



DEPARTMENT OF TRANSPORTATION
HAZARDOUS MATERIALS REGULATIONS BOARD
WASHINGTON, D.C. 20590

24902

[Docket No. HM-113; Amdt. Nos. 173-81;
177-33; 178-37]

MC 330 AND MC 331 CARGO TANKS
Stress Corrosion Cracking

The purpose of these amendments to the Hazardous Materials Regulations of the Department of Transportation is to (1) require wet fluorescent magnetic particle inspections of certain cargo tanks in anhydrous ammonia (ammonia) service; (2) require reports of such inspections from motor carriers; (3) prohibit shipment of ammonia that does not contain 0.2% water in quenched and tempered (Q and T) steel cargo tanks; (4) require that shippers test for the presence of water in ammonia when it is to be shipped in Q and T cargo tanks; (5) amend the requirements for shipping paper entries to indicate the suitability of the ammonia for certain cargo tanks; and (6) amend the requirements for post weld heat treatment of Q and T cargo tanks.

On January 4, 1974, the Board member for the Federal Highway Administration issued a notice of proposed rulemaking, Docket No. HM-113; Notice No. 73-39 FR 1059 which proposed these amendments. The proposals sought to prevent or reduce stress corrosion cracking in MC 330 and MC 331 cargo tanks. Interested persons were invited to give their views. All comments received have been carefully considered.

Several commenters suggested that a specified form, such as the one submitted by the Compressed Gas Association and the National Tank Truck Carriers, be required for the reports specified in § 173.33. The Board believes that the industry should not be required to execute a specified form, as long as all required information is reported. Therefore, a prescribed form is not being required. Several editorial changes have been made pertaining to the required information to be reported.

Many commenters cited potential operational problems with the proposal requiring an analysis of ammonia for water content at the time the ammonia is being loaded into cargo tanks. The Board has modified this provision by allowing samples to be taken either from ammonia storage tanks, from cargo tanks, or from product lines as the ammonia is being loaded into a cargo tank.

One commenter suggested a minimum of one hour for post-weld heat treatment at a temperature range of 1000° to 1100° F. The commenter failed to present any justification or data to support his suggestion, therefore, the Board has retained the heat treatment time schedule specified in the ASME Code, modifying only the temperature range as proposed in this rulemaking. The Board is also requiring a statement on the manufacturer's certificate to indicate whether or

not the cargo tank was post-weld heat treated for anhydrous ammonia service.

The Board proposed that copies of all test and inspection reports be provided to a prospective purchaser or lessee. Many commenters pointed out that this proposal would cause unnecessary duplication when the intent of the proposal could be met by making a report available to a prospective purchaser for his examination and a copy furnished only to the ultimate purchaser or lessee. The Board agrees and has adopted the suggestion. The proposed shipping paper entry relating to the addition of water has been shortened consistent with the present requirements of § 173.427.

One commenter suggested that this rulemaking be held in abeyance pending the results of a research effort funded by the Federal Highway Administration (FHWA) to determine the cause of stress corrosion cracking. The Board is aware that the research effort mentioned could result in future rulemaking in this area. With the outcome of the research being unpredictable, the Board does not believe any delay in this rulemaking is warranted.

The objective of the research is to (1) identify the contaminants in ammonia that contribute to stress-corrosion cracking of quenched and tempered steels; (2) establish critical concentration levels of the contaminants; and (3) determine the effect of water as an inhibitor. In addition commonly used non-quenched and tempered steels will be tested in a corrosive atmosphere. The contract is scheduled for completion by October 1975.

While there are many theories as to the actual cause of stress-corrosion cracking, there is general agreement among the experts that the addition of water does inhibit that cracking. During the public hearing on stress-corrosion cracking held on December 14, 1971, it was brought out that some shippers do not adequately control water injection equipment, thus raising the question as to when and in what quantities water is actually being added to the ammonia. This amendment will require positive quality control measures and periodic sampling by shippers to assure the addition of water to ammonia. The Board does not believe specific requirements on the addition of water as an inhibitor should be delayed until the research is completed.

Since there is also disagreement among the experts as to whether ammonia causes stress-corrosion cracking in non-quenched and tempered steels that have not been post-weld heat treated, the Board is requiring that cargo tanks constructed of these steels be inspected by wet fluorescent magnetic particle test, but not restricting the use of these tanks to water inhibited ammonia service. Data collected from the inspection reports and results of the research should indicate if additional proposals are necessary pertaining to the use of these cargo tanks.

As to an alleged serious economic impact, the Board is aware that the MC 330 and MC 331 cargo tank population is

nearly equally divided between tanks made from quenched and tempered steel, and those made from non-quenched and tempered steel. While this rulemaking may cause the relocation of some tanks, it is doubtful that any serious economic impact will result. The Board will consider on an individual basis any situation where this rulemaking may cause a severe economic hardship due to the relocation of MC 330 and MC 331 cargo tanks.

In the notice to this Docket, the Board proposed to adopt by reference two Compressed Gas Association publications having a 1973 edition date. Since that time the CGA has reprinted these publications with a 1975 edition date. No substantive changes have been made to either publication, therefore, the Board is adopting, with this Amendment, the 1975 editions.

In consideration of the foregoing, 49 CFR, Parts 173, 177, and 178 are revised as follows:

PART 173—SHIPPERS

1. In § 173.33, paragraph (e) (1) is revised and paragraphs (e)(10) through (e) (15) are added to read as follows:

§ 173.33 Cargo tank use authorization.

(e) * * *

(1) Each cargo tank must be tested and inspected at least once every 5 years in accordance with paragraphs (e) (2), (3), (4), (10), (11), and (12) of this section. A cargo tank that has been in service more than 5 years since the last test or retest, must be tested and inspected according to the provision of this paragraph by October 1, 1975. The tank and each safety relief valve of any cargo tank used for the transportation of chlorine must be retested at least once every 2 years.

(10) *Ammonia tanks.* Each MC 330 and MC 331 cargo tank used for anhydrous ammonia which is constructed of quenched and tempered steel or constructed of other than quenched and tempered steel but without post-weld heat treatment, must be internally inspected by the wet fluorescent magnetic particle method immediately prior to and in conjunction with the performance of any hydrostatic retest 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 titled, "Guidelines for Inspection and Repair of MC 330 and MC 331 Cargo Tanks," 1975 edition.

NOTE: A tank that has been wet fluorescent magnetic particle inspected, in the manner prescribed by paragraph (e) (10) of this section on or after January 1, 1971, and not thereafter subjected to weld repairs is deemed to have met the inspection requirements of paragraph (e) (10) except that this tank must be re-inspected in the manner prescribed by

paragraph (e)(10) prior to January 1, 1976, and at least once every five years thereafter.

(11) *Repairs.* All cracks and other defects found must be repaired in accordance with the repair procedures described in CGA Technical Bulletin TB-2, titled "Guidelines for Inspection and Repair of MC 330 and MC 331 Cargo Tanks," 1975 edition and section VIII of the edition of the ASME Code under which the tank was built. Each tank having cracks and defects requiring welded repairs must meet all of the requirements of § 178.337-16 of this subchapter except that post-weld heat treatment after minor weld repairs is not required. When any repairs are made, including those by grinding, the tank must again be examined by the wet fluorescent magnetic particle method after hydrotest to assure that all defects have been removed.

(12) *Reports required.* Each motor carrier operating a MC 330 or MC 331 cargo tank subject to subparagraph (e)(10) of this section shall make a written report, in duplicate, concerning the cargo tank following the required inspection or test. This reporting requirement does not apply to a motor carrier leasing a cargo tank for less than 30 days if the lessor has submitted the reports required by this section. The report for each cargo tank must contain the following:

(i) Carrier's name, address of principal office, and telephone number;

(ii) Complete name plate data required by specification MC 330 or MC 331, including data required by ASME Code;

(iii) Carrier's equipment number, which shall be the same as reported in accordance with § 177.824 (f) (1) (iii) (a) of this subchapter;

(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 date of test;

(vi) A statement of the nature and severity of defects found, if any. In particular, information must be furnished to indicate the location of defects detected, such as in a weld, a 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 cargo tank, such as "tank scrapped," or "returned to service;" and

(ix) A statement of whether or not the cargo tank is used for transportation of anhydrous ammonia, liquefied petroleum gas or any other commodity which shall be identified. Also, if the cargo tank was used for anhydrous ammonia, a statement indicating whether each shipment of ammonia was certified by its shipper as containing 0.2 percent water by weight.

(13) *Filing of reports.* The report required by this section must be filed with the Director of the Bureau of Motor Carrier Safety, Federal Highway Administration, Department of Transportation, Washington, D.C. 20599, Attention: Regulations Division. 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 1 year thereafter. However, upon a written request to, and with the approval of, the Director, Regional Motor Carrier Safety office, for the region in which a motor carrier has his principal place of business, the carrier may maintain the reports at a regional or terminal office.

(14) *Supplying reports.* Each carrier offering a MC 330 or MC 331 cargo tank for sale or lease must make available for inspection a copy of any reports made under this paragraph to each prospective purchaser or lessee. Copies of such reports must be provided for the purchaser or lessee if the cargo tank is leased for more than 30 days.

(15) *Record of inspections.* Each carrier shall prepare a record of inspections required by paragraphs (e)(10) and (e)(11) of this section. The inspection record shall be signed by the person conducting the inspections, and retained with the carrier's file copy of the report submitted under paragraph (e)(12) of this section. The inspection record must identify by cargo tank manufacturer's serial number each cargo tank inspected and also indicate the name of the inspecting agency and person, the nature of any defect or damage discovered, and must state by what method the defect or damage was discovered. If no defect or damage was discovered upon inspection this fact must also be reported.

(i) The reports required of a carrier by paragraphs (e)(12) and (13) of this section may be combined in a single report.

2. In § 173.315 paragraph (a) (1), Note 14 is revised to read as follows:

§ 173.315 Compressed gases in cargo tanks and portable tank containers.

(a) * * *

(1) * * *

NOTE 14: Specifications MC 330 and MC 331 cargo tanks constructed of other than quenched and tempered steel ("NQT") are authorized for all grades of anhydrous ammonia. Specifications MC 330 and MC 331 cargo tanks constructed of quenched and tempered steel ("QT") (see marking requirements of § 177.823 (b) (5) of this subchapter) are authorized for anhydrous ammonia having a minimum water content of 0.2 percent by weight. Any addition of water must be made using steam condensate, de-ionized, or distilled water. Any tank being placed in anhydrous ammonia service or a tank which has been in other service or has been opened for inspection, test, or repair, must be cleaned of the previous product and must be purged of air before loading. See §§ 173.427(a) (3) and

177.817(a) (1) of this subchapter special shipping paper requirements.

Any person offering for transportation anhydrous ammonia in a specification MC 330 and MC 331 cargo tank constructed of QT steel shall perform a periodic analysis for prescribed water content in the ammonia. The analysis shall be performed (1) from a sample of the ammonia in storage taken once every 7 days, or each time ammonia is added to the storage tanks, whichever is less frequent; (2) at the time the cargo tanks are loaded, then a sample of the ammonia taken from at least one loaded cargo tank out of each 10 loads, or from one cargo tank every 24 hours, whichever is less frequent; or (3) from the loading line to the cargo tank. If water is added at time of loading, the sample must be taken from a point in the loading line between the water injection equipment and the cargo tank. In those cases where water is added at the time of loading, positive provisions must be made to assure water injection equipment is operating. If the water injection equipment becomes inoperative, suitable corrective maintenance must be performed after which a sample from the first loaded cargo tank must be analyzed for prescribed water content.

The analysis method to be used must be as prescribed in CGA Pamphlet G-2.2, titled "Tentative Standard Method for Determining Minimum of 0.2% w^o in Anhydrous Ammonia," 1975 edition.

Records indicating the results of analysis taken, as required by this section, must be retained for 2 years and must be open to inspection by a representative of the Department.

3. In § 173.427, paragraph (a) (3) is revised to read as follows.

§ 173.427 Shipping papers.

(a) * * *

(3) For shipments of anhydrous ammonia in specification MC 330 and MC 331 cargo tanks constructed of quenched and tempered steel, the shipper shall also show "(0.2 percent water)" to indicate suitability for shipment in the tank as authorized by § 173.315(a) (1) Note 14. For shipments of anhydrous ammonia that do not contain 0.2 percent water, the shipper must also show "(not for Q and T tanks)."

PART 177—SHIPMENTS MADE BY WAY OF COMMON, CONTRACT, OR PRIVATE CARRIERS BY PUBLIC HIGHWAY

1. In § 177.817, paragraph (a) (1) is revised, paragraph (a) (2) is redesignated (a) (3), and a new paragraph (a) (2) is added to read as follows:

§ 177.817 Shipping papers.

(a) * * *

(1) A carrier may not accept for transportation nor transport anhydrous ammonia in specification MC 330 and MC 331 cargo tanks constructed of quenched and tempered steel, unless the shipping paper is marked "(0.2 percent water)" to indicate suitability for shipment in

such tanks as authorized by § 173.315 (a) (1) Note 14 of this subchapter.

(2) A carrier may not accept for transportation or transport anhydrous ammonia that does not contain 0.2 percent water by weight in specification MC 330 and MC 331 cargo tanks constructed of quenched and tempered steel, nor may a carrier accept such shipment for transport in any "NQT" cargo tanks unless the shipping paper is marked "(NOT FOR Q AND T TANKS)" as prescribed by § 173.315(a)(1) Note 14 of this subchapter.

2. In § 177.824, the introductory text of paragraph (f) and paragraphs (f) (1) (ii) and (iii) and (f) (2) are revised to read as follows:

§ 177.824 Retesting and inspection of cargo tanks.

(f) *Reporting requirements.* Each motor carrier shall file with the Director, Bureau of Motor Carrier Safety, Federal Highway Administration, Department of Transportation, Washington, D.C. 20590, a written listing of all MC 330 and MC 331 cargo tanks he has in service. Each motor carrier, upon placing in service or withdrawing from service any MC 330 and MC 331 cargo tank (other than a cargo tank used in interchange service which is reported upon by another carrier), shall file a supplemental report with the Bureau.

(1) * * *

(ii) One of the following statements: "Cargo tank placed in service" or "Cargo tank withdrawn from service," as appropriate, followed by the date of placement or removal;

(iii) The carrier's equipment number, manufacturer's name, manufacturer's serial number, specification MC 330 or MC 331, and "QT" (quenched and tempered) or "NQT" (not quenched and tempered).

(2) A copy of each report required by this paragraph 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 1 year thereafter. However, upon a written request

to, and with the approval of, the Director, Regional Motor Carrier Safety Office, for the region in which a motor carrier has his principal place of business, the carrier may maintain the reports at a regional or terminal office.

PART 178—SHIPPING CONTAINER SPECIFICATIONS

1. In § 178.337, the heading is revised, and paragraph (f) in § 178.337-1 is amended by adding the following sentence at the end of the paragraph.

§ 178.337 Specification MC 331; cargo tanks constructed of steel, primarily for transportation of compressed gases as defined in the Compressed Gas Section.

§ 178.337-1 General requirements.

(f) * * * A tank used for anhydrous ammonia must be post-weld heat treated. The post-weld heat treatment must be as prescribed in the ASME Code, but in no event at less than 1050° F. tank metal temperature.

2. In § 178.337-18, paragraph (a) (1) is added to read as follows:

§ 178.337-18 Certification.

(a) * * *

(1) The certificate must contain a statement indicating whether or not the cargo tank was post-weld heat treated for anhydrous ammonia as specified in § 178.337-1(f).

These amendments are effective October 1, 1975. However, compliance with the regulations as amended herein is authorized immediately.

(Transportation of Explosives Act (18 U.S.C. 831-835); sec. 6 of the Department of Transportation Act (49 U.S.C. 1655))

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Board Member for the
Federal Highway Administration.

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