemblers, and repairers have been adopted, in place of the more extensive approval and registration processes proposed in the notice and suggested by commenters.

Under the registration provisions in Subpart F to Part 107, as adopted herein, any person engaged in the manufacture, assembly, certification, inspection or repair of a DOT specification cargo tank or cargo tank motor vehicle, or a cargo tank manufactured under the terms of an exemption, must register with the Department. Information and documents required to be submitted as a part of the registration for manufacturers include:

(1) A current ASME Certificate of Authorization.

(2) A statement signed by the person who has oversight for ensuring compliance with the applicable requirements of the chapter. The person must certify knowledge of those requirements and that each employee who has responsibility for ensuring quality control during the manufacture of a cargo tank, or for ensuring compliance with other cargo tank specification, qualification or design requirements, will meet certain minimum qualification requirements.

(3) A description of the specific function to be performed, e.g.

manufacture of cargo tanks, or the assembly of cargo tanks to a motor vehicle.

Information and documents required to be submitted by repairers are the same as those for manufacturers, except that a National Board Certificate of Authorization for use of the "R" stamp may be submitted instead of an ASME Certificate. Registration renewal will be every three years or upon reissuance of the ASME or National Board Certification, whichever occurs first.

III. Qualification, Maintenance—Part 180

This final rule establishes a new Part 180 containing all requirements applicable to persons who perform functions relating to maintenance and continuing qualification of packagings, such as prescribed inspections, testing, reconditioning and repair of cargo tanks. An outline of the subparts that will be contained in Part 180 and the present sections containing these requirements are as follows:

Part 180—Continuing Qualification and Maintenance of Packagings.
- Subpart A—General.
- Subpart B—Non-bulk packagings (except cylinders); Qualification and maintenance (§ 173.28).
- Subpart C—Cylinders; Qualification and maintenance (§ 173.34).
- Subpart D—Portable Tanks; Qualification and maintenance (§§ 173.32, 173.32a, 173.32b, 173.32c).
- Subpart E—Cargo Tanks; Qualification and maintenance (§§ 173.33, 177.824).
- Subpart F—Tank Cars; Qualification and maintenance (§ 173.31).

Only the requirements contained in Subparts A and E are adopted in this final rule. Subpart A contains general requirements pertaining to the continuing qualification and use of packagings set forth in this Part. Subpart E contains requirements on the maintenance and retesting of DOT specification cargo tanks and cargo tanks used under an exemption, and the requirements for continuing qualification of a cargo tank as an authorized packaging for hazardous materials. Certain other provisions addressed in Subpart E are the continued use of existing cargo tanks made to an obsolete specification, and cargo tanks conforming to and used under a DOT exemption containing provisions that have been incorporated in the HMR.

A. Manhole Closures

Included in Subpart E are requirements pertaining to features on cargo tanks such as the leak-tightness of manhole closures. Proposed § 180.405(a) would have required that each cargo tank be equipped with a secure closure on each manhole which is structurally capable of withstanding for at least 5 minutes, without leakage or permanent deformation, a static internal fluid pressure of at least 36 psig or the cargo tank test pressure, whichever is greater. Manhole assemblies on existing cargo tanks not meeting the proposed requirements would have been required to be retrofitted. Based on data furnished by a manufacturer, we estimated the cost to retrofit the affected cargo tanks to be between $20 and $250 per manhole when included as part of scheduled maintenance and testing.

Commenters expressed no objection to the proposal as it relates to manhole closures on MC 307 and MC 312 cargo tanks. Regarding MC 306 cargo tanks, commenters stated that requiring the manhole assembly to be structurally capable of withstanding 36 psig without permanent deformation is unrealistic and would not enhance safety. They stated that TTMA Recommended Practice (RP) No. 61–82, upon which the proposed structural capability requirement was based, allows some leakage, and deformation that does not affect lading retention capability. Commenters suggested a revision of the proposal to allow the use of manhole assemblies conforming to TTMA RP No. 61–82. We believe that to allow leakage of product from a manhole assembly creates an unsafe condition. Accordingly, as suggested by the commenters, we have revised proposed § 180.405(g) to adopt provisions consistent with a revised version of TTMA's standard for MC 306 type cargo tanks. These provisions specify no leakage, but allow deformation not affecting lading retention capability, and specify a quality control testing frequency of at least one percent (or one manhole closure, whichever is greater) of all manhole closures of each type produced, every three months. We believe that allowing deformation of the tank without leakage will not affect safety.

Commenters stated that we underestimated the cost of retrofitting affected cargo tanks and that the replacement cost for manholes requiring new collar installation could be as much as $1,300. Commenters also stated there are many cargo tanks equipped with manhole closures conforming to the required structural capability, but which are not certified or marked as conforming to TTMA RP No. 61–82. We agree with commenters that many unmarked manhole closures conform to this standard. Accordingly, we have revised proposed § 180.407. In those cases where the manufacturer of the manhole closure has identified and certified a particular model or series of closures as conforming to TTMA RP No. 61–82, the owner of the cargo tank may certify and mark the manhole closure in conformance with this standard. Commenters pointed out that, in some cases, the manufacturer of the manhole closure may not be known, or the manufacturer may not be willing to certify that the closure is structurally capable of conforming to the industry standard. To address this problem TTMA proposed a static test procedure for evaluating the integrity of existing manhole closures which are not marked and certified to RP No. 61–82 by the manufacturer. The test procedure contained in TTMA Technical Bulletin (TB) No. 107 specifies a 15 psig hydrostatic test, which the manhole closure must withstand without any evidence of leakage or permanent deformation. TTMA has submitted data to support its position that a manhole closure which has been tested in this manner is structurally capable of withstanding the 36 psig test without leakage. We believe the test procedures contained in TTMA TB No. 107 will be adequate in verifying the leak-tightness of unmarked closures. Accordingly, we are authorizing unmarked manhole closures that have been successfully tested in conformance with TTMA Technical Bulletin No. 107 to be marked and certified as conforming to the applicable requirements as prescribed in the technical bulletin.

B. Inspection and Testing

The table in proposed § 180.407(c) containing the testing and inspection schedule for DOT specification cargo tanks is revised for clarity, as suggested by NTTC. The specific scheduling intervals are adopted essentially unchanged.

Several commenters addressed the qualification requirements for persons performing certain prescribed tests. Commenters objected to the proposal in § § 180.407 requiring that the periodic pressure retest be performed by, or witnessed and certified by, an Authorized Inspector. Commenters argued that the cost for the use of an Authorized Inspector to witness or perform the pressure retest is not justified. Several commenters stated that performing a pressure retest requires less knowledge and skill than performing a thorough visual inspection. Several commenters also cited incidents to support their claims that their company employees are as knowledgeable and qualified, if not more so, than some Authorized Inspectors that they have employed. As

an alternative to the use of an Authorized Inspector, several commenters urged DOT to permit the periodic pressure retest and inspection to be performed by a "certified" inspector, e.g., a motor carrier employee with appropriate training and experience. The NTTC stated that such training should be specified by DOT and monitored by DOT and state enforcement agencies. Based on full consideration of the merits of these comments the periodic pressure retest may be performed by a qualified person who is registered with the Department under the procedures prescribed in § 180.409. We believe this change will allow more flexibility in the selection of qualified individuals.

Commenters also argued that, in proposed § 180.407(i), the use of persons qualified under the American Society for Nondestructive Testing (ASNT) Level II for ultrasonic testing for the required thickness tests is unnecessary. Commenters pointed out that a Level II Technician is qualified to perform ultrasonic examination for weld defects, a far more complicated procedure than a thickness measurement. We believe that this comment has merit and are requiring, instead of the Level II qualifications, that the tester be trained n the use of the particular thickness testing device, according to the instructions provided by the manufacturer of the device.

C. Bottom Damage Protection—Wet Lines

Bottom loading and unloading outlets on cargo tanks, although very useful, present the inherent risk that if damaged the entire contents of the tank may be released. To counteract this risk the tank outlet, outlet valve and piping are specifically designed to prevent damage to the outlet and outlet valves that would result in the loss of lading in an accident. The tank outlet and outlet valve are designed to be nearly flush with the surface of the tank. In addition, piping attached to the outlet valve is provided with a sacrificial device that is designed to break under accident loads and thereby prevent the piping from causing damage to the outlet valve or tank wall. Because such piping under the current regulation is not specifically a part of the product containment vessel and is designed to fail in an accident, RSPA's position is that piping between the tank outlet valve and any loading valves is not an appropriate packaging for the transportation of hazardous materials.

As a part of the implementation of the Clean Air Act (CAA), EPA required that cargo tanks used in areas operating under EPA's State Implementation Plan for the CAA must be equipped with a vapor recovery system. The petroleum industry chose to use bottom loading in conjunction with tank top vapor recovery as their method of compliance with the CAA. All motor fuels must be metered for tax purposes. Unfortunately, in implementing this system the industry did not provide for a way to drain product from the cargo tank piping back into the loading facility and maintain proper accounting for tax purposes. As a result, cargo tanks are currently operated with gasoline in external piping that is designed to fail in an accident. The operation of cargo tanks with lading retained in external piping is generally limited to petroleum distillate fuels metered for road fuel tax purposes and transported in bottom loaded MC 306 type cargo tanks. The scope of these operations encompasses the vast majority of all gasoline transported.

RSPA strongly believes the practice of transporting hazardous materials in exposed unprotected piping designed to fail, if impacted in an accident, is an unnecessary risk. Currently this practice is generally limited to gasoline transportation; expansion of this practice to other segments of the cargo tank transportation industry particularly for material with inherent hazards greater than gasoline is unacceptable. Accordingly, RSPA proposed in the NPRM a prohibition on the transportation of hazardous materials in external piping unless the piping is protected by very substantial guards.

Commenters from the petroleum industry, represented by the American Petroleum Institute (API) and several large petroleum companies, argued that the need for bottom damage protection structures to protect piping containing lading is not justified. They argued that, based on statistical data showing the infrequency of accidents involving these lines, the relatively small amount of product exposed, and the integrity and operation of current self-closing valves, the loss of lading from piping is not a significant problem.

RSPA agrees that accidents resulting in damage to unprotected external piping carrying lading are infrequent, but the consequences of such accidents can be substantial, particularly if the material released has inherent hazards greater than that of gasoline. For this reason, we have adopted the proposal to clarify that, with the exception of gasoline, the transportation of hazardous materials in external unprotected piping is prohibited. For hazardous materials other than gasoline, transportation in external unprotected piping is less common and thus the prohibition of such transportation will have a much lower cost impact. However, if the transportation of gasoline in external unprotected piping were prohibited, the impact on the petroleum industry could be substantial.

Although we have very serious concerns with the practice of transporting gasoline in external unprotected piping, we do not have sufficient data regarding incidents that can be attributed to the dislodging of piping to justify prohibiting the practice for gasoline at this time. Nor do we have adequate information concerning possible alternative procedures or equipment for accomplishing vapor recovery and road fuel tax metering, and the costs associated with these alternatives. Many of the potential cost effective ways to eliminate the risk associated with the transportation of gasoline in external unprotected line may entail alterations to the cargo tank piping, fixed loading and unloading equipment, or both. For these reasons we are excepting gasoline from the prohibition on the transportation of hazardous materials in external unprotected piping. However, we encourage the petroleum industry to consider the risk they accept in employing this practice, and work to eliminate it. We believe the petroleum industry is best positioned to consider and evaluate all the possible ways to eliminate this risk in the most cost effective manner.

The final rule contains a new provision, at § 173.33(e), which permits the retention of fuels in piping outboard of a shear section provided certain conditions are met. These conditions limit the inside diameter and aggregate volume of all unprotected piping on the cargo tank transporting hazardous materials. The intent of these provisions is to limit the quantity of lading transported and thereby limit the level of risk to current levels. These provisions in § 173.33(e) are limited to fuels metered for road fuel tax purposes. The retention of any other hazardous material in external unprotected piping is prohibited.

IV. Use of Cargo Tanks

A. Gasoline—Design Pressure of Cargo Tanks

Several commenters addressed the proposal in § 173.33(c) on the application of the design pressure formula to gasoline. (See discussion of § 173.33 later in this preamble). In its comments, the American Petroleum Institute (API) pointed out that gasoline

is a blend of organic chemicals which have seasonal variations to enhance the efficiency of motor vehicles. For the winter, gasoline is blended with a higher volatility (higher vapor pressure) to ensure engine start up; whereas for the summer, a lower volatility (lower vapor pressure) is blended to prevent vapor lock. As a result of this seasonal blending, gasoline typically marketed in the winter could not, under the proposal, be transported in the existing fleet of gasoline cargo tanks, because the proposed design pressure formula and reference temperature would require the use of a cargo tank having a design pressure exceeding that of the existing MC 306 cargo tank. API further states that in order to provide uniform automotive performance year-round, the majority of gasoline is blended and marketed in accordance with a consensus standard, ASTM D439, which would prevent winter gasoline from being shipped during periods of elevated temperatures approaching 115 °F. API asserts that use of this standard would achieve the same condition sought under proposed § 173.33(c). The concluding recommendation from API was that ASTM D439 should be adopted as the safety standard for the transportation of gasoline. This would be achieved by exempting gasoline generally conforming to ASTM D439 from the design pressure formula.

At a subsequent public meeting, API provided additional information to support its recommendation, including a listing of States with requirements similar to ASTM D439, results of a gasoline marketing survey, and calculations supporting their proposal. The gasoline marketing survey provided by API documented divergence from ASTM D439, and in some cases the maximum allowed Reid Vapor Pressure (RVP) specified in ASTM D439 for classes of gasoline were exceeded. Further, only a few States have regulations requiring compliance with the ASTM D439 standard. Two States even allow marketing of winter gasoline with RVP's greater than 18 psia, which is not authorized for transport in MC 306 cargo tanks nor is it in compliance with ASTM D439. Based on comments and information we have received on ASTM D439, it is clear that the standard: (a) is a marketing standard designed towards consumer's satisfaction with automotive performance, (b) is not a safety standard; and (c) is not widely recognized by States nor strictly followed by shippers of gasoline.

However, the general concept that winter gasoline should not be marketed in the summer forms the basis for our modifying the proposed design pressure requirement (herein an MAWP requirement) for gasoline transported in cargo tanks equipped with a 1 psig normal vent. In this final rule, in order for a hazardous material to be transported in a cargo tank equipped with a 1 psig normal vent, the sum of the tank static head and 1 psig (the maximum vapor pressure exerted by the lading) must be less than or equal to the MAWP of the cargo tank. In addition, the vapor pressure of the lading at 115 °F must be no greater than 1 psig. An exception from the vapor pressure limit is granted for gasoline under certain circumstances. A maximum ambient and lading temperature table appears in § 173.119(a)(17)(iii) in the final rule. The table prescribes the maximum ambient and lading temperature for the transportation of each class of gasoline and generally recognizes ASTM D439, as was recommended by API. This table is derived from the ASTM D439 gasoline class definitions, API technical documentation for the conversion of Reid Vapor Pressure to normal vapor pressure, and a revision of the maximum allowable working pressure equation appearing in proposed § 173.33(c). The derivation process involved calculation of the maximum ambient temperature for each ASTM D439 class of gasoline that would not exceed a 1 psig pressure measured at the top of the tank. Pressures in excess of 1 psig will be relieved by the 1 psig normal vent, which vents predominantly air. (See discussion on § 178.346). While ensuring adequate pressure capability of the cargo tank for each class of gasoline, use of the table will not prevent the transportation of any gasoline blended in accordance with ASTM D439.

B. Smaller Capacity Cargo Tanks in Flammable Liquid Service

The NPRM contained a proposal to remove, at § 177.824(a), an exception for cargo tanks with a capacity of 3,000 gallons or less used exclusively in flammable liquid service from inspection and periodic retest requirements. Most of these are MC 306 type cargo tanks. Comments from the petroleum marketing industry (i.e., distributors of gasoline, fuels and other petroleum products), took strong exception to the proposal. Many commenters supported the comments filed by the Petroleum Marketers Association of America (PMAA). PMAA stated, in part:

> Contrary to DOT's assertion, these smaller vehicles are not "operated under similar conditions, and operated over the same roads * * * as typical 4000 to 8000 gallon cargo tanks motor vehicles." Rather, these smaller vehicles are generally used in less populated, and therefore, less exposed, rural areas to deliver product intrastate to small accounts with an average tank capacity of between 500–1000 gallons.
>
> While PMAA agrees that "periodic maintenance, inspection and retesting of any vehicle transporting hazardous material must be an integral part of any responsible operator's safety management program," DOT offers no evidence to show that owners of these vehicles do not already engage in periodic maintenance or that these vehicles present a hazard to the public. These vehicles are already subject to state regulations and local ordinance designed to meet community safety concerns, some of which may be more stringent than federal requirements.
>
> * * * Elimination of the small vehicle exemption will subject small business marketers to dual, and perhaps triple, regulation under federal, state and local requirements. Compliance with several layers of regulations will make it impractical, if not impossible for these small businesses to continue to supply the farm and bulk end user accounts solely dependent upon the largely rural network of marketers for their petroleum requirements.

RSPA acknowledges that information is not readily available on the type of periodic maintenance being performed by owners of these smaller cargo tanks. Several commenters asserted that they already perform periodic maintenance and inspection of their smaller cargo tanks and, therefore, the proposal to subject these vehicles to periodic inspections is unnecessary. One commenter asserted that their vehicles are inspected annually by State fire marshals and, therefore, the exception should be retained. However, we believe that few State and local agencies have enacted regulations governing the maintenance and testing of smaller cargo tanks. We find that many States have adopted or incorporated the HMR as a part of their laws, including the exception granted for smaller cargo tanks operating exclusively in flammable liquid service.

We believe that a cargo tank containing 3000 gallons of a flammable liquid presents a significant risk to the public. Furthermore, we believe that citizens in rural as well as urban areas must be provided protection from that risk. Many state public safety representatives have supported this proposal. The proposed requirement that the retest be performed or witnessed by an Authorized Inspector, as discussed earlier in this preamble, is not adopted in this final rule. Similarly, the proposal to require all repairs to pressure parts on cargo tanks be performed or witnessed by an Authorized Inspector is not adopted in this final rule. These changes will alleviate commenters'

concerns regarding potential cost increases in those areas. We believe that if the commenters' assertions that periodic maintenance, inspections, and repairs are presently being performed on these tanks are true, there should be minimal incremental costs to small businesses. The final rule contains requirements for the periodic maintenance, inspection, and retest of all cargo tanks.

V. Impact of this Rulemaking on Existing Exemptions

A number of cargo tanks are being operated under exemption. It is our intention that, to the maximum extent appropriate, existing cargo tanks authorized for use under an outstanding exemption be covered under this rule, thereby eliminating the need for the exemption. It is our position, however, that in order to be re-marked as a specification cargo tank, an existing cargo tank must, as a minimum, meet the basic provisions in this rule.

Accordingly, each owner or manufacturer of a cargo tank which is used in the transportation of liquid hazardous materials should examine the tank and the tank drawings to determine if the cargo tank meets the requirements f the applicable MC 306, MC 307 or fC 312 cargo tank specification in effect at the time of manufacture and the conditions prescribed in the applicable DOT exemption. The owner of a cargo tank meeting the applicable requirements should remove the DOT exemption number stenciled on the cargo tank and mark the identification plate (or a plate placed adjacent to the specification plate) as specified by § 180.407(f)(6) according to the applicable specification. A copy of the exemption in effect at the time the cargo tank is remarked must be retained on file at the owner's principal place of business during the period the cargo tank is in service, and for at least one year thereafter. DOT exemptions that may be affected by this rulemaking are as follows:

Hazardous waste tanks

3095	8640
5701	8708
6325	8742
7478	8751
7948	8761
8213	8822
8269	8844
8337	8904
8348	9143
8408	9463
8428	9486
78	9512
8	9515
49	9536
8551	9543
8552	9568
8620	

VI. Delayed Effective Dates

Delayed effective dates are found in the following sections to provide for a smooth transition from the existing requirements to the new requirements:

1. Section 180.405—Authorizes the construction of DOT Specification MC 306, MC 307 and MC 312 cargo tanks conforming to the applicable specification requirements in effect on June 12, 1989 until December 12, 1990.

2. Section 180.413—Authorizes the repair of DOT Specification MC 300, MC 301, MC 302, MC 303, MC 305, and MC 306 cargo tanks, and non ASME MC 304, MC 307, MC 310, MC 311 and MC 312 cargo tanks by persons who do not presently hold an ASME or National Board Certificate of Authorization until December 12, 1990.

3. Section 180.405(g)—Allows owners of existing cargo tanks with manhole assemblies not meeting the requirements of § 178.345–5 until June 13, 1994 to retrofit the manhole assemblies.

4. Sections 178.345–10 and 180.405(h)—Require that after June 12, 1991 any reclosing pressure relief valve installed on a cargo tank must be capable of reseating to a leak-tight condition.

5. Section 178.345–10—Requires that each pressure relief system on a DOT Specification 406, 407 or 412 cargo tank be designed to withstand a dynamic pressure surge of 50 psig applied for at least 300 milliseconds without leakage of liquid regardless of vehicle orientation after June 13, 1994.

Review by Section

Readers are reminded that this review by section discusses only significant comments on the proposals in the NPRM and changes made to the NPRM in this Final Rule. For those provisions that are unchanged, readers are referred to the preamble discussion in the original NPRM (50 FR 37766) and subsequent correction document (50 FR 49866).

Sections 107.501–107.504. These new sections contain registration requirements for persons engaged in the manufacture, assembly, certification, inspection or repair of DOT specification cargo tanks or cargo tank motor vehicles, and cargo tanks manufactured under exemption. Section 107.502 contains general registration requirements applicable to manufacturers, assemblers, repair facilities, and other persons who perform the specified functions. Section 107.503 contains information on completing a registration statement. This section also grants an exception from requirements for an ASME Certificate of Authorization for assemblers of cargo tanks who perform no welding on the cargo tank wall. Section 107.504 contains provisions on required documentation, required updates of registration information, and procedures for renewal. See earlier discussion in this preamble under the heading "Cargo tank: Manufacturer Qualification, Registration, Quality Control, and Certification."

Section 171.3. Proposed § 171.3(f)(1) would have authorized the continued use of nonspecification cargo tank motor vehicles for transportation of hazardous wastes in intrastate commerce under certain conditions. Upon further consideration, we realized that these tanks, which are not under exemption, are used only to transport waste materials that do not require the use of a DOT specification cargo tank. Therefore, the proposed provision is unnecessary and is not adopted in this rule.

Section 171.7. Several commenters requested that matter incorporated by reference not be identified by a specific edition number or date. The commenters stated that the absence of dated material would allow persons to use the most recently published edition of incorporated standards without delay and would eliminate the need for RSPA to publish periodic updates of incorporated matter in the **Federal Register**. The Director of the Federal Register (OFR) has the responsibility for approval of materials incorporated by reference into the **Federal Register**. Thus, OFR regulations require an agency that seeks approval for a change to a publication that is approved for incorporation by reference must publish notice of the change in the **Federal Register** and amend the Code of Federal Regulations. The language incorporating a publication by reference must state the title, date, edition, author, publisher, and identification number of the publication. See approval procedures for incorporation by reference in 1 CFR Part 51.

The proposed changes to reflect the new address of the American Welding Society (AWS), to revise the reference numbering of the AWS Code, and to incorporate the latest editions of the American Boiler and Pressure Vessel Code and CGA Technical Bulletin TB–2 were handled in other separate rulemaking actions.

The change to incorporate the Rubber Manufacturers Association (RMA) Technical Bulletin 13 is not adopted. The provisions contained in RMA Technical Bulletin 13 that were to be referenced are brief and, thus, are adopted in the rule. Also the change to incorporate the

American Society for Nondestructive Testing Standard for use by persons who perform ultrasonic thickness testing on cargo tanks is not adopted in this rule. See preamble discussion to § 180.409.

Section 171.8. The definitions for "Authorized Inspector," "Authorized Inspection Agency," and "Cargo tank motor vehicle," are adopted as proposed. The proposed definition for "cargo tank" as a tank with a capacity of over 110 gallons is revised to provide consistency with the definition of a "bulk packaging." A bulk packaging is defined in § 171.8 to mean a packaging with a capacity of greater than 118.9 gallons if used for a liquid. Since a cargo tank is considered a bulk packaging, this change eliminates discrepancies between the two definitions for tanks with a capacity between 110 gallons and 118.9 gallons. In addition, in the cargo tank definition, references are added to refer to the definitions of "tank" appearing in the MC 331 and MC 338 cargo tank specifications, in §§ 178.337–1 and 178.338–1, respectively, and new definitions are added for "Registered Inspector" and "Design certifying engineer."

Section 172.203. Paragraph (h) is amended to correct references to provisions contained in § 173.315.

Section 173.33. Proposed paragraph (a)(2) is revised, as suggested by NTTC and the Chemical Manufacturers Association (CMA), to make both the shipper and the carrier responsible for ensuring the compatibility of materials that are offered or loaded for transportation in a cargo tank motor vehicle. The CMA stated, "For customer pickup shipments, where a cargo tank in a multi-compartmental motor vehicle already contains a material when arriving at a shipper's facility, it should be the responsibility of the receiver (motor carrier) to ensure that mixture of the materials will not create an unsafe condition. A shipper may not be familiar with the characteristics of the chemical which is already contained in one or more of the cargo tanks in a multi-compartmental vehicle." RSPA agrees with the commenters that, in a case where a motor carrier receives hazardous materials from different shippers, the responsibility for ensuring an unsafe condition is not generated, should be a shared responsibility and not the exclusive responsibility of the shipper or the carrier. Accordingly, paragraph (a)(2) has been revised to provide that "two or more materials may not be loaded or accepted for transportation. . . ."

Proposed paragraphs (b) (1) and (2) are revised to clarify that a cargo tank may not be loaded with any hazardous materials that may produce an unsafe condition.

A commenter objected to proposed paragraph (b)(4) which would require that the rate used to load or unload a cargo tank be less than or equal to the rate marked on the cargo tank specification plate. The commenter stated that a proposed requirement would have no effect if the manhole is open or if the closed system is protected by the pressure relief devices. We do not agree with the commenter. The use of a loading rate exceeding the maximum loading rate may lead to possible over pressurization and tank rupture in addition to leakage of lading through relief valves. In addition, we have revised proposed paragraph (b)(4) to specify the maximum pressure that may be used during loading and unloading when the loading/unloading rate is not marked on the cargo tank specification plate.

Proposed paragraph (c) would have required that prior to filling and offering a hazardous material for transportation, a shipper must confirm that the design pressure of the cargo tank is greater than or equal to 120 percent of the sum of the vapor pressure of the lading at 115 °F, the tank static head exerted by the lading, and any pressure exerted by the gas padding, including air, in the ullage space or dome. As is discussed later in this preamble (see discussion of § 178.345–1), the term "maximum allowable working pressure" (MAWP) has replaced the term "design pressure" in this final rule. The term MAWP will be used for the remainder of this discussion for consistency with the final rule. Commenters argued that the proposed formula is too restrictive, and would require a higher MAWP than is necessary for the commodity to be shipped, particularly for gasoline shipped in MC 306-type cargo tanks. These commenters suggested that either the safety factor of 1.2 or the vapor pressure reference temperature be reduced in order to present a more realistic approach. Additionally, commenters pointed out that the ASME Code provides a 4 to 1 factor of safety in the structural design of cargo tanks, eliminating the need for an additional safety factor in the MAWP equation.

We agree that a cargo tank constructed to the ASME Code or to the HMR is structurally designed with a substantial factor of safety. We are also aware that the use of a vapor pressure reference temperature of 115 °F is the extreme of what is experienced in normal transportation. However, we are concerned about the possible loss of hazardous materials lading from a cargo tank involved in an accident involving a rollover. Under proposed § 178.340–10, safety relief valves would be set at the MAWP, and reclose at 90% of the set pressure. We believe that a safety factor must be included to ensure that the static head and vapor pressure of the lading, in addition to any gas padding in the tank, do not cause the relief valves to open in a rollover situation, and release product continuously without reseating.

The intent of the NPRM was to link the properties of the lading to the structural design of the tank and to the relief device settings. Our primary concern in relating a potential lading to the cargo tank MAWP is in the settings of the pressure relief valves, as discussed above, since an adequate factor of safety is included in the structural design of the tank itself. As a result of the written comments received and the public meetings held, we have modified the maximum allowable working pressure requirements in the final rule. This final rule requires an MAWP greater than or equal to 100 percent of the sum of the vapor pressure of the lading at 115 °F, plus the tank static head of the lading, plus the pressure exerted by any gas padding. The 20 percent safety cushion has been removed from the calculation of the MAWP where it results in increased wall thickness; but it has been retained in the pressure relief valve settings. The final rule requires that the primary pressure relief valve setting be no less than 120 percent of the MAWP of the tank, determined as described above.

It was not our intention in proposed paragraph (c) to change the existing pressure relief and venting requirements of cargo tanks used to transport compressed gases, including cryogenic liquids. This error has been corrected in the final rule.

Proposed paragraph (c)(4) would have required the use of a cargo tank motor vehicle having a design pressure of 25 psig or higher for any material that meets the definition of more than one hazard class. It was our intent in the NPRM to require a higher integrity tank for dual hazard materials, and to specifically exclude the MC 306 cargo tank from use in transporting flammable liquids that also meet the definition of a corrosive. However, the proposal would also have excluded MC 312 cargo tanks in the pressure range of 15–25 psig. Some commenters questioned the necessity of the required minimum pressure for low vapor pressure, high flash point (such as UN Packaging Group III) materials, while other commenters expressed support for the

proposed change. This proposal has not been adopted in this final rule. However, it will be given further consideration under a separate rulemaking action (Docket HM 181).

The NPRM contained proposals to standardize certain commodity requirements and eliminate several discrepancies in the requirements for transporting certain kinds of commodities in DOT specification cargo tanks. For example, it was proposed to require that all cargo tanks used to transport poisonous materials have a design pressure of 25 psig and to prohibit the use of non-reclosing pressure relief devices (except when in series with a reclosing relief valve) on cargo tanks transporting flammable liquids. The NPRM was not intended to be an extensive review and possible reclassification of those hazardous materials authorized to be shipped in cargo tanks.

On May 5, 1987, RSPA published a notice of proposed rulemaking under Docket HM-181, entitled "Performance-Oriented Packaging Standards; Miscellaneous Proposals". Among other things, the proposal called for the adoption of an internationally recognized classification system for hazardous materials and the placement of hazardous materials into groups of bulk packagings which provide equivalent levels of packaging integrity. The present packaging sections for the bulk transportation of hazardous materials were adopted on a piecemeal basis over the years. In some sections, materials with similar transportation hazards are not authorized in similar bulk packagings due to oversight or because the industry did not petition the DOT to authorize them. Specifically, the proposal would allow a hazardous material that can safely be carried in one type of cargo tank to be carried in all cargo tanks of similar or greater integrity. Additionally, the proposal would require bulk packagings of much greater integrity than presently required for materials that are toxic by inhalation. This final rule does not address any of the issues raised in Docket HM-181.

For the above stated reason, RSPA has not accepted a commenter's recommendation that a new provision be added to provide that whenever an MC 300, MC 301, MC 302, MC 305 or MC 306 cargo tank is authorized, the use of an MC 307, MC 312 or MC 331 cargo tank having an equal or higher marked design pressure be authorized. The use of a higher integrity tank in place of a currently authorized specification tank is being considered under a separate rulemaking (Docket HM-181) and, therefore, has not been made a part of this final rule. The public and regulated industry should be aware that the final rule promulgated under Docket HM-181 might have significant impact on commodities authorized to be transported in DOT specification cargo tanks in the future.

Section 173.119. For discussion of the substantive changes affecting this section, refer to the preamble discussions under the heading "Use of Cargo Tank" and the discussion of changes to § 178.346.

Sections 173.135 and 173.136. A commenter suggested that transportation safety could be enhanced by authorizing only MC 330 and MC 331 cargo tanks for use in transporting the named chlorosilanes under this section. This same commenter requested that RSPA amend the provisions in this section to provide for the transportation of dimethyl chlorosilane in MC 330 and MC 331 cargo tanks The commenter presented no data to support these more restrictive provisions nor is RSPA aware of any problems with the use of the cargo tanks authorized. RSPA will give this matter further consideration should information be received to support the change.

Section 173.154. A provision is added in proposed paragraph (a)(4) to specify the requirements for prsssure relief devices on MC 310, MC 311, MC 312 and DOT 412 cargo tanks, which was inadvertently omitted from this section.

Section 173.240. NTTC recommended that RSPA amend § 173.240 by revising the definition of a "corrosive material" and the test requirements. NTTC stated, in part:

> We believe that the regulatory testing of "corrosive materials" (at Section 173.240) must be changed. It bears little relevance to transportation practices; has been outdated by contemporary testing and analytical technology; and has [led] to premature deterioration of even newly-manufactured cargo tanks.
>
> The current mandated tests allow the manufacturer of a corrosive to test under one set of circumstances and then offer the product for transportation under another. For example, the manufacturer may conduct the corrosive test with a product at a temperature of 70 degrees F. at a specified concentration while loading it aboard a cargo tank at 95 degrees F. and at a significantly different concentration. Metallurgists inform us that chemicals may be substantially more aggressive to tank parent and weld metal at a higher temperature. Such would accelerate internal corrosion, pitting, and (particularly) intergranular cracking.

Although NTTC's recommendation has merit, the suggested corrosive material definition and test criteria are beyond the scope of this rule making and, therefore, has not been made a part of this rule. However, this matter may be considered under a rulemaking action in the future.

Section 173.247. A commenter requested a revision to authorize silicon chloride for transportation under § 173.280 instead of § 173.247. The commenter stated that this change would simplify the HMR and enhance safety. In the comments made to § 178.280, the commenter suggested that RSPA change the section heading from "Trichlorosilanes" to "Nonflammable Chlorosilanes (including silicon chloride)". The commenter stated that this change would provide for these chemicals to be more rationally grouped for appropriate packaging in MC 330 and MC 331 cargo tanks. The commenter provided no reason for this more restrictive provision. Without data to support these changes, no action has been taken under this final rule.

Section 173.252. A commenter disagreed with the clarification contained in proposed paragraph (a)(4) stating that the prescribed ⅜ inch minimum thickness for the tank shell and head excludes any lining, cladding or corrosion allowance. The commenter stated that the existing regulations required that each tank must have a head and shell thickness of at least ⅜ inch and a nickel cladding on the inside surface comprising at least 20 percent of the total thickness. RSPA also received a letter requesting clarification of the provision. In the reply, RSPA agreed that (1) where cladding is required by § 173.252(a)(4), the thickness of the cladding is based on a percentage of the minimum calculated shell thickness rather than the as-built thickness if the shell is thicker than required, and (2) the word "shell" as mentioned in § 173.252(a)(4) means the total thickness of steel plus nickel. In any case the steel portion of the composite shell must conform to the material, minimum thickness and structural integrity requirements of the applicable cargo tank specification. The composite steel/nickel plate must conform to the requirements of ASTM specification A-265-69. The final rule has been revised consistent with this clarification.

Section 173.264. In the NPRM, RSPA proposed to include a provision found in Note 1 to paragraph (a)(14) that authorized inhibited hydrofluoric acid solution of 60 percent to 65 percent concentrations in unlined cargo tanks. A commenter stated that 60 percent to 65 percent hydrofluoric acid is no longer being produced and, therefore, continuing to grant the provision is

unnecessary. The commenter also pointed out that the Manufacturing Chemists Association had filed a petition (P-440) seeking removal of the provision. Although not a part of the proposal, RSPA believes the request has merit and it is adopted in paragraph (a)(14) of this final rule.

The commenter also requested that we prohibit the use of bottom outlets on cargo tanks authorized under this section and § 173.265(a)(4). The commenter presented no data to support this change. RSPA is not aware of any safety problems with the use of bottom outlets on cargo tanks authorized under this section. In the absence of data to support the change, no action is being taken at this time.

Section 173.265. The proposed change to paragraph (a)(4) is corrected to apply to paragraph (b)(4) in the final rule.

Section 173.266. Proposed paragraph (r)(2) would have removed a provision that designs for venting and pressure relief devices be examined by the Bureau of Explosives and approved by the Director, OHMT. A commenter requested that the provision be retained to keep the continuous vent arrangement. RSPA did not intend to remove this provision and this proposal has not been adopted.

Section 173.273. A commenter stated that the wording "and consisting of a spring-loaded pressure relief valve" in proposed paragraph (a)(5)(i) implies that a frangible disc in series is prohibited. The commenter stated that the use of a frangible disc should be allowed to protect the spring-loaded valve and to provide additional containment. As an alternative, the commenter requested that the wording be removed, as proposed § 178.340-10 (§ 178.345-10 as adopted herein) requires the use of a spring-loaded pressure relief valve and allows the use of a frangible disc in series. We agree with the commenter and have revised paragraph (a)(5) accordingly. We have also revised proposed paragraph (b)(2)(iii) to allow the setting of a spring-loaded valve in series with a frangible disc at 125 percent of design pressure instead of 150 percent of design pressure.

Section 173.315. Paragraph (i) is revised to permit safety relief valves to be certified by the valve manufacturer in place of an Authorized Inspector.

Existing § 173.33(k), which requires that MC 330 cargo tanks used to transport certain gases be equipped with liquid discharge controls conforming to § 178.337-11(c) at each liquid discharge opening, would have been removed and placed in new paragraph (n) of this section. Proposed paragraph (n) would have required that each vapor or liquid discharge opening on MC 330 and MC 331 cargo tanks be equipped as prescribed in proposed § 178.337-11. Several commenters expressed concern that, as proposed, these tanks would have to be retrofitted with internal valves on the vapor openings. It was not our intention to make any substantive change in the specification requirements for these tanks. Accordingly, the reference to the vapor discharge opening is removed.

Section 173.318. Consistent with other changes to the final rule and the reformatting of this section under a separate rulemaking, paragraphs (b)(2)(i) and (ii) are revised to require that the flow capacity and rating of pressure relief devices be verified and certified by the manufacturer of the device.

Section 173.346. A commenter requested a revision of proposed paragraph (a)(12) to authorize the continued use of a MC 306 cargo tank with a capacity of 3,000 gallons or less when operated by private carrier to transport formulated agricultural chemicals meeting the definition of Poison B. The transportation of Poison B materials was discussed in the preamble of the NPRM, and requires a cargo tank with a MAWP of 25 psig. We believe an MC 306 cargo tank is not adequate for the transportation of Poison B n.o.s. materials. Therefore, the final rule is adopted as proposed.

Sections 177.801 and 177.802. Section 177.801 is revised for clarity. After further consideration, we believe the provisions concerning the inspection of carrier facilities and records in proposed § 177.802(a), (b) and (c) are redundant. The provisions contained in paragraph (a) are adopted in this rule.

We proposed that the reporting and recordkeeping requirements presently found in § 177.824 be relocated to § 180.417. However, the provision in § 177.824(f) requiring motor carriers to file a report with FHWA listing all MC 330 or MC 331 cargo tanks in service, or being placed in or removed from service, was not included or discussed in the proposed rule. In the NPRM, the present requirement that motor carriers operating an MC 330 or MC 331 cargo tank in anhydrous ammonia service must complete a written report after testing and inspection was expanded to include cargo tanks motor vehicles operating in liquefied petroleum gas or any other service that may cause stress corrosion cracking of the tank. Therefore, we believe the reporting requirements appearing in present § 177.824(f) are no longer necessary, and they are not included in this final rule.

Section 178.320 General requirements applicable to all DOT specification cargo tanks. This new section contains general provisions pertaining to all DOT specification cargo tanks, including those used for compressed gases. Included are definitions of "manufacturer" and "design type."

As is discussed elsewhere in this document, the requirement that all cargo tanks be constructed and certified in conformance with the ASME Code is not adopted in this final rule. Independent inspection and certification of cargo tank design and construction by an Authorized Inspector is not required. The absence of independent review of each cargo tank by an Authorized Inspector has made necessary a new provision in § 178.320 which requires each design type (as defined in this section) be certified by a "Design Certifying Engineer" (as defined in § 171.8). Design certification by a qualified individual will ensure the integrity of a cargo tank design without requiring independent design review of each individual cargo tank.

Sections 178.337-3 and 178.338-3. Commenters emphasized that the NPRM proposed parameters for the determination of structural integrity would require cargo tanks with walls up to 25% thicker than presently required. The intent was not to increase the minimum wall thickness requirements. The parameters in this final rule are as follows:

For MC 331 cargo tanks. The stress values used are the same as that suggested in our research findings and recommendations. Further, for the dynamic pressure condition resulting from a deceleration of 2 g's in combination with the MAWP, the design stress value used for wall thickness calculations will be the lesser of the tank material's yield strength or 75 percent of the ultimate tensile strength of the material

For MC 338 cargo tanks. The stress values used will be the same as that proposed for the MC 331, except that the "g" loads used will be those found in § 178.338-13.

In § 178.337-3(d), a requirement which was inadvertently omitted would be restored as paragraph (3).

Section 178.345-1 (proposed § 178.340-1) General Requirements. Several commenters objected to the use of the term "design pressure" throughout the general sections as well as in sections containing the individual cargo tank specifications. These commenters, including TTMA and the Fruehauf Corporation, suggested that the term

"maximum allowable working pressure (MAWP)" should be used. Commenters, the public meetings held between the DOT and commenters, argued that an MC 306 cargo tank (DOT 406 herein), which is generally an oval cross-section tank not constructed in accordance with the ASME Code, is not "designed" through a series of calculations. Rather, the integrity of an MC 306 cargo tank is verified by hydrostatic test, and the use of the term "design pressure" for the MC 306 cargo tank is inaccurate. Further, commenters stated that use of the term "MAWP" maintains consistency with the ASME Code. It should be noted that the ASME Code uses both the terms "design pressure" and "MAWP." However, it is the MAWP which is used in the general structural design and pressure rating of the tank.

We understand cargo tank manufacturers' reluctance to use the term "design pressure," which is the term used in the existing cargo tank specification. Accordingly, the term "MAWP" is used in the final rule in place of the term "design pressure." The MAWP is the pressure used in the design of the cargo tank in the ASME Code and the individual cargo tank specifications. However, a shipper still must determine that the MAWP of a particular cargo tank is appropriate for a shipment of a commodity, as required by § 173.33.

Section 178.345–2 (proposed § 178.340–2) Material and material thickness. Several commenters requested, in addition to materials conforming to Section II, Parts A and B of the ASME Code, that materials conforming to ASTM standards be authorized for the construction of DOT specification cargo tanks. Specifically, TTMA listed two ASTM steel specifications, A676 and A715, and several aluminum alloy specifications for consideration. The aluminum alloy specifications that were listed are authorized in the HMR, and are suitable for use. We believe the two ASTM steel specifications are also suitable for use. Therefore, we have authorized those materials as well.

Commenters objected to a proposal to use a formula in place of the tables appearing in the current regulations to determine the minimum required thickness of a cargo tank shell or head. Commenters argued that it is easier to verify compliance with the specification requirements through the use of a table. TTMA, in its comments, requested that the thickness tables be retained in the individual specifications, with certain changes such as specifying the thickness to the use of decimals in place of fractions of inches or gauge designations. TTMA's revised thickness tables were derived based on the knowledge and experience of the cargo tank manufacturers in its membership, rather than on specific calculations based on anticipated stress levels.

We agree that the minimum thickness tables are easier to use than a formula. The use of minimum thickness tables can also prevent unusual situations such as a cargo tank designed with a very thin shell, but with enough ring stiffeners to meet the maximum allowable stress level requirements. However, we believe that the minimum required thickness of a cargo tank shell or head must take into account the maximum allowable stress levels. We found that the thicknesses in the tables presented by TTMA were generally adequate only to accommodate the stresses due to internal pressure. Consequently, the minimum thickness tables are being retained in the individual specifications; however, the values appearing in these tables must be replaced by the results of the stress calculations of § 178.345–3 if those calculations require a greater thickness. The tables, which are revisions of the tables developed by TTMA, have been greatly simplified, and the thickness tables for the DOT 412 cargo tank are expanded to include product densities of 16 to 26 pounds per gallon. The minimum thicknesses for cargo tank shells and heads listed in the tables are equal to or somewhat greater than those listed in the current regulations.

Section 178.345–3 (proposed § 178.340–3) Structural integrity. The principal comments received on the structural integrity requirements came from the TTMA and its members. In addition to written comments, several public working meetings were held between representatives of the DOT and TTMA. TTMA agreed that provisions for structural integrity based on g-loadings were needed for low pressure cargo tanks. However, they stated that the proposed g-loadings were too great. Commenters argued that, although the preamble to the NPRM specifically stated that no increases in the shell thickness of cargo tanks were intended by the rulemaking, the proposed g-loadings would nearly double the required shell and head thicknesses. The g-loadings recommended by TTMA were: 1.7–g vertical, based on vertical road shocks and ANSI recommendations; and 0.75–g longitudinal, based on the maximum expected deceleration. TTMA also stated that a realistic lateral force would be 0.4–g, which research has proven is the force necessary to cause overturn.

The proposed g-loadings are the same as those specified for the MC 330 and MC 331 cargo tanks, since all cargo tanks experience the same over-the-road loading conditions. Commenters stated that the g-loadings for those high pressure cargo tanks were set artificially high in order to add more thickness to the tanks, and that the loadings recommended by the commenters have worked successfully for many years. Further, commenters pointed out that the ASME design requirements already include a 4 to 1 factor of safety. We agree that the g-loadings recommended by TTMA, combined with the factor of safety required by the ASME Code, will ensure that cargo tanks are designed with adequate structural integrity. These loadings of 1.7-g vertical, 0.75-g longitudinal, and 0.4-g lateral are adopted in this final rule.

With regards to the evaluation of specific stresses, TTMA opposed the proposed requirement to include, in the design of heads and shell, the load resulting from the design pressure in combination with the dynamic pressure resulting from a longitudinal deceleration of 2 "g." TTMA stated that such a requirement would eliminate oval cross section tanks, and that the tank would not experience this type of loading in normal transportation. This requirement was proposed in order to account for accident conditions in which such loadings could occur. However, we believe that since this load combination would only occur during an accident situation, and would not ordinarily be experienced in transportation, a lower factor of safety, and a higher allowable stress could be allowed in the design for the loading. Therefore, in the final rule, the MAWP in combination with the dynamic pressure resulting from a longitudinal deceleration of 2 "g" may not exceed the lesser of the yield strength or 75 percent of the ultimate tensile strength of the material of construction.

TTMA further stated that the shear stresses described in proposed § 178.340–3(b) (6), (7), and (8) need not be calculated or taken into account, since the effective stress calculated by the formula in proposed § 178.340–3(c) (§ 178.345–3(c) herein) is governed by the tensile and compressive stresses described in paragraphs (1), (2), (3), and (5). TTMA stated that the calculated shear stresses are much lower than the tensile and compressive stresses. Additionally, TTMA and other commenters pointed out that a calculation of the tensile or compressive stress resulting from accelerative and decelerative forces applied at the

horizontal pivot of the fifth wheel, as described in proposed § 178.345–3(b)(4), is unnecessary, as this result will not exceed that calculated under proposed paragraph (b)(3). We agree that in most cases, the stress levels will be largely governed by the tensile and compressive stresses. However, since shear stresses in addition to accelerative and decelerative forces at the fifth wheel, are also experienced by the cargo tank motor vehicle in transportation, we believe that they must be evaluated as part of the design.

Section 178.345–5 (proposed § 178.340–5) Manhole Assemblies. Commenters objected to the proposed requirement that manhole closures be capable of withstanding, without leakage or permanent deformation, static internal fluid pressure of 36 psig or test pressure, whichever is greater. These commenters recommended that we should allow de minimis leakage and deformation that does not affect the structural integrity of the closures. Commenters stated that if deformation of the tank were allowed, then manhole assemblies conforming to the industry consensus standard TTMA RP No. 61–82 could be used. We believe that a leak-tight condition is necessary. To allow a certain amount of leakage would open the question of how much leakage is acceptable, and how that amount of leakage can be accurately measured. However, we believe that to allow deformation that does not affect the structural integrity of the cargo tank should not adversely affect safety. TTMA has developed a revised RP. No 61–89, which specifies no leakage, but allows some deformation. The revised standard also contains a requirement for testing every 3 months, one percent (or one manhole closure, whichever is greater) of all manhole closures of each type produced to verify compliance with this requirement. Provisions consistent with those found in revised TTMA RP No. 61–89 are being adopted for use in § 178.345–5 in this final rule.

Section 178.345–7 (proposed § 178.340–7) Circumferential reinforcements. The proposal would have required that all ring stiffeners conform to the ASME Code. Several commenters pointed out that the ASME Code requirements for ring stiffeners apply only to tanks under external pressure. We agree with the commenters that the ASME Code does not address ring stiffeners for tanks under internal pressure. Therefore, the existing requirements for ring stiffeners are retained under this final rule. This rule also allows ring stiffeners to be placed farther apart than 60 inches for vacuum-loaded tanks under certain conditions.

The NPRM contained a proposal to prohibit the use of hat shaped or open channel rings precluding visual inspection of the tank shell. Most commenters agreed that hat shaped or open channel rings should be prohibited on cargo tanks constructed of carbon steel which are used to transport corrosive materials, but did not believe that such rings should be prohibited on cargo tanks constructed of other materials or transporting other than corrosive materials. They argued that the proposal would require the use of "T" rings which are more susceptible to damage in a rollover accident where skidding is involved. They further stated that "T" rings create higher concentrated stress on the tank shell, which could lead to tearing of the shell and catastrophic loss of lading. We believe that this comment has merit; however, we do not agree that the prohibition against hat shaped or open channel rings should be limited to cargo tanks carrying corrosive material. We are aware of several accidents in which a cargo tank failed due to corrosion of the tank shell underneath a reinforcement ring, where such corrosion was caused externally by environmental elements rather than by the hazardous materials lading. Therefore, this final rule prohibits, on any cargo tank constructed of carbon steel, hat shaped or open channel rings which preclude visual inspection of the tank shell.

Section 178.345–8 (proposed § 178.340–8) Accident Damage Protection. The National Transportation Safety Board (NTSB), in its comments to the docket, supported the requirement in proposed 178.340–8(a) for accident damage protection for projections from the cargo tank shell. However, the NTSB stated that all projections from the cargo tank should be subject to the accident damage protection requirements, not just those extending more than 2 inches from the tank shell. NTSB stated, in part:

> While we believe it is the intent of the NPRM to protect all projections from rollover damage, even if they protrude less than two inches, the language used in § 178.340–8 (a) and (c) is not entirely clear in that respect. The Safety Board believes that the proposed rule should indicate unequivocally that all protrusions should have rollover protection.

The NTSB cited an accident which occurred near Springville, Alabama, and involved the spillage of 3,000 gallons of a Poison B liquid from an overturned cargo tank. The spill occurred because two 3-inch diameter washout pipes, projecting about 3 inches above the ring stiffeners, were torn away from the tank shell. These pipes were not protected by accident damage protection devices.

In contrast, TTMA commented that 2 inches from the tank was not adequate for most washouts and sumps. They stated that currently most sumps extend 4 inches from the tank and experience has shown little accident damage on such devices. TTMA requested that an exception from the accident damage protection requirements be granted for those projections which extend less than ½ their diameter and less than 4 inches from the tank shell.

It was our intention in the NPRM to provide an exception from the accident damage protection requirements for domes, sumps, and washout cover plates which have a relatively large diameter compared to their height and, therefore, are not likely to be torn from the cargo tank shell in a rollover accident on the roadway. Accordingly, we proposed an exception from the accident damage protection requirements for projections from the cargo tank which are of a material of a toughness equivalent to that of the tank shell and which extend not more than 2 inches from the tank shell. It was not our intent to except smaller diameter pipes, or projections whose diameter is smaller than the projection from the tank shell, from the accident damage protection requirements.

Upon consideration of both comments, we have clarified this section in the final rule. Proposed § 178.340–8(a)(1) (§ 178.345–8(a)(1) herein) has been revised to clarify that it applies specifically to domes, sumps, and washout cover plates, and that in order for these components to be excepted from the accident damage protection requirements, they must be of a strength, toughness, and thickness equal to the cargo tank shell thickness. In consideration of NTSB's comment, we believe that damage to projections from the tank is most likely to occur on the upper two thirds of the tank. Experience has shown that damage to large-diameter low-profile projections is very rare. We have clarified our proposal by adding a requirement that for the top ⅔ of the tank a projection may extend no more than 2 inches or ¼ its diameter from the tank without protection. Thus, a 2 inch high projection must be no less than 8 inches in diameter. For the bottom ⅓ of the tank, experience has shown TTMA's proposal to be adequate. Therefore, we have adopted TTMA's recommendation in the final rule for the lower ⅓ of the tank. However, proposed § 178.340–8(a)(2) (adopted as § 178.345–(a)(2) herein) is revised to clarify that all piping, and other devices not identified

in § 178.345–8(a)(1), that may retain ading in any tank orientation must be rotected from accident damage.

Commenters objected to the use of the term "fail safe" to describe a device designed to fail sacrificially in order to prevent loss of lading or failure of the cargo tank shell. According to one commenter, the implication of the use of the term "creates a situation wherein failure of the device to perform as expected, no matter what the situation, constitutes a design failure and exposes the designer, constructor, and tank owner to legal action." Commenters recommended that the term "shear section" be used, since that is the type of "fail safe" device which is used. TTMA proposed that the wall thickness of the shear section be at least 30 percent less than that of the adjacent piping or valve wall as opposed to the current 20 percent. We recognize the difficulty which may arise through the use of the term "fail safe." We proposed usage of the term "fail safe device" in the NPRM in order to provide some flexibility for cargo tank manufacturers and owners in meeting the safety requirements. We believe that the regulations should allow the development and use of other devices esigned to fail sacrificially in order to otect the integrity of the cargo tank. nerefore, § 178.345–8(a)(4), as adopted herein, requires "a sacrificial device such as a shear section." We have adopted TTMA's proposal on the reduction of wall thickness in our definition of "Sacrificial device." The term "sacrificial device" is defined in § 178.345–1 as "a device designed to break at no more than 70 percent of the load that would be required to cause failure of the protected lading retention device, part, or tank wall." The term "shear section" is also defined, as "a sacrificial device fabricated so that the wall thickness of the adjacent piping is abruptly reduced by at least 30 percent." The failure of the sacrificial device must leave the protected lading retention device or part and its attachment to the tank wall intact and capable of retaining lading.

Recently RSPA received a letter requesting clarification on whether a groove which is cast, rather than machined, is permissible under the requirement in existing § 178.340–8(d)(1)(i). The existing regulation requires that a shear section "be machined in such a manner as to abruptly reduce the wall thickness of the jacent piping (or valve) material by at st 20 percent." RSPA stated in its eply that although an "as-cast shear groove" may produce the same level of safety as the "machined" shear section, § 178-340–8(d)(1)(i) does not provide for such an alternative. This final rule prescribes a performance requirement for a "sacrificial device" rather than requiring a specific type of device, such as a shear section. Therefore, an "as-cast" shear groove would satisfy the sacrificial device requirements if it can be proven through test or other supporting information that it meets the performance requirement. That is, the shear groove must break at no more than 70 percent of the load that would be required to cause the failure of the protected lading retention device, part, or the tank wall.

Commenters objected to the bottom damage protection requirements contained in proposed § 178.340–8(b), particularly the design specifications which require any bottom damage protection device to be able to withstand "an impact equivalent to an energy of 275,000 foot pounds." This energy was based on the impact of a 4,000 pound automobile at a speed of 50 miles per hour or the impact of an 80,000 pound truck backing into a stationary structure at 10 miles per hour. Commenters stated that it is not definitive in engineering technology to define something as an impact equivalent to an energy. As one commenter, Fruehauf, stated, "the strength of the guard needs to be defined as a force rather than an energy." Fruehauf further pointed out that this energy could be created by a light object travelling at a high velocity or a heavy object travelling at a low velocity. TTMA and several individual manufacturers recommended that the design force be a 45,000 pounds force, with the guard extending at least 6 inches from any component that may contain lading. TTMA stated that this recommended force is based on the results of a rear underride study sponsored by the National Highway Traffic Safety Administration (NHTSA). In that study, it was determined that 45,000 pounds is the force created by an automobile travelling at 35 miles per hour impacting a heavy tractor-trailer combination.

Our analysis of past studies sponsored by NHTSA and FHWA has shown that a 4000 pound automobile travelling at 50 miles per hour experiences a force well in excess of 45,000 pounds upon impacting an 80,000 pound tractor-trailer combination. As stated in the NPRM, according to the accident data from studies of underride accidents, a significant percentage of underride accidents occur at or near highway speed limits. The 45,000 pound force obtained by NHTSA in its study of rear-underride accidents was recommended as the impact force above which the occupants of an automobile, travelling at 35 miles per hour, would not survive the impact of striking a tractor-trailer combination. A 1980 study sponsored by the FHWA entitled, "Performance Upgrading of Commercial Vehicle Rear Underride Guards," contains an equation for determining the maximum impact force experienced in a collision between an automobile and a truck. Assuming an automobile weight of 4000 pounds and width of 5 feet, a ground clearance of 24 inches, and an impact speed of 50 miles per hour, a maximum impact force of approximately 153,000 pounds is attained. That study recommends that a maximum impact force of 124,000 pounds be used in the design of underride guards. The purpose of the FHWA and NHTSA studies differ from our intent in this final rule, in that FHWA and NHTSA were designing a guard to minimize injury to passengers, including injury due to the force of impact, in occurrences where the automobile underrides a tractor-trailer combination. Our intention is to design a guard that will prevent loss of hazardous material lading from the cargo tank when lading retention components are struck in a collision. Tha maximum forces experienced in an automobile-tractor-trailer collision are the same regardless of the purpose of the guard. Therefore, we believe the guard must be designed to withstand a force of at least 155,000 pounds (based on the ultimate strength of the material) from the front, side, or rear, uniformly distributed over the surface of the device.

The NPRM proposed that the impact energy be applied over an area not greater than 6 square feet. Commenters objected to this design feature, declaring that it is too open for interpretation. This final rule establishes a design force of 155,000 pounds which must be applied over the surface of the device, but the allowable guard area and width over which the design force may be applied are limited.

It must be pointed out that the bottom damage protection device described above is only required if the optional external self-closing stop valve is used. An internal self-closing stop valve equipped with the proper sacrificial device need not be protected by an accident damage protection device. Further, in many cases, the vehicle frame, rear wheels, suspension system and rear end tank protection provide all or a significant portion of the necessary protection for external valves.

Comments addressing the proposed rear-end protection requirements were handled under a separate rulemaking action addressing rear bumpers on cargo tank trucks (Docket HM-183B, 54 FR 18820; May 2, 1989).

Section 178.345-9 (proposed 178.340-9) Pumps, piping, hoses, and connections. A commenter stated that the provisions in proposed § 178.340-9(a) apply only to loading pumps, as the cargo tank is not on the suction side of an unloading pump and need not be protected from the pump's outlet pressure. TTMA also stated that this paragraph should apply only to those pumps that may pressurize the cargo tank. The intent of this paragraph is to ensure that the cargo tank is protected from excessive rise in pressure due to the action of a pump. We do not believe this provision should be restricted to any one type of pump; however, we do believe that the paragraph can be restricted to those pumps which may pressurize the cargo tank. Therefore, the words "that may pressurize the cargo tank" are added to clarify that these pumps must be provided with an automatic means of closure.

Section 178.345-10 (proposed § 178.340-10) Pressure relief. Several commenters objected to the use of the term "spring-loaded," preferring the term "reclosing" to describe the required valves. We are accepting the term "reclosing"; however, we are prohibiting the use of gravity actuated reclosing valves since they may not reclose in the event of a rollover.

Most comments received on the requirements for pressure relief systems addressed the proposal requiring that a dual function vent be capable of withstanding a dynamic pressure surge of 50 psig applied for at least 300 milliseconds without leakage of liquid lading regardless of vehicle orientation, and be capable of functioning in the event of sustained pressure rise in excess of the prescribed set pressure. Most commenters, including TTMA and NTTC, stated that the proposed device does not exist, and that development and testing of such a vent would require time and extensive funding. Additionally, as NTTC stated, the device necessary to test this vent would require a high degree of sophistication, and funding. Since publication of the NPRM, we have been made aware that at least one manufacturer has developed a vent that purports to satisfy the "dual function" requirements. This manufacturer has publicly stated that the cost of such a vent would be about twice that of the currently used spring-loaded pressure relief device. We believe that the development, testing, and use of the proposed dual function vent is desirable, and that such a device can be effectively and economically produced. However, we realize that a reasonable period must be provided for development, testing, and ultimately, installation of these devices on cargo tank motor vehicles. Therefore, the mandatory use of the dual function pressure relief device is delayed until June 13, 1994. Use of the "dual function" device is permissible until that time.

We believe that until use of the dual function vent is mandatory, provisions are needed to limit the amount of product that is released from a pressure relief device in the event of a dynamic pressure surge, such as during a rollover, and to ensure that the device reseats and does not leak within a reasonable period. As a result of the various public meetings held between DOT and TTMA, TTMA has adapted an Australian standard for testing the behavior of pressure relief devices in rollover situations. This standard requires that each spring-loaded pressure relief valve be subjected to a series of three drop tests, to simulate a rollover situation. The amount of liquid ejected during the test is measured each time, and the amount lost must be less than a specified amount, for all three tests, for the pressure relief device to meet the requirements of the standard. After June 12, 1991, each pressure relief valve must be capable of reseating after a pressure surge and not release a volume greater than one gallon. This allowable release volume was derived from a series of tests conducted by TTMA on existing pressure relief valves mounted in MC 306 dome covers. During these tests, the pressure relief valves remained open for an average of 53 milliseconds before reseating, with an average of 0.8 gallon of water ejected. Specific initial pressure conditions and calibration requirements are added to insure the magnitude and duration of the pressure generated in actual roll-overs is duplicated by the drop test.

Several commenters claimed that to install a valve on a tank which would withstand a 50 psig pressure surge for up to 300 milliseconds would create a greater hazard to safety than a valve which releases a small amount of product in a pressure surge. These commenters stated that the cargo tank could potentially rupture if the pressure of the surge is held inside the tank. Commenters presented no data to support their claim that the cargo tank will rupture if subjected to a 50 psig pressure surge. In the absence of data to support that claim, the requirements for a dual function vent are adopted in the final rule.

The requirement contained in proposed § 178.340-11(f) that all pressure relief devices be certified in compliance with the design and testing requirements by a responsible official of the manufacturer and Authorized Inspector has been removed. These pressure relief devices must be certified by the device manufacturer (See preceding discussion in this preamble regarding the use of the Authorized Inspector). Certification in accordance with the ASME Code is required for relief devices built in accordance with the ASME Code.

Several commenters objected to the proposal to prohibit the use of non-reclosing pressure relief devices, specifically for MC 312 cargo tanks (DOT 412 cargo tanks herein). Commenters stated that non-reclosing devices, such as fusible and frangible (rupture) disks, provide a greater venting capacity and are less vulnerable to damage in a rollover accident than reclosing relief devices. Further, commenters argued that the MC 312 cargo tank is used primarily for corrosive materials. For corrosive materials, a large proportion of the required total venting capacity is for a fire situation and, in certain cases a single, lower capacity reclosing pressure relief device is more than adequate to relieve any pressure that will accumulate in the tank due to product expansion. Commenters also stated that to add several smaller capacity reclosing devices to replace a larger capacity non-reclosing device will unnecessarily add potential sources of leakage to the cargo tank.

As stated in the preamble to the NPRM, in a cargo tank accident, particularly an overturn followed by a fire, the functioning of a frangible disc or a fusible element would result in the release of a substantial quantity of lading, while a reclosing valve would minimize the quantity of lading released. Further, we believe that frangible discs are much more likely to fail as a result of impact and liquid surge than reclosing pressure relief devices. However, we recognize that low vapor pressure corrosive materials with no other hazards are not as susceptible to fire as flammable materials, and do not require the same total venting capacity. Therefore, instead of allowing frangible discs as a method of reducing the number of vents required, this final rule provides for a lower total venting capacity for cargo tanks transporting low vapor pressure corrosive materials with no other hazards. For these cargo

tanks, the total venting capacity must be determined by the equation appearing in e IM portable tank specification at § 178.270.11(d)(3). This equation relates the properties of the material to the required venting capacity. Cargo tanks with a total venting capacity determined in this manner must be in dedicated service for the corrosive material for which the required venting was calculated.

Several commenters argued that the proposed provisions on pressure relief devices were different from the pressure relief requirements of the ASME Code. It has always been our position that since cargo tanks are not stationary vessels, different pressure relief requirements are warranted.

Commenters also objected to the proposed elimination of the 1 psig "normal vent" from the DOT 406 cargo tank. Those comments are addressed in the discussion in § 178.346–1, on the design/operating pressure of the DOT 406, and in § 178.346–10 on pressure relief devices.

Section 178.345–11 (proposed § 178.340–11) Tank Outlets. Several commenters stated that a definition of the term "leak tight" should be established, since a drip-tight seal is extremely difficult to maintain, rticularly for chemical tanks.

mmenters requested that a limited mount of leakage be permitted for closures equipped with an additional leak tight cap or a closure outboard of the primary means of closure. TTMA and several manufacturers requested that leak tight be defined as no liquid leakage in excess of 30 cubic centimeters in 5 minutes with the tank pressurized to the maximum allowable working pressure. This amounts to in excess of one-third of a quart per hour. It is our position that any leakage from a closure presents an unsafe condition, even where such closure is provided with a secondary closure. A leak from the inboard closure would permit the accumulation of hazardous material lading between the inboard and the outboard closures, which would be spilled from the piping upon removal of the external closure. Such an occurrence could potentially injure transport workers or create a fire situation. Therefore, the term "leak tight" in this final rule means no leakage.

During the last several years, RSPA has received numerous inquiries concerning the required location of the self-closing stop valve required by the cargo tank specifications. The NPRM ntained a proposal to allow the use of ternal" valves in place of internal lves, provided the external valve is adequately protected against damage which could result in loss of lading from the cargo tank shell This provision is revised in the final rule to identify those situations (valve locations) where accident damage protection devices are required, and those situations where the use of a shear section would provide adequate protection against the loss of lading from the cargo tank.

The NTSB expressed its opposition to the proposed revision to permit the use of external valves in lieu of internal valves. NTSB stated: "The protection afforded by current requirements will be negated because an external valve will be more subject to damage from impacts that can render this essential safety device useless during emergencies." As was stated in the preamble to the NPRM, we believe that vacuum-loaded cargo tanks operating under DOT exemption, which have external self-closing stop valves protected by bottom damage protection, have demonstrated a high level of integrity. We have no experience data to indicate that this type of valve arrangement with adequate protection presents an unsafe condition. Therefore, we are permitting the use of adequately protected external valves. However, we have specified that the valve must be securely closed during transportation, and remain intact and capable of retaining product if the self-stored energy source is sheared off in an accident. Further, any piping extending beyond the accident damage protection device must be equipped with a sacrificial device which will fail under load in order to protect the external valve, piping and cargo tank wall.

Several commenters from the hazardous waste industry objected to the clarification that stop valves must be self-closing. Commenters stated that for cargo tanks transporting hazardous waste which may contain solids, semi-solids, or foreign objects which may interfere with the operation of the valve, a manually operated valve is preferable. A manually operated valve allows the operator to reopen the valve and remove the foreign object. A self-closing valve, commenters contended, would be damaged in a case where an obstruction blocks reseating of the valve. We recognize that solids or foreign objects may be present in waste materials and can potentially create an obstruction to effective seating of the discharge valve. However, many hazardous wastes which are transported in vacuum loaded cargo tanks do not contain solids or foreign objects. Also, the rule does not limit the use of these cargo tanks to hazardous wastes. We believe a safety feature must be available which will ensure that the discharge valve closes in an emergency situation such as a fire, where the operator may not be able to reach the valve. Therefore, we have revised the proposal to allow the stop valve on a loading/unloading outlet to be manually operated in normal loading and unloading operations. In addition, the cargo tank outlet must be equipped with a self-closing feature that will close automatically in an emergency situation, such as a fire.

The requirements for remote operators and thermally activated closures have also been revised for clarity. Additionally, a time limit of 30 seconds maximum has been placed on the time permitted from the actuation of a self-closing valve system to full closure. This time limit was established based upon discussions which took place at the public working meetings.

Section 178.345–12 (proposed § 178.340–12) Gauging devices. The proposal would have required that each cargo tank, except a tank intended to be filled by weight, be equipped with a gauging device which indicates the maximum permitted liquid level. Fruehauf commented that, in addition to allowing tanks to be filled by weight, the filling of tanks by a meter should be included. It was not our intention in the NPRM to limit the authorized method of loading of these cargo tanks. Rather, it was our intention to allow any method that would measure the actual amount of product contained in the cargo tank at any one time, including any heel that remains in the tank when it is reloaded.

TTMA stated that cargo tanks filled by volume, or intended to be loaded through an open manhole, should also be exempted from the requirement for gauging devices. These methods of loading can perhaps accurately measure the quantity of hazardous material that is loaded in the tank at the time of filling, but will not measure any residual lading which remained in the tank from a previous load. A cargo tank which is loaded by weight will take into account the total lading in the cargo tank at one time. Therefore, the proposed gauging device requirement is adopted unchanged.

Section 178.345–13 (proposed § 178.340–13) Pressure tests. This section has been revised to clarify that the pressure test applies to the "tank" rather than the "cargo tank."

Section 178.345–14 (proposed § 178.340–14) Marking. Several commenters stated that the location of the required nameplate and specification plates should be the right or curb side of the vehicle, in order to ensure that the inspector is not placed in an unsafe position while inspecting these plates. Other commenters stated

that the location of the plates should be "on the same side as the NHTSA plate," in consideration of any changes made in the location of the NHTSA plate. The location of the certification plate was moved to the left side of the cargo tank several years ago to coincide with the location of the NHTSA identification plate. A change in the location of the plate was not proposed in this rulemaking. Therefore, any discussion of such a change is deferred to a future rulemaking.

Commenters also stated that, in addition to allowing the nameplate and specification plate to be attached directly to the tank, the integral supporting structure of the tank should be authorized as an attachment site for the plates. RSPA has reservations about allowing the plates to be attached to the chassis of the cargo tank motor vehicle, because in some instances, a tank will be placed on a new chassis, while the specification plate remains on the old chassis. In this scenario, the cargo tank is rendered out of specification due to the lack of a specification plate. However, we do not object to the attachment of the plates to an integral supporting structure, which will never be separated from the tank.

The provisions in this section are reorganized to consolidate and place in paragraph (a) the requirements on the location and attachment of the nameplate and specification plate, the information required to be marked on these plates, and the size of the lettering.

The proposal would have required that the nameplate be affixed to each cargo tank, and a specification plate be affixed to each cargo tank motor vehicle. It was our intention to allow the use of a single plate on a cargo tank motor vehicle composed of more than one cargo tank made to the same specification. These provisions are revised to clarify that only one plate is required for each cargo tank motor vehicle if: the cargo tank motor vehicle is composed of non-ASME cargo tanks, none of which are separated by a void space; all the information required by paragraphs (b) and (c) appears on the plate; and the plate is not covered or hidden by any insulation. If a single plate is used, the information required must be printed for each cargo tank, from front to rear, in the order of the corresponding cargo tanks.

NTTC stated that the color coding requirement in proposed paragraph (f)(2) for specification plates on multi-specification cargo tanks is redundant to the information appearing on the data plate and, therefore, is unnecessary. We agree with the NTTC, and proposed paragraph (f)(2) has been removed.

Section 178.345-15 (proposed § 178.340-15) Certification. The proposed provision to require that the certification certificate be signed by an Authorized Inspector, and that a cargo tank not requiring ASME Code certification be certified as "constructed in accordance with the ASME Code" are not adopted in this final rule. See the earlier preamble discussions under subject headings.

In addition, the proposed requirement that design drawings be attached to the certification certificate and be provided to the purchaser has been removed. We believe that it is important for drawings to be furnished to the final manufacturer in a multi-stage construction. However, based on the comments we received, we no longer believe it is necessary for DOT to require that the drawings be provided to the purchaser of the cargo tank motor vehicle.

Section 178.348 (Specification DOT 406 cargo tank motor vehicle). Numerous commenters addressed the proposed revision of the MC 306 cargo tank specification. Commenters objected to the designation of the MAWP (design pressure) range of an MC 306 cargo tank between 3 psig and 14.9 psig. Comments received from cargo tank manufacturers, motor carriers and shippers all stated that there is no need to set the minimum pressure of this cargo tank at 3 psig, as these cargo tanks have been operating successfully for many years at a working pressure of 1 psig, which is maintained through the use of the 1 psig normal vent. The normal vent was not included in the NPRM. A minimum MAWP of 3 psig would have required that pressure relief devices be set at 3 psig, identical to current MC 306 cargo tank specification requirements. Operators of MC 306 cargo tanks used to transport gasoline have stated that the normal vent, in normal operation, vents predominantly air. During transportation, the gasoline heats up and expands, increasing the pressure in the vapor space of the tank, which contains mostly air. This increased pressure is relieved when it reaches 1 psig. Without the normal vent, commenters stated, the cargo tank will be operated at higher pressures unnecessarily and perhaps unsafely, with a reduction in the fatigue life of the cargo tank.

As was stated earlier in this document, we are concerned that in an overturn situation, even with an undamaged cargo tank, relief valves set at a pressure less than that determined from the formula in § 173.33(c) will release product continuously without reseating. However, the design of the 1 psig normal vent is such that it will not function in an overturn situation. We also point out that the MC 306 cargo tank is not used exclusively for gasoline, and higher vapor pressure materials could be transported in these cargo tanks, provided the MAWP of the tank complied with proposed § 173.33(c). A cargo tank equipped with a normal vent, carrying lading with a vapor pressure greater than 1 psig, would vent lading through the normal vent during normal transportation conditions. For this reason, in the final rule a 1 psig normal vent may be installed only on a DOT 406 (or MC 306-type) cargo tank which is used to transport a material for which the sum of the vapor pressure at 115 °F and 1 psig is less than or equal to the MAWP.

Manufacturers and carriers have maintained that there is no need to define a range of MAWP's for this cargo tank, since there are no cargo tanks currently built to the MC 306 specification which have a design pressure of "over 3 psig and less than 14.9 psig." They stated that the MC 306 is generally considered to be a "gasoline" cargo tank. Taking full consideration of these comments, we have established a minimum MAWP for a DOT 406 cargo tank based on the minimum pressure that any point on the cargo tank might see when in a rollover situation. The final rule establishes a minimum MAWP of 2.65 psig for the DOT 406 cargo tank. This pressure includes the static head of a gasoline lading in a typical MC 306-type cargo tank, plus a maximum of 1 psig of vapor pressure which will be seen in a tank equipped with a normal vent. For DOT 406 cargo tanks with a larger static head than that produced by gasoline in cargo tanks currently used, the MAWP must exceed 2.65 psig. In each case the required MAWP for the lading must be determined in accordance with § 173.33(c). The MAWP of a cargo tank not equipped with a normal vent may be as high as 4 psig to account for the variations in the lading. (See also discussion of maximum ambient temperature table for gasoline in § 173.119).

To accommodate situations where the ASME Code conflicts with current MC 306 design and construction practices, TTMA presented a list of sections of the ASME Code which they believe should not apply to construction of the new DOT 406 cargo tanks, including those sections relating to head formation and installation. We do not believe that adequate justification was presented for the elimination of many of the sections of the ASME Code cited by TTMA for exception in the DOT 406

specification. However, we agree that certain provisions in the ASME Code need not be applied to the construction of the DOT 406 cargo tank.

As discussed earlier in the preamble, § 178.345–1 provides certain exceptions to the ASME Code for the DOT 406 cargo tank. These exceptions include the required certification by a National Board authorized inspector, the use of "stuffed heads," and the construction of cargo tanks with an elliptical cross section. Other exceptions include the required loadings to be used in stress calculations, marking and certification of the cargo tank, material identification and recordkeeping requirements.

Thickness tables for shell, heads, bulkheads, and baffles for DOT 406 cargo tanks are contained in § 178.346–2. These tables have been greatly simplified, and are based on the volume of the cargo tank in gallons rather than on the volume capacity in gallons per inch, as has been used previously, because of the elliptical shape of most of these cargo tanks.

Section 178.346–10 contains a provision to allow the 1 psig "normal vent," as discussed earlier in this preamble. We are allowing the use of a 1 psig vent in order to extend the life of the cargo tank, on the basis that this vent releases predominantly air, and not hazardous material lading, during transportation. This section limits the use of cargo tanks equipped with normal vents to ladings meeting the requirements of § 173.33(c)(1)(i)(C).

As was discussed earlier in this document, the final rule requires pressure relief devices to be set at 120 percent of the MAWP of the cargo tank. Many commenters to proposed § 178.340–10 objected to the requirement that reclosing pressure relief devices close after discharge at not less than 90% of the set-to-discharge pressure, as it applies to the MC 306 cargo tank. For these cargo tanks, in order for a valve seat to lift high enough to allow the large airflows required in this specification, reclosing at 90% of the opening pressure will be nearly impossible. A commenter recommended that the reclosing pressure be reduced to 75% of the opening pressure. We believe that this comment has merit; however, in a cargo tank accident involving a rollover, the pressure exerted on the pressure relief device will be equal to the tank static head of lading plus the vapor pressure of the lading added to any gas padding. For cargo tanks equipped with a 1 psig normal vent transporting gasoline, the minimum pressure in this situation is 2.65 psig. Therefore the minimum reclosing pressure for a relief device on these tanks must be 2.65 psig, to ensure that the device indeed reseats, particularly during an overturn situation. To allow this pressure to be 75% of the set-to-discharge pressure would necessitate a minimum set pressure of 3.5 psig. However, this pressure is 130 percent of the MAWP of the cargo tank. In order to balance the requirements for a minimum reclosing pressure, and the concerns of the industry regarding the necessary differential between the set pressure and the reclosing pressure, the final rule requires that the primary pressure relief valves on DOT 406 cargo tanks be set to discharge at 125 percent of the MAWP (or 3.3 psig for gasoline cargo tanks equipped with a normal vent), and reclose at not less than 80 percent of the set to discharge pressure. The higher setting of relief valves at 125 percent of the tank MAWP has precedence in the intermodal tank area, where an ASME Code case approved such an arrangement. The required minimum reclosing pressure of 80 percent of the set pressure will provide substantial relief from the general requirement which states that pressure relief devices must reseat at not less than 90 percent of the set to discharge pressure.

TTMA suggested certain additional testing requirements for MC 306 cargo tanks. These tests would be used to ensure the proper functioning of relief valves at the set-to-discharge pressure, and ensure that these devices retain the cargo tank pressure below the set-to-discharge pressure. These devices are required to be tested and certified by the device manufacturer at the time of manufacture, and will be periodically tested in accordance with the requirements of Part 180. We believe it is unnecessary to add these additional requirements to the cargo tank manufacturing specifications.

The required test pressure found in § 178.346–13 herein has been changed to the greater of 5 psig or 150 percent of the MAWP, and the inspection pressure to the MAWP, with a minimum of 2.65 psig, to coincide with the change to prescribe the minimum MAWP of 2.65 psig for a DOT 406 cargo tank.

Section 178.347 (Specification DOT 407 cargo tank motor vehicle). As discussed earlier in the preamble, certain requirements have been relaxed. DOT 407 cargo tanks with a design pressure of 35 psig or less must be constructed in accordance with the ASME Code, with certain exceptions which are found in § 178.347–1. These exceptions include the use of a Registered Inspector in place of an Authorized Inspector for inspection and certification; the use of the "stuffed head" configuration, and knuckle radius of less than 6% of the tank diameter. Other exceptions include the required loadings to be used in stress calculations, marking and certification of the cargo tank, material identification and recordkeeping requirements.

Cargo tanks with a design pressure above 35 psig must be constructed and certified in full conformance with the ASME Code. These cargo tanks are of sufficiently high pressure to warrant the additional safety benefits of the ASME Code. Cargo tanks constructed to these pressures are generally not constructed with "stuffed heads."

Revised thickness tables, as discussed in the preamble to § 178.345–2, are found in § 178.347–2. Where the minimum thicknesses recommended by TTMA are lower than the thicknesses required by the current regulations, the higher values found in the current regulations are prescribed in the table.

Several commenters pointed out that vacuum relief devices should not be required on vacuum-loaded cargo tanks. We agree with the commenters and an exception has been added in § 178.347–10(b) which grants relief from the requirement for vacuum relief devices on cargo tanks designed to be loaded by vacuum. Cargo tanks not designed to be loaded by vacuum, however, must have a vacuum relief system capable of limiting the vacuum in the tank to less than 80 percent of the design vacuum capability of the cargo tank.

Section 178.348 (Specification DOT 412 cargo tank motor vehicle). A commenter stated that lower pressure (less than 15 psig design pressure) MC 312 cargo tanks, with elliptical cross-sections, are being used to transport low-density, low vapor pressure corrosive materials in oilfield servicing operations. The hazardous materials carried in these cargo tanks would require a design pressure less than 15 psig, based on the requirements of § 173.33(c). The commenter argued that there is no need to require a minimum design pressure of 15 psig, and full ASME construction, for these cargo tanks. Application of the ASME Code would require a circular cross-section to replace the elliptical cross-section currently used, and create cargo tanks with a higher center of gravity and less stability. Due to the lesser hazard and low vapor pressure of these materials, we agree that a 15 psig minimum design pressure is not necessary.

To permit the transportation of hazardous materials with low vapor pressure, we have revised the minimum MAWP for DOT 412 cargo tanks to 5 psig. The requirements of § 173.33(c) must be met for any material to be

transported in these cargo tanks. Any DOT 412 cargo tank with an MAWP between 5 and 15 psig must be constructed in accordance with the ASME Code with certain exceptions. These exceptions allow an elliptical cross-section, and all inspection and certification of these tanks may be performed by a Registered Inspector instead of an Authorized Inspector.

As stated in the discussion of § 178.345–10 earlier in this preamble, several commenters asked that non-reclosing pressure relief valves be authorized for MC 312 cargo tanks transporting corrosive materials. Alternatively, § 178.348–10 has been revised to allow a lower total venting capacity on these cargo tanks only when used in dedicated service for corrosive materials with no other hazard.

Subpart F, Part 180. This new subpart establishes the requirements for the retest, requalification and use of cargo tank motor vehicles.

Section 180.403. Several comments were received on the proposed definitions contained in this section.

Modification. Several commenters stated that the definition of "modification" should be revised to include only changes to the original cargo tank shell design. They stated that this change would ensure that the replacement of valves and fittings, and minor changes to appurtenances, such as fender attachments, lighting brackets, and ladder brackets would not be construed as modification. We agree that minor changes to non-lading retention components of the cargo tank, and replacement of valves and fittings, as long as they are in conformance with the original design criteria and appropriate specification, should not be considered "modifications." Therefore, the definition of "modification" is revised to clarify that modification means any change to a tank's original design and construction that would affect the structural integrity of the tank, and to exclude minor changes to and replacement of many appurtenances, fittings, valves, and vents. We have also removed "stretching," which is also defined in this section, from the definition of "modification."

Rebarrelling. Several commenters objected to the proposed definition of "rebarrelling" which was defined as "replacing more than 25 percent of the shell material of a cargo tank." Commenters stated that "rebarrelling" should mean replacement of 100 percent of the cargo tank shell, and that such replacement of the cargo tank shell material should not be subject to the requirements in § 180.413, which would require any rebarrelling to conform to the specification in effect at the time of rebarrelling. We disagree with the commenters. It is our position that replacement of a large portion of the cargo tank wall constitutes the manufacture of a new cargo tank, and the cargo tank must conform to the specification requirements in effect at the time of manufacture. What constitutes rebarrelling was discussed at the public meetings. In consideration of those discussions, "rebarrelling" is defined in this final rule to mean replacing more than 50 percent of the cargo tank wall.

Repair. The definition of "repair" is revised to clarify that the term refers only to work involving welding on a cargo tank's pressure parts. Therefore, the replacement of a valve or fitting which involves no welding does not constitute a "repair" and, therefore, is not required to be performed in an ASME "U" shop or a National Board "R" shop.

Paragraph (c) of this section permits the modification of the pressure relief devices and outlets of certain cargo tank specifications previously authorized to conform to a new specification. For instance, the outlets on an MC 307 cargo tank may be modified to conform to the outlet requirements found in the DOT 407 specification. This provision will allow MC 307 cargo tanks to be equipped with external self-closing stop valves, provided the valves are adequately protected as required by § 178.345–8.

Section 180.405. Paragraph (f) of this section contains provisions for re-marking certain cargo tanks manufactured under the terms of an exemption as DOT specification cargo tanks, under certain circumstances. This provision generally refers to vacuum-loaded cargo tanks constructed under exemption, substantially in compliance with the MC 307 or MC 312 cargo tank. For many years we have required that vacuum-loaded cargo tanks must be equipped with self-closing valves. There has been a great deal of confusion and misunderstanding on the part of exemption holders regarding the self-closing and remote closure features of these valves. This has resulted in cargo tanks manufactured without these features. It still is our position that these valves must have a self-closing feature; however, this self-closing feature may be external to the valve. This will allow the use of a valve which may be manually operated in normal loading and unloading operations. In order to allow adequate time for owners of vacuum loaded hazardous waste cargo tanks currently under exemption to equip their cargo tanks with self-closing valves, we are providing a 2-year compliance period. Cargo tanks meeting the requirements of § 180.405(f) except for the self-closing valve requirement, may be re-marked in accordance with that paragraph only after the self-closing valve has been installed.

The requirement currently in § 173.33(a)(2) granting a 36-month compliance period for certain cargo tank motor vehicles to be equipped with a rear accident damage protection device has been placed in § 180.405(1). The MC 303 cargo tank motor vehicle, which is a MC 306 type cargo tank, was not included in the final rule adopting those provisions (Docket HM–183B). It is added in this rule.

Section 180.407. Existing § 173.33(d)(i) contains an exception from the hydrostatic or pneumatic test for MC 330 and MC 331 cargo tanks used only in sodium metal service, since sodium metal presents a severe fire risk in contact with water, and the purity of the sodium metal must be maintained. A new Note 1 has been added to the Retest and Inspection Table in § 180.407(c) which retains this exception.

A commenter stated that lined or clad cargo tanks should not be hydrostatically retested. The commenter stated that a visual internal examination will reveal any problem with the lining that must be corrected. Further, the commenter pointed out that the tank car retest table in § 173.31 excepts glass, rubber, lead, or elastomeric lined tanks from periodic retest, and a similar exception should apply to cargo tanks. We agree with the commenter that for lower pressure cargo tanks, hydrostatic testing of a cargo tank which is lined or clad may not be a suitable indicator of the tank's structural integrity, particularly where the lining or cladding provides additional support to the tank. If a problem or defect in the lining or cladding exists, hydrostatic testing may cause deterioration of the tank under the lining, especially with acidic ladings. Therefore, a new Note 2 is added to the Retest and Inspection Table which contains an exception from the pressure test for uninsulated lined or clad tanks with a design pressure or MAWP less than 15 psig. These cargo tanks will be subject to the periodic lining inspection requirements. We believe that higher pressure (greater than or equal to 15 psig MAWP or design pressure) cargo tanks must be hydrostatically tested, and this requirement appears in the final rule.

Several commenters also noted that exceptions from the external and internal visual inspections which appear in the current regulations for certain

cargo tanks for which such inspection is impracticable or impossible were not included in the NPRM. These provisions were inadvertently omitted in the NPRM. Accordingly, paragraph (d), in the final rule, allows an internal visual inspection to be performed in place of the external visual inspection for cargo tanks which are insulated, and allows the pressure retest conducted in accordance with this section to be used in place of both the internal and external visual inspections when visual inspection of the cargo tank is precluded by both internal coating and external insulation, or when the cargo tank is not equipped with a manhole or inspection opening. Paragraph (e) contains an exception from the internal inspection requirements for cargo tanks not equipped with a manhole or inspection opening.

Paragraph (g) has been relaxed to allow inspectors other than Registered Inspectors to perform the pressure test. The inspector's qualification must be as prescribed in § 180.409, and the inspector must be identified to the Department in accordance with that section.

Several commenters objected to the proposed requirement in § 180.407(d)(2) to remove all spring-loaded pressure relief valves from the cargo tank for inspection and testing. These commenters pointed out that the pressure relief devices for MC 306-type cargo tanks are usually mounted in the dome cover. The removal of the dome cover on an annual basis for inspection and testing of the pressure relief valves would create unnecessary expense and downtime. Commenters recommended that the pressure relief devices be removed for inspection and testing at the time of the pressure test, which for most cargo tanks is at a 5 year interval. We believe the commenters' suggestion has merit. However, we do not believe that a 5-year frequency in removal, testing, and inspection is adequate for pressure relief devices which may be subject to corrosion damage due to the lading. Corrosion damage due to environmental elements can be detected during the annual external visual inspection. Therefore, as adopted in this final rule, pressure relief valves must be externally inspected for any corrosion or damage which might prevent safe operation, during the annual external visual inspection. Only those pressure relief valves on cargo tanks used to transport lading corrosive to the valve must be removed for testing and inspection on an annual basis. All pressure relief devices must be removed from the cargo tank for testing and inspection at the time of the pressure test.

A new provision has been added to the external visual inspection requirements in § 180.407(d)(2) to address the inspection of the gaskets on full opening rear heads. Additionally, the frequency of visual inspection of cargo tanks with full opening rear heads has been increased to once every 6 months in lieu of once each year. At the suggestion of the National Propane Gas Association (NPGA) (formerly National Liquefied Petroleum Gas Association) and several other commenters, a requirement to inspect the tank head and shell areas covered by the upper skid plate for corroded and abraded areas has been added to the visual inspection requirements. This inspection must be conducted at the time of the internal visual inspection, since we do not believe it is necessary to inspect this area on an annual basis.

The hydrostatic pressure test described in § 180.407(g) has also been modified to include only the cargo tank, less fittings, as contained in the current regulations. Additionally, in accordance with NTTC's comments, this section has been revised to clarify that owners of fewer than 5 cargo tanks have 5 years in which to pressure test their cargo tanks. As stated earlier, the requirement for removal of pressure relief valves for inspection and testing must be performed at the time of the pressure test for most cargo tanks.

Proposed paragraph (g)(4) would have required that each MC 330 and MC 331 cargo tank constructed of quenched and tempered steel, or constructed of other than quenched and tempered steel but without postweld heat treatment, used for the transportation of anhydrous ammonia, liquefied petroleum gas, or any other hazardous material that may cause stress corrosion cracking, be inspected by the wet fluorescent magnetic particle method immediately prior to and in conjunction with the pressure test. Several commenters, including the NPGA and the CGA objected to the application of the requirements to all cargo tanks used to transport liquefied petroleum gas in this requirement. These commenters stated that only "corrosive" liquefied petroleum gas transported in cargo tanks constructed of quenched and tempered steel causes stress corrosion cracking, and liquefied petroleum gas which is transported in accordance with 49 CFR is not corrosive to the tank. They further indicated that the transportation of corrosive LP gas in quenched and tempered steel cargo tanks is a compliance problem rather than a problem with existing regulations. The commenters claim that the addition of the proposed wet fluorescent magnetic particle inspection presents an unacceptable expense to those motor carriers who are currently complying with the requirements for transportation of liquefied petroleum gas.

We believe that in many cases, a load of "sour" LP gas will be transported in a cargo tank due to inadequate product testing on the part of shippers and carriers. We agree that this situation constitutes non-compliance with the current regulations, and there is insufficient data to indicate that "non-corrosive" LP gas causes stress corrosion cracking, or that "corrosive" LP gas causes stress corrosion cracking in cargo tanks constructed of other than quenched and tempered steel. Therefore, for cargo tanks transporting liquefied petroleum gas, we have limited the requirement for wet fluorescent magnetic particle inspection to cargo tanks constructed of quenched and tempered steel (Part UHT of the ASME Code). However, this includes the transportation of all liquefied petroleum gas and not only that which is considered "corrosive."

Several commenters argued that MC 330 and MC 331 cargo tanks should be excepted from the leakage test, since these tanks are effectively leak tested every refill. The requirements for the leakage test, which appear in paragraph (h), have been clarified to allow the leakage test to be evaluated with the hazardous materials lading in the tank for MC 330 and MC 331 cargo tanks

Section 180.409. Paragraph (a) of this section has been clarified to indicate that all persons performing any prescribed inspection or test must be familiar with the cargo tank and skillful in the use of the inspection and testing equipment needed. As stated earlier in this preamble under the heading "Inspection and Testing", the requirement that the person performing thickness testing be qualified in accordance with ASNT Level II for ultrasonic testing has been dropped. The person performing thickness testing must be trained in the use of the thickness testing device by the employer of the tester in accordance with the instructions of the manufacturer of the thickness testing device. Additionally, the person performing, or witnessing and certifying, the pressure test may be a Registered Inspector or an employee of the motor carrier or the owner of the cargo tank who has training and experience in conducting pressure tests in accordance with the ASME Code.

Section 180.411. Several commenters objected to the acceptability of results of tests and inspections related to cuts, digs, or gouges. The NPRM stated that no cut, dig, or gouge may be greater than 4 inches in length. Commenters stated that the length of the cut, dig, or gouge is irrelevant; the important factor being the depth of the defect. We agree that the most important factor of any cut, dig, or gouge is its depth. Accordingly, we have removed the length specification and now require that the minimum thickness remaining beneath a cut, dig, or gouge not be less than that prescribed in the applicable specification.

Several commenters argued that this section is too restrictive in that it does not allow any reduction in thickness below that prescribed in the applicable specification. These commenters pointed out that CGA TB–2, which is referenced in the repair procedures for MC 330 and MC 331 cargo tanks, allows minor defects to be removed by grinding if the wall thickness is not reduced below that shown on the data plate minus 0.010 inch. It was recommended that some tolerance be allowed for isolated areas. We have consistently held that, as stated in the current regulations at § 177.824(i) (and in § 180.407(j) herein), the cargo tank metal certification plate must be removed or made illegible if for any reason a cargo tank no longer meets the applicable specification. This includes the minimum wall thickness. Shippers and carriers were made aware of these provisions in a rule related notice titled "Carriers and Shippers—Concerning Continuing Qualification of Cargo Tanks" (48 FR 15127; April 7, 1983).

Section 180.413. Commenters objected to the proposed requirement that any repair, modification, stretching, or rebarrelling be performed in accordance with the specification in effect at the time the work is done. Commenters stated that we should require only that the work conform to the specification at the time of manufacture. In many cases, the entire cargo tank could not be brought into compliance with the new specifications. We believe that a stretching or rebarrelling constitutes a major change to the cargo tank which effectively creates a new cargo tank, and that such work must be performed in accordance with the specification requirements in effect at the time of stretching or rebarrelling. The change in the definition of "rebarrelling" from 25 to 50 percent replacement of the cargo tank wall will limit the number of changes to a cargo tank which require conformance with the current specification rather than the specification in effect at the time of manufacture. Additionally, we have made certain changes to clarify that only the parts affected by the stretching or rebarrelling need be in compliance with a new specification. "Modifications" and "repairs" may conform to the original specification or to the specification in effect at the time the work is performed.

The requirement that repairs be certified by an Authorized Inspector has been relaxed to allow certification by a Registered Inspector. Proposed paragraph (b)(vi) of § 180.413 has been changed to require repairs to MC 330 and MC 331 cargo tanks to be performed in accordance with the National Board Inspection Code's "Provisions for Repair of Pressure Vessels" instead of section VIII of the ASME Code under which the cargo tank was built. The National Board Inspection Code more specifically addresses repair.

Section 180.415. The letter "K" has been added to designate the leakage test in cargo tank markings.

Section 180.417. Paragraph (a)(3)(i) has been revised to allow testing and certification of non-ASME Code stamped cargo tanks under the direct supervision of a Registered Inspector rather than an Authorized Inspector.

Administrative Notices

A. Executive Order 12291

This final rule has been reviewed under the criteria specified in section 1(b) of Executive Order 12291 and is determined not to be a major rule. However, it is a significant rule under the regulatory procedures of the Department of Transportation (44 FR 11034). This rule does not require a Regulatory Impact Analysis, or an environmental impact statement under the National Environmental Policy Act (42 U.S.C. 4321 *et seq.*). A regulatory evaluation is available for review in the Docket.

B. Executive Order 12612

This action has been analyzed in accordance with the principles and criteria contained in Executive Order 12612, and it has been determined that the final rule does not have sufficient federalism implications to warrant the preparation of a Federalism Assessment.

C. Regulatory Flexibility Act

Based on limited information concerning the size and nature of entities likely to be affected by this rule, I certify this rule will not have a significant economic impact on a substantial number of small entities. A regulatory flexibility analysis is available for review in the docket.

D. Paperwork Reduction Act

Information collection and recordkeeping requirements contained in this amendment have been approved by the Office of Management and Budget under the provisions of 44 U.S.C. Chapter 35 and assigned control number 2137–0014.

List of Subjects

49 CFR Part 107

Practice and procedures.

49 CFR Part 171

Hazardous materials transportation, Incorporation by reference.

49 CFR Part 172

Hazardous materials transportation.

49 CFR Part 173

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

49 CFR Part 176

Hazardous materials transportation, Maritime carriers, Cargo vessels.

49 CFR Part 177

Hazardous materials transportation, Motor carriers.

49 CFR Part 178

Hazardous materials transportation, Packaging and containers.

49 CFR Part 180

Hazardous materials transportation, Packaging and containers.

In consideration of the foregoing, Title 49, Chapter I, Subchapters B and C of the Code of Federal Regulations, are amended as follows:

PART 107—HAZARDOUS MATERIALS PROGRAM PROCEDURES

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

Authority: 49 App. U.S.C. 1421(c); 49 U.S.C. 1802, 1806, 1808–1811; 49 CFR 1.45 and 1.53, and Pub. L. 89–670 (49 App. U.S.C. 1653(d), 1655).

2. The Table of Sections of Part 107 is amended by adding a new Subpart F consisting of §§ 107.501, 107.502, 107.503 and 107.504 to read as follows:

Subpart F—Registration of Cargo Tank and Cargo Tank Motor Vehicle Manufacturers and Repairers and Cargo Tank Motor Vehicle Assemblers

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107.501 Scope.
107.502 General registration requirements.
107.503 Registration statement.
107.504 Period of registration, updates, and record retention.

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3. A new Subpart F is added to read as follows:

Subpart F—Registration of Cargo Tank and Cargo Tank Motor Vehicle Manufacturers and Repairers and Cargo Tank Motor Vehicle Assemblers

§ 107.501 Scope.

This subpart establishes registration procedures for persons who are engaged in the manufacture, certification, inspection or repair of a cargo tank or a cargo tank motor vehicle manufactured in accordance with a DOT specification under subchapter C of this chapter or under the terms of an exemption issued under this part.

§ 107.502 General registration requirements.

(a) No person may engage in the manufacture, assembly, certification, inspection or repair of a cargo tank or cargo tank motor vehicle manufactured under the terms of a DOT specification under subchapter C of this chapter or an exemption issued under this part unless the person is registered with the Department in accordance with the provisions of this subpart. A person employed as an inspector or design certifying engineer is considered to be registered if the person's employer is registered.

(b) A person who performs functions which are subject to the provisions of this subpart may perform only those functions which have been identified to the Department in accordance with the procedures of this subpart.

(c) Registration statements must be in English, contain all of the information required by this subpart, and be submitted to: Approvals Branch, Office of Hazardous Materials Transportation, Attn: DHM-32, Research and Special Programs Administration, Department of Transportation, Washington, DC 20590.

(d) Upon determination that a registration statement contains all the information required by this subpart, the Department will send the registrant a letter confirming receipt of the registration application and assigning a registration number to that person. A separate registration number will be assigned for each cargo tank manufacturing, assembly, repair facility or other place of business identified by the registrant.

(e) *Definitions.* Definitions for the terms "Authorized Inspector," "cargo tank," "cargo tank motor vehicle," "design certifying engineer," "person," and "Registered inspector" are set forth in § 171.8 of this chapter. Definitions for the terms "design type" and "manufacturer" are set forth in § 178.320, and the term "repair" in § 180.403 of this chapter.

§ 107.503 Registration statement.

(a) Each registration statement must contain the following:

(1) Name;

(2) Street address, mailing address and telephone number for each facility or place of business;

(3) A statement signed by the person responsible for compliance with the applicable requirements of this chapter, certifying knowledge of those requirements and that each employee who is an inspector or design certifying engineer meets the minimal qualification requirements set forth in § 171.8 of this chapter for "registered inspector" or "design certifying engineer", respectively. For an organization, the certification must be signed by an official;

(4) A description of the specific functions to be performed, e.g., manufacture or repair of cargo tanks, assembly of cargo tanks to cargo tank motor vehicles, inspection and testing, design or cargo tank certification, etc. For inspection and testing, identify the specific types of inspections and tests;

(5) An identification of the types of DOT specification and exemption cargo tanks or cargo tank motor vehicles which the registrant intends to manufacture, assemble, repair, inspect, test or certify;

(6) A statement indicating whether the registrant employs inspectors or design certifying engineers to conduct certification, inspection or testing functions addressed by this subpart. If a disinterested party is used, the name, address and registration number of that party; and

(7) If the registrant is not a resident of the United States, the name and address of a permanent resident of the United States designated in accordance with § 107.7 to serve as agent for service of process.

(b) In addition to the information required under paragraph (a) of this section, each person who manufactures or assembles a cargo tank or cargo tank motor vehicle must submit a copy of the manufacturer's current ASME Certificate of Authorization for the use of the ASME "U" stamp. This requirement does not apply to an assembler who performs no welding on a cargo tank wall.

(c) In addition to the information required under paragraph (a) of this section, each person who repairs a cargo tank or cargo tank motor vehicle must submit a copy of the repair facility's current National Board Certificate of Authorization for the use of the "R" stamp or ASME Certificate of Authorization for the use of the ASME "U" stamp.

§ 107.504 Period of registration, updates, and record retention.

(a) Registration will be for a maximum of three years from the date of the original submission.

(b) Any correspondence with the Department must contain the registrant's name and registration number.

(c) A registration must be renewed every three years or within thirty days of reissuance of an ASME or National Board Certification, whichever occurs first, by submitting an up-to-date registration statement containing the information prescribed by § 107.503.

(d) A registrant shall provide written notification to the Department within thirty days of any of the following occurrences:

(1) Any change in the registration information submitted under § 107.503;

(2) Replacement of the person responsible for compliance with the requirements in § 107.503(a)(3). If this occurs, the registrant shall resubmit the required certification;

(3) Loss of ASME or National Board Certificate of Authorization;

or

(4) A change in function: such as, from assembly to manufacture, an addition of a function, or a change to the types of inspections, tests or certifications of cargo tanks or cargo tank motor vehicles.

(e) Each registrant shall maintain a current copy of the registration information submitted to the Department and a current copy of the registration number identification received from the Department at the location identified in § 107.503(a)(2) during such time the person is registered with the Department and for two years thereafter.

PART 171—GENERAL INFORMATION, REGULATIONS, AND DEFINITIONS

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

Authority: 49 App. U.S.C. 1802, 1803, 1804, and 1808; 49 CFR Part 1.

5. In § 171.2, paragraph (e) is added to read as follows:

§ 171.2 General requirements.

* * * * *

(e) When a person performs a function covered by or having an effect on a specification prescribed in Part 178, 179 or 180 of this subchapter, an approval issued under this subchapter, or an exemption issued under Subpart B of this chapter, that person must perform the function in accordance with that specification, approval, or exemption, as appropriate.

6. In § 171.7, paragraphs (c)(33), (c)(34), (d)(29) and (d)(30) are added to read as follows:

§ 171.7 Matter incorporated by reference.

* * * * *

(c) * * *

(33) TTMA: Truck Trailer Manufacturers Association, 1020 Princess Street, Alexandria, Virginia 22314.

(34) National Board: National Board of Boiler and Pressure Vessel Inspectors, 1055 Crupper Avenue, Columbus, Ohio 43229.

(d) * * *

(29) National Board Inspection Code is titled "National Board Inspection Code, A Manual for Boiler and Pressure Vessel Inspectors" NB–23, Rev. 4, 1983 edition.

(30) Truck Trailer Manufacturers Association:

(i) TTMA RP No. 81 is titled "Performance of Spring Loaded Pressure Relief Valves on MC 306, MC 307, and MC 312 Tanks," May 24, 1989 edition.

(ii) TTMA TB No. 107 is titled "Procedure for Testing Inservice, Unmarked, and/or Uncertified MC 306 Type Cargo Tank Manhole Covers," May 24, 1989 edition.

* * * * *

7. In § 171.8, the definition of "cargo tank" is revised and definitions for "Authorized Inspector," "Authorized Inspection Agency," "Cargo tank motor vehicle," "Design certifying engineer," "Maximum Allowable Working Pressure or MAWP," and "Registered Inspector" are added in alphabetical sequence to read as follows:

§ 171.8 Definitions and abbreviations.

* * * * *

"Authorized Inspector" means an Inspector who is currently commissioned by the National Board of Boiler and Pressure Vessel Inspectors and employed as an Inspector by an Authorized Inspection Agency.

"Authorized Inspection Agency" means: (1) A jurisdiction which has adopted and administers one or more sections of the ASME Boiler and Pressure Vessel Code as a legal requirement and has a representative serving as a member of the ASME Conference Committee; or (2) an insurance company which has been licensed or registered by the appropriate authority of a State of the United States or a Province of Canada to underwrite boiler and pressure vessel insurance in such State or Province.

* * * * *

"Cargo tank" means a bulk packaging which—(1) Is a tank (including the appurtenances, reinforcements, fittings and closures) intended for the carriage of liquids or gases (For "tank", see §§ 178.345–1(c), 178.337–1, or 178.338–1), as applicable;

(2) Is permanently attached to or forms a part of a motor vehicle, or is not permanently attached to a motor vehicle but which by reason of its size, construction or attachment to a motor vehicle is loaded or unloaded without being removed from the motor vehicle; and

(3) Is not fabricated under a specification for cylinders, portable tanks, tank cars or multi-unit tank car tanks.

"Cargo tank motor vehicle" means a motor vehicle with one or more cargo tanks permanently attached to or forming an integral part of the motor vehicle.

* * * * *

"Design certifying engineer" means a person registered with the Department in accordance with Part 107, Subpart F of this chapter who is an Authorized Inspector and has the knowledge and ability to determine if a cargo tank design meets the applicable DOT specification, or a person other than an Authorized Inspector who has this ability, at least one year of work experience in structural or mechanical design and an engineering degree (such as a professional engineer registered by the appropriate authority of a State of the United States or a Province of Canada).

* * * * *

"Maximum Allowable Working Pressure" or "MAWP" For DOT specification cargo tanks used to transport liquid hazardous materials, see § 178.345–1(k).

* * * * *

"Registered Inspector" means a person registered with the Department in accordance with Part 107, Subpart F of this chapter who is an Authorized Inspector who has the knowledge and ability to determine if a cargo tank conforms with the applicable DOT specification, or a person other than an Authorized Inspector who has this ability and, at a minimum, the following work experience, in cargo tank construction or repair, and education: one year of work experience and an engineering degree, two years of work experience and an associate degree in engineering, or three years of work experience and a high school diploma.

* * * * *

PART 172—HAZARDOUS MATERIALS TABLES AND HAZARDOUS MATERIALS COMMUNICATIONS REGULATIONS

8. The authority citation for Part 172 continues to read as follows:

Authority: 49 App. U.S.C. 1803, 1804, 1805, 1808; 49 CFR Part 1.

§ 172.203 [Amended]

9. In § 172.203, paragraph (h)(1)(i) is amended by removing the reference "§ 173.315(a)(1), Note 14" and inserting in its place the reference "§ 173.315(a), Note 15" and paragraph (h)(2)(i) is amended by removing the reference "§ 173.315(a)(1), Note 15" and inserting in its place the reference "§ 173.315(a), Note 15".

PART 173—SHIPPERS—GENERAL REQUIREMENTS FOR SHIPMENTS AND PACKAGINGS

10. The authority citation for Part 173 continues to read as follows:

Authority: 49 U.S.C 1803, 1804, 1805, 1806, 1807, 1808; 49 CFR Part 1, unless otherwise noted.

11. Part 173, Subpart B of the Table of Sections is amended by revising the entry for § 173.33 to read as follows:

Subpart B—Preparation of Hazardous Materials for Transportation.

Sec.

* * * * *

173.33 Hazardous materials in cargo tank motor vehicles.

* * * * *

12. In § 173.22, the introductory text to paragraph (a)(2) is revised and paragraph (b) is removed and reserved to read as follows:

§ 173.22 Shipper's responsibility.

(a) * * *

(2) The person shall determine that the packaging or container is an authorized packaging, including all special requirements, and that the packaging has been manufactured, assembled, and marked in accordance with the following:

* * * * *

(b) [Reserved]

* * * * *

13. Section 173.33 is revised to read as follows:

§ 173.33 Hazardous materials in cargo tank motor vehicles.

(a) *General requirements.* (1) No person may offer or accept a hazardous material for transportation in a cargo tank motor vehicle except as authorized by this subchapter.

(2) Two or more materials may not be loaded or accepted for transportation in the same cargo tank motor vehicle if, as a result of any mixture of the materials, an unsafe condition would occur, such as an explosion, fire, excessive increase in pressure or heat, or the release of toxic vapors.

(3) A cargo tank motor vehicle for which the prescribed periodic retest or reinspection under Subpart E of Part 180 of this subchapter is past due may not be filled and offered for transportation until the retest or inspection has been successfully completed.

(b) *Loading requirements.* (1) A hazardous material may not be loaded in a cargo tank if during transportation any part of the tank in contact with the hazardous material lading would have a dangerous reaction with the hazardous material.

(2) A cargo tank may not be loaded with a hazardous material that will have an adverse effect on the tank's integrity or—

(i) May combine chemically with any residue or contaminants in the tank to produce an explosion, fire, excessive increase in pressure, release of toxic vapors or other unsafe condition.

(ii) Due to its density, exceeds the maximum weight of lading marked on the specification plate.

(iii) Is at a temperature outside of the design temperature range specified on the tank specification plate.

(iv) May severely corrode or react with the tank material at any concentration and temperature that will exist during transportation.

(v) Is prohibited by § 173.21 or 173.24 of this subchapter.

(3) Air pressure may not be used to load or unload any lading if it may create an air-enriched mixture within the flammability range of the lading in the vapor space of the tank.

(4) The loading or unloading rate used must be less than or equal to that indicated on the cargo tank specification plate, except as specified in § 173.318(b)(6). If no loading or unloading rate is marked on the specification plate, the loading or unloading rate and pressure used must be limited such that the pressure in the tank may not exceed 130% of the MAWP.

(c) *Maximum Loding Pressure.* (1) Prior to filling and offering a cargo tank motor vehicle for transportation, the person must confirm that the cargo tank motor vehicle conforms to the specification required for the lading and that the MAWP of the cargo tank is greater than or equal to the largest pressure obtained under the following conditions:

(i) For compressed gases and certain refrigerated liquids that are not cryogenic liquids, the pressure prescribed in § 173.315 of this subchapter.

(ii) For cryogenic liquids, the pressure prescribed in § 173.318 of this subchapter.

(iii) For liquid hazardous materials shipped in DOT specification cargo tanks equipped with a 1 psig normal vent, the sum of the tank static head plus 1 psig. In addition, for hazardous materials shipped in these cargo tanks, the vapor pressure of the lading at 115 °F. must be not greater than 1 psig, except for gasoline transported in accordance with § 173.119(a)(17)(iii).

(iv) For liquid hazardous materials not covered in paragraph (c)(1)(i), (ii), or (iii) of this section, the sum of the vapor pressure of the lading at 115 °F, plus the tank static head exerted by the lading, plus any pressure exerted by the gas padding, including air in the ullage space or dome.

(v) The pressure prescribed in Subpart B, D, E, F, G, or H of this part, as applicable.

(vi) The maximum pressure used to load or unload the lading.

(2) Any Specification MC 300, MC 301, MC 302, MC 303, MC 305, MC 306 or MC 312 cargo tank motor vehicle with no marked design pressure or marked with a design pressure of 2.65 psig or less may be used for an authorized lading where the largest pressure derived from § 173.33(c) or § 178.345–1(k) of this subchapter is less than or equal to 2.65 psig. These cargo tanks must be marked or remarked with an MAWP or design pressure in accordance with § 180.405(k).

(3) Any Specification MC 310 or MC 311 cargo tank motor vehicle may be used for an authorized lading where the largest pressure derived from § 173.33(c) or § 178.345–1(k) of this subchapter is less than or equal to the MAWP or MWP, respectively, as marked on the specification plate.

(4) Any cargo tank manufactured prior to December 12, 1989, marked with a design pressure rather than an MAWP may be used for an authorized lading where the largest pressure derived from § 173.33(c) is less than or equal to the design pressure marked on the cargo tank.

(5) Any material that meets the definition of a Poison B material must be shipped in a cargo tank motor vehicle having a MAWP of 25 psig or greater.

(d) *Relief system.* (1) A non-reclosing pressure relief device, except when installed in series with a reclosing pressure relief valve, may not be fitted in a cargo tank used to transport hazardous materials. However, a cargo tank constructed before December 12, 1989, that is fitted with one or more non-reclosing pressure relief devices installed parallel to one or more reclosing pressure relief valves may continue to be used in hazardous material service for which the cargo tank was authorized on December 12, 1989. The requirements in this paragraph do not apply to MC 338 cargo tank motor vehicles transporting a cryogenic liquid or to MC 330, MC 331 and MC 338 cargo tank motor vehicles transporting a material described in part as a refrigerated liquid in § 172.101 of this subchapter.

(2) Each cargo tank used to transport a liquid hazardous material in its gaseous state must have a pressure relief system that provides the venting capacity prescribed in § 178.345–10(e) of this subchapter.

(3) A cargo tank made to a specification listed in column 1 may be upgraded or have the relief devices or outlets modified to meet the applicable requirement for the specification listed in column 2 without changing the markings on the tank specification plate.

Column 1	Column 2
MC 300, MC 301, MC 302, MC 303, MC 305.	MC 306 or DOT 406.
MC 306	DOT 406.
MC 304	MC 307 or DOT 407.
MC 307	DOT 407.
MC 310, MC 311	MC 312 or DOT 412.
MC 312	DOT 412.
MC 330	MC 331.

(e) *Fuel metered for road fuel tax purposes.* Notwithstanding the requirements in § 178.345–8(a), specification cargo tanks without

bottom damage protection devices, used for the transportation of fuel metered for road fuel tax purposes may be transported with bottom product filling/discharge piping filled with such fuels, provided that:

(1) Each internal self-closing stop valve is provided with a sacrificial device (see § 178.345-1), such as a shear section, located in the piping system outboard of the stop valve;

(2) The inside diameter of any piping does not exceed 4½ inches; and

(3) The aggregate volume of all piping on the cargo tank motor vehicle does not exceed 50 gallons.

14. In § 173.119, paragraphs (m)(11) and (m)(12) are removed and reserved; the introductory text of paragraphs (a) and (b), and paragraphs (a)(17), (b)(1), (e)(3), and (m)(10) are revised to read as follows:

§ 173.119 Flammable liquids not specifically provided for.

(a) *Flammable liquids with flash point of 20 °F. or below.* Flammable liquids with flash points of 20 °F., or below and having a vapor pressure (Reid [1] test) not over 16 psia, at 100 °F., other than those for which special requirements are prescribed in this Part, must be offered for transportation in DOT specification packagings constructed of materials that will not react dangerously with or be decomposed by the chemical packed therein as required in the following paragraphs (see paragraphs (c) to (i) of this section for high pressure liquids, paragraphs (j) to (l) of this section for viscous liquids, and paragraph (m) of this section for flammable liquids which are also oxidizers, radioactive material, corrosive liquids, poison B liquids, or organic peroxides and § 173.134 for flammable liquids that are also pyroforic liquids):

* * * * *

(17) Specification MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, MC 312, DOT 406, DOT 407, DOT 412 MC 330, or MC 331 (§§ 178.345, 178.346, 178.347, 178.348, 178.337 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) Each cargo tank is equipped with a pressure relief system meeting the requirements in § 178.346-10 or § 178.347-10 of this subchapter, except that pressure relief devices on Specification MC 330 and MC 331 cargo tanks must meet the requirements in § 178.337-9 of this subchapter.

(ii) Bottom outlets of the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345-11 of this subchapter, except that bottom outlets on Specification MC 330 and MC 331 cargo tanks must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337-11(a) of this subchapter. (See § 173.33(b)(3) for limitations on the use of air pressure unloading.)

(iii) MC 300, MC 301, MC 302, MC 303, MC 305, MC 306, and DOT 406 cargo tanks equipped with a 1 psig normal vent used to transport gasoline are subject to the following requirements. Based on the volatility class determined by using ASTM D439 and the Reid vapor pressure (RVP) of the particular gasoline, the maximum lading pressure and maximum ambient temperature permitted during the loading of gasoline may not exceed that listed in Table I.

TABLE I.— MAXIMUM AMBIENT TEMPERATURE—GASOLINE

ASTM D439 volatility class	Maximum lading and ambient temperature (see note 1)
A (RVP < = 9.0 psia)	131 °F
B (RVP < = 10.0 psia)	124 °F
C (RVP < = 11.5 psia)	116 °F
D (RVP < = 13.5 psia)	107 °F
E (RVP < = 15.0 psia)	100 °F

NOTE 1: Based on maximum lading pressure of 1 psig at top of cargo tank.

* * * * *

(b) Flammable liquids with flash points above 20 °F. to 73 °F. Flammable liquids with flash points above 20 °F. to 73 °F. having vapor pressure (Reid [1] test) not over 16 psia at 100 °F., other than those for which special requirements are prescribed in this Part, must be offered for transportation in DOT specification packagings constructed of materials that will not react dangerously with or be decomposed by the chemical packed therein, as follows (see paragraphs (c) through (i) of this section for high-pressure liquids and paragraph (m) of this section for flammable liquids which are also oxidizers, poison B liquids, organic peroxides or corrosive liquids):

(1) Packagings as prescribed in paragraph (a) of this section. Openings greater than 2.3 inches in diameter in barrels and drums are authorized when permitted by the specification.

* * * * *

(e) * * *

(3) Specification MC 304, MC 307, MC 310, MC 311, MC 312, DOT 407, DOT 412, MC 330 or MC 331 (§§ 178.345, 178.347, 178.348, 178.337 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The design pressure or MAWP of the cargo tank is at least 25 psig.

(ii) Each cargo tank is equipped with a pressure relief system meeting the requirements in § 178.347-10 of this subchapter, except that pressure relief devices on Specification MC 330 and MC 331 cargo tanks must meet the requirements in § 178.337-9 of this subchapter.

(iii) Bottom outlets on the cargo tank are equipped with self-closing stop-valves meeting the requirements in § 178.345-11 of this subchapter, except that bottom outlets on Specification MC 330 and MC 331 cargo tanks must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337-11(a) of this subchapter.

* * * * *

(m) * * *

(10) Specification MC 304, MC 307, MC 310, MC 311, MC 312, DOT 407, DOT 412, MC 330 or MC 331 (§§ 178.345, 178.347, 178.348, 178.337 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank may not be used to transport a flammable liquid which is also an organic peroxide, oxidizer or radioactive material.

(ii) Any cargo tank used to transport a flammable liquid that is also a poison B material has a design pressure or MAWP of at least 25 psig.

(iii) Any cargo tank used to transport a flammable liquid that is also a corrosive liquid, except Specification MC 330 or MC 331 cargo tanks, meets the corrosion protection requirements in § 178.345-2(c) of this subchapter.

(iv) Each cargo tank is equipped with a pressure relief system meeting the requirements in § 178.347-10 of this subchapter, except that pressure relief devices on Specification MC 330 and MC 331 cargo tanks must meet the requirements in § 178.337-9 of this subchapter.

(v) Bottom outlets on the cargo tank are equipped with self-closing stop-valves meeting the requirements in § 178.345-11 of this subchapter, except that bottom outlets on Specification MC 330 and MC 331 cargo tanks must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337-11(a) of this subchapter.

(11)-(12) [Reserved]

* * * * *

15. In § 173.123, paragraph (a)(6) is revised to read as follows:

§ 173.123 Ethyl chloride.

(a) * * *

[1] ASTM Test D323

(6) Specification MC 330 or MC 331 178.337 of this subchapter) cargo tank otor vehicle, with bottom outlets equipped with internal self-closing stop-valves meeting the requirements in § 178.337–11(a) of this subchapter.

* * * * *

16. In § 173.131, paragraphs (a) introductory text and (a)(2) are revised to read as follows:

§ 173.131 Road asphalt, or tar, liquid.

(a) Road asphalt, or tar, liquid must be packed in packagings as follows:

* * * * *

(2) A nonspecification cargo tank motor vehicle that is at least equivalent in design and construction to a Specification MC 306 or DOT 406 (§§ 178.345, 178.346 of this subchapter) cargo tank motor vehicle, except for the requirements in §§ 178.345–8 (c) and (d), 178.345–14, 178.345–15, 178.346–5, 178.346–10, and 178.346–11 of this subchapter (or the certification, manhole, venting, and emergency flow control requirements of the MC 306 cargo tank specification).

* * * * *

17. In § 173.134, paragraph (a)(6) is revised to read as follows:

*** 173.134 Pyroforic liquids, n.o.s.**

a) * * *

(6) Specification MC 330 or MC 331 (§ 178.337 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The design pressure of the cargo tank is at least 175 psig.

(ii) Each pressure relief device has direct communication with the vapor space in the tank when fully loaded.

(iii) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.337–11(a) of this subchapter.

18. In § 173.135, paragraph (a)(9) is revised to read as follows:

§ 173.135 Diethyl dichlorosilane, dimethyl dichlorosilane, ethyl dichlorosilane, ethyl trichlorosilane, methyl trichlorosilane, trimethyl chlorosilane, and vinyl trichlorosilane.

(a) * * *

(9) Specification MC 304, MC 307, DOT 407, MC 330 or MC 331 (§§ 178.345, 178.347, 178.337 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank is fabricated from steel or stainless steel.

(ii) The design pressure or MAWP of the cargo tank is as prescribed in 78.345–1 of this subchapter.

ii) The cargo tank, except ecification MC 330 and MC 331 cargo tanks, meets the corrosion protection requirements in §§ 178.345–2(c) of this subchapter.

(iv) The cargo tank is equipped with a pressure relief system meeting the requirements in 178.347–10 of this subchapter, except that pressure relief devices on Specification MC 330 and MC 331 cargo tanks must meet the requirements in § 178.337–9 of this subchapter.

(v) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter, except that bottom outlets on Specification MC 330 and MC 331 cargo tanks must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337–11(a) of this subchapter.

* * * * *

19. In § 173.136, paragraph (a)(8) is revised to read as follows:

§ 173.136 Methyl dichlorosilane and trichlorosilane.

(a) * * *

(8) Specification MC 330 or MC 331 (§ 178.337 of this subchapter) cargo tank motor vehicle. Bottom outlets must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337–11(a) of this subchapter.

* * * * *

20. In § 173.141, paragraph (a)(8) is revised to read as follows:

§ 173.141 Amyl mercaptan, butyl mercaptan, ethyl mercaptan, isopropyl mercaptan, propyl mercaptan, and aliphatic mercaptan mixtures.

(a) * * *

(8) Specification MC 330 or MC 331 (§ 178.337 of this subchapter) cargo tank motor vehicle. Bottom outlets must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337–11(a) of this subchaprer.

* * * * *

21. In § 173.145, paragraph (a)(7) is revised to read as follows:

§ 173.145 Dimethylhydrazine, unsymmetrical, and methylhydrazine.

(a) * * *

(7) Specification MC 304, MC 307, MC 310, MC 311, MC 312, DOT 407, DOT 412, MC 330 or MC 331 (§§ 178.345, 178.347, 178.348, 178.337 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank is fabricated from steel or stainless steel.

(ii) The tank is equipped with steel pressure relief valves meeting the requirements in § 178.347–10 of this subchapter.

(iii) The cargo tank meets the corrosion protection requirements in § 178.345–2(c) or § 178.347 of this subchapter.

(iv) The cargo tank has no bottom outlets.

(v) The design pressure or MAWP of the cargo tank is at least 25 psig.

* * * * *

22. In § 173.148, paragraph (a)(3) is revised to read as follows:

§ 173.148 Monoethylamine.

(a) * * *

(3) Any cargo tank motor vehicle prescribed in § 173.119(e)(3).

* * * * *

23. In § 173.154, paragraph (a)(18) is removed and reserved; and paragraph (a)(4) is revised to read as follows:

§ 173.154 Flammable solids, organic peroxide solids and oxidizers not specifically provided for.

(a) * * *

(4) Specification MC 303, MC 304, MC 306, MC 307, MC 310, MC 311, MC 312, DOT 406, DOT 407, DOT 412, MC 330 or MC 331 (§§ 178.345, 178.348, 178.347, 178.348, 178.337 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) Cargo tanks are authorized only for—

(A) Sodium perchlorate or magnesium perchlorate, wet, with 10 percent or more water, equally distributed within the cargo tank;

(B) Potassium nitrate solutions, except that MC 306 cargo tanks are not authorized; or

(C) Ammonium nitrate with 15 percent of more water in solution at a maximum temperature of 240 °F., except that transportation by vessel in uninsulated tanks and MC 303, MC 306, MC 310 and DOT 406 cargo tank motor vehicles is not authorized.

(iii) Bottom outlets on the cargo tank are equipped with stop-valves meeting the requirements in § 178.345–11 of this subchapter, except that bottom outlets on Specification MC 330 and MC 331 cargo tanks must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337–11(a) of this subchapter.

(iv) Only a Specification MC 304, MC 307 or DOT 407 cargo tank motor vehicle is authorized for transportation by vessel.

(v) A cargo tank may have heating coils if an inorganic heating medium is used.

(vi) Each MC 310, MC 311, MC 312, or DOT 412 cargo tank is equipped with pressure relief devices meeting the requirements in § 178.347–10 of this subchapter.

* * * * *

(18) [Reserved]

* * * * *

24. In § 173.190, paragraph (b)(4) is revised to read as follows:

§ 173.190 Phosphorus, white or yellow.

* * * * *

(b) * * *

(4) Specification MC 304, MC 307, MC 310, MC 311, MC 312, DOT 407, DOT 412, MC 330 or MC 331 (§§ 178.337, 178.345, 178.347, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The lading is completely immersed in water or completely blanketed with an inert gas. The loading temperature may not exceed 140 °F.

(ii) The cargo tank has foam or equivalent insulation at least 4 inches thick, or at least 2 inches thick if the tank is equipped with an exterior heating jacket. The cargo tank has no interior heating coils.

(iii) The cargo tank has no bottom outlets.

(iv) Each cargo tank is equipped with pressure relief devices meeting the requirements in § 178.347–10 of this subchapter.

(v) An empty cargo tank motor vehicle may not be offered for transportation unless the tank is cleaned, or is filled to capacity with water having a temperature not exceeding 140 °F.

* * * * *

25. In § 173.206, paragraph (c)(3) is revised to read as follows:

§ 173.206 Sodium or potassium, metallic; sodium amide; sodium potassium alloys; sodium aluminum hydride; lithium metal; lithium silicon, lithium ferro silicon; lithium hydride; lithium borohydride; lithium aluminum hydride; lithium acetylide-ethylene diamine complex; aluminum hydride; cesium metal; rubidium metal; zirconium hydride, powdered.

* * * * *

(c) * * *

(3) Specification MC 330 or MC 331 (§ 178.337 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The material is in a molten condition when loaded and solidified before being moved over a public highway.

(ii) The outage is 5 percent or more at a sodium temperature of 208 °F.

(iii) The design pressure of the cargo tank is at least 150 psig.

(iv) The tank is equipped with exterior heating coils fusion-welded to the tank shell and properly stressed relieved.

(v) The cargo tank is equipped with pressure relief devices meeting the requirements in § 178.337.9 of this subchapter.

(vi) The cargo tank has no bottom outlets.

* * * * *

26. In § 173.224, paragraph (a)(4) is revised to read as follows:

§ 173.224 Cumene hydroperoxide, dicumyl peroxide, diisopropylbenzene hydroperoxide, paramenthane hydroperoxide, pinane hydroperoxide, and tertiary butylisopropyl benzene hydroperoxide.

(a) * * *

(4) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) Cargo tanks are authorized only for—

(A) Diisopropylbenzene hydroperoxide not over 60 percent strength in a nonvolatile solvent;

(B) Paramenthane hydroperoxide not over 60 percent strength in a nonvolatile solvent;

(C) Pinane hydroperoxide not over 45 percent strength in a nonvolatile solvent; or

(D) Cumene hydroperoxide not over 90 percent strength in a nonvolatile solvent, except that specification MC 310 cargo tanks are not authorized.

(iii) The cargo tank has no bottom outlets.

(iv) The pressure relief system on the cargo tank meets the requirements in § 178.347–10 of this subchapter.

* * * * *

27. In § 173.245, paragraphs (a)(30) and (a)(31) are removed and reserved; paragraph (a)(29) is revised to read as follows:

§ 173.245 Corrosive liquids not specifically provided for.

(a) * * *

(29) Specification MC 303, MC 304, MC 306, MC 307, MC 310, MC 311, MC 312, DOT 407 or DOT 412 (§§ 178.345, 173.346, 178.347, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) A Specification MC 303 or MC 306 cargo tank fabricated from Type 316 stainless steel not less than 0.100 inch thick is authorized only for monoethanolamine, *primary amyl alcohol*, phosphoric acid, and solutions thereof.

(ii) A Specification MC 306 cargo tank fabricated of aluminum is authorized only for monoethanolamine and *primary amyl alcohol*.

(iii) The cargo tank meets the corrosion protection requirements in § 178.345.2(c) of this subchapter.

(iv) Bottom outlets on the cargo tank are equipped with self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

(30)–(31) [Reserved]

* * * * *

28. In § 173.247 paragraph (a)(12) is revised to read as follows:

§ 173.247 Acetyl bromide; acetyl chloride; acetyl iodide; antimony pentachloride; benzoyl chloride; boron trifluoride acetic acid complex; chromyl chloride; dichloroacetyl chloride; diphenylmethyl bromide solutions; pyrosulfuryl chloride; silicon chloride; sulfur chloride (mono and di); sulfuryl chloride; thionyl chloride; tin tetrachloride (anhydrous); titanium tetrachloride; trimethyl acetyl chloride.

(a) * * *

(12) Specification MC 310, MC 311, MC 312, DOT 412, MC 330, or MC 331 (§§ 178.345, 178.348, 178.337 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank meets the corrosion protection requirements in § 178.345–2(c) of this subchapter.

(ii) Bottom outlets on the cargo tank are equipped with stop-valves meeting the requirements in § 178.345–11 of this subchapter, except that bottom outlets on Specification MC 330 and MC 331 cargo tanks must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337–11(a) of this subchapter.

(iii) The cargo tank is not made of aluminum.

* * * * *

29. In § 173.247a, paragraph (a)(3) is revised to read as follows:

§ 173.247a Vanadium tetrachloride and vanadium oxytrichloride.

(a) * * *

(3) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tanks are authorized only for vanadium oxytrichloride padded with an inert non-soluble gas adequate to exclude the presence of air.

(ii) The cargo tank meets the corrosion protection requirements in § 178.345–2(c) of this subchapter.

(iii) Bottom outlets on the cargo tank are equipped with stop-valves meeting the requirements in § 178.345–11 of this subchapter.

(iv) The tank is not authorized for transportation by vessel.

(v) The cargo tank is not made of aluminum.

* * * * *

30. In § 173.248, paragraph (a)(6) is revised to read as follows:

§ 173.248 Spent sulfuric acid, or spent mixed acid.

(a) * * *

(6) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, if—

(i) The cargo tank meets the corrosion protection requirements in § 178.345–2(c) of this subchapter.

(ii) Bottom outlets on the cargo tank are equipped with stop valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

31. In § 173.249, paragraphs (a)(1) and (a)(6) are revised to read as follows:

§ 173.249 Alkaline corrosive liquids, n.o.s.; alkaline liquids, n.o.s.; alkaline corrosive battery fluid; potassium fluoride solution; potassium hydrogen fluoride solution; sodium aluminate, liquid; sodium hydroxide solution; potassium hydroxide solution.

(a) * * *

(1) In packagings prescribed in § 173.245, except § 173.245(a)(29).

* * * * *

(6) Specification MC 303, MC 304, MC 306, MC 307, MC 310, MC 311, MC 312, DOT 407, DOT 412 (§§ 178.345, 178.347, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) A Specification MC 303 cargo tank—

(A) Is fabricated from steel or stainless steel;

(B) When fabricated of steel, is authorized only for alkaline corrosive liquid, n.o.s., and alkaline liquid, n.o.s.; and

(C) Is not authorized for transportation by vessel.

(ii) The cargo tank meets the corrosion protection requirements in § 178.345–2(c) of this subchapter.

(iii) A Specification MC 306 cargo tank is fabricated from Type 316 stainless steel of not less than 0.100 inch thick.

(iv) Bottom outlets on the cargo tank are equipped with self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

32. In § 173.249a, paragraph (d)(1) is revised and a new paragraph (d)(8) is added to read as follows:

§ 173.249a Cleaning compound, liquid; coal tar dye, liquid; dye intermediate, liquid; mining reagent, liquid; and textile treating compound mixture, liquid.

(d) * * *

(1) In specification packaging as prescribed in § 173.245, except § 173.245 (a)(29).

* * * * *

(8) Specification MC 303, MC 304, MC 306, MC 307, MC 310, MC 311, MC 312, DOT 407 or DOT 412 (§§ 178.345, 178.347, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) Each cargo tank meets the corrosion protection requirements in § 178.345–2(c) of this subchapter.

(ii) A Specification MC 303 cargo tank is made from steel or stainless steel. The cargo tank is not authorized for transportation by vessel.

(iii) A Specification MC 306 cargo tank is fabricated from Type 316 stainless steel of not less than 0.100 inch thick. The cargo tank is not authorized for transportation by cargo vessel.

(iv) Bottom outlets on the cargo tank are equipped with self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

33. In § 173.250a, paragraphs (a)(1) and (a)(2) are revised to read as follows:

§ 173.250a Benzene phosphorus dichloride and benzene phosphorus thiodichloride.

(a) * * *

(1) In specification packagings prescribed in § 173.245, except § 173.245(a)(29), which are made of or lined with materials compatible with the lading.

(2) Specification MC 304, MC 307, MC 310, MC 311, MC 312, DOT 407 or DOT 412 (§§ 178.345, 178.347, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank meets the corrosion protection requirements in § 178.345–2(c) of this subchapter.

(ii) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

34. In § 173.252, paragraph (a)(4) is revised to read as follows:

§ 173.252 Bromine.

(a) * * *

(4) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The total volume of bromine loaded into the cargo tank is at least 88 percent and not more than 96 percent of the volume of the tank.

(ii) The tank shell and heads are at least 3/8 inch thick, excluding lining, cladding or corrosion allowance.

(iii) The tank is of ASTM A–265 material having a nickel cladding material on the inside surface comprising at least 20 percent of the total minimum thickness, or steel at least 3/8 inch thick lined with lead at least 3/16 inch thick. The cladding material must meet the requirements in ASTM B–162. The composite plate must meet the requirements in ASTM A–265.

(iv) The cargo tank meets the corrosion protection requirements in § 178.345–2(c) of this subchapter.

(v) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

35. In § 173.253, paragraph (a)(6) is revised to read as follows:

§ 173.253 Chloroacetyl chloride.

(a) * * *

(6) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank is fabricated from at least 99 percent nickel, or Type 316 stainless steel.

(ii) The cargo tank meets the corrosion protection requirements in § 178.345–2(c) of this subchapter.

(iii) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

36. In § 173.254, paragraph (a)(5) is revised to read as follows:

§ 173.254 Chlorosulfonic acid and mixtures of chlorosulfonic acid- sulfur trioxide.

(a) * * *

(5) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank meets the corrosion protection requirements in § 178.345–2(c) of this subchapter.

(ii) Bottom outlets on the cargo tank are equipped with self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

37. In § 173.255, paragraph (a)(5) is revised to read as follows:

§ 173.255 Dimethyl sulfate.

(a) * * *

(5) Cargo tank motor vehicles as prescribed in § 173.254(a)(5).

* * * * *

38. In § 173.257, paragraph (a)(4) is revised to read as follows:

§ 173.257 Electrolyte (acid) and alkaline corrosive battery fluid.

(a) * * *

(4) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank is lined with rubber or material of equivalent or greater strength, durability, and acid-resistance.

(ii) Bottom outlets on the cargo tank are equipped with self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

39. In § 173.262, paragraphs (a)(11) and (b)(4) are revised to read as follows:

§ 173.262 Hydrobromic acid.

(a) * * *

(11) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank is lined with rubber or other material of equivalent or greater strength, durability, and acid-resistance.

(ii) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

(b) * * *

(4) Cargo tank motor vehicles as prescribed in paragraph (a)(11) of this section.

* * * * *

40. In § 173.263, paragraph (a)(10) is revised to read as follows:

§ 173.263 Hydrochloric (muriatic) acid; hydrochloric (muriatic) acid mixtures; hydrochloric (muriatic) acid solution, inhibited, sodium chlorite solution (not exceeding 42 percent sodium chlorite); and cleaning compounds, liquids, containing hydrochloric (muriatic) acid.

(a) * * *

(10) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank is lined with rubber or other material of equivalent or greater strength, durability, and acid-resistance, except that an unlined tank made from Type 304 or Type 316 stainless steel is authorized for sodium chlorite solutions not exceeding 42 percent strength.

(ii) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

41. In § 173.264, Note 1 to paragraph (a)(14) is removed; paragraphs (a)(14) and (b)(3) are revised to read as follows:

§ 173.264 Hydrofluoric acid; White acid.

(a) * * *

(14) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank is lined with rubber or other material of equivalent or greater strength, durability, and acid-resistance, except that an unlined cargo tank is authorized for hydrofluoric acid solutions of 60 percent to 65 percent concentration provided the lading is inhibited so that the corrosive effect on steel is not greater than that of 65 percent hydrofluoric acid.

(ii) Bottom outlets on the cargo tank are equipped with self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

(b) * * *

(3) Specification MC 310, MC 311, MC 312 or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle. Bottom outlets on the cargo tank must be equipped with self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

42. In § 173.265, paragraph (b)(4) is revised to read as follows:

§ 173.265 Fluorosilicic acid (hydrofluorosilicic acid) (hydrofluosilicic acid).

(b) * * *

(4) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank is lined with rubber or other material of equivalent or greater strength, durability, and acid-resistance.

(ii) Bottom outlets on the cargo tank are equipped with self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

43. In § 173.266, paragraph (f)(2) is revised to read as follows:

§ 173.266 Hydrogen peroxide solution in water.

* * * * *

(f) * * *

(2) Specification MC 310, MC 311, MC 312 or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The tank is fabricated—

(A) From aluminum meeting the requirements of Aluminum Association designation 1060, 1260, 5254 or 5262 alloy, and with a minimum wall thickness of 0.500 inches; or

(B) An MC 312 cargo tank may be fabricated of Type 304L, 316 or 316L stainless steel.

(ii) The MAWP of the cargo tank is at least 40 psig.

(iii) The tank is designed and fabricated so that the internal surfaces can be effectively cleaned and passivated. All openings are located on the top of the tank.

(iv) The cargo tank has no bottom outlets.

(v) A cargo tank in hydrogen peroxide service is used in hydrogen peroxide service only and the cargo tank specification plate is so marked. In addition to the required markings prescribed in § 172.328 of this subchapter, each such cargo tank is marked in letters at least 1 inch high "FOR HYDROGEN PEROXIDE SERVICE ONLY".

(iv) The designs for venting and pressure relief devices have been examined by the Bureau of Explosives and approved by the Director, OHMT.

44. In § 173.267, paragraph (a)(7) is revised to read as follows:

§ 173.267 Mixed acid (nitric and sulfuric acid) (nitrating acid).

(a) * * *

(7) Any cargo tank motor vehicle prescribed in § 173.254(a)(5).

* * * * *

45. In § 173.268, paragraph (b)(3) is revised to read as follows:

§ 173.268 Nitric acid.

* * * * *

(b) * * *

(3) Any cargo tank motor vehicle as prescribed in § 173.254(a)(5).

* * * * *

46. In § 173.271, paragraph (a)(8) is revised to read as follows:

§ 173.271 Methyl phosphonic dichloride, phosphorus oxybromide, phosphorus oxychloride, phosphorus trichloride, and thiophosphoryl chloride.

(a) * * *

(8) Specification MC 310, MC 311, MC 312 or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicles, subject to the following conditions:

(i) The tank is—

(A) Fabricated from mild steel, stainless steel or at least 99 percent nickel (with cast metal parts of tank in contact with lading at least 96.7 percent nickel);

(B) Clad with Type 316 stainless steel at least 20 percent as thick as the parent metal; or

(C) Lined with lead at least 1/32 inch thick or lined with at least 99 percent

ure nickel at least 1/8 inch thick at all ints including rivets, welds and other nts, and edges of tank plates.

(ii) A tank fabricated from, or clad with, Type 316 stainless steel is authorized only for phosphorous oxychloride, phosphorous trichloride, and thiophosphoryl chloride.

(iii) A tank fabricated from mild steel or austenitic stainless steel, without cladding or lining, is authorized only for phosphorous trichloride service.

(iv) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

47. In § 173.272, paragraphs (i)(25) and (i)(28) are removed and reserved; paragraphs (c), (d), (e), (f) and (i)(21) are revised to read as follows:

§ 173.272 Sulfuric acid.

* * * * *

(c) *Concentrations of 51 percent or less.* Authorized packagings for sulfuric acid at concentrations of 51 percent or less are prescribed in paragraphs (i) (1)–(16), (21), (24), and (26) of this section.

(d) *Concentrations of greater than 51 percent to not over 65.25 percent.* Authorized packagings for sulfuric acid concentrations of 51 percent to not r 65.25 percent are prescribed in ragraphs (i) (1)–(16), (21), and (27)–(29) of this section.

(e) *Concentrations of greater than 65.25 percent to not over 77.5 percent.* Authorized packagings for sulfuric acid at concentrations of 65.25 percent to not over 77.5 percent are prescribed in paragraphs (i) (1)–(16), (20)–(22), and (29) of this section.

(f) *Concentrations of greater than 77.5 percent to not over 95 percent.* Authorized packagings for sulfuric acid concentrations of 77.5 percent to not over 95 percent are prescribed in paragraphs (i)(1)–(22), and (29) of this section.

(g) *Concentrations of greater than 95 percent to not over 100.5 percent.* Authorized packagings for sulfuric acid concentrations of greater than 95 percent to not over 100.5 percent are prescribed in paragraphs (i)(1)–(4), (6), (9), (14)–(22), and (29) of this section.

(h) *Concentrations of over 100.5 percent.* Authorized packagings for sulfuric acid concentrations of over 100.5 percent are prescribed in paragraphs (i) (1)–(4), (17), and (19)–(23) of this section.

* * * * *

) * * *

21) Specification MC 310, MC 311, ...C 312 or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank is lined with rubber or other material of equivalent or greater strength, durability, and acid-resistance.

(ii) An unlined steel cargo tank is authorized for sulfuric acid of 65.25 percent or greater concentration, provided the corrosive effect on steel is not greater than that of 65.25 percent sulfuric acid measured at 100 °F.

(iii) The temperature of the lading may not exceed the design temperature of the cargo tank marked on the cargo tank specification plate.

(iv) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter.

* * * * *

(25) [Reserved]

* * * * *

(28) [Reserved]

* * * * *

48. In § 173.273, paragraphs (a)(5) and (b)(2) are revised to read as follows:

§ 173.273 Sulfur trioxide.

(a) * * *

(5) Specification MC 310, MC 311, MC 312 or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank is equipped with a pressure relief system meeting the requirements in § 178.345–10 of this subchapter and consisting of a spring-loaded pressure relief valve, or a combination spring-loaded pressure relief valve and a frangible (rupture disk) installed in series with the relief valve. When the pressure relief system consists of a spring-loaded pressure relief valve and a frangible (rupture disk) installed in series with the pressure relief valve, the spring-loaded pressure relief valve must be set-to-discharge at a pressure not exceeding 125 percent of the design pressure.

(ii) The tank is not equipped with interior heating coils.

(iii) Bottom outlets on the cargo tank are equipped with self-closing stop valves meeting the requirements in § 178.345–11 of this subchapter.

(b) * * *

(2) Specification MC 311, MC 312, DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank is insulated.

(ii) The tank is not equipped with interior heating coils.

(iii) The cargo tank is equipped with a pressure relief system meeting the requirements in § 178.345–10 of this subchapter and consisting of a spring-loaded pressure relief valve, or a combination spring-loaded pressure relief valve and a frangible (rupture) disk installed in series with the relief valve. When the pressure relief system consists of a spring-loaded pressure relief valve and a frangible (rupture) disk installed in series with the pressure relief valve, the spring-loaded pressure relief valve must be set-to-discharge at a pressure not exceeding 125 percent of the design pressure.

* * * * *

49. In § 173.274, paragraph (a)(4) is revised to read as follows:

§ 173.274 Fluosulfonic acid.

(a) * * *

(4) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle. Bottom outlets must be equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11(a)(1) of this subchapter

* * * * *

50. In § 173.276, paragraph (a)(6) is revised to read as follows:

§ 173.276 Anhydrous hydrazine and hydrazine solution.

(a) * * *

(6) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank is fabricated from Type 304 or Type 347 stainless steel with molybdenum content not exceeding 1 percent.

(ii) The vapor space in the cargo tank is filled with nitrogen gas at not less than atmospheric pressure.

(iii) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11(a)(1)(i) of this subchapter, except that bottom outlets on Specification MC 330 and MC 331 cargo tanks must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337–11(c) of this subchapter.

* * * * *

51. In § 173.277, paragraph (a)(9) is revised to read as follows:

§ 173.277 Hypochlorite solutions.

(a) * * *

(9) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank is lined with rubber or other material of equivalent or greater strength, durability, and acid-resistance.

(ii) Bottom outlets are equipped with internal self-closing stop-valves meeting the requirements in § 178.345-11(a)(1)(i) of this subchapter.

(iii) Continued use of nonspecification cargo tanks is authorized only if they were used to transport hypochlorite solutions prior to January 1, 1983.

* * * * *

52. In § 173.280, paragraph (a)(8) is revised to read as follows:

§ 173.280 Trichlorosilanes.

(a) * * *

(8) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The tank is made of steel or stainless steel.

(ii) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345-11(a)(1) of this subchapter.

* * * * *

53. In § 173.287, paragraph (b)(8) is revised to read as follows:

§ 173.287 Chromic acid solution.

* * * * *

(b) * * *

(8) Any cargo tank motor vehicle prescribed in § 173.254(a)(5), except that the cargo tanks are not authorized for transportation by vessel.

* * * * *

54. In § 173.289, paragraphs (a)(1) and (a)(4) are revised to read as follows:

§ 173.289 Formic acid and formic acid solutions.

(a) * * *

(1) In packagings prescribed in § 173.245, except § 173.245(a)(14) and (a)(29) and DOT 5A steel drum.

* * * * *

(4) Any cargo tank motor vehicle prescribed in § 173.254(a)(5).

* * * * *

55. In § 173.292, paragraphs (a)(1) and (a)(2) are revised to read as follows:

§ 173.292 Hexamethylene diamine solution.

(a) * * *

(1) In packagings as prescribed in § 173.249, except § 173.249(a)(6).

(2) Specification MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, MC 312 or, DOT 406, DOT 407, DOT 412 (§§ 178.345, 178.346, 178.347, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The cargo tank meets the corrosion protection requirements in § 178.345-2(c) of this subchapter.

(ii) A Specification MC 306 or DOT 406 cargo tank is fabricated from Type 316 stainless steel not less than 0.100 inch thick.

(iii) A Specification MC 303 cargo tank is fabricated from steel or stainless steel.

(iv) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345-11(a)(1) of this subchapter.

56. In § 173.294, paragraph (a)(3) is revised to read as follows:

§ 173.294 Monochloroacetic acid, liquid or solution.

(a) * * *

(3) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The tank is fabricated from Type 304 or Type 316 stainless steel, 99 percent pure nickel plates, titanium meeting the requirements in ASTM SA-265, or is suitably lined with nickel or stainless steel.

(ii) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345-11(a)(1)(i) of this subchapter.

* * * * *

57. In § 173.295, paragraph (a)(10) is removed and reserved; paragraph (a)(9) is revised to read as follows:

§ 173.295 Benzyl chloride.

(a) * * *

(9) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) A tank fabricated of steel is used to transport stabilized benzyl chloride.

(ii) A tank fabricated from at least 99 percent nickel is used for unstabilized benzyl chloride that is anhydrous and free from impurities such as iron. All cast metal parts of the tank in contact with the lading are fabricated from at least 96.7 percent nickel.

(iii) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345-11(a)(1)(i) of this subchapter.

(10) [Reserved]

* * * * *

58. In § 173.296, paragraph (a)(2) is revised to read as follows:

§ 173.296 Di iso octyl acid phosphate.

(a) * * *

(2) Any cargo tank motor vehicle prescribed in § 173.254(a)(5).

* * * * *

59. In § 173.297, paragraph (a)(4) is revised to read as follows:

§ 173.297 Titanium sulfate solution containing not more than 45 percent sulfuric acid.

(a) * * *

(4) Specification MC 310, MC 311, MC 312, or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) Each cargo tank is rubber-lined.

(ii) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345-11(a)(1) of this subchapter.

* * * * *

60. In § 173.315, the introductory text of paragraph (a), and Note 4 and paragraph 5 of Note 17 which follows the table in paragraph (a) are revised; and paragraphs (h)(4), (i)(1) and (k)(3) are revised; and paragraphs (n) and (o) are added to read as follows:

§ 173.315 Compressed gases in cargo tanks and portable tanks.

(a) A compressed gas offered for transportation in a cargo tank motor vehicle or a portable tank must be prepared in accordance with this section, §§ 173.32, 173.33 and Subpart E of Part 180 of this subchapter; for cryogenic liquids, see § 173.318; for marking requirements, see §§ 172.326 and 172.328 of this subchapter. A compressed gas must be loaded and offered for transportation in accordance with the following table:

* * * * *

Note 4: Material must be steel. Tank must have a corrosion allowance of 20 percent or 0.10 inch, whichever is less, added to the metal thickness. In chlorine tanks, the wall thickness must be at least 0.625 inch including corrosion allowance.

* * * * *

Note 17 * * *

(5) Has been inspected and tested in accordance with Subpart E of Part 180 of this subchapter as specified for MC 331 cargo tanks.

* * * * *

(h) * * *

(4) Except on a tank used exclusively for the transportation of carbon dioxide, refrigerated liquid or nitrous oxide, refrigerated liquid, each opening for a pressure gauge must be restricted at or inside the tank by an orifice no larger than 0.060 inch in diameter. For carbon dioxide, refrigerated liquid or nitrous oxide, refrigerated liquid service, the

pressure gauge need only be used during filling operation.

(i) * * *

(1) The safety relief valves on each tank must meet the following conditions:

(i) The total relieving capacity, as determined by the flow formulas contained in Section 5 of CGA Pamphlet S-1.2, must be sufficient to prevent a maximum pressure in the tank of more than 120 percent of the design pressure;

(ii) The flow capacity testing and rating must be in accordance with Section 5 of CGA Pamphlet S-1.2 and certified by the valve manufacturer.

(iii) For an insulated tank, the required relieving capacity of the relief valves must be the same as for an uninsulated tank, unless the insulation will remain in place and will be effective under fire conditions. In this case, each insulated tank must be covered by a sheet metal jacket of not less than 16 gauge thickness.

(iv) An MC 330 cargo tank that has relief valves sized by Fetterly's formula dated November 27, 1928, may be continued in service. Copies of this formula may be obtained from the Bureau of Explosives.

* * * * *

(k) * * *

(5) Has been inspected and tested in accordance with Subpart E of Part 180 of this subchapter as specified for MC 331 cargo tanks;

* * * * *

(n) Each MC 330 and MC 331 cargo tank used to transport a flammable gas, anhydrous ammonia or hydrogen chloride, refrigerated liquid must have each liquid opening equipped in accordance with § 178.337-11 of this subchapter.

(o) *Chlorine cargo tanks.* Each cargo tank motor vehicle used for the transportation of chlorine must meet the requirements in the following:

(1) No piping, hose, or other device for loading or unloading may be attached to any valve, except at the time of loading or unloading. No hose, piping, or tubing used for loading or unloading may be mounted or carried on the motor vehicle. Except at the time of loading or unloading, the pipe connection of each angle valve must be closed with a screw plug which is chained or otherwise fastened to prevent misplacement.

(2) Each chlorine cargo tank angle valve must be tested to be leak free at not less than 225 psig using dry air or inert gas before installation and thereafter once every five loadings or once a week, which ever occurs first.

Prior to each loading, the cargo tank must be inspected and the angle valves and gasketed joints must be examined and tested at a pressure of not less than 50 psig to determine that they are not leaking and are in proper condition for transportation. Any leaks must be corrected before the cargo tank is offered for transportation.

(3) Excess flow valves on the cargo tank must meet the requirements in § 178.337-11(a)(4) of this subchapter.

61. In § 173.318, paragraphs (b)(2)(i)(C) and (g)(3), and a sentence at the end of paragraph (a)(2)(ii) are added to read as follows:

§ 173.318 Cryogenic liquids in cargo tanks.

* * * * *

(b) * * *

(2) * * *

(i) * * *

(C) The flow capacity and rating must be verified and certified by the manufacturer.

(ii) * * * The flow capacity and rating must be verified and certified by the manufacturer of the device.

* * * * *

(g) * * *

(3) Each cargo tank motor vehicle used to transport a flammable cryogenic liquid must be examined after each shipment to determine its actual holding time. The record required by § 177.840(h) of this subchapter may be used for this determination. If the examination indicates that the actual holding time of the cargo tank, after adjustment to reflect an average ambient temperature of 85 °F, is less than 90 percent of the marked rated holding time (MRHT) for the cryogenic liquid marked on the specification plate or adjacent thereto (see § 178.338-18(b) of this subchapter), the tank may not be refilled with any flammable cryogenic liquid until it is restored to its marked rated holding time value or it is re-marked with the actual marked rated holding time determined by this examination. If the name of the flammable cryogenic liquid that was transported and its marked rated holding time is not displayed on or adjacent to the specification plate, this requirement may be met by deriving the MRHT of the cargo tank for that flammable cryogenic liquid and comparing that derived MRHT with the actual holding time after adjustment.

62. In § 173.346, paragraph (a)(12) is revised to read as follows:

§ 173.346 Poison B liquids not specifically provided for.

(a) * * *

(12) Specification MC 304, MC 307, MC 310, MC 311, MC 312, DOT 407 or DOT 412 (§§ 178.345, 178.347, 178.348, 178.337 of this subchapter) cargo tank motor vehicle subject to the following conditions:

(i) The design pressure of the cargo tank is at least 25 psig.

(ii) Bottom outlets on the cargo tank are equipped with self-closing stop-valves meeting the requirements in § 178.345-11(a)(1)(i) of this subchapter, except that bottom outlets on Specification MC 330 and MC 331 cargo tanks must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337-11(a) of this subchapter.

(iii) Each tank is equipped with a steel pressure relief system meeting the requirements in § 178.347-10 of this subchapter, except that pressure relief devices on MC 330 or MC 331 cargo tanks must meet the requirements in § 178.337-9 of this subchapter.

* * * * *

63. In § 173.347, paragraph (a)(3) is revised to read as follows:

§ 173.347 Aniline oil.

(a) * * *

(3) Any cargo tank motor vehicle prescribed in § 173.346(a)(12).

* * * * *

64. In § 173.352, paragraph (a)(5) is revised to read as follows:

§ 173.352 Sodium and potassium cyanide solutions, and cyanide solution, n.o.s.

(a) * * *

(5) Any cargo tank motor vehicle prescribed in § 173.346(a)(12), except that the tank is at least 0.250 inch thick and the tank has no bottom outlets.

* * * * *

65. In § 173.353, paragraph (e) is revised to read as follows:

§ 173.353 Methyl bromide and methyl bromide mixtures.

* * * * *

(e) Specification MC 330 or MC 331 (§ 178.337 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(1) The design pressure of the cargo tank is at least 250 psig.

(2) The tank has sufficient outage so that it will not become liquid full with lading at 130° F.

(3) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.337-11(a) of this subchapter.

66. In § 173.354, Note 1 and footnote 1 are removed, and paragraph (a)(5) is revised to read as follows:

§ 173.354 Motor fuel antiknock compound or tetraethyl lead.

(a) * * *

(5) Specification MC 330 or MC 331 (§ 178.337 of this subchapter) cargo tank motor vehicle are authorized for motor fuel antiknock compound only.

* * * * *

67. In § 173.358, paragraph (a)(14) is revised to read as follows:

§ 173.358 Hexaethyl tetraphosphate, methyl parathion, organic phosphate compound, organic phosphorus compound, parathion, tetraethyl dithio pyrophosphate, and tetraethyl pyrophosphate, liquid.

(a) * * *

(14) Specification MC 310, MC 311, MC 312, DOT 412, MC 330, or MC 331 (§§ 178.345, 178.348, 178.337 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The lading is under no pressure except its own vapor pressure.

(ii) Only a Specification MC 330 or MC 331 cargo tank is authorized for hexaethyl tetraphosphate, parathion, tetraethyl dithio pyrophosphate or tetraethyl pyrophosphate, liquid.

(iii) Each Specification MC 310, MC 311, MC 312 or DOT 412 cargo tank has a minimum shell and head thickness of 0.187 inch for a steel tank and 0.266 inch for an aluminum tank. The tank is designed for a lading weight of at least 13 pounds per gallon.

(iv) The design pressure of the cargo tank is at least 25 psig.

(v) Transportation is authorized by private motor carrier only.

(vi) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11 of this subchapter, except that bottom outlets on Specification MC 330 and MC 331 cargo tanks must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337–11(a) of this subchapter.

(vii) Each tank is equipped with a steel pressure relief system meeting the requirements in § 178.347–10 of this subchapter, except that pressure relief devices on MC 330 or MC 331 cargo tanks must meet the requirements in § 178.337–9 of this subchapter.

* * * * *

68. In § 173.359, paragraph (a)(16) is revised to read as follows:

§ 173.359 Hexaethyl tetraphosphate mixtures; methyl parathion mixtures; organic phosphorus compound mixtures, organic phosphate compound mixtures; parathion mixtures, tetraethyl dithio pyrophosphate mixtures; and tetraethyl pyrophosphate mixtures, liquid (includes solutions, emulsions, or emulsifiable liquids).

(a) * * *

(16) Specification MC 310, MC 311, MC 312, DOT 412, MC 330 or MC 331 (§§ 178.345, 178.348, 178.337 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The lading is under no pressure except its own vapor pressure.

(ii) Each Specification MC 310, MC 311, MC 312 and DOT 412 cargo tank has a minimum shell and head thickness of 0.187 inch for a steel tank and 0.266 inch for an aluminum tank. The tank is designed for a lading weight of at least 13 pounds per gallon.

(iii) The design pressure of the cargo tank is at least 25 psig.

(iv) Transportation is authorized by private motor carrier only.

(v) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11(a)(1) of this subchapter, except that bottom outlets on Specification MC 330 and MC 331 cargo tanks must be equipped with internal self-closing stop-valves meeting the requirements in § 178.337–11(a) of this subchapter.

(vi) Each tank is equipped with a steel pressure relief system meeting the requirements in § 178.345–10 of this subchapter, except that pressure relief devices on MC 330 or MC 331 cargo tanks must meet the requirements in the § 178.337–9 of this subchapter.

* * * * *

69. In § 173.369, paragraph (a)(14) is revised to read as follows:

§ 173.369 Carbolic acid (phenol), not liquid.

(a) * * *

(14) Specification MC 304, MC 307, MC 310, MC 311, MC 312, DOT 407 or DOT 412 (§§ 178.345, 178.347, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The MAWP of the cargo tank is at least 25 psig.

(ii) The tank has sufficient outage so that it will not become liquid full with lading at 130° F.

(iii) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11(a)(1) of this subchapter.

* * * * *

70. In § 173.373, paragraph (a)(6) is revised to read as follows:

§ 173.373 Ortho-nitroaniline and paranitroaniline.

(a) * * *

(6) Specification MC 304, MC 307, MC 310, MC 311, MC 312, DOT 407 or DOT 412 (§§ 178.345, 178.347, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The tanks are authorized only for ortho-nitroaniline loaded in a liquefied state at a temperature not over 180 °F.

(ii) Each cargo tank is made of steel and is insulated.

(iii) The MAWP of the cargo tank is at least 25 psig.

(iv) Bottom outlets on the cargo tank are equipped with internal self-closing stop-valves meeting the requirements in § 178.345–11(a)(1) of this subchapter.

(v) The tanks are not authorized for transportation by vessel.

71. In § 173.374, paragraph (a)(4) is revised to read as follows:

§ 173.374 Nitrochlorobenzene, meta or para.

(a) * * *

(4) Specification MC 312 or DOT 412 (§§ 178.345, 178.348 of this subchapter) cargo tank motor vehicle, subject to the following conditions:

(i) The tanks are authorized only for para nitrochlorobenzene, solid.

(ii) Each cargo tank is insulated and equipped with heating coils.

(iii) The MAWP of the cargo tank is at least 25 psig.

(iv) The tanks are not authorized for transportation by vessel.

(v) Bottom outlets on the cargo tank meet the requirements in § 178.345–11(a)(1) of this subchapter.

* * * * *

PART 176—CARRIAGE BY VESSEL

72. The authority citation for Part 176 continues to read as follows:

Authority: 49 U.S.C. 1803, 1804, 1805, 1808; 49 CFR 1.53, App. A to Part 1.

73. In § 176.76, a sentence is added at the end of paragraph (b) to read as follows:

§ 176.76 Highway vehicles, railroad vehicles, freight containers, and portable tanks containing hazardous materials.

* * * * *

(b) * * * A cargo tank motor vehicle containing hazardous materials may be transported—

(1) On a carfloat or trailership if the material is authorized aboard a cargo vessel by § 172.101 of this subchapter; or

(2) On a passenger ferry vessel or railroad car ferry vessel if the material is authorized aboard a passenger vessel by § 172.101 of this subchapter.

* * * * *

PART 177—CARRIAGE BY PUBLIC HIGHWAY

74. The authority citation for Part 177 continues to read as follows:

Authority: 49 App. U.S.C. 1803, 1804, 1805, 49 CFR Part 1.

75–76. Sections 177.800, 177.801, and 177.802 are revised to read as follows:

'77.800 Purpose and scope.

) This part prescribes requirements, ddition to those contained in Parts 171, 172, 173, 178 and 180 of this subchapter, that are applicable to the acceptance and transportation of hazardous materials by private, common or contract carriers by motor vehicle.

(b) It is the duty of each motor carrier to comply with the prescribed regulations and to thoroughly instruct employees in relation thereto.

§ 177.801 Unacceptable hazardous materials shipments.

No person may accept for transportation or transport by motor vehicle any shipment of hazardous material that is not in accordance with the requirements of this subchapter.

§ 177.802 Inspection.

Records, equipment, packagings and containers under the control of a motor carrier, insofar as they affect safety in transportation of hazardous materials by motor vehicle, must be made available for examination and inspection by a duly authorized representative of the Department.

77. Section 177.814 is revised to read as follows:

'.814 Retention of cargo tank motor cle manufacturer's certificate, .ntenance and other reports.

Each owner of a cargo tank motor vehicle and each motor carrier must comply with the reporting and record retention requirements contained in § 180.417 of this subchapter.

§ 177.822 [Amended]

78. In § 177.822, paragraph (b) is amended by removing the reference "178.315" and inserting in its place "178.351".

79. Section 177.824 is revised to read as follows:

§ 177.824 Retesting and inspection of cargo tanks.

Except as otherwise provided in this subchapter, no motor carrier may operate a cargo tank motor vehicle containing a hazardous material unless the cargo tank motor vehicle conforms to the retest and inspection requirements set forth in Subpart E of Part 180 of this subchapter. This paragraph does not apply to any cargo tank filled prior to the retest or inspection due date.

80. In § 177.840, the section heading d paragraph (f) are revised to read as ws:

7.840 Compressed gases.

* * * *

(f) A cargo tank motor vehicle used for transportation of chlorine may not be moved, coupled or uncoupled, when any loading or unloading connections are attached to the vehicle, nor may it be left without the power unit attached unless the vehicle is chocked or equivalent means are provided to prevent motion. For additional requirements, see § 173.315(o) of this subchapter.

* * * * *

§ 177.835 [Amended]

81. In § 177.835, paragraph (k), the first sentence is amended by removing the reference to "178.315" and inserting in its place "178.351", and the last sentence is amended by removing the reference "178.318" and inserting in its place "178.352".

PART 178—SHIPPING CONTAINER SPECIFICATIONS

82. The authority citation for Part 178 continues to read as follows:

Authority: 49 App. U.S.C. 1803, 1804, 1805, 1806, 1808, 49 Part 1.

83–84. A new § 178.320 is added to subpart J to read as follows:

§ 178.320 General requirements applicable to all DOT specification cargo tank motor vehicles.

(a) *Definitions.* (1) For the purposes of this subpart, "design type " means one or more cargo tanks which are made—

(i) To the same specification;

(ii) By the same manufacturer;

(iii) To the same engineering drawings, and calculations;

(iv) Of the same materials of construction;

(v) To the same diameter;

(vi) To a length varying by no more than five percent;

(vii) With the volume varying by no more than five percent (due to a change in length only); and

(viii) For the purposes of § 178.338 only, with the same insulation system.

(2) "Manufacturer " means any person engaged in the manufacture or assembly of a DOT specification cargo tank or cargo tank equipment. A manufacturer shall register with the Department in accordance with subpart F of Part 107 in subchapter B of this chapter.

(b) *Design certification.* (1) Each cargo tank design type shall be certified in conformance with the specification requirements by a design certifying engineer registered in accordance with Subpart F of Part 107.

(2) The design certifying engineer shall furnish to the manufacturer a certificate, including sketches, drawings, and calculations, to indicate compliance with the specification requirements. Each certificate shall be signed by the design certifying engineer.

(3) The manufacturer shall retain the design certificate at his principal place of business for as long as he manufacturers DOT specification cargo tanks.

85. In § 178.337, the heading is revised to read as follows:

§ 178.337 Specification MC 331; cargo tank motor vehicle primarily for transportation of compressed gases as defined in Subpart G of Part 173 of this subchapter.

* * * * *

86. In § 178.337–1, paragraph (e) is revised to read as follows:

§ 178.337–1 General requirements.

* * * * *

(e) *Insulation.* (1) Each tank required to be insulated must conform with the use and performance requirements contained in §§ 173.315(a) Table, Note 11 and 178.337–1 (a)(3) and (e)(2) of this subchapter.

(2) Each tank intended for chlorine; carbon dioxide, refrigerated liquid; or nitrous oxide, refrigerated liquid service must have suitable insulation of such thickness that the overall thermal conductance is not more than 0.08 Btu per square foot per °F differential per hour. The conductance must be determined at 60 °F. Insulation material used on tanks for nitrous oxide, refrigerated liquid must be noncombustible. Insulating material used on tanks for chlorine must be corkboard or self-extinguishing polyurethane foam, with a minimum thickness of 4 inches.

* * * * *

87. In § 178.337–2, paragraph (c) is revised to read as follows:

§ 178.337–2 Material.

* * * * *

(c) A cargo tank in anhydrous ammonia service must be constructed of steel. The use of copper, silver, zinc or their alloys is prohibited. Baffles made from aluminum may be used only if joined to the tank by a process not requiring post weld heat treatment of the tank.

88. Section 178.337–3 is revised to read as follows:

§ 178.337–3 Structural integrity.

(a) The maximum calculated design stress value may not exceed the maximum design stress values prescribed in Section VIII of the ASME Code or 25 percent of the minimum specified tensile strength of the metal at any point in the cargo tank. The

calculated design stresses must take into account the weight of the tank, the maximum weight of lading, and the weight of structures supported by the cargo tank, but not including the weight of the structures supporting the tank in normal conditions. The stresses due to internal pressure and vertical loadings must be applied in all considerations. The accelerative, decelerative and lateral forces must be applied separately. The combination case which produces the maximum effective stress shall govern. Corrosion allowance material may not be used to satisfy the design requirements.

(1) The design and construction of each cargo tank must provide for all potential structural loadings, including but not limited to dynamic loads, superimposed loadings and the effect of temperature gradients resulting from lading and ambient temperature extremes. When dissimilar materials are used, their thermal coefficients must be considered in the calculation of the design stress value.

(2) Maximum concentrated stresses which might be created at pads, cradles or supports due to shear, bending and torsion shall also be considered and calculated in accordance with Appendix G of Section VIII of the ASME Code.

(b) Steel less than 3/16 inch or aluminum less than 0.270 inch thick may not be used for the shell or heads of the tank unless the tank is evacuated or has a load bearing jacket. Steel at least 0.110 inch thick may be used for the shell or heads for a tank that is evacuated or has a load bearing jacket. Steel less than 0.110 inch thick may not be used for the shell or head under any circumstance.

(c) Analyses of basic cargo tank structural integrity must be made using the conditions specified in paragraph (a) of this section. The stresses involved are not necessarily uniform throughout the cargo tank. Stress calculations must be made by the following formula:

$$S = 0.5(S_y + S_x) = \{0.25(S_y - S_x)^2 + S_s^2\}^{0.5}$$

where at any given point under consideration, and for the worst combination of loadings that can occur at the same time, the stress levels produced at the point being considered are:

S = Effective stress as limited by this requirement, in psi.

S_y = The circumferential tensile stress due to internal pressure, in psi.

S_x = The following tensile or/and compressive stresses, in psi, that apply.

(1) The longitudinal tensile stresses due to internal pressure;

(2) The tensile or compression stress generated by the axial load resulting from a decelerative force equal to twice the static weight of the fully loaded vehicle applied independently to each suspension assembly at the road surface;

(3) The tensile or compression stress generated by the bending moment resulting from a decelerative force equal to twice the static weight of the fully loaded vehicle applied independently to each suspension assembly at the road surface;

(4) The tensile or compression stress generated by the axial load resulting from an accelerative force equal to the static weight of the fully loaded vehicle applied to the horizontal pivot of the fifth wheel supporting the vehicle;

(5) The tensile or compression stress generated by the bending moment resulting from an accelerative force equal to the static weight of the fully loaded vehicle applied to the horizontal pivot of the fifth wheel supporting the vehicle;

(6) The tensile or compression stress due to a bending moment produced by a vertical force equal to three times the static weight of the fully loaded vehicle.

S_s = The following shear stresses, in psi, that apply.

(1) The vertical shear stress due to a vertical force equal to three times the static weight of the tank and contents;

(2) The lateral shear stress due to a lateral accelerative force which will produce an overturn but not less than 0.75 times the static weight of the fully loaded vehicle, applied at the road surface; and

(3) The torsional shear stress due to a lateral accelerative force which will produce an overturn but not less than 0.75 times the static weight of the fully loaded vehicle, applied at the road surface.

(d) In addition to meeting the conditions specified in paragraph (a) of this section, the design calculations for the tank heads and shell must include the load resulting from the design pressure in combination with the dynamic pressure resulting from a longitudinal deceleration of 2 "g". For this loading condition, the design stress value used may not exceed the lesser of the yield strength or 75 percent of the ultimate tensile strength of the material of construction. The stress value requiring the greatest wall thickness derived from paragraphs (a), (b), (c) or (d) of this section must be used.

(e) A corrosion allowance of at least 20 percent of the minimum shell and head thickness or 0.100 inch, whichever is less, must be added to the thickness requirement for a cargo tank used in chlorine or sulfur dioxide service. The head and shell thickness for chlorine tanks must be at least 9/16 inch, including corrosion allowance.

(f) The design, construction, and installation of any appurtenance to the shell or heads of the cargo tank must minimize the possibility of appurtenance damage or failure adversely affecting the lading retention integrity of the tank. Where a tank support is attached to any part of the tank head, the stresses imposed must meet the requirements in paragraph (a) of this section.

(1) A lightweight attachment, such as a conduit clip, brakeline clip or placard holder, must be constructed of a material of lesser strength than the tank shell or head material and may not be more than 72 percent of the thickness of the tank shell or head to which it is attached. The attachment may be secured directly to the tank shell or head if the device is designed and installed in such a manner that if damaged it will not affect the lading retention integrity of the tank. The lightweight attachment must be secured to the tank shell or head by continuous weld or in such manner as to preclude formation of pockets, which may become sites for incipient corrosion. Attachments meeting the requirements of this paragraph are not authorized for cargo tanks constructed under paragraph UHT of the ASME Code.

(2) Except as prescribed in §§ 178.337-3(f)(1) and 173.337-13(d), the welding of any appurtenance to a shell or head must be made by attachment of a mounting pad so that there will be no adverse effect upon the lading retention integrity of the tank if any force is applied to the appurtenance, from any direction. The thickness of a mounting pad may not be less than that of the shell or head to which it is attached, and not more than 1.5 times the shell or head thickness. However, a pad not less than 0.250 inch thick may be used when the shell or head thickness is over 0.250 inch thick. If weep holes or tell-tale holes are used, the pad must be drilled or punched at its lowest point before it is attached to the tank. Each pad must—

(i) Extend at least 2 inches in each direction from any point of attachment of an appurtenance;

(ii) Have rounded corners, or otherwise be shaped in a manner to minimize stress concentrations on the shell or head; and

(iii) Be attached by a continuous weld around the pad, except for a small gap at the lowest point for draining, using filler material conforming to the recommendations of the manufacturer of the head or shell material.

(3) Where any tank support is attached to any part of a tank head, the stresses imposed upon the head must be as required in paragraph (a) of this section and § 178.337-13 with respect to maximum concentrated stresses at pads and cradles.

89. In § 178.337-4, the first sentence in paragraph (b) is revised to read as follows:

§ 178.337-4 Joints.

* * * * *

(b) Welding procedure and welder performance must be in accordance with ...tion IX of the ASME Code. * * *

* * * * *

90. In § 178.337-6, paragraph (a) is revised to read as follows:

§ 178.337-6 Closure for manhole.

(a) Each cargo tank manufactured after December 12, 1989, must be provided with a manhole conforming to paragraph UG-46(g)(1) and other applicable requirements of the ASME Code, except that a cargo tank constructed of NQT steel having a capacity of 3500 water gallons or less may be provided with an inspection opening conforming to paragraph UG-46 and other applicable requirements of the ASME Code instead of a manhole.

* * * * *

91. In § 178.337-8, paragraphs (a)(2) and (b) are revised to read as follows:

§ 178.337-8 Outlets.

(a) * * *

(2) With the exception of gauging devices, thermometer wells, and pressure relief valves, each opening in a cargo tank intended for use in transporting compressed gas (except carbon dioxide, refrigerated liquid) must be—

(i) Closed with a plug, cap or bolted ...ge;

(ii) Protected with an excess flow ...ve on product discharge openings or protected with a check valve on product inlet openings; or

(iii) Fitted with an internal self-closing stop valve as specified in § 178.337-11(a).

(b) Outlets on chlorine cargo tanks must meet the requirements in § 178.337-1(c)(2).

92. In § 178.337-9, the section heading, the paragraph (a) heading, and paragraphs (b) and (d)(1) are revised to read as follows:

§ 178.337-9 Pressure relief devices, piping, valves, hoses, and fittings.

(a) *Pressure relief devices.* * * *

(b) *Piping, valves, hose, and fittings.* (1) The burst pressure of all piping, pipe fittings, hose and other pressure parts, except for pump seals and pressure relief devices, must be at least 4 times the design pressure of the tank. Additionally, the burst pressure may not be less than 4 times any higher pressure to which each pipe, pipe fitting, hose or other pressure part may be subjected to in service. For chlorine service, see paragraph (b)(7) of this section.

(2) Pipe joints must be threaded, ...lded or flanged. If threaded pipe is ...d, the pipe and fittings must be ...edule 80 weight or heavier. Malleable metals must be used in the construction of valves and fittings. Where copper tubing is permitted, joints shall be brazed or be of equally strong metal union type. The melting point of the brazing material may not be lower than 1000° F. The method of joining tubing must not reduce the strength of the tubing, such as by the cutting of threads.

(3) Each hose coupling must be designed for a pressure of at least 120 percent of the hose design pressure and so that there will be no leakage when connected.

(4) Piping must be protected from damage due to thermal expansion and contraction, jarring, and vibration. Slip joints are not authorized for this purpose.

(5) *Piping and fittings* must be grouped in the smallest practicable space and protected from damage as required by § 178.337-10.

(6) All *piping, valves, and fittings* on a cargo tank must be proved free from leaks. This requirement is met when such piping, valves, and fittings have been tested after installation with gas or air and proved leak tight at not less than the design pressure marked on the cargo tank. This requirement is applicable to all hoses used in a cargo tank, except that hose may be tested before or after installation on the tank.

(7) *Chlorine cargo tanks.* Cargo tanks used to transport chlorine must conform to the following:

(i) No hose, piping or tubing used for loading or unloading may be mounted or carried on the cargo tank motor vehicle.

(ii) Angle valves on chlorine cargo tank motor vehicles must conform to the standards of The Chlorine Institute, Inc., as follows:

(A) For a cargo tank manufactured before January 1, 1975, to either Drawing 104-4, dated May 5, 1958, or Drawing 104-5, dated September 1, 1972.

(B) For a cargo tank manufactured on or after January 1, 1975, to Drawing 104-5, dated September 1, 1972.

(iii) Before installation, each angle valve must be tested for leakage at not less than 225 psig using dry air or inert gas.

* * * * *

(d) *Refrigeration and heating coils.* (1) Refrigeration and heating coils must be securely anchored with provisions for thermal expansion. The coils must be pressure tested externally to at least tank test pressure, and internally to either the tank test pressure or twice the working pressure of the heating/refrigeration system, whichever is higher. A tank may not be placed in service if any leakage occurs or other evidence of damage is found. The refrigerant or heating medium to be circulated through the coils must not be capable of causing any adverse chemical reaction with the tank lading in the event of leakage. The unit furnishing refrigeration may be mounted on the motor vehicle.

* * * * *

93. Section 178.337-11 is revised to read as follows:

§ 178.337-11 Emergency discharge control.

(a) *Excess flow valves, back flow check valves and stop valves.* (1) When required by § 178.337-8(a)(2):

(i) Each internal self-closing stop valve and excess flow valve must automatically close if any of its attachments are sheared off or if any attached hoses or piping are separated.

(ii) Each self-closing stop valve, excess flow valve, or check valve must be located inside the tank or inside a welded nozzle which is an integral part of the tank. The valve seat must be located inside the tank or within a welded flange, its companion flange, a nozzle or coupling. The installation must be made so as to assure that any undue strain which causes a failure requiring the functioning of the valve will not impair the operation of the valve.

(iii) All parts of the valve inside the tank, or within a nozzle, flange, companion flange, or coupling must be made of material not subject to corrosion or other deterioration in the presence of the lading.

(iv) Any liquid level gauging device must be constructed so that the outward flow of the tank lading does not exceed the flow through a 0.060-inch diameter opening.

(v) Each excess flow valve must close automatically at the rated flow of gas or liquid as specified by the valve manufacturer. The flow rating of the piping, fittings, valves, and hose on each side of the excess flow valve must be at least equal to that of the excess flow valve. If branching or other restrictions are incorporated in the system so that the flow rating is reduced to less than that of the excess flow valve at the tank, additional excess flow valves must be located where the flow rates are reduced. The additional valves must have sufficient flow rating so that total capacity equals or exceeds the excess flow valve capacity.

(vi) An excess flow valve may be designed with a bypass, not to exceed a 0.040-inch diameter opening, to allow equalization of pressures.

(2) Each liquid or vapor discharge opening in a cargo tank intended for the

transportation of a flammable liquid, a flammable compressed gas, hydrogen chloride (refrigerated liquid), or anhydrous ammonia must be equipped with a remotely controlled internal self-closing stop-valve. For cargo tanks intended for use in chlorine service, see paragraph (a)(4) of this section.

(i) On a tank over 3,500 gallons water capacity, each internal self-closing stop-valve must be provided with remote means of automatic closure, both mechanical and thermal, that are installed at the ends of the tank in at least two, diagonally opposite locations. Cable linkage between closures and remote operators must be corrosion resistant and effective in all types of environment and weather. If the loading/unloading connection at the tank is not in the general vicinity of one of the two locations specified above, one additional fusible element must be installed so that heat from a fire in the loading unloading connection area will activate the emergency control system. Fusible elements must not have a melting point exceeding 250° F. The loading/unloading connection area is where hoses or hose reels are connected to the permanent metal piping.

(ii) On a tank of 3,500 gallons water capacity or less, each internal self-closing stop-valve must be provided with at least one remote means of automatic closure, which may be mechanical, installed on the end of the tank furthest away from the loading/unloading connection area. The loading/unloading connection area is where hoses or hose reels are connected to the permanent metal piping

(3) Unless otherwise specified in paragraph (c) of this section, each outlet of a cargo tank intended for the transportation of a nonflammable gas (except carbon dioxide, refrigerated liquid) must be provided with an internal self-closing stop-valve or an automatic excess flow valve.

(4) Excess flow valves on chlorine cargo tank motor vehicles must conform to the standards of The Chlorine Institute, Inc., as follows:

(i) For a cargo tank manufactured before January 1, 1975:

(A) A valve conforming to either Drawing 101-4, dated May 16, 1968, or Drawing 101-6, dated September 1, 1973, must be installed under each liquid angle valve.

(B) A valve conforming to either Drawing 106-3, dated May 16, 1973, or Drawing 106-5, dated September 1, 1973, must be installed under each gas angle valve.

(ii) For a cargo tank manufactured on or after January 1, 1975:

(A) A valve conforming to Drawing 101-6, dated September 1, 1973, must be installed under each liquid angle valve.

(B) A valve conforming to Drawing 106-5, dated September 1, 1973, must be installed under each gas angle valve.

(b) *Shut-off valves.* Each filling and discharge line must be provided with a manual stop-valve located as close to the tank as practicable. However, if an internal self-closing stop-valve is used, the manual stop valve must be located in the line between the self-closing stop-valve and the hose connection. A single so-called "stop-check" or excess flow valve may not be used to satisfy the requirements of this paragraph, except as provided in paragraph (c) of this section.

(c) The requirements in paragraph (a) of this section do not apply to:

(1) A vapor or liquid discharge opening of less than 1¼ inch NPT equipped with an excess flow valve together with a manually operated external self closing stop valve, in place of a remotely controlled internal self-closing stop-valve.

(2) A vapor or liquid discharge opening of 1¼ inch NPT equipped with an excess flow valve together with a manually operated external stop valve installed before October 1, 1984.

(3) An engine fuel line, on a truck-mounted tank, of not over ¾ inch NPT equipped with a valve having an integral excess flow valve.

94. In § 178.337-14, paragraph (b) is revised to read as follows:

§ 178.337-14 Gauging devices.

* * * * *

(b) *Pressure gauges.* (1) See § 173.315(h) of this subchapter.

(2) Each cargo tank used in carbon dioxide, refrigerated liquid or nitrous oxide, refrigerated liquid service must be provided with a suitable pressure gauge. A shut-off valve must be installed between the pressure gauge and the tank.

* * * * *

95. Section 178.337.15 is revised to read as follows:

§ 178.337-15 Pumps and compressors.

(a) Liquid pumps or gas compressors, if used, must be of suitable design, adequately protected against breakage by collision, and kept in good condition. They may be driven by motor vehicle power take-off or other mechanical, electrical, or hydraulic means. Unless they are of the centrifugal type, they shall be equipped with suitable pressure actuated by-pass valves permitting flow from discharge to suction or to the tank.

(b) A liquid chlorine pump may not be installed on a cargo tank intended for the transportation of chlorine.

96. In § 178.338-18, the first and second sentences of paragraph (a) are revised to read as follows:

§ 178.337-18 Certification.

(a) The tank vehicle manufacturer must supply and the owner must obtain, a tank manufacturer's data report as required by the ASME Code, and a certificate stating that the completed cargo tank motor vehicle conforms in all respects to Specification MC 331 and the ASME Code. The certificate must be signed by a responsible official of the manufacturer and a Registered Inspector. The manufacturer's and the Registered Inspector's registration number must appear on the certificate (See subpart F, Part 107 in subchapter B of this chapter.) * * *

* * * * *

97. Section 178.338-3 is revised to read and follows:

§ 178.338-3 Structural integrity.

(a) The maximum calculated design stress value may not exceed the maximum design stress values prescribed in Section VIII of the ASME Code or 25 percent of the minimum specified tensile strength of the metal at any point in the cargo tank. The calculated design stresses must take into account the weight of the tank, the maximum weight of lading, and the weight of structures supported by the cargo tank, but not including the weight of the structures supporting the tank in normal conditions. The stresses due to internal pressure and vertical loadings must be applied in all considerations. The accelerative, decelerative and lateral forces must be applied separately. The combination case which produces the maximum effective stress shall govern. Corrosion allowance material may not be used to satisfy the design requirements.

(1) The design and construction of each cargo tank must provide for all potential structural loadings, including but not limited to dynamic loads, superimposed loadings and the effect of temperature gradients resulting from lading and ambient temperature extremes. When dissimilar materials are used, their thermal coefficients must be considered in the calculation of the design stress value.

(2) Maximum concentrated stresses which might be created at pads, cradles or supports due to shear, bending and torsion shall also be considered and calculated in accordance with Appendix G of Section VIII of the ASME Code.

(b) Steel less than 3/16 inch or minum less than 0.270 inch thick may . be used for the shell or heads of the ık unless the tank is evacuated or has oad bearing jacket. Steel at least 0.110 ıch thick may be used for the shell or heads for a tank that is evacuated or has a load bearing jacket. Steel less than 0.110 inch thick may not be used for the shell or head under any circumstance.

(c) Analyses of basic cargo tank structural integrity must be made using the conditions specified in paragraph (a) of this section. The stresses involved are not necessarily uniform throughout the cargo tank. Stress calculations must be made by the following formula:

$$S = 0.5(S_y + S_x) \pm [0.25(S_y - S_x)^2 + S_s^2]^{0.5}$$

where at any given point under consideration, and for the worst combination of loadings that can occur at the same time, the stress levels produced at the point being considered are:

S = Effective stress as limited by this requirement, in psi.

S_y = The circumferential tensile stress due to internal pressure, in psi.

S_x = The following tensile and/or compressive stresses, in psi, that apply.

(1) The longitudinal tensile stresses due to internal pressure;

(2) The tensile or compression stress generated by the axial load resulting from a ·celerative force applied independently to ·h suspension assembly at the road surface ·ng applicable static loadings specified in ·8.338–13 (b) and (c);

(3) The tensile or compression stress generated by the bending moment resulting from a decelerative force applied independently to each suspension assembly at the road surface using applicable static loadings specified in § 178.338–13 (b) and (c);

(4) The tensile or compression stress generated by the axial load resulting from an accelerative force applied to the horizontal pivot of the fifth wheel supporting the vehicle using applicable static loadings specified in § 178.338–13 (b) and (c);

(5) The tensile or compression stress generated by the bending moment resulting from an accelerative force applied to the horizontal pivot of the fifth wheel supporting the vehicle using applicable static loadings specified in § 178.338–13 (b) and (c);

(6) The tensile or compression stress due to a bending moment produced by a vertical force using applicable static loadings specified in § 178.338–13 (b) and (c).

S_s = The following shear stresses (in psi) that apply.

(1) The vertical shear stress due to a vertical force equal to three times the static weight of the tank and contents;

(2) The lateral shear stress due to a lateral accelerative force applied at the road surface which will produce an overturn but not less than 0.75 times the static weight of the fully loaded vehicle; and

(3) The torsional shear stress due to a ·ral accelerative force applied at the road ·ace which will produce an overturn but not less than 0.75 times the static weight of the fully loaded vehicle.

(d) In addition to meeting the conditions specified in paragraph (a) of this section, the design calculations for the tank heads and shell must include the load resulting from the design pressure in combination with the dynamic pressure resulting from a longitudinal deceleration of 2 "g". For this loading condition, the design stress value used must not exceed the lesser of the yield strength or 75 percent of the ultimate tensile strength of the material of construction. The stress value requiring the greatest wall thickness derived from paragraph (a), (b), (c), or (d) of this section must be used.

(e) The design, construction, and installation of any appurtenance to the shell or heads of the cargo tank must minimize the possibility of appurtenance damage or failure adversely affecting the lading retention integrity of the tank. Where a tank support is attached to any part of the tank head, the stresses imposed must conform to the requirements of paragraph (a) of this section.

(1) A lightweight attachment, such as a conduit clip, brakeline clip or placard holder, must be constructed of a material of lesser strength than the tank shell or head material and may not be more than 72 percent of the thickness of the tank shell or head to which it is attached. The attachment may be secured directly to the tank shell or head if the device is designed and installed in such a manner that if damaged it will not affect the lading retention integrity of the tank. The light weight attachment must be secured to the tank shell or head by continuous weld or in such manner as to preclude formation of pockets, which may become sites for incipient corrosion. Attachments conforming with this paragraph are not authorized for cargo tanks constructed under paragraph UHT of the ASME Code.

(2) Except as prescribed in §§ 178.338.3(f)(1) and 173.318(a), the welding of any appurtenance to a shell or head must be made by attachment of a mounting pad so that there will be no adverse effect upon the lading retention integrity of the tank if any force is applied to the appurtenance, from any direction. The thickness of a mounting pad may not be less than that of the shell or head to which it is attached, and not more than 1.5 times the shell or head thickness. However, a pad not less than 3/16 inch thick may be used when the shell or head thickness is over 3/16 inch. If weep holes or tell-tale holes are used, the pad must be drilled or punched at its lowest point before it is attached to the tank. Each pad must:

(i) Extend at least 2 inches in each direction from any point of attachment of an appurtenance;

(ii) Be attached by a continuous weld around the pad except for a small gap at the lowest point for draining.

98. In § 178.338–8, paragraph (b) is revised to read as follows:

§ 178.338–8 Pressure relief devices, piping, valves, and fittings.

* * * * *

(b) * * *

(1) The burst pressure of all piping, pipe fittings, hoses and other pressure parts, except for pump seals and pressure relief devices, must be at least 4 times the design pressure of the tank. Additionally, the burst pressure may not be less than 4 times any higher pressure to which each pipe, pipe fitting, hose or other pressure part may be subjected to in service.

(2) Pipe joints must be threaded, welded or flanged. If threaded pipe is used, the pipe and fittings must be Schedule 80 weight or heavier. Malleable metals must be used in the construction of valves and fittings. Where copper tubing is permitted, joints shall be brazed or be of equally strong metal union type. The melting point of the brazing materials may not be lower than 1000 °F. The method of joining tubing may not reduce the strength of the tubing, such as by the cutting of threads.

(3) Each hose coupling must be designed for a pressure of at least 120 percent of the hose design pressure and so that there will be no leakage when connected.

(4) Piping must be protected from damage due to thermal expansion and contraction, jarring, and vibration. Slip joints are not authorized for this purpose.

(5) All piping, valves and fittings on a cargo tank must be proved free from leaks. This requirement is met when such piping, valves, and fittings have been tested after installation with gas or air and proved leak tight at not less than the design pressure marked on the cargo tank. This requirement is applicable to all hoses used in a cargo tank, except that hose may be tested before or after installation on the tank.

(6) Each valve must be suitable for the tank design pressure at the tank design service temperature.

(7) All fittings must be rated for the maximum tank pressure and suitable for the coldest temperature to which they will be subjected in actual service.

(8) All piping, valves, and fittings must be grouped in the smallest practicable space and protected from damage as required by § 178.338–10.

(9) When a pressure-building coil is used on a tank designed to handle oxygen or flammable ladings, the vapor connection to that coil must be provided with a valve or check valve as close to the tank shell as practicable to prevent the loss of vapor from the tank in case of damage to the coil. The liquid connection to that coil must also be provided with a valve.

99. Section 178.338–17 is revised to read as follows:

§ 178.338–17 Pumps and compressors.

(a) *Liquid pumps and gas compressors*, if used, must be of suitable design, adequately protected against breakage by collision, and kept in good condition. They may be driven by motor vehicle power take-off or other mechanical, electrical, or hydraulic means. Unless they are of the centrifugal type, they shall be equipped with suitable pressure actuated by-pass valves permitting flow from discharge to suction to the tank.

(b) 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 must not be installed on any cargo tank used to transport oxygen, cryogenic liquid.

100. Sections 178.340, 178.341, 178.342 and 178.343 are removed, and §§ 178.345 through 178.345–15, 178.346 through 178.346–15, 178.347 through 178.347–15 and 178.348 through 178.348–15 are added to subpart J to read as follows:

§ 178.345 General design and construction requirements applicable to Specification DOT 406 (§ 178.346), DOT 407 (§ 178.347), and DOT 412 (§ 178.348) cargo tank motor vehicles.

§ 178.345–1 General requirements.

(a) Specification DOT 406, DOT 407 and DOT 412 cargo tank motor vehicles must conform to the requirements of this section in addition to the requirements of the applicable specification contained in §§ 178.346, 178.347 or 178.348.

(b) All specification requirements are minimum requirements.

(c) *Definitions.* The following terms apply to §§ 178.345, 178.346, 178.347 and 178.348.

"*Appurtenance*" means any cargo tank accessory attachment that has no lading retention or containment function and provides no structural support to the cargo tank.

"*Baffle*" means a non-liquid-tight transverse partition device that deflects, checks or regulates fluid motion in a tank.

"*Bulkhead*" means a liquid-tight transverse closure at the ends of or between cargo tanks.

"*Charging line*" means a hose, tube, pipe, or similar device used to pressurize a tank with material other than the lading.

"*Companion flange*" means one of two mating flanges where the flange faces are in contact or separated only by a thin leak sealing gasket and are secured to one another by bolts or clamps.

"*Connecting structure*" means the structure joining two cargo tanks.

"*Constructed and certified in conformance with the ASME Code*" means the cargo tank is constructed and stamped in accordance with the ASME Code, and is inspected and certified by an Authorized Inspector.

"*Constructed in accordance with the ASME Code*" means the cargo tank is constructed in accordance with the ASME Code with the authorized exceptions (see §§ 178.346, 178.347, and 178.348) and is inspected and certified by a Registered Inspector.

"*External self-closing stop-valve*" means a self-closing stop-valve designed so that the self-stored energy source is located outside the tank and the welded flange.

"*Flange*" means the structural ring for guiding or attachment of a pipe or fitting with another flange (companion flange), pipe, fitting or other attachment. For size and shape, see ANSI B16.5.

"*Inspection pressure*" means the pressure used to determine leak tightness of the tank when testing with pneumatic pressure.

"*Internal self-closing stop-valve*" means a self-closing stop-valve designed so that the self-stored energy source is located inside the tank or tank sump, or within the welded flange, and the valve seat is located within one inch of the external face of the welded flange or sump of the tank.

"*Lading*" means the hazardous material contained in a cargo tank.

"*Loading/unloading connection*" means the fitting in the loading/unloading line farthest from the loading/unloading outlet to which the loading/unloading hose or device is attached.

"*Loading/unloading outlet*" means the tank outlet used for normal loading/unloading operations.

"*Loading/unloading stop-valve*" means the stop valve farthest from the tank loading/unloading outlet to which the loading/unloading connection is attached.

"*Maximum allowable working pressure*" or "*MAWP*" See § 178.345–1(k).

"*Multi-specification cargo tank motor vehicle*" means a cargo tank motor vehicle equipped with two or more cargo tanks fabricated to more than one cargo tank specification.

"*Nozzle*" means the subassembly consisting of a pipe section with a welded or forged flange on one end in which the flange is an integral part of the neck extension.

"*Outlet*" means any opening in the shell or head of a tank, (including the means for attaching a closure), except that the following are not outlets: A threaded opening securely closed during transportation with a threaded plug, a flanged opening securely closed during transportation with a bolted or welded blank flange, a manhole, or gauging devices, thermometer wells, and safety relief devices.

"*Outlet stop-valve*" means the stop-valve at the tank loading/unloading outlet.

"*Pipe coupling*" means a fitting with internal or external threads on both ends.

"*Rear bumper*" means the structure designed to prevent a vehicle or object from under-riding the rear of a motor vehicle. See § 393.86 of this title.

"*Rear-end tank protection device*" means the structure designed to protect a cargo tank and any lading retention piping or devices in case of a rear end collision.

"*Sacrificial Device*" means an element, such as a shear section, designed to fail under load in order to prevent damage to any lading retention part or device. The device must break under strain at no more than 70 percent of the strength of the weakest piping element between the tank and the sacrificial device. Operation of the sacrificial device must leave the remaining piping and its attachment to the tank intact and capable of retaining lading.

"*Self-closing stop-valve*" means a stop-valve held in the closed position by means of self-stored energy, which opens only by application of an external force and which closes when the external force is removed.

"*Shear section*" means a sacrificial device fabricated in such a manner as to abruptly reduce the wall thickness of the adjacent piping or valve material by at least 30 percent.

"*Shell*" means the circumferential portion of a tank defined by the basic design radius excluding the closing heads.

"*Stop-valve*" means a valve that stops flow of lading.

"*Sump*" means a protrusion from the ttom of a tank shell designed to .acilitate complete loading and unloading of lading.

"*Tank*" means a container, consisting of a shell and heads, that forms a pressure tight vessel having openings designed to accept pressure tight fittings or closures, but excludes any appurtenances, reinforcements, fittings, or closures.

"*Test pressure*" means the pressure to which a tank is subjected to determine pressure integrity.

"*Toughness of material*" means the capability of a material to absorb the energy represented by the area under the stress strain curve (indicating the energy absorbed per unit volume of the material) up to the point of rupture.

"*Vacuum tank*" means a tank that is loaded by reducing the pressure in the tank to below atmospheric pressure.

"*Variable specification cargo tank*" means a cargo tank that is constructed in accordance with one specification, but which may be altered to meet another specification by changing relief device, closures, lading discharge devices, and other lading retention 'evices.

"*Void*" means the space between tank ads or bulkheads and a connecting .ructure.

"*Welded flange*" means a flange attached to the tank by a weld joining the tank shell to the cylindrical outer surface of the flange, or by a fillet weld joining the tank shell to a flange shaped to fit the shell contour.

(d) A manufacturer of a cargo tank must hold a current ASME certificate of authorization and must be registered with the Department in accordance with Part 107, Subpart F of this chapter.

(e) All construction must be certified by an Authorized Inspector or by a Registered Inspector as applicable to the cargo tank.

(f) Each cargo tank must be designed and constructed in conformance with the requirements of the applicable cargo tank specification. Each DOT 412 cargo tank with a maximum allowable working pressure greater than 15 psig, and each DOT 407 cargo tank with a maximum allowable working pressure greater than 35 psig must be "constructed and certified in conformance with the ASME Code" except as limited or modified by the applicable cargo tank specification. Other cargo tanks must be "constructed accordance with the ASME Code", .cept as limited or modified by the applicable cargo tank specification.

(g) Requirements relating to parts and accessories on motor vehicles, which are contained in Part 393 of the Federal Motor Carrier Safety Regulations of this title, are incorporated into these specifications.

(h) Any additional requirements prescribed in Part 173, 177, or 180 of this subchapter that pertain to the transportation of specific lading are incorporated into these specifications.

(i) *Cargo tank motor vehicle composed of multiple cargo tanks.*

(1) A cargo tank motor vehicle composed of more than one cargo tank may be constructed with the cargo tanks made to the same specification or to different specifications. Each cargo tank must conform in all respects with the specification for which it is certified.

(2) The strength of the connecting structure joining multiple cargo tanks in a cargo tank motor vehicle must meet the structural design requirements in § 178.345–3. Any void within the connecting structure must be vented to the atmosphere by a drain of at least 1 inch inside diameter which shall be kept open at all times. The connecting structure must have inspection openings of sufficient size and number to permit proper visual internal inspection of the connecting structure and cargo tank surfaces. Each drainage and inspection opening must be accessible.

(j) *Variable specification cargo tank.* A cargo tank that may be physically altered to conform to another cargo tank specification must have the required physical alterations to convert from one specification to another clearly indicated on the variable specification plate.

(k) *Maximum Allowable Working Pressure (MAWP).* The MAWP for each cargo tank must be greater than or equal to the largest of the following (The MAWP derived is the pressure to be used as prescribed in the ASME Code in the design of the tank):

(1) The pressure prescribed for the lading in Part 173;

(2) Vapor pressure of the most volatile lading, at 115 °F (expressed in psig), plus the maximum static pressure exerted by the lading at the maximum lading density, plus any pressure exerted by a gas padding (including air in the ullage space or dome), if used; or

(3) The maximum pressure in the tank during loading or unloading.

§ 178.345–2 Material and material thickness.

(a) All material for shell, heads, bulkheads, and baffles must be metal compatible with the lading intended to be transported therein and must conform to Section II, Parts A and B, of the ASME Code except as follows:

(1) ASTM A 676 or ASTM A 715 steels are also authorized for cargo tanks "constructed in accordance with the ASME Code".

(2) Aluminum alloys suitable for fusion welding and conforming with the 0, H32 or H34 tempers of one of the following ASTM specifications may be used for cargo tanks "constructed in accordance with the ASME Code":

ASTM B–209 Alloy 5052
ASTM B–209 Alloy 5086
ASTM B–209 Alloy 5154
ASTM B–209 Alloy 5254
ASTM B–209 Alloy 5454
ASTM B–209 Alloy 5654

All heads, bulkheads and baffles must be of 0 temper (annealed) or stronger tempers. All shell materials shall be of H 32 or H 34 tempers except that the lower ultimate strength tempers may be used if the minimum shell thicknesses in the tables are increased in inverse proportion to the lesser ultimate strength.

(b) *Minimum thickness.* The minimum thickness for the shell and heads must be such that the maximum stress levels specified in § 178.345–3(a), (b), (c), or (d) of this subpart are not exceeded. In no case may the shell or head thickness be less than that specified in the applicable specification.

(c) *Corrosion or abrasion protection.* A cargo tank or a part thereof, subject to thinning by corrosion or mechanical abrasion due to the lading, must be protected by providing the tank or part of the tank with a suitable increase in thickness of material, a lining or some other suitable method of protection.

(1) *Corrosion allowance.* Material added for corrosion allowance need not be of uniform thickness if different rates of attack can reasonably be expected for various areas of the tank.

(2) *Lining.* Lining material must consist of a nonporous, homogeneous material not less elastic than the parent metal and substantially immune to attack by the lading. The lining material must be bonded or attached by other appropriate means to the tank wall and must be imperforate when applied. Any joint or seam in the lining must be made by fusing the materials together, or by other satisfactory means.

§ 178.345–3 Structural integrity.

(a) The maximum calculated design stress value (the effective stress on the tank shell in any plane normal to the longitudinal axis) may not exceed the maximum design stress value prescribed in Section VIII of the ASME Code or 25 percent of the minimum specified tensile

strength of the metal at any point in the cargo tank. The forces, loads and stresses must take into account the weight of the tank, the maximum weight of lading and the weight of structures supported by the tank but not including the weight of the structures supporting the tank in normal conditions. The accelerative, decelerative and lateral forces must be applied separately. The combination case which produces the maximum effective stress shall govern. Corrosion allowance material may not be used to satisfy the design requirements.

(1) The design and construction of each cargo tank must provide for all potential structural loadings, including but not limited to dynamic loads, superimposed loadings, and the effect of temperature gradients resulting from lading and ambient temperature extremes. Thermal coefficients of dissimilar materials must be considered in the calculation of the design stress value.

(2) Maximum concentrated stresses which might be created at pads, cradles or supports due to shear, bending and torsion shall also be considered and calculated in accordance with Appendix G of Section VIII of the ASME Code.

(b) Analysis of basic cargo tank structural integrity must be made using the conditions specified in paragraph (a) of this section. The stresses involved are not uniform through the length of the tank. Calculation of the basic structural integrity must be made by the following formula:

$$S = 0.5(S_y + S_x) \pm [0.25(S_y - S_x)^2 + S_s^2]^{0.5}$$

where at any given point under consideration, and for the worst combination of loadings that can occur at the same time, the stress levels produced at the point being considered are:

S = Effective stress as limited by this requirement, in psi.

S_y = The circumferential tensile stress due to internal pressure, in psi.

S_x = The following tensile or/and compressive stresses (in psi) that apply.

(1) The longitudinal tensile stresses due to internal pressure;

(2) The tensile or compression stress generated by the axial load resulting from a decelerative force equal to 0.75 times the static weight of the fully loaded vehicle applied independently to each suspension assembly at the road surface;

(3) The tensile or compression stress generated by the bending moment resulting from a decelerative force equal to 0.75 times the static weight of the fully loaded vehicle applied independently to each suspension assembly at the road surface;

(4) The tensile or compression stress generated by the axial load resulting from an accelerative force equal to 0.75 times the static weight of the fully loaded vehicle applied to the horizontal pivot of the upper coupler (fifth wheel) supporting the vehicle;

(5) The tensile or compression stress generated by the bending moment resulting from an accelerative force equal to 0.75 times the static weight of the fully loaded vehicle applied to the horizontal pivot of the upper coupler (fifth wheel) supporting the vehicle;

(6) The tensile or compression stress due to a bending moment produced by a vertical force equal to 1.7 times the static weight of the tank and contents.

S_s = The following shear stresses (in psi) that apply.

(1) The vertical shear stress due to a vertical force equal to 1.7 times the static weight of the tank and contents;

(2) The lateral shear stress due to a lateral accelerative force equal to 0.4 times the static weight of the tank and contents applied at the road surface; and

(3) The torsional shear stress due to a lateral accelerative force equal to 0.4 times the static weight of the tank and contents applied at the road surface.

(c) In addition to meeting the conditions specified in paragraph (a) of this section, the design calculations for the tank heads and shell must include the load resulting from the MAWP in combination with the dynamic pressure resulting from a longitudinal deceleration of 2 "g". For this loading, the design stress value used must not exceed the lesser of the yield strength or 75 percent of the ultimate tensile strength of the material of construction. The stress valve requiring the greatest wall thickness derived from paragraph (a), (b), or (c) of this section must be used.

(d) If a tank is supported by a vehicle frame or other form of structural support, a tank shell or head thickness less than that specified in paragraph (c) of this section may be used provided that the effective stresses prescribed in paragraph (b) of this section are fully evaluated and considered.

(e) The design, construction, and installation of any appurtenance to the shell or head of the cargo tank must minimize the possibility of appurtenance damage or failure adversely affecting the lading retention integrity of the tank.

(1) Structural members, the suspension subframe, accident protection devices and external rings should be used as sites for attachment of appurtenances and other accessories to the cargo tank when practicable.

(2) A lightweight attachment, such as a conduit clip, brakeline clip, skirting structure, lamp mounting bracket or placard holder, must be constructed of a material of lesser strength than the tank shell or head material and may not be more than 72 percent of the thickness of the tank shell or head to which it is attached. The lightweight attachment may be secured directly to the tank shell or head if the device is designed and installed in such a manner that if damaged it will not affect the lading retention integrity of the tank. The attachment must be secured to the tank shell or head by continuous weld or in such manner as to preclude formation of pockets, which may become sites for incipient corrosion.

(3) Except as prescribed in paragraphs (e)(1) and (e)(2) of this section, the welding of any appurtenance to a shell or head must be made by attachment of a mounting pad so that there will be no adverse effect upon the lading retention integrity of the tank, if any force less than that prescribed in § 178.345-8(b)(1) is applied. The thickness of a mounting pad may not be less than that of the shell or head to which it is attached and not more than 1.5 times the shell or head thickness. However, a pad not less than 3/16 inch thick may be used when the shell or head is over 3/16 inch thick. If weep holes or tell-tale holes are used, the pad must be drilled or punched at its lowest point before it is attached to the tank. Each pad must:

(i) extend at least 2 inches in each direction from any point of attachment of an appurtenance;

(ii) have rounded corners, or otherwise be shaped in a manner to minimize stress concentrations on the shell or head; and

(iii) be attached by a continuous weld around the pad except for a small gap at the lowest point for draining.

§ 178.345-4 Joints.

(a) All joints between tank shell, heads, baffles, baffle attaching rings, and bulkheads must be welded in conformance with the ASME Code welding procedures.

(b) Where practical all welds must be easily accessible for inspection.

§ 178.345-5 Manhole assemblies.

(a) Each cargo tank with capacity greater than 400 gallons must be accessible through a manhole at least 15 inches in diameter.

(b) Each manhole, fill opening and washout assembly must be structurally capable of withstanding, without leakage or permanent deformation that would affect its structural integrity, a static internal fluid pressure of at least 36 psig, or cargo tank test pressure, whichever is greater. The manhole assembly manufacturer shall verify compliance with this requirement by hydrostatically testing at least one percent (or one manhole closure, whichever is greater) of all manhole

losures of each type produced each 3 onths, as follows:

(1) The manhole, fill opening, or ashout assembly must be tested with the venting devices blocked. Any leakage or deformation that would affect the product retention capability of the assembly shall constitute a failure.

(2) If the manhole, fill opening, or washout assembly tested fails, then five more covers from the same lot must be tested. If one of these five covers fails, then all covers in the lot from which the tested covers were selected are to be 100% tested or rejected for service.

(c) Each manhole, filler and washout cover must be fitted with a safety device that prevents the cover from opening fully when internal pressure is present.

(d) Each manhole and fill cover must be secured with fastenings that will prevent opening of the covers as a result of vibration under normal transportation conditions or shock impact due to a rollover accident on the roadway or shoulder where the fill cover is not struck by a substantial obstacle.

(e) Each manhole cover must be permanently marked by stamping or other means with:

(1) Manufacturer's name;

(2) Test pressure _____ psig;

(3) A statement certifying that the manhole cover meets the requirements in § 178.345–5.

§ 178.345–6 Supports and anchoring.

(a) A cargo tank with a frame not integral to the tank must have the tank secured by restraining devices to eliminate any motion between the tank and frame that may abrade the tank shell due to the stopping, starting, or turning of the vehicle. The design calculations of the support elements must include the stresses indicated in § 178.345–3(b). Such restraining devices must be readily accessible for inspection and maintenance, except that insulation and jacketing are permitted to cover the restraining devices.

(b) A cargo tank designed and constructed so that it constitutes, in whole or in part, the structural member used in lieu of a frame must be supported in such a manner that the resulting stress levels in the tank do not exceed those specified in § 178.345–3(a). The design calculations of the support elements must include the stresses indicated in § 178.345–3(b).

§ 178.345–7 Circumferential reinforcements.

(a) A tank with a shell thickness of less than ⅜ inch must be circumferentially reinforced with bulkheads, baffles, ring stiffeners, or any combination thereof, in addition to the tank heads.

(1) Circumferential reinforcement must be located so that the thickness and tensile strength of the shell material in combination with the frame and reinforcement produces structural integrity at least equal to that prescribed in § 178.345–3 (a) and (b) and in such a manner that the maximum unreinforced portion of the shell does not exceed 60 inches. Circumferential reinforcement spacing of cargo tanks designed to be loaded by vacuum may exceed 60 inches provided the maximum unreinforced portion of the shell conforms with the requirements of Section VIII, Division 1 of the ASME Code.

(2) Circumferential reinforcement must be located within one inch of points where discontinuity in the longitudinal shell sheet alignment exceeds 10 degrees unless otherwise reinforced with structural members capable of maintaining shell stress levels authorized in § 178.345–3(a).

(b) Except for doubler plates and knuckle pads, no reinforcement may cover any circumferential joint.

(c) A baffle or baffle attachment ring, if used as a required reinforcement member, must produce structural integrity at least equal to that prescribed in § 178.345–3 and must be circumferentially welded to the tank shell. The welded portion must not be less than 50 percent of the total circumference of the tank and the length of any unwelded space on the joint shall not exceed 40 times the shell thickness.

(d) *Stiffening rings.* (1) Stiffening rings, when used to conform with this section, must be continuous around the circumference of the tank shell and must have a section modulus about the neutral axis of the ring section parallel to the shell at least equal to that determined as follows:

$I/C\ (min) = 0.00027\ WL$ for MS, HSLA and stainless steels

$I/C\ (min) = 0.000467\ WL$ for aluminum alloys

Where:

I/C = Section modulus in inches

W = Tank width or diameter in inches

L = Ring spacing in inches; i.e., the maximum distance from the midpoint of the unsupported shell on one side of the ring stiffener to the midpoint of the unsupported shell on the opposite side of the ring stiffener.

(2) If a ring stiffener is welded to the tank shell, a portion of the shell may be considered as part of the ring section for purposes of computing the ring section modulus. This portion of the shell may be used provided at least 50 percent of the total circumference of the tank is welded and the length of any unwelded space on the joint does not exceed 40 times the shell thickness. The maximum portion of the shell to be used in these calculations is as follows:

Circumferential ring stiffener to tank shell welds	Distance between parallel circumferential ring stiffener to shell welds	Shell section
1		20t
2	Less than 20t	20t + W
3	20t or more	40t

where:

t = Shell thickness.

W = Distance between parallel circumferential ring stiffener to shell welds.

(3) Stiffening rings, when used to conform with the vacuum requirements of this section, must be as prescribed in the ASME Code.

(4) If configuration of internal or external ring stiffener encloses an air space, this air space shall be arranged for venting and be equipped with drainage facilities which shall be kept operative at all times.

(5) Stiffening rings must be of the type that can be visually inspected. Hat shaped or open channel rings which preclude visual inspection of the tank shell are prohibited on cargo tanks constructed of carbon steel.

§ 178.345–8 Accident damage protection.

(a) *General.* Each cargo tank and its associated piping, closures and valves must be designed and constructed to minimize the potential for the loss of lading due to an accident. The cargo tank design and construction should take into consideration the potential for puncture, abrasion, crush, dynamic pressure, and impact and inertial loadings.

(1) Any dome, sump, or washout cover plate projecting from the cargo tank wall that retains lading in any tank orientation, must be as strong and tough as the tank wall and have a thickness at least equal to that specified by the appropriate cargo tank specification. Any such projection located in the lower one-third of the tank circumference (or cross section perimeter for non-circular tanks) that extends more than half its diameter at the point of attachment to the tank or more than 4 inches from the tank wall, or located in the upper ⅔ of the tank circumference for circular tanks (or the upper ⅔ of the cargo tank cross section perimeter for non-circular tanks) that extends more than one-fourth its diameter or 2 inches from the point of attachment to the tank must have accident damage protection devices that are:

(i) As specified in this section;

(ii) 125 percent as strong as the otherwise required accident damage protection device; or

(iii) Attached to the cargo tank in accordance with the requirements of paragraph (a)(3) of this section.

(2) Outlets, valves, closures, piping, or any devices that if damaged in an accident could result in a loss of lading from the cargo tank must be protected by accident damage protection devices as specified in this section.

(3) Accident damage protection devices attached to the wall of a cargo tank must be designed, constructed, and installed so as to maximize the distribution of loads to the tank wall and minimize the possibility of adversely affecting the lading retention integrity of the cargo tank. Each accident damage protection device may be designed to prevent loss of the lading retention capability of the cargo tank by failure of the device from loads in excess of those required in this section. In this case, accident induced stresses resulting from the appropriate accident damage protection device requirements in combination with the stresses from the tank operating at the MAWP may not result in a tank wall stress greater than 75 percent of the ultimate strength of the tank material.

(4) Any piping that extends beyond an accident damage protection device must be equipped with a stop-valve and a sacrificial device such as a shear section. The sacrificial device must be located in the piping system outboard of the stop-valve and within the accident damage protection device to prevent any accidental loss of lading. The device must break at no more than 70 percent of the load that would be required to cause the failure of the protected lading retention device, part or tank wall. The failure of the sacrificial device must leave the protected lading retention device and its attachment to the tank wall intact and capable of retaining product.

(5) *Minimum road clearance.* The minimum allowable road clearance of any cargo tank component or protection device located between any two adjacent axles on a vehicle or vehicle combination shall be at least one-half inch for each foot separating such axles, and in no case less than 12 inches.

(b) *Bottom damage protection.* Each outlet, projection or piping located in the lower ⅓ of the tank circumference (or cross section perimeter for non-circular tanks) that could be damaged in an accident thereby resulting in the loss of lading must be protected by a bottom damage protection device, except as provided by § 178.345-8(a)(1).

(1) Any bottom damage protection device must be able to withstand or deflect away from the cargo tank a force of 155,000 pounds (based on the ultimate strength of the material) from the front, side, or rear, uniformly distributed over each surface of the device, over an area not to exceed 6 square feet, and a width not to exceed 6 feet. The device must extend an adequate distance, such that the piping or other component being protected will not be damaged, and in no case less than 6 inches beyond any component that may contain lading.

(2) A lading discharge opening equipped with an internal self-closing stop-valve need not conform to paragraph (b)(1) of this section provided it is protected so as to reasonably assure against the accidental loss of lading. This protection must be provided by a sacrificial device located outboard of each internal self-closing stop-valve and within 4 inches of the major radius of the tank shell or within 4 inches of a sump, but in no case more than 8 inches from the major radius of the tank shell. The device must break at no more than 70 percent of the load that would be required to cause the failure of the protected lading retention device, part or tank wall. The failure of the sacrificial device must leave the protected lading retention device or part and its attachment to the tank wall intact and capable of retaining product.

(c) *Rollover Damage Protection.* Each closure for openings, including but not limited to manhole, filling or inspection openings, and each valve, fitting, pressure relief device, vapor recovery system or other accessory located in the upper ⅔ of a cargo tank circumference for circular tanks (or the upper ⅔ of a cargo tank cross section perimeter for non-circular tanks) must be protected by being enclosed inside the body of the tank, by being enclosed inside a rollover damage protection device, or by being 125 percent as strong as the otherwise required damage protection device.

(1) A rollover damage protection device on a cargo tank motor vehicle must be designed and installed to withstand a load normal (perpendicular to the tank surface) and tangential from any direction (perpendicular to the normal load) to the tank shell equal to at least twice the weight of the loaded cargo tank motor vehicle, based on the ultimate strength of the material used. These design loads may be considered independently. If more than one rollover protection device is used, each device must be capable of carrying its proportionate share of the required loads and in each case at least one-fourth the required total tangential load. The design must be proven capable of carrying the required loads by calculations, tests or a combination of tests and calculations. Deformation of the protection device is acceptable provided the devices being protected are not damaged.

(2) A rollover damage protection device that would otherwise allow the accumulation of liquid on the top of the tank, must be provided with a drain that directs the liquid to a safe point of discharge away from any structural component of the cargo tank motor vehicle.

(d) *Rear-end protection.* Each cargo tank shall be provided with a rear accident damage protection device to protect the tank and piping in the event of a rear-end collision and reduce the likelihood of damage which could result in the loss of lading. The rear-end tank protection device must conform to the following requirements (Nothing in this paragraph shall be construed to relieve a manufacturer of responsibility for complying with the requirements of § 393.86 of this title):

(1) The inboard surface of the rear-end tank protection device shall be located at least 6 inches to the rear of any vehicle component used for loading or unloading or that may contain lading while the vehicle is in transit, in order to prevent the device from applying force upon the cargo tank or tank components in the event of an accident.

(2) The dimensions of the rear-end tank protection device shall conform to the following:

(i) The bottom surface of the rear-end protection device must be at least 4 inches below the lower surface of any valve, fitting, or piping at the rear of the tank and not more than 60 inches from the ground with the vehicle empty.

(ii) The maximum width of a notch, indentation, or separation between sections of a rear-end tank protection device may not exceed 24 inches. A notched, indented, or separated rear-end protection device may be used only when the piping at the rear of the tank is equipped with a sacrificial device outboard of a shut-off valve.

(iii) The widest part of the motor vehicle at the rear may not extend more than 18 inches beyond the outermost ends of the device or (if separated) devices on either side of the vehicle.

(3) The structure of the rear-end tank protection device and its attachment to the vehicle must be designed to withstand, without leakage of lading, the impact of the cargo tank motor vehicle at rated payload, at a deceleration of 2 "g" using a safety factor of two based on the ultimate strength of the materials used. Such impact shall be considered

uniformly distributed and applied horizontally (parallel to the ground) from any direction at an angle not to exceed 30 degrees to the longitudinal axis of the vehicle.

§ 178.345-9 Pumps, piping, hoses and connections.

(a) Each loading or unloading pump mounted on a cargo tank motor vehicle that may pressurize the cargo tank must be provided with an automatic means of closure to prevent internal pressure from exceeding the MAWP of the tank and tank-mounted equipment.

(b) Each hose, piping, stop-valve, lading retention fitting and closure for each cargo tank must be designed for a bursting pressure of at least 100 psig, and not less than four times the cargo tank MAWP. Each hose coupling must be designed for a bursting pressure of not less than 120 percent of the design bursting pressure of the hose and must be so designed that there will be no leakage when connected.

(c) Suitable provision must be made to allow for and prevent damage due to expansion, contraction, jarring, and vibration. Slip joints may not be used for this purpose.

(d) Any heating device, when installed, must be so constructed that the breaking of its external connections will not cause leakage of the tank lading.

(e) Any gauging, loading or charging device, including associated valves, must be provided with an adequate means of secure closure to prevent leakage.

(f) The attachment and construction of each loading/unloading or charging line must be of sufficient strength, or be protected by a sacrificial device, such that any load applied by loading/unloading or charging lines connected to the cargo tank cannot cause damage resulting in loss of lading from the cargo tank.

(g) Use of a nonmetallic pipe, valve or connection that is not as strong and heat resistant as the tank material is authorized only if such attachment is located outboard of the product retention system.

§ 178.345-10 Pressure relief.

(a) Each cargo tank must be equipped with a pressure relief system and when required with a vacuum relief system in conformance with this section and the applicable individual specification. The pressure and vacuum relief system must be designed to operate and have sufficient capacity to prevent tank rupture or collapse due to over-pressurization or vacuum resulting from tank heating, cooling, loading or unloading.

(b) *Type and construction of relief systems and devices*

(1) Each cargo tank must be provided with a primary pressure relief system consisting of one or more reclosing pressure relief valves. A secondary pressure relief system consisting of another pressure relief valve in parallel with the primary pressure relief system may be used to augment the total venting capacity of the cargo tank. Non-reclosing pressure relief devices are not authorized in any cargo tank except when in series with a reclosing pressure relief device. Gravity actuated reclosing valves are not authorized on any cargo tank.

(2) If a frangible (rupture) disk is inserted in series with a reclosing pressure relief valve, the space between the frangible (rupture) disk and the valve must be provided with a suitable tell-tale indicator to permit detection of any frangible (rupture) disk pinholing or leakage which may cause a malfunction of the pressure relief system. The frangible (rupture) disk must rupture at a tank pressure within the range specified in paragraph (d)(1) of this section.

(3) Each pressure relief system must be designed to prevent loss of lading from the system in case of pressure surges, vehicle upset or accident, regardless of vehicle orientation. A pressure relief system designed to withstand a dynamic pressure surge of 50 psig applied for at least 300 milliseconds without leakage of liquid lading may be considered to be in compliance with this requirement. After June 6, 1994, each pressure relief system must be designed to withstand a dynamic pressure surge of 50 psig applied for at least 300 milliseconds without leakage of liquid lading regardless of vehicle orientation. Each pressure actuated relief system must function in the event of sustained pressure rise in excess of the prescribed set pressure. After June 12, 1991, each pressure actuated relief valve must be capable of reseating to a leak-tight condition, after a pressure surge and release of a lading volume of not more than one gallon. This requirement shall be considered to be met if the pressure relief valve successfully withstands the testing procedure outlined in TTMA RP No. 81—"Performance of Spring-Loaded Pressure Relief Valves on MC 306, MC 307, and MC 312 Tanks," except that in addition:

(i) For this test, the drop height and cushioning must be calibrated to produce a measured pressure generated in the drop test vessel of not less than 50 psig for not less than 300 milliseconds with the pressure actuated relief valve blocked closed;

(ii) The total pressure resulting from static head and pad pressure, exerted on the pressure actuated relief valve immediately before and after the drop test must be not less than the MAWP of the cargo tank; and

(iii) The total volume of liquid released during the test shall not exceed one gallon.

(4) Each reclosing pressure relief valve must be constructed and installed in such a manner that unauthorized adjustment of the relief setting can be detected and corrected.

(5) No shut-off valve or other device that could prevent venting through the pressure relief system may be installed in a pressure relief system.

(6) The pressure relief system must be mounted, shielded and drainable so as to minimize the accumulation of material that could impair the operation or discharge capability of the system by freezing, corrosion or blockage.

(c) *Location of relief devices.* Each pressure relief device must communicate with the vapor space of the tank in a position as near as possible to the longitudinal and transverse center of the tank. The discharge from any device must be unrestricted. Protective devices which deflect the flow of vapor are permissible provided the required vent capacity is maintained.

(d) *Settings of pressure relief system*—(1) *Primary pressure relief system.* Unless otherwise prescribed in the applicable individual specification, each primary pressure relief valve must be set to function at 120 percent of the MAWP and must start to open at not less than set pressure and not more than 110 percent of set pressure. The reclosing valve must reclose at a pressure not less than 90 percent of the set-to-discharge pressure and remain closed at lesser pressures, except as provided in § 178.346-10.

(2) *Secondary pressure relief system.* Each pressure relief valve used as a secondary relief device must be set-to-discharge at a pressure not less than 120 percent of the MAWP and be fully open at 150 percent of the MAWP.

(e) *Venting capacity of pressure relief systems.* The pressure relief system (primary and secondary, including any piping) in each tank, once fully opened, must have sufficient venting capacity to limit the tank internal pressure to a maximum of 150 percent of the tank's MAWP. This total venting capacity may not be less than that shown in Table 1 of this paragraph, except as provided in § 178.348-10.

TABLE 1.—MINIMUM EMERGENCY VENT CAPACITY

[In cubic feet free air/hour at 60 °F and 1 atm.]

Exposed area in square feet	Cubic feet free air per hour
20	15,800
30	23,700
40	31,600
50	39,500
60	47,400
70	55,300
80	63,300
90	71,200
100	79,100
120	94,900
140	110,700
160	126,500
180	142,300
200	158,100
225	191,300
250	203,100
275	214,300
300	225,100
350	245,700
400	265,000
450	283,200
500	300,600
550	317,300
600	333,300
650	348,800
700	363,700
750	378,200
800	392,200
850	405,900
900	419,300
950	432,300
1,000	445,000

Note 1: Interpolate for intermediate sizes.

(1) *Primary pressure relief system.* Unless otherwise specified in the applicable individual specification, the primary relief system must have a minimum venting capacity of 12,000 SCFH per 350 square feet of exposed tank area, but in any case at least one fourth the required total venting capacity for the cargo tank.

(2) *Secondary pressure relief system.* If the primary pressure relief system does not provide the required total venting capacity, additional capacity must be provided by a secondary pressure relief system.

(f) *Certification of pressure relief devices.* The manufacturer of any pressure relief device, including valves, frangible (rupture) disks, vacuum vents and combination devices must certify that the device model was designed and tested in accordance with this section and the appropriate cargo tank specification. The certificate must contain sufficient information to describe the device and its performance. The certificate must be signed by a responsible official of the manufacturer who approved the flow capacity certification.

(g) *Rated flow capacity certification test.* Each pressure relief device model must be successfully flow capacity certification tested prior to first use. Devices having one design, size and set pressure are considered to be one model. The testing requirements are as follows:

(1) At least 3 devices of each specific model must be flow capacity tested at a pressure not greater than 130 percent of the MAWP of the cargo tank. For a device model to be certified, the capacities of the devices tested must fall within a range of plus or minus 5 percent of the average for the devices tested.

(2) The rated flow capacity of a device model may not be greater than 90 percent of the average value for the devices tested.

(3) The rated flow capacity derived for each device model must be certified by a responsible official of the device manufacturer.

(h) *Marking of pressure relief devices.* Each pressure relief device must be permanently marked with the following:

(1) Manufacturer's name;

(2) Model number;

(3) Set-to-discharge pressure, in psig; and

(4) Rated flow capacity, in SCFH at the rating pressure, in psig.

§ 178.345–11 Tank outlets.

Each tank outlet that may contain lading in any tank attitude must be equipped with a stop-valve or other leak tight closure in accordance with this section (such tank outlets, closures and associated piping must be protected in accordance with § 178.345–8).

(a) Each loading/unloading outlet must be equipped with an internal self-closing stop valve or with an external self-closing stop valve located as close as possible to the tank shell. Each self-closing valve system must be designed to close within 30 seconds of actuation. Each self-closing stop valve must be designed such that during transportation the valve is in a securely closed position such that if the actuating system is sheared off or damaged in an accident, the valve will remain closed and capable of retaining product. For external valves, the self-closing function is required only for emergency situations such as a fire or hose rupture. During normal loading/unloading operations the valve may be manually operated. In addition to normal means of closure, each internal or external self-closing stop valve must be fitted with a remotely activated means of closure located more than 10 feet from the stop valve, as specified below. Cable linkage to these closures must be corrosion resistant and effective in all types of environment and weather. Any loading/unloading connection extending beyond the self-closing stop valve must be fitted with another stop valve at the end of such connection.

(1) For cargo tanks intended for flammable, pyrophoric, oxidizing or Poison B liquids, the remote means of closure must be activated for closure by manual or mechanical means. In addition, in case of fire each stop valve must be activated for closure by an automatic heat activated means located as close as possible to the loading/unloading connection. Thermally activated closures must activate at a temperature not over 250 °F.

(2) For cargo tanks intended exclusively for a lading other than those mentioned in paragraph (a)(1) of this section the remote means of closure may be actuated by manual or mechanical means only.

(b) Each tank outlet that is not a loading/unloading outlet must be equipped with a stop-valve or other leak tight closure located as close as practicable to the tank outlet. Any connection extending beyond this closure must be fitted with another stop-valve at the end of such connection.

§ 178.345–12 Gauging devices.

Each cargo tank except a tank intended to be filled by weight, must be equipped with a gauging device that indicates the maximum permitted liquid level to an accuracy of 0.5 percent. Gauge glasses are not permitted.

§ 178.345–13 Pressure and leakage tests.

(a) Each tank must be pressure and leak tested in accordance with this section and §§ 178.346–13(a), 178.347–13(a) or 178.348–13(a), as applicable.

(b) *Pressure test.* Each tank or tank compartment must be tested hydrostatically or pneumatically. Each tank of a multi-tank cargo tank motor vehicle must be tested with the adjacent tanks empty and at atmospheric pressure. Each closure, except pressure relief devices and loading/unloading venting devices rated at less than the prescribed test pressure, must be in place during the test. If the venting device is not removed during the test, such device must be rendered inoperative by a clamp, plug or other equally effective restraining device, which may not prevent the detection of leaks, or damage the device. Restraining devices must be removed immediately after the test is completed.

(1) *Hydrostatic method.* Each tank, including its domes, must be filled with water or other liquid having similar viscosity, the temperature of which may not exceed 100 °F. The tank must then be pressurized as prescribed in the applicable specification. The pressure

must be gauged at the top of the tank. The prescribed test pressure must be maintained for at least 10 minutes during which time the tank must be inspected for leakage, bulging, or other defect.

(2) *Pneumatic method.* A pneumatic test may be used in place of the hydrostatic test. The tank must be pressurized with air or similar gas. Test pressure must be reached gradually by increasing the pressure to one half of test pressure. Thereafter, the pressure must be increased in steps of approximately one tenth of the test pressure until test pressure is reached. Test pressure must be held for at least 5 minutes. The pressure must then be reduced to inspection pressure which must be maintained while the entire cargo tank surface is inspected for leakage or other sign of defects. The inspection method must consist of coating the entire surface of the tank, particularly each joint, with a solution of soap and water or other equally sensitive method. Suitable safeguards must be provided to protect employees and other persons should a failure occur.

(c) The cargo tank with all its accessories in place and operable must be leak tested at not less than 80 percent of tank's MAWP with the pressure maintained for at least 5 minutes.

(d) Any cargo tank that leaks, bulges or shows any other sign of defect must be rejected. Rejected cargo tanks must be suitably repaired and retested successfully prior to being returned to service. The retest after any repair must use the same method of test under which the cargo tank was originally rejected.

§ 178.345-14 Marking.

(a) *General.* The manufacturer shall certify that each cargo tank motor vehicle has been designed, constructed and tested in accordance with the applicable Specification DOT 406, DOT 407 or DOT 412 (§§ 178.345, 178.346, 178.347, 178.348 of this part) cargo tank requirements, and when applicable, with the ASME Code. The certification shall be accomplished by marking the tank as prescribed in paragraphs (b) and (c) of this section and by preparing the certificate prescribed in § 178.345-15. Metal plates prescribed by paragraphs (b), (c), (d) and (e) of this section must be permanently affixed to the tank or its integral supporting structure, by brazing, or welding around the plate perimeter. These plates must be affixed on the left side of the vehicle near the front of the cargo tank (or the front-most tank of a multi tank cargo tank motor vehicle), in place readily accessible for inspection. The plates must be permanently and plainly marked in English by stamping, embossing or other means in characters at least 3/16 inch high.

(b) *Nameplate.* Each cargo tank must have a corrosion resistant nameplate permanently attached to it. The following information, in addition to that required by the ASME Code, must be marked on the tank nameplate (parenthetical abbreviations may be used):

(1) DOT Specification number DOT XXX (DOT XXX), where "XXX" is replaced with the applicable specification number.

(2) Original test date, month and year (Orig. Test Date).

(3) Tank MAWP, in psig (MAWP).

(4) Tank test pressure (Test P), in psig.

(5) Tank design temperature range (Design temp. range)____ °F to ____ °F.

(6) Nominal capacity (Water cap.), in gallons.

(7) Maximum design density of lading (Max. design lading dens.), in pounds per gallon.

(8) Material specification number—shell (Mat spec.—shell yyy***), where "yyy" is replaced by the alloy designation and "***" by the alloy type.

(9) Material specification number—heads (Mat. spec.—heads yyy***), where "yyy" is replaced by the alloy designation and "***" by the alloy type.

(10) Minimum thickness—shell (Min. thick.—shell), top ____, side ____, bottom ____, in inches.

(11) Minimum thickness—heads (Min. thick.—head), in inches.

(12) Manufactured thickness—shell (Mfd. shell thick.), top ____, side ____, bottom ____, in inches.

(13) Manufactured thickness—heads (Mfd. heads thick.), in inches.

(14) Weld material (Weld mat.).

(15) Exposed surface area, in square feet.

(c) *Specification plate.* Each cargo tank motor vehicle must have an additional corrosion resistant metal specification plate attached to it. The specification plate must contain the following information (parenthetical abbreviations may be used):

(1) Cargo tank motor vehicle manufacturer (CTM veh. mfr.).

(2) Cargo tank motor vehicle certification date (CTM veh. cert. date), if different from the cargo tank certification date.

(3) Cargo tank manufacturer (CT mfr.);

(4) Cargo tank date of manufacture (CT date of mfr.), month and year.

(5) Maximum weight of lading (Max. payload), in pounds.

(6) Maximum loading rate in gallons per minute (Max load. rate, GPM) at maximum loading pressure ____ psig.

(7) Maximum unloading rate in gallons per minute (Max. unload. rate, GPM), at maximum unloading pressure ____ psig.

(8) Lining material (Lining).

(9) Heating system design pressure (Heating sys. press.), in psig, if applicable.

(10) Heating system design temperature (Heating sys. temp.), in °F, if applicable.

(d) *Multi-tank cargo tank motor vehicle.* For a cargo tank motor vehicle having one cargo tank or having all its cargo tanks not separated by any void space, the information required by paragraphs (b) and (c) of this section may be combined on one specification plate. When separated by a void space, each cargo tank must have an individual nameplate as required in paragraph (b) of this section. The cargo tank motor vehicle may have a combined nameplate and specification plate. When only one plate is used, the plate must be visible and not covered by any insulation and the required information must be listed on the plate from front to rear in the order of the corresponding cargo tank location.

(e) *Variable specification cargo tank.* Each variable specification cargo tank must have a corrosion resistant metal variable specification plate attached to it. The mounting of this variable specification plate must be such that only the plate identifying the applicable specification under which the tank is being operated is legible.

(1) The following information must be included (parenthetical abbreviations are authorized):

Specification DOT XXX (DOT XXX), where "XXX" is replaced with the applicable specification number.

Equipment required	Required rating [1]
Pressure relief devices:	
Pressure actuated type	
Fusible type	
Frangible type	
Lading discharge devices	
Top	
Bottom	
Pressure unloading fitting	
Closures:	
Manhole	
Fill openings	
Discharge openings	

[1] Required rating—to meet the applicable specification.

(2) If no change of information in the specification plate is required, the letters "NC" must follow the rating required. If the cargo tank is not so equipped, the word "None" must be inserted.

(3) Those parts to be changed or added must be stamped with the appropriate MC or DOT Specification markings.

(4) The alterations that must be made in order for the tank to be modified from one specification to another must be clearly indicated on the manufacturer's certificate and on the variable specification plate.

§ 178.345-15 Certification.

(a) The manufacturer of a cargo tank motor vehicle made to any of these specifications must furnish the owner, at or before the time of delivery, the following:

(1) A certificate signed by a responsible official of the manufacturer and a Registered Inspector certifying that the cargo tank motor vehicle is constructed, tested and completed in conformance with the applicable specification. The manufacturer's and the Registered Inspector's registration number must appear on the certificate (See Subpart F, Part 107 in subchapter B of this chapter).

(2) For a variable specification cargo tank, a certificate signed by a responsible official of the manufacturer and a Registered Inspector that the cargo tank is constructed for variable specification service. The certificate must include all the information required and marked on the variable specification plate.

(b) In the case of a cargo tank motor vehicle manufactured in two or more stages, each manufacturer who performs a manufacturing operation on the incomplete vehicle or portion thereof shall furnish to the succeeding manufacturer, at or before the time of delivery, a certificate covering the particular operation performed by that manufacturer and any certificate(s) received from previous manufacturers including the certificate received from the Design Certifying Engineer. The certificate(s) must include sufficient sketches or drawings, and other information to indicate the make, size, model and location of each valve and pressure relief device, and the arrangement of all piping associated with the tank. Each certificate must be signed by a responsible official of the manufacturing firm for the portion of the complete cargo tank motor vehicle represented thereby, such as basic tank fabrication, insulation, jacket, lining or piping. The final manufacturer shall furnish the owner with all certificates, excluding sketches and drawings.

§ 178.346 Specification DOT 406; cargo tank motor vehicle.

§ 178.346-1 General requirements.

(a) Each Specification DOT 406 cargo tank motor vehicle must meet the general design and construction requirements in § 178.345, in addition to the specific requirements contained in this section.

(b) *Maximum Allowable Working Pressure:* The MAWP of each cargo tank must be no lower than 2.65 psig and no higher than 4 psig.

(c) Vacuum loaded cargo tanks must not be constructed to this specification.

(d) Each cargo tank must be "constructed in accordance with the ASME Code" except as modified herein:

(1) The record-keeping requirements contained in the ASME Code Section VIII, Division I do not apply. Parts UG-90 thru 94 of Section VIII, Division I do not apply. Inspection and certification must be made by an inspector registered in accordance with Subpart F of Part 107.

(2) Loadings must be as prescribed in § 178.346-3.

(3) Formed heads must have a knuckle radius of at least 3 times the material thickness, and in no case less than one-half inch. Inserted or stuffed head attachment to the shell by fillet weld is authorized when such head is of a thickness authorized by UG-32 and § 178.346-2. Shell sections of cargo tanks designed with a non-circular cross-section need not be given a preliminary curvature, as prescribed in UG-79.

(4) Marking, certification, data reports, and nameplates must be as prescribed in §§ 178.345-14, 178.346-14, 178.345-15, and 178.346-15.

(5) Manhole closure assemblies must conform to §§ 178.345-5 and 178.346-5.

(6) Pressure relief devices must be as prescribed in §§ 178.345-10 and 178.346-10.

(7) The hydrostatic or pneumatic test must be as prescribed in §§ 178.345-13 and 178.346-13.

(8) The following parts of the ASME Code, Section VIII, Division I do not apply: UG-12, UG-34, UG-77, UG-80, UG-81, and UG-96.

§ 178.346-2 Material and thickness of material.

(a) The type and thickness of material for DOT 406 cargo tanks must conform to § 178.345-2 of this Part, but may in no case be less than that indicated in Tables I and II below.

TABLE I.—MINIMUM THICKNESS OF HEADS (OR BULKHEADS AND BAFFLES WHEN USED AS TANK REINFORCEMENT) USING MILD STEEL (MS), HIGH STRENGTH LOW ALLOY STEEL (HSLA), AUSTENITIC STAINLESS STEEL (SS) OR ALUMINUM (AL)—EXPRESSED IN DECIMALS OF AN INCH AFTER FORMING

Material	Volume capacity in gallons per inch of length								
	14 or less			Over 14 to 22			23 and over		
	MS	HSLA SS	AL	MS	HSLA SS	AL	MS	HSLA SS	AL
Thickness	.100	.100	.160	.115	.115	.173	.129	.129	.197

TABLE II.—MINIMUM THICKNESS OF SHELL USING MILD STEEL (MS), HIGH STRENGTH LOW ALLOY STEEL (HSLA), AUSTENITIC STAINLESS STEEL (SS) OR ALUMINUM (AL)—EXPRESSED IN DECIMALS OF AN INCH AFTER FORMING [1]

Rated capacity (gallons)	MS	SS/HSLA	AL
More than 0 to at least 4,500	0.100	0.100	0.151
More than 4,500 to at least 8,000	0.115	0.100	0.160
More than 8,000 to at least 14,000	0.129	0.129	0.173
More than 14,000	0.143	0.143	0.187

[1] Maximum distance between bulkheads, baffles, or ring stiffeners shall not exceed 60 inches.

§ 178.346–3 Structural integrity.

The structural integrity of each cargo tank motor vehicle must conform to § 178.345–3.

§ 178.346–4 Joints.

All joints in the fabrication of each cargo tank must conform to § 178.345–4.

§ 178.346–5 Manhole assemblies.

Each manhole assembly must conform to § 178.345–5.

§ 178.346–6 Supports and anchoring.

Supports and anchoring on each cargo tank motor vehicle must conform to § 178.345–6.

§ 178.346–7 Circumferential reinforcement.

The circumferential reinforcement on each cargo tank must conform to § 178.345–7.

§ 178.346–8 Accident damage protection.

Each cargo tank motor vehicle must be protected from accident damage in accordance with § 178.345–8.

§ 178.346–9 Pumps, piping, hoses and connections.

Each pump and all piping, hoses and connections on each cargo tank motor vehicle must conform to § 178.345–9.

§ 178.346–10 Pressure relief.

(a) Each cargo tank must be equipped with a pressure relief system in accordance with § 178.345–10 and this section.

(b) *Type and construction.* In addition to the pressure relief devices required in § 178.345–10:

(1) Each cargo tank must be equipped with one or more vacuum relief devices; and

(2) Each cargo tank may be equipped with one or more normal vents set to open at not less than 1 psig. Each normal vent must be designed to prevent loss of lading through the device in case of cargo tank motor vehicle overturn. Cargo tanks equipped with a normal vent may be used only for those ladings meeting the requirements of § 173.33(c)(1)(i)(c).

(c) *Pressure settings of relief valves.* (1) Notwithstanding the requirements of § 178.345–10, each pressure relief valve must:

(i) Be set to function at 125 percent of the MAWP and not less than 3.3 psig;

(ii) Function at a pressure not greater than 110 percent of the set pressure and not less than the set pressure;

(iii) Reclose at a pressure not less than 80 percent of the set-to-discharge pressure.

(2) Each vacuum relief device must be set to open at no more than 6 ounces vacuum.

(d) *Venting capacities.*

(1) The total venting capacity of the pressure relief system must limit the cargo tank pressure to not greater than cargo tank test pressure. The total venting capacity rated at no greater than cargo tank test pressure, must be at least that specified in the table in § 178.345–10(e).

(2) The primary pressure relief valve must have a minimum venting capacity of at least 6,000 SCFH of free air, rated at not greater than the tank test pressure.

(3) Each vacuum relief system must have sufficient capacity to limit the vacuum to 1 psig.

(4) If pressure loading or unloading devices are provided, the relief system must have adequate vapor and liquid capacity to limit the tank pressure to 130 percent of MAWP at maximum loading or unloading rate. The maximum loading and unloading rates must be included on the metal specification plate.

§ 178.346–11 Outlets.

(a) All outlets on each tank must conform to § 178.345–11 and this section.

(b) External self-closing stop-valves are not authorized as an alternative to internal self-closing stop-valves on loading/unloading outlets.

§ 178.346–12 Gauging devices.

Any gauging device on DOT 406 cargo tanks must conform to § 178.345–12.

§ 178.346–13 Pressure and leakage tests.

(a) Each cargo tank must be tested in accordance with § 178.345–13 and this section.

(b) *Pressure test.* Test pressure must be as follows:

(1) Using the hydrostatic test method, the test pressure must be the greater of 5.0 psig or 1.5 times the cargo tank MAWP.

(2) Using the pneumatic test method, the test pressure must be the greater of 5.0 psig or 1.5 times the cargo tank MAWP, and the inspection pressure must be the cargo tank MAWP.

(c) *Leakage test.* Where applicable, the Environmental Protection Agency's "Method 27—Determination of Vapor Tightness of Gasoline Delivery Tank Using Pressure—Vacuum Test" 40 CFR Part 60 Appendix A, is an acceptable alternate leakage test.

§ 178.346–14 Marking.

Each cargo tank motor vehicle must be marked in accordance with § 178.345–14.

§ 178.346–15 Certification.

Each cargo tank motor vehicle must be certified in accordance with § 178.345–15.

§ 178.347 Specification DOT 407; cargo tank motor vehicle.

§ 178.347–1 General requirements.

(a) Each specification DOT 407 cargo tank motor vehicle must conform to the general design and construction requirements in § 178.345 in addition to the specific requirements contained in this section.

(b) Each tank must be of a circular cross-section and have an MAWP of at least 25 psig.

(c) Any cargo tank built to this specification with a MAWP greater than 35 psig and each tank designed to be loaded by vacuum must be "constructed and certified in accordance with the ASME Code". The external design pressure for a cargo tank loaded by vacuum must be at least 15 psi.

(d) Each cargo tank built to this specification with MAWP less than 35 psig must be "constructed in accordance with the ASME Code" except as modified herein:

(1) The record-keeping requirements contained in the ASME Code, Section VIII, Division I, do not apply. The inspection requirements of parts UG–90 thru 94 do not apply. Inspection and certification must be made by an inspector registered in accordance with Subpart F of Part 107.

(2) Loadings must be as prescribed in § 178.347–3.

(3) Formed heads must have a knuckle radius of at least 3 times the material thickness, and in no case less than one-half inch. Inserted or stuffed head attachment to the shell by fillet weld is authorized when such head is of a thickness authorized by UG–32 and § 178.347–2.

(4) Marking, certification, data reports and nameplates must be as prescribed in §§ 178.345–14, 178.347–14, 178.345–15, and 178.347–15.

(5) Manhole closure assemblies must conform to §§ 178.345–5 and 178.347–5.

(6) Pressure relief devices must be as prescribed in §§ 178.345–10 and 178.347–10.

(7) The hydrostatic or pneumatic test must be as prescribed in §§ 178.345–13 and 178.347–13.

(8) The following parts of the ASME Code do not apply: UG–12, UG–34, UG–77, UG–80, and UG–81, and UG–96.

§ 178.347–2 Material and thickness of material.

(a) The type and thickness of material for DOT 407 specification cargo tanks must conform to § 178.345–2 and this section. In no case may the thickness be less than that indicated in Tables I and II below.

TABLE I—MINIMUM THICKNESS OF HEADS, BULKHEADS AND BAFFLES WHEN USED AS TANK REINFORCEMENT) USING MILD STEEL (MS), HIGH STRENGTH LOW ALLOY STEEL (HSLA), AUSTENITIC STAINLESS STEEL (SS) AND ALUMINUM (AL)—EXPRESSED IN DECIMALS OF AN INCH

Volume capacity in gallons per inch	10 or less	Over 10 to 14	Over 14 to 18	Over 18 to 22	Over 22 to 26	Over 26 to 30	Over 30
Thickness (MS)	0.100	0.100	0.115	0.129	0.129	0.143	0.156
Thickness (HSLA)	0.100	0.100	0.115	0.129	0.129	0.143	0.156
Thickness (SS)	0.100	0.100	0.115	0.129	0.129	0.143	0.156
Thickness (AL)	0.160	0.160	0.173	0 187	0.194	0.216	0.237

TABLE II—MINIMUM THICKNESS OF SHELL USING MILD STEEL (MS), HIGH STRENGTH LOW ALLOY STEEL (HSLA), AUSTENITIC STAINLESS STEEL (SS) AND ALUMINUM (AL)—EXPRESSED IN DECIMALS OF AN INCH

Volume capacity in gallons per inch	10 or less	Over 10 to 14	Over 14 to 18	Over 18 to 22	Over 22 to 26	Over 26 to 30	Over 30
Thickness (MS)	0.100	0.100	0.115	0.129	0.129	0.143	0.156
Thickness (HSLA)	0.100	0.100	0.115	0.129	0.129	0.143	0.156
Thickness (SS)	0.100	0.100	0.115	0.129	0.129	0.143	0.156
Thickness (AL)	0.151	0.151	0.160	0.173	0.194	0.216	0.237

§ 178.347–3 Structural integrity.

The structural integrity of each cargo tank motor vehicle must conform to § 178.345–3.

§ 178.347–4 Joints.

All joints in the fabrication of each cargo tank must conform to § 178.345–4.

§ 178.347–5 Manhole assemblies.

Each manhole assembly must conform to § 178.345–5, except that each manhole assembly must be capable of withstanding internal fluid pressures of 40 psig or test pressure of the tank, whichever is greater.

§ 178.347–6 Supports and anchoring.

Supports and anchoring on each cargo tank motor vehicle must be in conformance with § 178.345–6.

§ 178.347–7 Circumferential reinforcement.

The circumferential reinforcement on each cargo tank must conform to § 178.345–7.

§ 178.347–8 Accident damage protection.

Each cargo tank motor vehicle must be protected from accident damage in accordance with § 178.345–8.

§ 178.347–9 Pumps, piping, hoses and connections.

Each pump and all piping, hoses and connections on each cargo tank motor vehicle must conform to § 178.345–9.

§ 178.347–10 Pressure relief.

(a) Each cargo tank must be equipped with a pressure and vacuum relief system in accordance with § 178.340–10 and this section.

(b) *Type and construction.* Vacuum relief devices are not required for cargo tanks designed to be loaded by vacuum.

(c) *Pressure settings of relief valves.* The setting of pressure relief valves must be in accordance with § 178.345–10(d).

(d) *Venting capacities.*

(1) The total venting capacity of the pressure relief system must limit the cargo tank pressure to not greater than 150 percent of the cargo tank MAWP. The total venting capacity, rated at no greater than 150 percent of the cargo tank MAWP, must be at least that specified in the table in § 178.345–10(e).

(2) The vacuum relief system must limit the vacuum to less than 80 percent of the design vacuum capability of the cargo tank.

(3) If pressure loading or unloading devices are provided, the relief system must have adequate vapor and liquid capacity to limit the tank pressure to 130 percent of the MAWP at maximum loading or unloading rate. The maximum loading or unloading rate must be included on the metal specification plate.

§ 178.347–11 Outlets.

All outlets on each tank must conform to § 178.345–11.

§ 178.347–12 Gauging devices.

Any gauging device on DOT 407 cargo tanks must conform to § 178.345–12.

§ 178.347–13 Pressure and leakage test.

(a) Each cargo tank must be tested in accordance with § 178.345–13 and this section.

(b) *Pressure test.* Test pressure must be as follows:

(1) Using the hydrostatic test method, the test pressure must be at least 40 psig or 1.5 times tank MAWP, whichever is greater.

(2) Using the pneumatic test method, the test pressure must be 40 psig or 1.5 times tank MAWP, whichever is greater, and the inspection pressure is tank MAWP.

§ 178.347–14 Marking.

Each cargo tank motor vehicle must be marked in accordance with § 178.345–14.

§ 178.347-15 Certification.

Each cargo tank motor vehicle must be certified in accordance with § 178.345-15.

§ 178.348 Specification DOT 412; cargo tank motor vehicle.

§ 178.348-1 General requirements.

(a) Each specification DOT 412 cargo tank motor vehicle must conform to the general design and construction requirements in § 178.345 in addition to the specific requirements of this section.

(b) The MAWP of each cargo tank must be at least 5 psig.

(c) The MAWP for each cargo tank designed to be loaded by vacuum must be at least 25 psig internal and 15 psig external.

(d) Each cargo tank having a MAWP greater than or equal to 15 psig must be of circular cross-section.

(e) Each cargo tank having a—

(1) MAWP greater than or equal to 15 psig must be "constructed and certified in conformance with the ASME Code "; or

(2) MAWP less than 15 psig must be "constructed in accordance with the ASME Code," except as modified herein:

(i) The record-keeping requirements contained in the ASME Code, Section VIII, Division I, do not apply. Parts UG-90 thru 94 of Section VIII, Division I do not apply. Inspection and certification must be made by an inspector registered in accordance with Subpart F of Part 107.

(ii) Loadings must be as prescribed in § 178.348-3.

(iii) Formed heads must have a knuckle radius of at least 3 times the material thickness, and in no case less than one-half inch. Inserted or stuffed head attachment to the shell by fillet weld is authorized when such head is of a thickness authorized by UG-32 and § 178.348-2. Shell sections of cargo tanks designed with a non-circular cross-section need not be given a preliminary curvature as prescribed in UG-79.

(iv) Marking, certification, data reports, and nameplates must be as prescribed in §§ 178.345-14, 178.348-14, 178.345-15, and 178.348-15.

(v) Manhole closure assemblies must conform to §§ 178.345-5 and 178.348-5.

(vi) Pressure relief devices must be as prescribed in §§ 178.345-10 and 178.348-10.

(vii) The hydrostatic or pneumatic test must be as prescribed in §§ 178.345-13 and 178.348-13.

(viii) The following parts of the ASME Code, Section VIII, Division I do not apply: UG-12, UG-34, UG-77, UG-80, UG-81, and UG-96.

§ 178.348-2 Material and thickness of material.

(a) The type and thickness of material for DOT 412 cargo tanks must conform to § 178.345-2 of this Part, but in no case may the thickness be less than that indicated in Tables I and II below.

TABLE I.—MINIMUM THICKNESS OF HEADS (AND BULKHEADS AND BAFFLES WHEN USED AS TANK REINFORCEMENT) USING MILD STEEL (MS), HIGH STRENGTH LOW ALLOY STEEL (HSLA), AUSTENITIC STAINLESS STEEL (SS) OR ALUMINUM EXPRESSED IN DECIMALS OF AN INCH

Volume capacity (gallons per inch)	10 or less				Over 10 to 14				Over 14 to 18			18 and over		
Lading density at 60 °F in pounds per gallon...	10 lbs and less	Over 10 to 13 lbs	Over 13 to 16 lbs	Over 16 to 26 lbs	10 lbs and less	Over 10 to 13 lbs	Over 13 to 16 lbs	Over 16 lbs	10 lbs and less	Over 10 to 13 lbs	Over 13 to 16 lbs	10 lbs and less	Over 10 to 13 lbs	Over 13 to 16 lbs
Thickness (inch), steel	.100	.129	.157	.187	.129	.157	.187	.250	.157	.250	.250	.157	.250	.312
Thickness (inch), aluminum	.144	.187	.227	.270	.187	.227	.270	.360	.227	.360	.360	.227	.360	.450

TABLE II.—MINIMUM THICKNESS OF SHELL USING MILD STEEL (MS), HIGH STRENGTH LOW ALLOY STEEL (HSLA) OR AUSTENITIC STAINLESS STEEL (SS)—EXPRESSED IN DECIMALS OF AN INCH

Volume capacity in gallons per inch	10 or less				Over 10 to 14				Over 14 to 18			18 and over		
Lading density at 60 °F in pounds per gallon...	10 lbs and less	Over 10 to 13 lbs	Over 13 to 16 lbs	Over 16 lbs	10 lbs and less	Over 10 to 13 lbs	Over 13 to 16 lbs	Over 16 lbs	10 lbs and less	Over 10 to 13 lbs	Over 13 to 16 lbs	10 lbs and less	Over 10 to 13 lbs	Over 13 to 16 lbs
Thickness (steel):														
Distances between heads (and bulkheads baffles and ring stiffeners when used as tank reinforcement):														
36 in. or less	.100	.129	.157	.187	.100	.129	.157	.187	.100	.129	.157	.129	.157	.187
Over 36 in. to 54 inches	.100	.129	.157	.187	.100	.129	.157	.187	.129	.157	.187	.157	.250	.250
Over 54 in. to 60 inches	.100	.129	.157	.187	.129	.157	.187	.250	.157	.250	.250	.187	.250	.312
Thickness (aluminum):														
Distances between heads (and bulkheads baffles and ring stiffeners when used as tank reinforcement):														
36 in. or less	.144	.187	.227	.270	.144	.187	.227	.270	.144	.187	.227	.187	.227	.270
Over 36 in. to 54 inches	.144	.187	.227	.270	.144	.187	.227	.270	.187	.227	.270	.157	.360	.360
Over 54 in. to 60 inches	.144	.187	.227	.270	.187	.227	.270	.360	.227	.360	.360	.270	.360	.450

Note: Thickness of aluminum material = Steel thickness from tables I and II times $(3 \times 10^7$ divided by E)$^{1/2}$, where: E = modulus of elasticity of material to be used.

§ 178.348-3 Structural integrity.

The structural integrity of each cargo tank motor vehicle must conform to § 178.345-3.

§ 178.348-4 Joints.

All joints in the fabrication of each cargo tank must conform to § 178.345-4.

§ 178.348-5 Manhole assemblies.

Each manhole assembly must conform to § 178.345-5.

§ 178.348-6 Supports and anchoring.

Supports and anchoring on each cargo tank motor vehicle must be in conformance with § 178.345-6.

§ 178.348-7 Circumferential reinforcement.

The circumferential reinforcement on each cargo tank must conform to § 178.345-7.

§ 178.348-8 Accident Damage Protection.

Each cargo tank motor vehicle must be protected from accident damage in accordance with § 178.345-8.

§ 178.348-9 Pumps, piping, hoses and connections.

Each pump and all piping, hoses and connections on each cargo tank motor vehicle must conform to § 178.345-9.

§ 178.348-10 Pressure relief.

(a) Each cargo tank must be equipped with a pressure and vacuum relief system in accordance with § 178.340-10 and this section.

(b) *Type and construction.* Vacuum relief devices are not required for cargo tanks designed to be loaded by vacuum.

(c) *Pressure settings of relief valves.* The setting of the pressure relief devices must be in accordance with § 178.345-10(d), except as provided in paragraph (d)(3) of this section.

(d) *Venting capacities.* (1) The vacuum relief system must limit the vacuum to less than 80 percent of the design vacuum capability of the cargo tank.

(2) If pressure loading or unloading devices are provided, the pressure relief system must have adequate vapor and liquid capacity to limit tank pressure to the cargo tank test pressure at the maximum loading or unloading rate. The maximum loading and unloading rates must be included on the metal specification plate.

(3) Cargo tanks used in dedicated service for materials classed as corrosive material, with no secondary hazard, may have a total venting capacity which is less than required by § 178.345-10(e). The total venting capacity for these cargo tanks must be determined in accordance with the formula contained in § 178.270-11(d)(3).

§ 178.348-11 Outlets.

All outlets on each tank must conform to § 178.345-11 and this section.

§ 178.348-12 Gauging devices.

Any gauging device must conform to § 178.345-12.

§ 178.348-13. Pressure and leakage test.

(a) Each cargo tank must be tested in accordance with § 178.345-13 and this section.

(b) Pressure test. Test pressure must be as follows:

(1) Using the hydrostatic test method, the test pressure must be at least 1.5 times MAWP.

(2) Using the pneumatic test method, the test pressure must be at least 1.5 times tank MAWP, and the inspection pressure is tank MAWP.

§ 178.348-14 Marking.

Each cargo tank motor vehicle must be marked and certified in accordance with § 178.345-14.

§ 178.348-15 Certification.

Each cargo tank motor vehicle must be certified in accordance with § 178.345-15.

101. A new part 180 is added to Subchapter C of Title 49 to read as follows:

PART 180—CONTINUING QUALIFICATION AND MAINTENANCE OF PACKAGINGS

Subpart A—General

Sec.

180.1 Purpose and scope.
180.2 Applicability
180.3 General Requirements.

Subpart B-D [Reserved]

Subpart E—Qualification and Maintenance of Cargo Tanks

180.401 Applicability.
180.403 Definitions.
180.405 Qualification of cargo tanks.
180.407 Requirements for test and inspection of cargo tanks.
180.409 Minimum qualifications for inspectors and testers.
180.411 Acceptable results of tests and inspections.
180.413 Repair, modification, stretching, or rebarrelling of cargo tanks.
180.415 Test and inspection markings.
180.417 Reporting and record retention requirements.

Authority: 49 U.S.C. 1803, 1804, 1806, 1808; 49 CFR Part 1, unless otherwise specified.

Subpart A—General

§ 180.1 Purpose and scope.

This part prescribes requirements pertaining to the maintenance, reconditioning, repair, inspection and testing of packagings, and any other function having an effect on the continuing qualification and use of a packaging under the requirements of this subchapter.

§ 180.2 Applicability.

(a) Any person who performs a function prescribed in this part shall perform that function in accordance with this part.

(b) Any person who performs a function prescribed in this part is considered subject to the regulations of this subchapter when that person—

(1) Makes any representation indicating compliance with one or more of the requirements of this part; or

(2) Reintroduces a packaging into commerce that bears markings indicating compliance with this part.

§ 180.3 General requirements.

(a) No person may represent, mark, certify, sell, or offer a packaging or container as meeting the requirements of this part, or an exemption pertaining to this part issued under Subchapter B of this chapter, whether or not the packaging or container is intended to be used for the transportation of a hazardous material, unless it is marked, maintained, reconditioned, repaired, or retested, as appropriate, in accordance with this part, an approval issued thereunder, or an exemption issued under Subchapter B of this chapter.

(b) The representations, markings, and certifications subject to the prohibitions of paragraph (a) of this section include:

(1) Identifications that include the letters "DOT", "MC", "ICC", or "UN";

(2) Exemption, approval, and registration numbers that include the letters "DOT";

(3) Test dates displayed in association with specification, registration, approval, or exemption markings indicating conformance to a test or retest requirement of this subchapter, an approval issued thereunder, or an exemption issued under Subchapter B of this chapter;

(4) Documents indicating conformance to the testing, inspection, maintenance or other continuing qualification requirements of this part; and

(5) Sales literature, including advertising, indicating that the packaging or container represented therein conforms to requirements

ontained in Subchapter B or C of this apter.

ubparts B-D [Reserved]

Subpart E—Qualification and Maintenance of Cargo Tanks

§ 180.401 Applicability.

This subpart prescribes requirements, in addition to those contained in Parts 171, 172, 173 and 178 of this subchapter, applicable to any person responsible for the continuing qualification, maintenance or periodic testing of a cargo tank.

§ 180.403 Definitions.

In addition to the definitions contained in §§ 171.8 and 178.345-1 of this subchapter, the following definitions apply to this subpart:

"*Modification*" means any change to a cargo tank's original design and construction which would affect the structural integrity or lading retention capability of the cargo tank. Changes to appurtenances, such as fender attachments, lighting brackets, and ladder brackets, are excluded from this definition. Replacement of components such as valves, vents, and fittings with a component of a similar design and the ame size is not considered a odification. For the purposes of this ubpart, "stretching" is not considered a modification.

"*Owner*" means the owner of a cargo tank motor vehicle used for the transportation of hazardous materials, or his authorized agent.

"*Rebarrelling*" means replacing more than 50 percent of the combined shell and head material of a cargo tank.

"*Repair*" means any welding on pressure parts done to return a cargo tank to its original design and construction, or to a condition prescribed for that cargo tank specification in effect at the time of repair.

"*Stretching*" means any change in length, width or diameter of the cargo tank, or any change to a cargo tank motor vehicle's undercarriage that may affect the cargo tank's structural integrity.

§ 180.405 Qualification of cargo tanks.

(a) *General.* Unless otherwise provided in this subpart, each cargo tank used for the transportation of hazardous material must be an authorized packaging.

(b) *Cargo tank specifications.* To ualify as an authorized packaging, each rgo tank must conform to this subpart, e applicable requirements specified in part 173 of this subchapter for the specific lading, and an applicable specification in effect on the date the initial construction began: MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311, MC 312, MC 330, MC 331, MC 338, DOT 406, DOT 407, or DOT 412 (§ 178.337, § 178.338, § 178.345, § 178.346, § 178.347, § 178.348 of this subchapter). However, construction of MC 306, MC 307, or MC 312 cargo tanks meeting the requirements of the applicable specification in effect on June 12, 1989, is authorized until December 5, 1990.

(c) *Cargo tank specifications no longer authorized for construction.* (1) A cargo tank made to a specification listed in Column 1 may be used when authorized in this Part, provided tank construction began before the date listed in Column 2:

Column 1	Column 2
MC 300	Sept. 2, 1967.
MC 301	June 12, 1961.
MC 302, MC 303, MC 304, MC 305, MC 310, MC 311.	Sept. 2, 1967.
MC 330	May 15, 1967.
MC 306, MC 307, MC 312	Dec. 5, 1990.

(2) A cargo tank of a specification listed in paragraph (c)(1) of this section may have its pressure relief devices and outlets modified as follows:

(i) A Specification MC 300, MC 301, MC 302, MC 303, or MC 305 cargo tank, to conform with a Specification MC 306 or DOT 406 cargo tank (See §§ 178.346-10 and 178.346-11 of this subchapter).

(ii) A specification MC 306 cargo tank to conform to a Specification DOT 406 cargo tank (§§ 178.346-10 and 178.346-11 of this subchapter).

(iii) A Specification MC 304 or cargo tank, to conform with a Specification MC 307 or DOT 407 cargo tank (See §§ 178.347-10 and 178.347-11 of this subchapter).

(iv) A Specification MC 307 cargo tank, to conform with a Specification DOT 407 cargo tank (See §§ 178.347-10 and 178.347-11 of this subchapter).

(v) A Specification MC 310 or MC 311 cargo tank, to conform with a Specification MC 312 or DOT 412 cargo tank (See §§ 178.348-10 and 178.348-11 of this subchapter).

(vi) A Specification MC 312 cargo tank, to conform with a Specification DOT 412 cargo tank (See §§ 178.348-10 and 178.348-11 of this subchapter).

(vii) A Specification MC 330 cargo tank, to conform with a Specification MC 331 cargo tank (See §§ 178.337-8 and 178.337-9 of this subchapter).

(d) *MC 338 cargo tank.* The owner of a cargo tank that conforms to and was used under the terms of an exemption issued before October 1, 1984, that authorizes the transportation of a cryogenic liquid shall remove the exemption number stenciled on the cargo tank and stamp the specification plate (or a plate placed adjacent to the specification plate) "DOT MC 338" followed by the exemption number, for example, "DOT MC 338-E * * * *". (Asterisks to be replaced by the exemption number). The cargo tank must be remarked prior to the expiration date of the exemption. During the period the cargo tank is in service, the owner of a cargo tank that is remarked in this manner must retain at its principal place of business a copy of the last exemption in effect. No new construction of cargo tanks pursuant to such exemption is authorized.

(1) The holding time must be determined, as required in § 178.338-9 of this subchapter, on each cargo tank or on at least one cargo tank of each design. Any subsequent cargo tank manufactured to the same design type (see § 178.320), if not individually tested, must have the optional test regimen performed during the first shipment (see §§ 178.338-9 (b) and (c) of this subchapter).

(2) The holding time determined by test for one authorized cryogenic liquid may be used as the basis for establishing the holding time for other authorized cryogenic liquids.

(e) *MC 331 cargo tanks.* The owner of a MC 331 (§ 178.337 of this subchapter) cargo tank that conforms to and was used under an exemption issued before October 1, 1984, that authorizes the transportation of ethane, refrigerated liquid; ethane-propane mixture, refrigerated liquid; or hydrogen chloride, refrigerated liquid shall remove the exemption number stenciled on the cargo tank and stamp the exemption number on the specification plate (or a plate placed adjacent to the specification plate), immediately after the DOT Specification, for example, "DOT MC 331-E * * * *". (Asterisks to be replaced by the exemption number.) The cargo tank must be remarked prior to the expiration date of the exemption. During the period the cargo tank is in service, the owner of a cargo tank that is remarked in this manner must retain at is principal place of business a copy of the last exemption in effect.

(f) *MC 306, MC 307, MC 312 cargo tanks.* A Registered Inspector and the owner of a MC 306, MC 307 or MC 312 cargo tank motor vehicle constructed in accordance with and used under an exemption issued before December 12, 1989, that authorizes a condition specified in this paragraph shall

examine the cargo tank motor vehicle and its design to determine if it meets the requirements of the applicable MC 306, MC 307 or MC 312 specification in effect at the time of manufacture, except as specified herein.

(1) A cargo tank motor vehicle constructed after August 1, 1981, or the date specified in the applicable exemption, in conformance with the following conditions that apply, may be remarked and certified in accordance with paragraphs (f) (5) and (6) of this section:

(i) A vacuum-loaded cargo tank must have an ASME Code stamped specification plate marked with a minimum internal design pressure of 25 psig, and be designed for a minimum external design pressure of 15 psig.

(ii) A cargo tank having an outlet equipped with an external self-closing stop valve must have the stop valve and associated piping protected within the vehicle's rear-end tank protection device, the vehicle frame or an equally adequate accident damage protection device (See §§ 178.345–8 of this subchapter.) The external self-closing stop valve must be equipped with a remotely actuated means of closure consisting as follows:

(A) For a cargo tank used in other than corrosive service, the remote means of closure must be activated for closure by manual or mechanical means and, in case of fire, by an automatic heat activated means.

(B) For a cargo tank used in corrosive service, the remote means of closure may be actuated by manual or mechanical means only.

(iii) A cargo tank having an unreinforced portion of the shell exceeding 60 inches must have the circumferential reinforcement located so that the thickness and tensile strength of shell material in combination with the frame and circumferential reinforcement produces a structural integrity at least equal to that prescribed in § 178.345–3 of the specification in effect at time of manufacture.

(iv) A cargo tank having a projection from the tank shell or head that may contain lading in any tank position is authorized, provided such projection is as strong as the tank shell or head and is located within the motor vehicle's rear-end tank protection or other appropriate accident damage protection device.

(v) A cargo tank may be constructed of nickel, titanium, or other ASME sheet or plate materials in accordance with an exemption.

(2) A vacuum-loaded cargo tank constructed after August 1, 1981, or the date specified in the applicable exemption, in conformance with paragraph (f)(1) of this section, except that an outlet is equipped with an external valve which is not equipped with a self-closing feature:

(i) Must be equipped with a self-closing valve prior to June 12, 1992.

(ii) May be remarked and certified in accordance with paragraphs (f) (5) and (6) of this section after the cargo tank motor vehicle has been equipped with the self-closing valve.

(3) A vacuum-loaded cargo tank constructed prior to August 1, 1981, in conformance with paragraph (f)(1) of this section, except for paragraph (f)(1)(i), may be remarked and certified in accordance with paragraphs (f) (5) and (6) of this section.

(4) A vacuum-loaded cargo tank constructed prior to August 1, 1981, in conformance with paragraph (f)(1) of this section, except for paragraph (f)(1)(i), and an outlet is equipped with an external valve which is not equipped with a self-closing feature:

(i) Must be equipped with a self-closing valve prior to June 12, 1992.

(ii) May be remarked and certified in accordance with paragraphs (f)(5) and (6) of this section after the cargo tank motor vehicle has been equipped with the self-closing valve.

(5) The owner of a cargo tank for which a determination has been made that the cargo tank is in conformance with paragraph (f) (1), (2), (3), or (4) of this section shall complete a written certification, in English, signed by the owner and containing at least the following information:

(i) A statement certifying that each cargo tank conforms to § 180.405 (f) (1), (2), (3), or (4);

(ii) The applicable DOT exemption number, the applicable specification number and the owner's and manufacturer's serial number for the cargo tank;

(iii) A statement setting forth any modifications made to bring the cargo tank into conformance with § 180.405(f) (1), (2), (3), or (4), or the applicable specification;

(iv) A statement identifying the person certifying the cargo tank and the date of certification.

(6) The owner of a certified cargo tank shall remove the exemption number stenciled on the cargo tank and must durably mark the specification plate (or a plate placed adjacent to the specification plate) "MC + + +-E ****####" (where "+ + +" is to be replaced by the applicable specification number, "* * * *" by the exemption number and "# # # #" by the alloy.)

(7) During the period the cargo tank is in service, and for one year thereafter, the owner of a cargo tank that is certified and remarked in this manner must retain on file at its principal place of business a copy of the certificate and the last exemption in effect.

(g) *Cargo tank manhole assemblies.* (1) On or before June 13, 1994, each owner of a cargo tank manufactured prior to December 12, 1989, authorized for the transportation of a hazardous material, must have the cargo tank equipped with manhole assemblies conforming with § 178.345–5 except for the marking requirements in § 178.345–5(e) and the hydrostatic testing requirement in 178.345–5(b) of this section. Manhole assemblies installed on an MC 300, MC 301, MC 302, MC 303, MC 305, or MC 306 cargo tank prior to December 12, 1989, which are marked or certified in writing as conforming to TTMA RP No. 61 may be considered to be in compliance with this paragraph. Any manhole assembly installed on a cargo tank after December 12, 1989, must meet the requirements in § 178.345–5.

(2) The owner of an MC 300, MC 301, MC 302, MC 303, MC 305, or MC 306 cargo tank manufactured prior to December 12, 1989, which is equipped with a manhole assembly or assemblies manufactured prior to December 12, 1989, which are not certified in conformance with TTMA RP No. 61 may have them certified in accordance with the Recommended Practice by the manufacturer of the manhole closure. Those manhole closures which the manufacturer cannot identify and certify, or for which the manufacturer cannot be identified, may be tested and certified in accordance with TTMA TB No. 107. These certifications must be performed on or before June 13, 1994.

(3) The owner of five or more DOT specification cargo tanks requiring retrofit or certification of the manhole closure must retrofit or certify at least 20 percent of the affected cargo tanks each year beginning in 1990 until all affected manhole closures on cargo tanks have been retrofitted or certified. The owner of fewer than 5 DOT specification cargo tanks has until June 13, 1994 to retrofit or certify the manhole closures.

(h) *Pressure Relief System.* After June 12, 1991, any reclosing pressure relief valve installed on any cargo tank must be capable of reseating to a leak-tight condition, after a pressure surge and release of a lading volume of not more than one gallon. This requirement shall be considered to be met if the pressure relief valve successfully withstands the testing procedure outlined in TTMA RP No. 81.89 "Performance of Spring Loaded Pressure Relief Valves on MC

06, MC 307, and MC 312 Tanks." with ne exceptions noted in § 178.345-10(b)(3). After June 13, 1994, any pressure relief system installed on a DOT 406, DOT 407, or DOT 412 cargo tank must meet the requirements in § 178.345-10(b).

(i) *Flammable cryogenic liquids.* Each cargo tank used to transport a flammable cryogenic liquid must be examined after each shipment to determine its actual holding time (See § 173.318(g)(3) of this subchapter.)

(j) *Withdrawal of certification.* A specification cargo tank that for any reason no longer meets the applicable specification may not be used to transport hazardous materials unless the cargo tank is repaired and retested in accordance with §§ 180.413 and 180.407 prior to being returned to hazardous materials service. If the cargo tank is not in conformance with the applicable specification requirements, the specification plate on the cargo tank must be removed, obliterated or securely covered. The details of the conditions necessitating withdrawal of the certification must be recorded and signed on the written certificate for that cargo tank. The vehicle owner shall retain the certificate for at least 1 year after withdrawal of the certification.

(k) *DOT specification cargo tank with no marked design pressure or a marked design pressure of less than 2.65 psig.* The owner of an MC 300, MC 301, MC 302, MC 303, MC 305, MC 306 or MC 312 cargo tank, which has a pressure relief system set at 3 psig, shall mark or remark the cargo tank with an MAWP or design pressure of not greater than 2.65 psig.

(l) *MC 300, MC 301, MC 302, MC 303, MC 305, MC 306 cargo tank—Rear accident damage protection.* (1) Notwithstanding the requirements in § 180.405(b), the applicable specification requirement for a rear bumper or rear-end tank protection device on MC 300, MC 301, MC 302, MC 303, MC 305, and MC 306 cargo tanks does not apply to a cargo tank truck (power unit) until July 1, 1992, if the cargo tank truck—

(i) Was manufactured before July 1, 1989;

(ii) Is used to transport gasoline or any other petroleum distillate product; and

(iii) Is operated in combination with a cargo tank full trailer. However, an empty cargo tank truck, without a cargo tank full trailer attached, may be operated without the required rear bumper or rear-end tank protection device on a one-time basis while being transported to a repair facility for installation of a rear bumper or rear-end protection device.

(2) Each cargo tank shall be provided with a rear accident damage protection device to protect the tank and piping in the event of a rear- end collision and reduce the likelihood of damage which could result in the loss of lading. The rear-end protection device must be in the form of a rear-end tank protection device meeting the requirements of § 178.345-8(d) or a rear bumper meeting the following:

(i) The bumper shall be located at least 6 inches to the rear of any vehicle component used for loading or unloading or that may contain lading while the vehicle is in transit.

(ii) The dimensions of the bumper shall conform to § 393.86 of this title.

(iii) The structure of the bumper shall be designed to withstand, without leakage of lading, the impact of the vehicle with rated payload, at a deceleration of 2 "g" using a safety factor of two based on the ultimate strength of the bumper material. Such impact shall be considered uniformly distributed and applied horizontally (parallel to the ground) from any direction at an angle not exceeding 30 degrees to the longitudinal axis of the vehicle.

§ 180.407 Requirements for test and inspection of cargo tanks.

(a) *General.* (1) A cargo tank constructed in accordance with a DOT specification for which a test or inspection specified in this section has become due, may not be filled and offered for shipment until the test or inspection has been successfully completed. This paragraph does not apply to any cargo tank filled prior to the test or inspection due date.

(2) Except during a pressure test, a cargo tank may not be subjected to a pressure greater than its design pressure or MAWP.

(3) A person witnessing or performing a test or inspection specified in this section must meet the minimum qualifications prescribed in § 180.409.

(4) Each cargo tank which has successfully passed a test or inspection specified in this section must be marked in accordance with § 180.415.

(5) A cargo tank which fails a prescribed test or inspection must:

(i) Be repaired and retested in accordance with § 180.413; or

(ii) Be removed from hazardous materials service and the specification plate removed, obliterated or covered in a secure manner.

(b) *Conditions requiring test and inspection of cargo tanks.* Without regard to any other test or inspection requirements, a cargo tank must be tested and inspected in accordance with this section prior to further use if:

(1) The cargo tank shows evidence of bad dents, corroded or abraded areas, leakage, or any other condition that might render it unsafe for transportation service.

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

(3) The cargo tank has been out of hazardous materials transportation service for a period of one year or more.

(4) The cargo tank has been modified from its original design specification.

(5) The Department so requires based on the existence of probable cause that the cargo tank is in an unsafe operating condition.

(c) *Periodic test and inspection.* Each cargo tank must be tested and inspected as specified in the following table by an inspector meeting the qualifications in § 180.409.

Test or inspection	Cargo tank, configuration, and service	Period
Inspections		
External visual	All cargo tanks designed to be loaded by vacuum with full opening rear head.	6 mos.
	All other cargo tanks	1 yr.
Internal visual	All insulated cargo tanks except MC 330, MC331, MC 338.	1 yr.
	All cargo tanks transporting lading corrosive to the tank.	1 yr.
	All other cargo tanks except MC 338.	5 yr.
Lining/cladding	All lined or clad cargo tanks transporting lading corrosive to the tank.	1 yr.
Tests		
Leakage Pressure (hydrostatic or pneumatic) (See Notes 1 and 2)	All cargo tanks except MC 338	1 yr.
	All cargo tanks which are insulated with no manhole or insulated and lined, except MC 338.	1 yr.
	All cargo tanks designed to be loaded by vacuum with full opening rear head.	2 yrs.
	MC 330 and MC 331 cargo tanks in chlorine service.	2 yr.
	All other cargo tanks	5 yr.
Thickness over entire tank	All unlined cargo tanks in corrosive service, except MC 338.	2 yr.

Note 1: Pressure testing is not required for MC 330 and MC 331 cargo tanks in dedicated sodium metal service.

Note 2: Pressure testing is not required for uninsulated lined or clad cargo tanks, with a design pressure or MAWP less than 15 psig, which receive an external visual inspection and lining inspection at least once each year.

(d) *External visual inspection and testing.* (1) Where insulation precludes external visual inspection, the cargo tank shall receive a visual internal inspection in accordance with § 180.407(e). Where visual inspection is precluded by both internal coating and external insulation, or when the cargo tank is not equipped with a manhole or inspection opening, the tank shall be hydrostatically or pneumatically tested in accordance with 180.407(c) and § 180.407(g).

(2) The external visual inspection and testing must include as a minimum the following:

(i) The tank shell and heads must be inspected for corroded or abraded areas, dents, distortions, defects in welds and any other conditions, including leakage, that might render the tank unsafe for transportation service;

(ii) The piping, valves, and gaskets must be carefully inspected for corroded areas, defects in welds, and other conditions, including leakage, that might render the tank unsafe for transportation service;

(iii) All devices for tightening manhole covers must be operative and there must be no evidence of leakage at manhole covers or gaskets;

(iv) All emergency devices and valves including self-closing stop valves, excess flow valves and remote closure devices must be free from corrosion, distortion, erosion and any external damage that will prevent safe operation. Remote closure devices and self-closing stop valves must be functioned to demonstrate proper operation;

(v) Missing bolts, nuts and fusible links must be replaced, and loose bolts and nuts must be tightened;

(vi) All required markings on the cargo tank must be legible;

(vii) The cargo tank motor vehicle must conform to Part 393 of this title (the Federal Motor Carrier Safety Regulations) and, where appropriate, Part 571 of this title (the Federal Motor Vehicle Safety Standards);

(viii) All major appurtenances on the cargo tank including, but not limited to, the upper coupler (fifth wheel) assembly, suspension system attachments, and connecting structures, must be inspected for any corrosion or damage which might prevent safe operation.

(3) All reclosing pressure relief valves must be externally inspected for any corrosion or damage which might prevent safe operation. All reclosing pressure relief valves on cargo tanks carrying lading corrosive to the valve must be removed from the cargo tank for inspection and testing. Each reclosing pressure relief valve required to be removed and tested must open at the required set pressure and reseat to a leak-tight condition at 90 percent of the set-to-discharge pressure or the pressure prescribed for the applicable cargo tank specification.

(4) Corroded or abraded areas must be thickness tested in accordance with the procedures set forth in paragraphs (i) (2), (3), (5) and (6) of this section.

(5) The gaskets on any full opening rear head must be:

(i) visually inspected for cracks or splits caused by weather or wear; and

(ii) replaced if cuts or cracks which are likely to cause leakage, or are of a depth one-half inch or more, are found.

(6) The inspector must record the results of the external visual examination as specified in § 180.417(b).

(e) *Internal visual inspection.* (1) When the cargo tank is not equipped with a manhole or inspection opening, the tank shall be hydrostatically or pneumatically tested in accordance with § 180.407(c) and § 180.407(g).

(2) The internal visual inspection must include as a minimum the following:

(i) The tank shell and heads must be inspected for corroded and abraded areas, dents, distortions, defects in welds, and any other condition that might render the tank unsafe for transportation service.

(ii) If lined, the lining material must be inspected for defects. Tank liners must be inspected as specified in § 180.407(f).

(3) At the time of the internal inspection, tank head and shell areas covered by the upper skid plate must be inspected for corroded and abraded areas, dents, distortions, defects in welds, and any other condition that might render the tank unsafe for transportation service.

(4) Corroded or abraded areas must be thickness tested in accordance with paragraphs (i) (2), (3), (5) and (6) of this section.

(5) Degraded or defective areas of the tank liner must be removed and tank shell or head below the defect must be inspected. Corroded areas must be thickness tested in accordance with § 180.407(i).

(6) The inspector must record the results of the internal visual inspection as specified in § 180.417(b).

(f) *Lining inspection.* The integrity of the lining on all lined cargo tanks, when lining is required by this Subchapter, must be verified at least once each year as follows:

(1) Rubber (elastomeric) lining must be tested for leaks as follows:

(i) Equipment shall consist of: (A) a high frequency spark tester capable of producing sufficient voltage to insure proper calibration;

(B) A probe with an "L" shaped 3/32 inch diameter wire with up to a 12-inch bottom leg or equally sensitive probe; and

(C) A steel calibration block with a known leak, equivalent to a puncture caused by a 22 gauge hypodermic needle, lined with the same material as that to be tested.

(ii) The probe shall be passed over the surface of calibration block in a constant uninterrupted manner until the leak is found. The leak is detected by the white or light blue spark formed. (A leak-free lining causes a dark blue or purple spark). The voltage shall be adjusted to the lowest setting that will produce a minimum 0.5 inch spark measured from the top of the lining to the probe. The spark tester shall be calibrated periodically using a test calibration block, using the same power source, probe and cable length, and to assure that the setting on the probe has not changed.

(iii) After calibration, the probe must be passed over the lining in an uninterrupted stroke.

(iv) Leaks that are found shall be marked for repair using chalk.

(2) Linings made of other than rubber (elastomeric material) must be tested using equipment and procedures prescribed by the lining manufacturer.

(g) *Pressure retest.* (1) *Test Procedure*—(i) As part of the pressure test, the inspector must perform an external and internal visual inspection, except that on an MC 338 cargo tank, or a cargo tank not equipped with a manhole or inspection opening, an internal inspection is not required.

(ii) All reclosing pressure relief valves must be:

(A) Removed from the cargo tank for inspection and testing. Each reclosing pressure relief valve must open at the required set pressure and reseat to a leak-tight condition at 90 percent of the set-to-discharge pressure or the pressure prescribed for the applicable cargo tank specification; or,

(B) Replaced.

(iii) Each cargo tank must be tested hydrostatically or pneumatically to the minimum internal pressure specified in the following table:

Specification	Test pressure
MC 300, 301, 302, 303, 305, 306.	3 psig or design pressure, whichever is greater.
MC 304, 307	40 psig or 1.5 times the design pressure, whichever is greater.
MC 310, 311, 312	3 psig or 1.5 times the design pressure, whichever is greater.
MC 330, 331	1.5 times either the MAWP or the re-rated pressure, whichever is applicable.
MC 338	1.25 times either the MAWP or the re-rated pressure, whichever is applicable.
DOT 406	5 psig or 1.5 times the MAWP, whichever is greater.
DOT 407	40 psig or 1.5 times the MAWP, whichever is greater.
DOT 412	1.5 times the MAWP.

(iv) Each owner of 5 or more MC 300, MC 301, MC 302, MC 303, MC 304, MC 305, MC 306, MC 307, MC 310, MC 311,

r MC 312 cargo tanks must pressure .st at least 20 percent of the cargo tanks in his ownership each year beginning in 1990. The owner of fewer than five MC specification cargo tanks has until June 13, 1994, to pressure test these units.

(v) Each cargo tank of a multi-tank cargo tank motor vehicle must be tested with the adjacent cargo tanks empty and at atmospheric pressure.

(vi) All closures except pressure relief devices must be in place during the test. All prescribed loading and unloading venting devices rated at less than test pressure may be removed during the test. If retained, the devices must be rendered inoperative by clamps, plugs, or other equally effective restraining devices. Restraining devices may not prevent detection of leaks or damage the venting devices and must be removed immediately after the test is completed.

(vii) *Hydrostatic test method.* Each tank, including its domes, must be filled with water or other liquid having similar viscosity, at a temperature not exceeding 100 °F. The tank must then be pressurized to not less than the pressure specified in paragraph (g)(1)(iii) of this section. The tank, including its closures, must hold the prescribed test pressure or at least 10 minutes during which time t shall be inspected for leakage, bulging or any other defect.

(viii) *Pneumatic test method.* The tank must be pressurized with air or a similar gas. The pneumatic test pressure in the tank must be reached by gradually increasing the pressure to one-half of the test pressure. Thereafter, the pressure must be increased in steps of approximately one-tenth of the test pressure until the required test pressure has been reached. The test pressure must be held for at least 5 minutes. The pressure must then be reduced to the MAWP, which must be maintained during the time the entire tank surface is inspected. During the inspection, a suitable method must be used for detecting the existence of leaks. This method must consist either of coating the entire surface of all joints under pressure with a solution of soap and water, or using other equally sensitive methods. When a pneumatic test is performed, suitable safeguards should be provided to protect employees and other persons should a failure occur.

(2) When testing an insulated cargo tank, the insulation and jacketing need not be removed unless it is otherwise impossible to reach test pressure and maintain a condition of pressure equilibrium after test pressure is reached, or the vacuum integrity cannot be maintained in the insulation space. If an MC 338 cargo tank used for the transportation of a flammable gas or oxygen, refrigerated liquid is opened for any reason, the cleanliness must be verified prior to closure using the procedures contained in § 178.338–15 of this subchapter.

(3) Each MC 330 and MC 331 cargo tank constructed of quenched and tempered steel (Part UHT of the ASME Code), or constructed of other than quenched and tempered steel but without postweld heat treatment, used for the transportation of anhydrous ammonia, or any other hazardous materials that may cause corrosion stress cracking, must be internally inspected by the wet fluorescent magnetic particle method immediately prior to and in conjunction with the performance of the pressure test prescribed in this section. Each MC 330 and MC 331 cargo tank constructed of quenched and tempered steel (Part UHT of the ASME Code) used for the transportation of liquefied petroleum gas must be internally inspected by the wet fluorescent magnetic particle method immediately prior to and in conjunction with the performance of the pressure test prescribed in this section. The wet fluorescent magnetic particle inspection must be in accordance with Section V of the ASME Code and CGA Technical Bulletin TB–2. This paragraph does not apply to cargo tanks that do not have manholes. (See § 180.417(c) for reporting requirements.)

(4) All pressure bearing portions of a cargo tank heating system employing a medium such as, but not limited to, steam or hot water for heating the lading must be hydrostatically pressure tested at least once every 5 years. The test pressure must be at least 1.5 times the heating system design pressure and must be maintained for five minutes. A heating system employing flues for heating the lading must be tested to ensure against lading leakage into the flues or into the atmosphere.

(5) *Exceptions.* (i) Pressure testing is not required for MC 330 and MC 331 cargo tanks in dedicated sodium metal service.

(ii) Pressure testing is not required for uninsulated lined or clad cargo tanks, with a design pressure or MAWP less than 15 psig, which receive an external visual inspection and a lining inspection at least once each year.

(6) *Acceptance criteria.* A cargo tank that leaks, fails to retain test pressure or pneumatic inspection pressure, shows distortion, excessive permanent expansion, or other evidence of weakness that might render the cargo tank unsafe for transportation service, may not be returned to service.

(7) The inspector must record the results of the pressure test as specified in § 180.417(b).

(h) *Leakage test.* (1) Each cargo tank shall be leak tested in accordance with § 180.407(c). The cargo tank, with all valves and accessories in place and operative, must be tested at not less than 80 percent of the tank design pressure or MAWP, whichever is marked on the certification or specification plate. The pressure must be maintained for at least 5 minutes. The leakage test must include product piping. MC 330 and MC 331 cargo tanks may be leak tested with the hazardous materials contained in the tank during the test. Suitable safeguards shall be provided to protect employees and other persons should a failure occur.

(2) Where applicable, the Environmental Protection Agency's "Method 27—Determination of Vapor Tightness of Gasoline Delivery Tank Using Pressure-Vacuum Test," 40 CFR Part 60 Appendix A, is an acceptable alternative test.

(3) A cargo tank that fails to retain leakage test pressure may not be returned to service as a specification cargo tank.

(4) The inspector must record the results of the leakage test as specified in § 180.417(b).

(i) *Thickness testing.* (1) The shell and head thickness of all unlined cargo tanks used for the transportation of materials corrosive to the tank must be measured at least once every 2 years, except that cargo tanks measuring less than the sum of the minimum prescribed thickness, plus one-fifth of the original corrosion allowance, must be tested annually.

(2) Measurements must be made using a device capable of accurately measuring thickness to 0.002 of an inch.

(3) Any person performing ultrasonic thickness testing must be trained in the proper use of the thickness testing device used.

(4) Thickness testing must be performed in the following areas, as a minimum:

(i) Areas of the tank shell and heads and shell and head area around any piping that retains lading;

(ii) Areas of high shell stress such as the bottom center of the tank;

(iii) Areas near openings;

(iv) Areas around weld joints;

(v) Shell reinforcements;

(vi) Appurtenance attachments;

(vii) Upper coupler (fifth wheel) assembly attachments;

(viii) Suspension system attachments and connecting structures; and

(ix) Known thin areas in the tank shell and nominal liquid level lines.

(5) An owner of a cargo tank that no longer conforms with the minimum prescribed thickness may not return the cargo tank to hazardous materials service. The tank's specification plate must be removed, obliterated or covered in a secure manner.

(6) The inspector must record the results of the thickness test as specified in § 180.417(b).

§ 180.409 Minimum qualifications for inspectors and testers.

(a) Any persons performing or witnessing the inspections and tests specified in § 180.407(c) must be familiar with the cargo tank and skillful in the use of the inspection and testing equipment needed.

(b) Additional requirements. (1) *Thickness test.* Persons performing thickness testing must be trained in the use of the thickness testing device used in accordance with the thickness testing device manufacturer's instruction.

(2) *Pressure test.* Persons performing the pressure test must be trained and experienced in conducting a pressure test in accordance with the requirements in the ASME Code. The person performing the pressure test may be a Registered Inspector or an employee of a carrier or cargo tank owner. If the person performing the pressure test is not a Registered Inspector;

(i) The employer of the tester must submit the following information to the Director, Office of Hazardous Materials Transportation, Attn: (DHM-32), Research and Special Programs Administration, Department of Transportation, 400 Seventh Street, SW., Washington, DC 20590:

(A) Name; and

(B) Street address, mailing address and telephone number of each facility where pressure testing will be performed.

(ii) A copy of the tester's qualifications must be retained with the documents required by § 180.417(b).

§ 180.411 Acceptable results of tests and inspections.

(a) *Corroded or abraded areas.* The minimum thickness may not be less than that prescribed in the applicable specification.

(b) *Dents, cuts, digs and gouges.* (See CGA Pamphlet C-6 for evaluation procedures.)

(1) For dents at welds or that include a weld, the maximum allowable depth is ¼ inch. For dents away from welds, the maximum allowable depth is 1/10 of the greatest dimension of the dent, but in no case may the depth exceed one inch.

(2) The minimum thickness remaining beneath a cut, dig, or gouge may not be less than that prescribed in the applicable specification.

(c) *Weld or structural defects.* Any cargo tank with a weld defect such as a crack, pinhole, or incomplete fusion, or a structural defect must be taken out of hazardous materials service until repaired.

(d) *Leakage.* All sources of leakage must be properly repaired prior to returning a tank to hazardous materials service.

(e) *Relief valves.* Any pressure relief valve that fails to open and reclose at the prescribed pressure must be repaired or replaced.

(f) *Liner intergity.* Any defect shown by the test must be properly repaired.

(g) *Pressure test.* Any tank that fails to meet the acceptance criteria found in the individual specification that applies must be properly repaired.

§ 180.413 Repair, modification, stretching, or rebarrelling of cargo tanks.

(a) Any repair, modification, stretching, or rebarrelling of a cargo tank must be performed in conformance with the requirements of this section. Except for work performed on a MC 300, MC 301, MC 303, MC 304, MC 305, MC 306, MC 307, MC 311, or MC 312 before December 5, 1990, the repair, modification, stretching, or rebarrelling must be performed by:

(1) A cargo tank manufacturer holding a valid ASME Certificate of Authorization for the use of the ASME "U" stamp and registered in accordance with Subpart F of Part 107 of Subchapter B of this Chapter; or

(2) A repair facility holding a valid National Board Certificate authorizing the use of the "R" stamp and registered in accordance with Subpart F of Part 107 of Subchapter B of this Chapter.

(b) *Repair and Modification.* (1) A cargo tank may be repaired or modified in accordance with the following:

(i) DOT 406, DOT 407, and DOT 412 cargo tanks must be repaired or modified in accordance with the specification requirements in effect at the time of manufacture or at the time of repair;

(ii) MC 300, MC 301, MC 302, MC 303, MC 305, and MC 306 cargo tanks must be repaired or modified in accordance with the original specification or with the DOT 406 specification in effect at the time of repair.

(iii) MC 304 and MC 307 cargo tanks must be repaired or modified in accordance with the original specification or with the DOT 407 specification in effect at the time of repair;

(iv) MC 310, MC 311, and MC 312 cargo tanks must be repaired or modified in accordance with the original specification or with the DOT 412 specification in effect at the time of repair;

(v) MC 338 cargo tanks must be repaired or modified in accordance with the specification requirements in effect at the time of manufacture or at the time of repair; and

(vi) MC 330 and MC 331 cargo tanks must be repaired or modified as follows:

(A) Repairs must be in accordance with the repair procedures described in CGA Technical Bulletin TB-2 and the National Board Inspection Code—Provisions for Repair of Pressure Vessels. Each cargo tank having cracks and defects requiring welded repairs must meet all of the requirements of § 178.337-16 of this subchapter, except that postweld heat treatment after minor weld repairs is not required. When any repair is made of defects revealed by the wet fluorescent magnetic particle inspection, including those by grinding, the cargo tank must again be examined by the wet fluorescent magnetic particle method after hydrostatic testing to assure that all defects have been removed.

(B) Modifications must be performed in accordance with the original specification or with the MC 331 specification requirements in effect at the time of repair.

(2) Prior to any repair work or modification the cargo tank must be emptied of any hazardous material lading. Cargo tanks containing flammable or toxic lading must be purged.

(3) Any repair or modification of a cargo tank involving welding on the shell or head must be certified by a Registered Inspector. Any repair or modification of an ASME Code "U" stamped cargo tank must be in accordance with the National Board Inspection Code.

(4) The suitability of any repair or modification affecting the structural integrity of the cargo tank must be determined by the testing prescribed in the applicable specification.

(5) Each owner of a cargo tank must retain at its principal place of business all records of repairs or modifications made to each tank during the time the tank is in service and for one year thereafter.

(c) *Repair or replacement of piping, valves, hoses or fittings.* In the event of repair or replacement, any piping, valve, or fitting must be tested in accordance with the provisions of the applicable specification before the cargo tank is

returned to hazardous materials service. Piping, valves and fittings must be tested after installation; hoses may be tested either before or after installation on the cargo tank.

(d) *Stretching and rebarrelling.* Stretching or rebarrelling of a cargo tank is authorized if:

(1) All new material and equipment, and equipment affected by the stretching or rebarreiling conforms with the requirements of the specification in effect at the time of such work. Stretching or rebarrelling must be performed as follows:

(i) For Specification MC 300, MC 301, MC 302, MC 303, MC 305 and MC 306 cargo tanks in accordance with Specification DOT 406;

(ii) For Specification MC 304 and MC 307 cargo tanks in accordance with Specification DOT 407;

(iii) For Specification MC 310, MC 311, and MC 312 cargo tanks in accordance with Specification DOT 412;

(iv) For Specification MC 330 cargo tanks in accordance with Specification MC 331.

(2) The person performing the stretching or rebarrelling must:

(i) Have knowledge of the original design concept, particularly with respect to structural design analysis, material and welding procedures;

(ii) Assure compliance with the rebuilt cargo tank's structural integrity, venting, and accident damage protection requirements;

(iii) Assure compliance with all applicable Federal Motor Carrier Safety regulations for any newly installed safety equipment;

(iv) Pressure retest each cargo tank in accordance with § 180.407(g);

(v) Change the existing specification plate to reflect the cargo tank as modified, or remove the existing specification plate and attach a new specification plate to the cargo tank;

(vi) On a variable specification cargo tank, install a new variable specification plate.

(3) The design of the rebarrelled or stretched cargo tank must be certified by a design certifying engineer registered in accordance with Subpart F of Part 107. The person performing the stretching or rebarrelling and a Registered Inspector must certify that the rebarrelled or stretched cargo tank has been constructed and tested in accordance with the applicable specification by issuing a new manufacturer's certificate. The registration number of the Registered Inspector must be entered on the certificate.

§ 180.415 Test and inspection markings.

Each cargo tank successfully completing the test and inspection requirements contained in § 180.407 must be marked as specified in this section. Each cargo tank must be durably and legibly marked, in English, with the test date (month and year) followed by the type of test or inspection. The marking must be in letters and numbers at least 1¼ inches high, on the front head or the tank shell near the specification plate. The type of test or inspection may be abbreviated as follows: V for external visual inspection and test; I for internal visual inspection; P for pressure retest; L for lining test, K for leakage test; and T for thickness test. For example, the marking "10–85 P, V, L" would indicate that in October 1985 the cargo tank received and passed the prescribed pressure retest, external visual inspection and test, and the lining inspection.

§ 180.417 Reporting and record retention requirements.

(a) *Vehicle certification.* (1) Each owner of a cargo tank shall retain the manufacturer's data report or certificate and related papers certifying that the cargo tank identified in the documents was manufactured and tested in accordance with the applicable specification. The owner shall retain the documents throughout his ownership of the cargo tank and for one year thereafter. In the event of change of ownership, the prior owner shall retain non-fading photo copies of these documents for at least one year.

(2) Each motor carrier who uses a specification cargo tank must obtain a copy of the manufacturer's certificate and related papers or the alternative report authorized in paragraph (a)(3) (i) or (ii) of this section and retain the documents as specified in this paragraph. A motor carrier who is not the owner of a cargo tank must retain a copy of the vehicle certification report at its principal place of business for as long as the cargo tank motor vehicle is used by that carrier and for one year thereafter. Upon a written request to, and with the approval of the Regional Director, Office of Motor Carrier Safety, Federal Highway Administration, for the region in which a motor carrier has its principal place of business, a motor carrier may retain the certificate and related papers required by this paragraph at a regional or terminal office. The addresses and jurisdictions of the various regional Motor Carrier Safety Offices are provided in § 390.40 of this title. The provisions of this section do not apply to a motor carrier leasing a cargo tank for less than 30 days.

(3) *DOT Specification cargo tanks manufactured before December 12, 1989—*

(i) *Non-ASME Code stamped cargo tanks*—If an owner does not have a manufacturer's certificate for a cargo tank and he wishes to certify it as a specification cargo tank, the owner must perform appropriate tests and inspections, under the direct supervision of a Registered Inspector, to determine if the cargo tank conforms with the applicable specification. Both the owner and the Registered Inspector must certify that the cargo tank fully conforms to the applicable specification. The owner must retain the certificate, as specified in this section.

(ii) *ASME Code stamped cargo tanks.* If the owner does not have the manufacturer's certificate and data report required by the specification, the owner may contact the National Board for a copy of the manufacturer's data report, if the cargo tank was registered with the National Board, or copy the information contained on the cargo tank's identification and ASME Code plates. Additionally, both the owner and the Authorized Inspector must certify that the cargo tank fully conforms to the specification. The owner must retain such documents, as specified in this section.

(b) *Test or inspection reporting.* Each cargo tank which is tested or reinspected as specified in § 180.407 must have a written report, in English, prepared in accordance with this paragraph.

(1) The test or inspection report must include the following:

(i) Type of test or inspection performed and a listing of all items either tested or inspected (a checklist is acceptable);

(ii) Owner's and manufacturer's serial numbers;

(iii) DOT Specification;

(iv) Test Date (Month and year);

(v) Location of defects found and method used to repair each defect;

(vi) Name and address of person performing the test;

(vii) Disposition statement, such as "Cargo tank returned to service" or "Cargo tank withdrawn from service"; and

(viii) Dated signature of inspector and owner.

(2) The owner and the motor carrier, if not the owner, must each retain a copy of the test and inspection reports until the next test or inspection of the same type is successfully completed. This requirement does not apply to a motor

carrier leasing a cargo tank for less than 30 days.

(c) *Additional requirements for Specification MC 330 and MC 331 cargo tanks.* (1) After completion of the pressure test specified in § 180.407(g)(3), each motor carrier operating a Specification MC 330 or MC 331 cargo tank in anhydrous ammonia, liquefied petroleum gas, or any other service that may cause stress corrosion cracking, must make a written report containing the following information:

(i) Carrier's name, address of principal place of business, and telephone number;

(ii) Complete identification plate data required by Specification MC 330 or MC 331, including data required by ASME Code;

(iii) Carrier's equipment number;

(iv) A statement indicating whether or not the tank was stress relieved after fabrication;

(v) Name and address of the person performing the test and the date of the test;

(vi) a statement of the nature and severity of any defects found. In particular, information must be furnished to indicate the location of defects detected, such as in weld, heat-affected zone, the liquid phase, the vapor phase, or the head-to-shell seam. If no defect or damage was discovered, that fact must be reported;

(vii) A statement indicating the methods employed to make repairs, who made the repairs, and the date they were completed. Also, a statement of whether or not the tank was stress relieved after repairs and, if so, whether full or local stress relieving was performed;

(viii) A statement of the disposition of the cargo tank, such as "cargo tank scrapped" or "cargo tank returned to service"; and

(ix) A statement of whether or not the cargo tank is used in anhydrous ammonia, liquefied petroleum gas, or any other service that may cause stress corrosion cracking. Also, if the cargo tank has been used in anhydrous ammonia service since the last report, a statement indicating whether each shipment of ammonia was certified by its shipper as containing 0.2 percent water by weight.

(2) A copy of the report must be retained by the carrier at its principal place of business during the period the tank is in the carrier's service and for one year thereafter. Upon a written request to, and with the approval of, the Director, Regional Office of Motor Carrier Safety, Federal Highway Administration for the region in which a motor carrier has its principal place of business, the carrier may maintain the reports at a regional or terminal office.

(3) The requirement in paragraph (c)(1) of this section does not apply to a motor carrier leasing a cargo tank for less than 30 days.

(d) *Supplying reports.* Each carrier offering a DOT Specification cargo tank for sale or lease must make available for inspection a copy of the most recent report made under this section to each purchaser or lessee. Copies of such reports must be provided to the purchaser, or the lessee if the cargo tank is leased for more than 30 days.

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Travis P. Dungan,

Administrator.

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