



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

24909

[Docket No. HM-100; Amdt. Nos. 173-82,
179-14]

PART 173—SHIPPERS

**PART 179—SPECIFICATIONS FOR TANK
CARS**

Ethylene Oxide; Opening in Tank Car Heads

On April 5, 1972, the Hazardous Materials Regulations Board ("the Board") published a notice of proposed rulemaking, Docket No. HM-100; Notice No. 72-4 (37 FR 6871), which proposed these amendments. The reasons for all these amendments were discussed in that notice of proposed rulemaking. Interested persons were invited to give their views and several comments were received by the Board.

The purpose of these amendments is to authorize the shipment of ethylene oxide in insulated portable tanks and to upgrade the requirements of filling and the specifications of tank cars authorized for ethylene oxide. In addition, Association of American Railroads specification ARA-IV-A and ARA-IV, and DOT specification 104 and 104W, tank cars are no longer authorized to be used for the transportation of ethylene oxide.

Gas padding. Several comments were received regarding the adequacy of the requirements proposed by the Board in Notice No. 72-4 covering gas padding. Several commenters pointed out that there are a number of gases that are suitable for padding. However, because of differences in solubility of these gases in liquid ethylene oxide, differences in loading temperatures and other factors, different amounts of padding gas (and hence different charging pressures) are required to provide the same level of safety for these different loading conditions. The Board agrees that the proposed pressure range of 35 to 60 p.s.i.g. at 70° F. does not completely reference the range of padding pressures producing safe loading and transportation conditions. The Board also agrees with one commenter's suggestion that it is more appropriate to state the padding gas requirements in the form of performance criteria. As a consequence, §§ 173.124(a)(5) and (a)(6) have been changed from what was proposed in accordance with these recommendations.

Fusible plugs on portable tanks. In Notice No. 72-4, the Board proposed requirements for portable tanks to be used in the transportation of ethylene oxide. The proposal was based on extensive experience gained by one shipper under special permit. Essentially, the proposal was based on the conditions existing in the special permit. One commenter, the special permit holder, suggested increasing the proposed thickness of the tank shell material since permit experience was with heavier gauge tanks. The Board agrees with this suggestion and has so provided in § 173.124(a)(6). With re-

spect to these portable tanks, the Board proposed to require that the tanks be equipped with safety relief valves or frangible discs. Under the special permit, these tanks have been equipped with fusible plugs, and not safety relief valves or frangible discs. This same commenter requested that fusible plugs, in addition to safety relief valves or frangible discs, be permitted for such small tanks (maximum 300 gallons) designed according to the same basic criteria as are DOT-5P insulated drums which are used for liquefied petroleum gases. The commenter pointed out that the DOT-5P drum specification was established based on extensive fire testing to determine the proper sizing of the fuse plugs to prevent rupture of the container under fire exposure and that the surface to volume ratio of his portable tanks is the same as that of a DOT-5P drum. The Board agrees that, with more specific requirements applicable to the fusible plug and to performance criteria for the insulation, fusible plugs may be permitted in this size packaging. Section 173.124(a)(6) specifies the requirements accordingly.

Gaskets. The Manufacturing Chemists Association, Inc., the submitter of the petition upon which Docket No. HM-100 was based, pointed out that it did not recommend Teflon, or interwoven stainless steel and Teflon, as the only acceptable resilient materials for gaskets in ethylene oxide service. It stated that it wished to merely identify these materials as being among those suitable for ethylene oxide transportation service. It noted that to list all of the suitable materials in the regulations would not be practicable nor desirable since to do so could place unnecessary restraints on the development of technology in this application. It stated that it believed that it would be more appropriate to specify the materials that are not suitable (neoprene, natural rubber, and asbestos) and to state the requirements for gaskets on a performance criterion basis. In a related observation, the Board notes that the Coast Guard has successfully applied this philosophy to gasketing materials for use on ethylene oxide barges. (See 46 CFR 40.05-40, valves, fittings, and accessories.) In consideration of these factors, the requirements concerning gaskets have been restated in performance terms. Certain undesirable materials, including asbestos, have been prohibited. One commenter objected to the absence of approval for compressed asbestos gaskets stating that such gaskets have been in use and he has found no evidence to support their prohibition. The Board has been advised that asbestos is not suitable because it significantly lowers the autoignition temperature of ethylene oxide. In addition, neoprene and natural rubber are considered unsuitable for use because of their undesirable reaction to ethylene oxide. Another commenter stated that the prohibition of certain materials and

the establishment of performance criteria for gaskets were fully justifiable but concluded that the effective date of these requirements should be delayed for 18 months after the effective date of the amendments in this docket. The Board does not agree with such a delay. Since the hazards of neoprene, natural rubber, and asbestos with ethylene oxide have been recognized, there is no justification for delaying their replacement for what would be over two years.

In consideration of the foregoing, 49 CFR Parts 173 and 179 are amended as follows:

A. In § 173.119, the last sentence of paragraphs (a)(12), (e)(2), and (f)(3) is amended to read as follows. Notes 1, 2, and 3 following paragraph (f)(3), remain unchanged.

§ 173.119 Flammable liquids not specifically provided for.

(a) * * *

(12) * * * Openings in tank heads to facilitate application of lining are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved (§ 179.3 of this subchapter) manner.

(e) * * *

(2) * * * Openings in tank heads to facilitate application of lining are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved (§ 179.3 of this subchapter) manner. (See Note 1 of paragraph (f)(3) of this section.)

(f) * * *

(3) * * * Openings in tank heads to facilitate application of lining are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved (§ 179.3 of this subchapter) manner.

B. In § 173.124, paragraph (a)(5) is amended; Note 1 and paragraph (b) are deleted; paragraph (a)(6) is added to read as follows:

§ 173.124 Ethylene oxide.

(a) * * *

(5) Specification 105A100W or 111A-100W4 (§§ 179.100, 179.200 of this subchapter) tank car. Each 105A***W series tank car must be equipped with a 75 p.s.i.g. safety valve and must be stenciled 105A100W. Each tank car must be stenciled, in letters not less than 1½ inches high, "ETHYLENE OXIDE ONLY" near the car specification number. Outage of each tank must be sufficient to prevent the tank from becoming entirely filled with liquid at 105° F. Each tank, loaded or empty, must be padded with dry nitrogen or other suitable dry inert gas in sufficient quantity to render the vapor phase in the tank nonflammable at a temperature up to 105° F. Consideration must be given to the lading temperature and the solubility of the gas in ethylene oxide as well as the

partial pressure required of the padding gas used to provide this protection. The gas must be free of impurities which may cause the ethylene oxide to rearrange chemically or to polymerize, decompose, or undergo other violent chemical reaction. See §§ 179.102-12 and 179.202-18 of this subchapter for special requirements for tank cars authorized for ethylene oxide. Openings in tank heads to facilitate application of nickel lining are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved (§ 179.3 of this subchapter) manner (See Note 1 of § 173.119(f)(3)).

NOTE 1 [Deleted]

(6) Specification 51 (§ 178.245 of this subchapter) portable tank. Each tank, loaded or empty, must be padded with dry nitrogen or other suitable dry inert gas in sufficient quantity to render the vapor phase in the tank nonflammable at a temperature up to 105° F. Consideration must be given to the lading temperature and the solubility of the gas in ethylene oxide as well as the partial pressure required of the padding gas used to provide this protection. The gas must be free of impurities which may cause the ethylene oxide to rearrange chemically or to polymerize, decompose, or undergo other violent chemical reaction. Each tank must be constructed to be in compliance with the following requirements:

(i) The tank must be insulated with mineral wool or glass fiber of sufficient thickness so that the thermal conductance at 60° F. is not more than 0.075 B.t.u. per hour, per square foot, per degree Fahrenheit temperature differential. When a tank is equipped with fusible plugs instead of a safety relief valve or frangible disc, insulation must meet the requirements of paragraph (a)(6)(iii) of this section.

(ii) The insulating material of the tank must be protected by a steel jacket having a minimum thickness of 12 gauge. This jacket must be applied to prevent moisture from coming in contact with the insulation.

(iii) Each tank must be equipped with a safety relief valve or frangible disc, meeting the requirements of § 173.315, set to relieve at 75 p.s.i.g. Instead of a safety relief valve or frangible disc, a tank may be equipped with safety devices of the fusible plug type with threaded straight base orifice, with yield temperature of 157° to 170° F., having a minimum vent area of 0.0012 square inch per pound of water capacity of the container. When a fusible plug is used instead of a safety relief valve or frangible disc, the tank must be insulated with mineral wool or glass fiber of such insulating properties and required additional thickness that the tank filled as for shipment will not rupture in a fire.

(iv) Filling must be such that the tank will not be liquid full below 185° F.

(v) Copper, silver, mercury, magnesium, or their alloys may not be used in any part of the tank or appurtenances if that part or appurtenance is normally in contact with ethylene oxide liquid or vapor.

(vi) Neoprene, natural rubber, and asbestos gaskets are prohibited. All packings and gaskets must be constructed of

materials which do not react spontaneously with or lower the autoignition temperature of ethylene oxide.

(vii) The capacity of the tank may not exceed 300 gallons.

(b) [Deleted]

C. In § 173.314 paragraph (c) Table, Note 16 following table is amended to read as follows:

§ 173.314 Requirements for compressed gases in tank cars.

* * * * *

(c) * * *

NOTE 16: Openings in tank heads to facilitate application of nickel lining are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved (§ 179.3 of this subchapter) manner.

* * * * *

D. In § 173.354, the last sentence of paragraph (a)(4) is amended to read as follows:

§ 173.354 Motor fuel antiknock compound or tetraethyl lead.

(a) * * *

(4) * * * Openings in tank heads to facilitate application of nickel lining are authorized on tank cars constructed before January 1, 1975. These openings must be closed in an approved (§ 179.3 of this subchapter) manner.

* * * * *

A. In § 179.102, §§ 179.102-6(a)(3) and 179.102-17 are deleted; §§ 179.102-12 and 197.102-20 are amended to read as follows:

§ 179.102 Special commodity requirements for pressure tank car tanks.

§ 179.102-6 Vinyl chloride or vinyl methyl ether, inhibited.

(a) * * *

(3) [Deleted]

* * * * *

§ 79.102-12 Ethylene oxide.

(a) Each tank car used to transport ethylene oxide must be constructed to be in compliance with the following special requirements:

(1) The tank must be constructed in accordance with the DOT-105A * * * W specification, and its jacket stenciled "DOT-105A100W" and "Ethylene Oxide Only." "Ethylene Oxide Only" must appear on both sides of the tank and in letters not less than 1½ inches high.

(2) Each safety relief valve must be in compliance with the requirements specified in the DOT-105A100W tank car specification. Each safety relief valve must have its discharge piped to the top of the manway bonnet assembly. Vapor exit from the assembly must be provided through a full opening weather cap located directly above the safety valve vent pipe. Compliance with this provision is required after January 31, 1975 except that tank cars which are not in compliance and were built before January 31, 1975, must be in compliance by January 31, 1976.

(3) Copper, silver, mercury, magnesium, or their alloys may not be used in any part of the tank or appurtenances if that part of appurtenance is normally in contact with ethylene oxide liquid or vapor.

(4) Interior pipes of liquid discharge valves, vapor lines, gaging devices (when

the device provides a means for passage of the lading from the interior to the exterior of the tank) and sampling lines must be equipped with excess flow valves of an approved design.

(5) Each tank must be equipped with a thermometer well.

(6) Each tank must be insulated with glass fiber except tank cars built before January 31, 1975, are authorized in this service when insulated with cork.

(7) The manway protective housing and cover must be insulated with glass fiber or other material that will provide protection against heat deterioration of the valves and any resilient material contained within the housing. Compliance with this provision is required after January 31, 1975, except that tank cars which are not in compliance and were built before January 31, 1975, must be in compliance by January 31, 1976.

(8) Neoprene, natural rubber, and asbestos gaskets are prohibited. All O-rings, packings and gaskets must be constructed of materials which do not react spontaneously with or lower the auto-ignition temperature of ethylene oxide.

§ 179.102-17 [Deleted]

§ 179.102-20 Dimethyl hydrazine unsymmetrical.

Class DOT-105AW tank cars used to transport dimethyl hydrazine unsymmetrical must be stenciled DOT-105A-100W. Tanks must be equipped with steel or stainless steel safety relief valves of the type and size used on specification DOT-105A100W tank cars.

B. In § 179.201-1 paragraph (a) table, footnote 2 is added and reference thereto replaces § 173.314(c), the second entry in the column headed 111A100W4:

§ 179.201 Individual specification requirements applicable to nonpressure tank car tanks.

§ 179.201-1 Individual specification requirements.

(a) * * *

²See § 173.314(c) of this subchapter for compressed gases and § 173.116 of this subchapter for flammable liquids, unless otherwise specified in Part 173, Subpart C.

§ 179.201-1 [Amended]

C. In § 179.202, § 179.202-1 is amended by deleting the second sentence which begins with the word "Openings"; § 179.202-18 is amended to read as follows:

§ 179.202 Special commodity requirements for non-pressure tank car tanks.

§ 179.202-18 Ethylene oxide.

(a) Each tank car used to transport ethylene oxide must be constructed to be in compliance with the following special requirements:

(1) The tank must be constructed in accordance with the DOT-111A100W4 specification and its jacket stenciled on both sides "ETHYLENE OXIDE ONLY" in letters not less than 1½ inches high.

(2) The safety relief valve, if not lo-

cated on the manway nozzle, must be protected by an approved and insulated protective housing. Each safety relief valve must have its discharge piped to the top of the manway bonnet assembly or protective housing. Vapor exit from the manway bonnet assembly or protective housing must be provided through a full opening weather cap located directly above the safety valve vent pipe. Compliance with this provision is required after January 31, 1975, except that tank cars which are not in compliance and were built before January 31, 1975, must be in compliance by July 31, 1976.

(3) Copper, silver, mercury, magnesium, or their alloys may not be used in any part of the tank or appurtenances if that part or appurtenance is normally in contact with ethylene oxide liquid or vapor.

(4) Interior pipes of liquid discharge valves, vapor lines, gaging devices (when the device provides a means for passage of the lading from the interior to the exterior of the tank) and sampling lines must be equipped with excess flow valves of an approved design.

(5) Each tank must be equipped with a thermometer well.

(6) Each tank must be insulated with glass fiber except tank cars built before January 31, 1975, are authorized in this service when insulated with cork.

(7) Manway nozzle, cover plate, and protective housing must be of approved design. The manway protective housing and cover must be insulated with glass fiber or other material that will provide protection against heat deterioration of the valves and any resilient material contained within the housing. Compliance with this provision is mandatory after January 31, 1975, except that tank cars which are not in compliance and were built before January 31, 1975, must be in compliance by July 31, 1976.

(8) Neoprene, natural rubber, and asbestos gaskets are prohibited. All valve stem packings, O-rings, and gaskets must be constructed of materials which do not react spontaneously with or lower the autoignition temperature of ethylene oxide.

(9) Vacuum relief valves are prohibited.

These amendments are effective January 31, 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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