§ 173.315 Compressed gases in cargo tanks and portable tanks.

(a) Liquefied compressed gases that are transported in UN portable tanks, DOT specification portable tanks, or cargo tanks must be prepared in accordance with this section. §173.32, §173.33 and subpart E or subpart G of part 180 of this subchapter, as applicable. For cryogenic liquid in cargo tanks, see §173.318. For marking requirements for portable tanks and cargo tanks, see §172.336 and §172.338 of this subchapter, as applicable.

1. UN portable tanks: UN portable tanks must be loaded and offered for transportation in accordance with portable tank provision T50 in §172.102 of this subchapter.

2. Cargo tanks and DOT specification portable tanks: Cargo tanks and DOT specification portable tanks must be loaded and offered for transportation in accordance with the following table:

<table>
<thead>
<tr>
<th>Kind of gas</th>
<th>Maximum permitted filling density</th>
<th>Specification container required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent by weight (see Note 1)</td>
<td>Percent by volume (see par. f)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Type (see Note 2)</td>
</tr>
<tr>
<td>Ammonia, anhydrous or Ammonia solutions with greater than 50 percent ammonia (see Notes 14 and 17)</td>
<td>56</td>
<td>See Note 5</td>
</tr>
<tr>
<td>Ammonia solutions with more than 35 percent but not more than 50 percent ammonia</td>
<td>See par. (c) of this section</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Bromotrifluoromethane (R-13B1 or H-1391); (See Note 9)</td>
<td>133</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Butadiene, stabilized</td>
<td>See par. (b) of this section</td>
<td>See par. (b) of this section</td>
</tr>
<tr>
<td>Carbon dioxide, refrigerated liquid</td>
<td>See par. (c)(1) of this section</td>
<td>See Note 1</td>
</tr>
<tr>
<td>Chlorine</td>
<td>125</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Chlorodifluoromethane (R-142b); (1-Chloro 1,1-difluoroethane); (See Note 9)</td>
<td>100</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Chlorodifluoromethane (R-22); (See Note 9)</td>
<td>105</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Chloropentafluoroethane (R-115); (See Note 9)</td>
<td>See par. (c) of this section</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Chlorotrifluoromethane (R-13); (See Note 9)</td>
<td>See par. (c) of this section</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Dichlorodifluoromethane (R-12); (See Note 9)</td>
<td>119</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Difluorocarbons (R-152a); (See Note 9)</td>
<td>79</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Dimethyl ether (see Note 16)</td>
<td>59</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Dimethyldilamine, anhydrous</td>
<td>59</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Division 2.1, materials not specifically provided for in this table</td>
<td>See par. (c) of this section</td>
<td>See Note 16</td>
</tr>
<tr>
<td>Division 2.2, materials not specifically provided for in this table</td>
<td>See par. (c) of this section</td>
<td>See Note 16</td>
</tr>
<tr>
<td>Division 2.3, Hazard Zone A, materials not specifically provided for in this table</td>
<td>See par. (c) of this section</td>
<td>See Note 20</td>
</tr>
<tr>
<td>Division 2.3, Hazard Zone B, materials not specifically provided for in this table</td>
<td>See par. (c) of this section</td>
<td>See Note 20</td>
</tr>
<tr>
<td>Division 2.3, Hazard Zone C, materials not specifically provided for in this table</td>
<td>See par. (c) of this section</td>
<td>See Note 24</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Kind of gas</th>
<th>Maximum permitted filling density</th>
<th>Specification container required</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent by weight (see Note 1)</td>
<td>Percent by volume (see par. (f) of this section)</td>
</tr>
<tr>
<td>Division 2.3, Hazard Zone D, materials not specifically provided for in this table</td>
<td>See par. (c) of this section</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Ethane, refrigerated liquid</td>
<td>See par. (c) of this section</td>
<td>DOT-51, MC-330, MC-331</td>
</tr>
<tr>
<td>Ethane-propane mixture, refrigerated liquid</td>
<td>See par. (c) of this section</td>
<td>DOT-51, MC-330, MC-331</td>
</tr>
<tr>
<td>Hexafluoropropane</td>
<td>110</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Hydrogen chloride, refrigerated liquid</td>
<td>103.0</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Liquefied petroleum gas (see Note 15)</td>
<td>See par. (b) of this section</td>
<td>DOT-51, MC-330, MC-331; See Note 26</td>
</tr>
<tr>
<td>Methylacetylene-propadiene, stabilized</td>
<td>See Note 10</td>
<td>See Note 11</td>
</tr>
<tr>
<td>Methylamine, anhydrous</td>
<td>60</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Methyl chloride</td>
<td>84</td>
<td>88.5</td>
</tr>
<tr>
<td>Methyl chloride (optional portable tank 2,000 pounds water capacity, fusible plug)</td>
<td></td>
<td>See Note 6</td>
</tr>
<tr>
<td>Methyl mercaptan</td>
<td>80</td>
<td>90</td>
</tr>
<tr>
<td>Nitrous oxide, refrigerated liquid</td>
<td>See par. (c)(1) of this section</td>
<td>95</td>
</tr>
<tr>
<td>Refractory gas, n.o.s. or Dispersant gas, n.o.s. (See Note 9)</td>
<td>See par. (c) of this section</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Sulfur dioxide (tanks not over 1,200 gallons water capacity)</td>
<td>125</td>
<td>87.5</td>
</tr>
<tr>
<td>Sulfur dioxide (tanks over 1,200 gallons water capacity)</td>
<td>125</td>
<td>87.5</td>
</tr>
<tr>
<td>Sulfur dioxide (optional portable tank 1,000–2,000 pounds water capacity, fusible plug)</td>
<td>125</td>
<td>87.5</td>
</tr>
<tr>
<td>Trimethylamine, anhydrous</td>
<td>57</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Vinyl chloride</td>
<td>84 (see Note 13)</td>
<td>See Note 7</td>
</tr>
<tr>
<td>Vinyl fluoride, stabilized</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>Vinyl methyl ether</td>
<td>68</td>
<td></td>
</tr>
</tbody>
</table>

**Note 1:** Maximum filling density for liquefied gases is hereby defined as the percent ratio of the weight of gas in the tank to the weight of water that the tank will hold. For determining the water capacity of the tank in pounds, the weight of a gallon (231 cubic inches) of water at 60 °F. in air shall be 8.32828 pounds.

**Note 2:** See §173.32 for authority to use other portable tanks and for manifolding cargo tanks, see paragraph (q) of this section. Specifications MC 330 cargo tanks may be painted as specified for MC 331 cargo tanks.

**Note 3:** If cargo tanks and portable tank containers for carbon dioxide, refrigerated liquid, and nitrous oxide, refrigerated liquid, and nitrous oxide, refrigerated liquid, are designed to conform to the requirements in Section VIII of the ASME Code for low temperature operation (IBR, see §171.7 of this subchapter), the design pressure may be reduced to 100 psig or the controlled pressure, whichever is greater.

**Note 4:** Material must be steel. Packagings must have a corrosion allowance of 20 percent or 0.10 inch, whichever is less, added to the metal thickness. The minimum wall thickness for chlorine packagings is 0.300 inch for stainless steel or 0.625 inch for carbon steel, including corrosion allowance.

**Note 5:** Unlabeled cargo tanks and portable tank containers for liquid anhydrous ammonia may be filled to 87.5 percent by volume provided the temperature of the anhydrous ammonia being loaded into such tanks is determined to be not lower than 30 °F., or provided the filling of such tanks is stopped at the first indication of frost or ice formation on the outside surface of the tank and is not resumed until such frost or ice has disappeared.

**Note 6:** Tanks equipped with fusible plugs must be filled by weight.

**Note 7:** Chlorine packagings may be shipped only if the contents are to be unloaded at one unloading point.

**Note 8:** Chlorine packagings may be transported in authorized cargo tanks and portable tanks marked "DISPERSANT GAS," or "REFRIGERANT GAS.

**Note 10:** [Reserved]
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Note 12: No aluminum, copper, silver, zinc or an alloy of any of these metals shall be used in packaging construction where it comes into contact with the lading.

Note 13: All parts of valves and safety devices in contact with contents of tank must be of a metal or other material suitably treated or phosphated, which will not cause formation of any acetylene.

Note 14: Specifications MC 330 and MC 331 cargo tanks constructed of other than quenched and tempered steel "(QT)" 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 § 172.328(c) of this subchapter) are authorized for anhydrous ammonia having a minimum water content of 0.2 percent by weight. 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 § 172.203(h) of this subchapter for special shipping paper requirements.

Note 15: Specifications MC 330 and MC 331 cargo tanks constructed of other than quenched and tempered steel (NQT) are authorized for all grades of liquefied petroleum gases. Only grades of liquefied petroleum gases determined to be "noncorrosive" are authorized in Specification MC 330 and MC 331 cargo tanks constructed of quenched and tempered steel (QT). "Noncorrosive" means the corrosiveness of the gas does not exceed the limitations for classification 1 of the ASTM Copper Strip Classification when tested in accordance with ASTM D 1838, "Copper Strip Corrosion by Liquefied Petroleum (LP) Gases" (IBR, see § 171.7 of this subchapter). (For QT and (NQT) marking requirements, see § 172.328(c) of this subchapter. For special shipping paper requirements, see § 172.203(h) of this subchapter.)

Note 16: Openings, inlets, and outlets on MC 330 and MC 331 cargo tanks must conform to § 178.337–8(a) of this subchapter. MC 330 and MC 331 cargo tanks must be equipped with emergency discharge control equipment as specified in § 178.337–11(a) of this subchapter.

Note 17: A Specification MC-330 or MC-331 cargo tank or a non-specification cargo tank meeting, and marked in conformance with, the edition of the ASME Code in effect when it was fabricated, may be used for the transportation of anhydrous ammonia if its:

1. Has a minimum design pressure not lower than 250 psig;
2. Was manufactured in conformance with the ASME Code prior to January 1, 1981, according to its ASME name plate and manufacturer's data report;
3. Is painted white or aluminum;
4. Complies with Note 12 of this paragraph;
5. Has been inspected and tested in accordance with subpart E of part 180 of this subchapter as specified for MC 331 cargo tanks.
6. Was used to transport anhydrous ammonia prior to January 1, 1981;
7. Is operated exclusively in intrastate commerce (including its operation by a motor carrier otherwise engaged in interstate commerce) in a state where its operation was permitted by the laws of that state (not including the incorporation of this subchapter) prior to January 1, 1981; and
8. Is operated in conformance with all other requirements of this subchapter.

Note 18: The minimum packaging design pressure must not be less than the vapor pressure at the reference temperature of the material, or of 173.4 kPa (25 psig), whichever is less.

Note 19: The minimum packaging design pressure must be in excess of the vapor pressure at the reference temperature of the lading.

Note 20: The minimum packaging design pressure must not be less than 1.5 times the vapor pressure of the lading at 46 °C (115 °F).

Note 21: The minimum packaging design pressure must not be less than 1.3 times the vapor pressure of the lading at 46 °C (115 °F).

Note 22: The minimum packaging design pressure must not be less than 1.1 times the vapor pressure of the lading at 46 °C (115 °F).

Note 23: Packagings must be made of stainless steel except that steel other than stainless steel may be used in accordance with the provisions of § 173.24(b) of this part. Thickness of stainless steel for shell and heads must be the greater of 7.62 mm (0.300 inch) or the thickness required for the packaging at its minimum design pressure.

Note 24: Packagings must be made of stainless steel except that steel other than stainless steel may be used in accordance with the provisions of § 173.24(b) of this part. Thickness of stainless steel for shell and heads must be the greater of 6.35 mm (0.250 inch) or the thickness required for the packaging at its minimum design pressure.

Note 25: Packagings must be made of stainless steel except that steel other than stainless steel may be used in accordance with the provisions of § 173.24(b) of this part. Thickness of stainless steel for shell and heads must be the greater of 6.35 mm (0.250 inch) or the thickness required for the packaging at its minimum design pressure. For sulphur dioxide, this Note does not apply until October 1, 1994.

Note 26: Non-specification cargo tanks may be used for the transportation of liquefied petroleum gas, subject to the conditions prescribed in paragraph (k) of this section.

Note 27: Non-specification cargo tanks may be used for transportation of Ammonia, anhydrous and ammonia solutions with greater than 50% ammonia, subject to the conditions prescribed in paragraph (m) of this section.

(b) Maximum permitted filling densities for cargo and portable tank containers for transportation of butadiene, stabilized, and liquefied petroleum gas are as follows:

<table>
<thead>
<tr>
<th>Maximum specific gravity of the liquid material at 60 °F.</th>
<th>Maximum permitted filling density in percent of the water-weight capacity of the tanks (per- cent) See Note 1</th>
<th>Maximum permitted filling density in percent of the water-weight capacity of the tanks (per- cent) See Note 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.473 to 0.480</td>
<td>36</td>
<td>44</td>
</tr>
<tr>
<td>0.489 to 0.498</td>
<td>39</td>
<td>42</td>
</tr>
<tr>
<td>0.496 to 0.503</td>
<td>40</td>
<td>43</td>
</tr>
<tr>
<td>0.504 to 0.510</td>
<td>41</td>
<td>44</td>
</tr>
<tr>
<td>0.511 to 0.519</td>
<td>42</td>
<td>46</td>
</tr>
<tr>
<td>Minimum specific gravity of the liquid material at 60 °F.</td>
<td>Over 1200 gallons</td>
<td>Over 1200 gallons</td>
</tr>
<tr>
<td>0.520 to 0.527</td>
<td>44</td>
<td>47</td>
</tr>
<tr>
<td>0.528 to 0.536</td>
<td>45</td>
<td>48</td>
</tr>
<tr>
<td>0.537 to 0.544</td>
<td>46</td>
<td>49</td>
</tr>
<tr>
<td>0.545 to 0.552</td>
<td>47</td>
<td>50</td>
</tr>
<tr>
<td>0.553 to 0.560</td>
<td>48</td>
<td>51</td>
</tr>
<tr>
<td>0.561 to 0.568</td>
<td>49</td>
<td>52</td>
</tr>
<tr>
<td>0.569 to 0.576</td>
<td>50</td>
<td>53</td>
</tr>
<tr>
<td>0.577 to 0.584</td>
<td>51</td>
<td>54</td>
</tr>
<tr>
<td>0.585 to 0.592</td>
<td>52</td>
<td>55</td>
</tr>
<tr>
<td>0.593 to 0.600</td>
<td>53</td>
<td>56</td>
</tr>
<tr>
<td>0.601 to 0.608</td>
<td>54</td>
<td>57</td>
</tr>
<tr>
<td>0.609 to 0.617</td>
<td>55</td>
<td>58</td>
</tr>
<tr>
<td>0.618 to 0.626</td>
<td>56</td>
<td>59</td>
</tr>
</tbody>
</table>

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Maximum permitted filling density in percent of the water-weight capacity of the tanks (percent) See Note 1

<table>
<thead>
<tr>
<th>Maximum specific gravity of the liquid material at 60 °F</th>
<th>Maximum permitted filling density in percent of the water-weight capacity of the tanks (percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.627 and over ........................................</td>
<td>57</td>
</tr>
<tr>
<td>Over 1200 gallons .....................................</td>
<td>60</td>
</tr>
</tbody>
</table>

NOTE 1: Filling is permitted by volume provided the same filling density is used as permitted by weight, except when using fixed length dip tube or other fixed maximum liquid level indicators (paragraph (f) of this section), in which case the maximum permitted filling density shall not exceed 97 percent of the maximum permitted filling density by weight contained in the table.

(1) Odorization. All liquefied petroleum gas shall be effectively odorized as required in Note 2 of this paragraph to indicate positively, by a distinctive odor, the presence of gas down to a concentration in air of not over one-fifth the lower limit of combustibility provided, however, that odorization is not required if harmful in the use or further processing of the liquefied petroleum gas, or if odorization will serve no useful purpose as a warning agent in such use or further processing.

NOTE 2: The lower limits of combustibility of the more commonly used liquefied petroleum gases are: Propane, 2.15 percent; butane, 1.55 percent. These figures represent volumetric percentages of gas-air mixtures in each case.

(2) A tank containing ethane, refrigerated liquid; ethane-propane mixture, refrigerated liquid; or hydrogen chloride, refrigerated liquid. Such tank must be filled to allow at least two percent outage below the inlet of the pressure relief valve or pressure control valve under conditions of incipient opening, with the tank in a level attitude.

(d) If the loading of cargo tanks and portable tank containers with liquefied gases is to be determined by weight, the gross weight shall be checked after the filling line is disconnected in each instance. The gross weight shall be calculated from the tank capacity and tare weight set forth on the metal plate required by the specification, and the maximum filling density permitted for the material being loaded into the tank as set forth in the table, paragraph (a) of this section.

(e) If the loading of cargo tanks and portable tank containers with liquefied gases is to be determined by adjustable liquid level device, each tank and each compartment thereof shall have a thermometer well, so that the internal liquid temperature can easily be determined, and the amount of liquid in the tank shall be corrected to a 60 °F basis. Liquid levels shall not exceed a level corresponding to the maximum filling density permitted for the material being loaded into the tank as set forth in the table in paragraph (a) of this section.

(f) When the loading of cargo tanks and portable tank containers with liquefied gases is determined only by fixed length dip tube or other fixed maximum liquid level indicator, the device shall be arranged to function at a level not to exceed the maximum permitted volume prescribed by the table, paragraph (a) of this section. Loading shall be stopped when the device functions.

(g) Containers, the liquid level of which has been determined by means of a fixed length dip tube gauging device, shall not be acceptable for stowage as cargo on vessels in commerce subject to the jurisdiction of the United States Coast Guard. Nothing contained in this section shall be so construed as to prohibit the transportation on car floats...
or car ferries of motor vehicles laden
with containers nor cargo tanks the
liquid level of either of which has been
determined by means of fixed length
dip tube devices.

(h) Each cargo tank and portable
tank, except a tank filled by weight,
must be equipped with one or more of
the gauging devices described in the
following table which indicate accu-
rately the maximum permitted liquid
level. Additional gauging devices may
be installed but may not be used as pri-
mary controls for filling of cargo tanks
and portable tanks. Gauge glasses are
not permitted on any cargo tank or
portable tank. Primary gauging de-
vices used on cargo tanks of less than
3500 gallons water capacity are exempt
from the longitudinal location require-
ments specified in paragraphs (h)(2)
and (3) of this section provided: The
tank length does not exceed three
times the tank diameter; and the cargo
tank is unloaded within 24 hours after
each filling of the tank.

<table>
<thead>
<tr>
<th>Kind of gas</th>
<th>Gaging device permitted for filling purposes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sulfur dioxide</td>
<td>None.</td>
</tr>
<tr>
<td>Vinyl chloride</td>
<td>Fixed length dip tube.</td>
</tr>
<tr>
<td>Vinyl fluoride, inhibited</td>
<td>Do.</td>
</tr>
</tbody>
</table>

(1) The design pressure of the liquid
level gauging devices shall be at least
equal to the design pressure of the
tank.

(2) If the primary gauging device is
adjustable, it must be capable of ad-
justment so that the end of the tube
will be in the location specified in
paragraph (h)(3) of this section for at
least one of the ladings to be trans-
ported, at the filling level cor-
responding to an average loading tem-
perature. Exterior means must be pro-
vided to indicate this adjustment. The
gauging device must be legibly and per-
manently marked in increments not
exceeding 20 Fahrenheit degrees (or not
exceeding 25 p.s.i.g. on tanks for carbon
dioxide, refrigerated liquid or nitrous
oxide, refrigerated liquid), to indicate
the maximum levels to which the tank
may be filled with liquid at tempera-
tures above 20 °F. However, if it is not
practicable to so mark the gauging de-
vice, this information must be legibly
and permanently marked on a plate af-
fixed to the tank adjacent to the gaug-
ing device.

(3) A dip tube gauging device consists of
a pipe or tube with a valve at its
outer end with its intake limited by an
orifice not larger than 0.060 inch in di-
ameter. If a fixed length dip tube is
used, the intake must be located mid-
way of the tank both longitudinally and
laterally and at maximum per-
mitted filling level. In tanks for lique-
fied petroleum gases, the intake must
be located at the level reached by the
ladings when the tank is loaded to max-
imum filling density at 40 °F.

(4) Except on a tank used exclusively
for the transportation of carbon diox-
ide, 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 serv-
ic, this information must be legibly
and permanently marked on a plate af-
fixed to the tank adjacent to the gaug-
ing device.

(5) Each tank must be provided with
one or more pressure relief devices
which, unless otherwise specified in this part, must be of the spring-loaded type. Each valve must be arranged to discharge upward and unobstructed to the outside of the protective housing to prevent any impingement of escaping gas upon the tank. For each chlorine tank the protective housing must be in compliance with the requirements set forth in the applicable specification.

(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 S-1.2 (IBR, see §171.7 of this subchapter), must be sufficient to prevent a maximum pressure in the tank of more than 120 percent of the design pressure;

(ii) The flow capacity rating, testing and marking must be in accordance with Sections 5, 6 and 7 of CGA Pamphlet S-1.2.

(iii) For an insulated tank, the required relieving capacity of the relief devices 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, except for UN portable tanks, each insulated tank must be covered by a sheet metal jacket of not less than 16 gauge thickness. For UN portable tanks where the relieving capacity of the valves has been reduced on the basis of the insulation system, the insulation system must remain effective at all temperatures less than 649 °C (1200.2 °F) and be jacketed with a material having a melting point of 700 °C (1292.0 °F) or greater.

(iv) An MC 330 cargo tank that has relief valves sized by Fetterly’s formula dated November 27, 1928, may be continued in service.

(2) Each safety relief valve must be arranged to minimize the possibility of tampering. If the pressure setting or adjustment is external to the valve, the safety relief valve must be provided with means for sealing the adjustment and it must be sealed.

(3) Each safety relief valve on a portable tank, other than a UN portable tank, must be set to start-to-discharge at pressure no higher than 110% of the tank design pressure and no lower than the design pressure specified in paragraph (a) of this section for the gas transported. For UN portable tanks used for liquefied compressed gases and constructed in accordance with the requirements of §178.276 of this subchapter, the pressure relief device(s) must conform to §178.276(e) of this subchapter.

(4) Except for UN portable tanks, each safety relief valve must be plainly and permanently marked with the pressure in p.s.i.g. at which it is set to discharge, with the actual rate of discharge of the device in cubic feet per minute of the gas or of air at 60 °F (15.6 °C) and 14.7 p.s.i.a., and with the manufacturer’s name or trade name and catalog number. The start-to-discharge valve marking must be visible after the valve is installed. The rated discharge capacity of the device must be determined at a pressure of 120% of the design pressure of the tank. For UN portable tanks, each pressure relief device must be clearly and permanently marked as specified in §178.274(f)(1) of this subchapter.

(5) Each safety relief valve must have direct communication with the vapor space in the tank.

(6) Each connection to a safety relief valve must be of sufficient size to provide the required rate of discharge through the safety relief valve.

(7) [Reserved]

(8) Each pressure relief valve outlet must be provided with a protective device to prevent the entrance and accumulation of dirt and water. This device must not impede flow through the valve. Pressure relief devices must be designed to prevent the entry of foreign matter, the leakage of liquid and the development of any dangerous excess pressure.

(9) On tanks for carbon dioxide, refrigerated liquid or nitrous oxide, refrigerated liquid each safety relief device must be installed and located so that the cooling effect of the contents will not prevent the effective operation of the device. In addition to the required safety relief valves, these tanks may be equipped with one or more pressure controlling devices.

(10) Each tank for carbon dioxide, refrigerated liquid also may be equipped with one or more non-reclosing pressure relief devices set to function at a
pressure not over two times nor less than 1.5 times the design pressure of the tank.

(11) Each portion of connected liquid piping or hose that can be closed at both ends must be provided with a safety relief valve without an intervening shut-off valve to prevent excessive hydrostatic pressure that could burst the piping or hose.

(12) Subject to conditions of paragraph (a) of this section for the methyl chloride and sulfur dioxide optional portable tanks, one or more fusible plugs examined by the Bureau of Explosives and approved by the Associate Administrator may be used on these tanks in place of safety relief valves of the spring-loaded type. The fusible plug or plugs must be in accordance with CGA Pamphlet S–1.2, to prevent a pressure rise in the tank of more than 120 percent of the design pressure. If the tank is over 30 inches long, each end must have the total specified safety discharge area.

(13) A safety relief valve on a chlorine cargo tank must conform to one of the following standards of The Chlorine Institute, Inc.: Type 1 1/2 JQ225, Dwg. H51970 (IBR, see §171.7 of this subchapter); or Type 1 1/2 JQ225, Dwg. H50155 (IBR, see §171.7 of this subchapter).

(j) Consumer storage containers. (1) Storage containers for liquefied petroleum gas or propane charged to five percent of their capacity or less and intended for permanent installation on consumer premises may be shipped by private motor carrier under the following conditions:

(i) Each container must be constructed in compliance with the requirements in Section VIII of the ASME Code (IBR, see §171.7 of this subchapter) and must be marked to indicate compliance in the manner specified by the respective Code.

(ii) Maximum permitted filling density may not exceed that specified in paragraph (b) of this section.

(iii) Prior to loading on a motor vehicle, the container must be inspected by a trained and qualified person for leaks, corroded or abraded areas, dents, distortions, weld defects, or other condition that may render the container unsafe for transportation. A record of the inspection must be legibly signed and dated by the person performing the inspection and retained by the container owner for two years. The signature on the inspection record represents a certification that the container has been inspected and has no defects that would render it unsafe for transportation under the HMR. The record of inspection must include the date of inspection, the inspector's contact information (such as a telephone number), the container's serial number and container size (water capacity), estimated amount of hazardous material, and the origin and destination of shipment.

(iv) Only one storage container may be transported on a motor vehicle.

(v) For loading on a motor vehicle, the container must be lifted by slings, which must be completely wrapped around the container. Lifting lugs may not be used. The slings must be rated to a weight sufficient to accommodate the container and its lading and shall comply with ASME B30.9 on slings used
for lifting purposes, and must be visually inspected prior to each use. A sling showing evidence of tears, fraying, or other signs of excessive wear may not be used.

(vi) The storage container must be secured on a motor vehicle so that the container is completely within the envelope of the vehicle and does not extend beyond the vehicle frame.

(vii) The storage container must be placed on the vehicle in a manner, such as in a cradle, which ensures that no weight is placed on the supporting legs during transportation.

(viii) The storage container must be secured against movement during transportation. Bracing must conform with the requirements of paragraph (j)(1)(iii) of this section and §177.834(a) of this subchapter and with Section 6–5.2 of NFPA 58, Liquefied Petroleum Gas Code. Straps or chains used as tie-downs must be rated to exceed the maximum load to be transported and conform to the requirements in §§393.100 through 393.106 of this title.

(ix) Tow trailers used to transport storage containers in accordance with this paragraph (j)(2) must provide rear end protection that conforms to requirements in §393.86 of this title.

(3) Storage containers of less than 1,042 pounds water capacity (125 gallons) may be shipped when charged with liquefied petroleum gas in compliance with DOT filling density.

(k) A nonspecification cargo tank meeting, and marked in conformance with, the edition of Section VIII of the ASME Code in effect when it was fabricated may be used for the transportation of liquefied petroleum gas provided it meets all of the following conditions:

(1) It must have a minimum design pressure no lower than 250 psig.

(2) It must have a capacity of 13,247.5 L (3,500 water gallons) or less.

(3) It must have been manufactured in conformance with Section VIII of the ASME Code prior to January 1, 1981, according to its ASME name plate and manufacturer’s data report.

(4) It must conform to the applicable provisions of NFPA 58, except to the extent that provisions in NFPA 58 are inconsistent with requirements in parts 178 and 180 of this subchapter.

(5) It must be inspected, tested, and equipped in accordance with subpart E of part 180 of this subchapter as specified for MC 331 cargo tank motor vehicles.

(6) Except as provided in this paragraph (k), it must be operated exclusively in intrastate commerce, including its operation by a motor carrier otherwise engaged in interstate commerce, in a state where its operation was permitted by law (not including the incorporation of this subchapter) prior to January 1, 1981. A cargo tank motor vehicle operating under authority of this section may cross state lines to travel to and from a qualified assembly, repair, maintenance, or requalification facility. The cargo tank need not be cleaned and purged, but it may not contain liquefied petroleum gas in excess of five percent of the water capacity of the cargo tank. If the vehicle engine is supplied fuel from the cargo tank, enough fuel in excess of five percent of the cargo tank’s water capacity may be carried for the trip to or from the facility.

(7) It must have been used to transport liquefied petroleum gas prior to January 1, 1981.

(8) It must be operated in conformance with all other requirements of this subchapter.

(1) Anhydrous ammonia must not be offered for transportation or transported in specification MC 330 and MC 331 cargo tanks constructed of quenched and tempered (“QT”) steel except as provided in this paragraph.

(1) The ammonia must have a minimum water content of 0.2 percent by weight. Any addition of water must be made using steam condensate, deionized, or distilled water.

(2) Except as otherwise provided in this paragraph, each person offering for transportation or transporting anhydrous ammonia shall perform a periodic analysis for prescribed water content in the ammonia. The analysis must be performed:

(i) From a sample of the ammonia in storage taken at least once every 7 days, or each time ammonia is added to the storage tanks, whichever is less frequent; or

(ii) 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

(iii) At the same frequency as described in paragraph (l)(2)(ii) of this section, from a sample taken from the loading line to the cargo tank.

(3) If water is added at the time of loading:

(i) The sample for analysis must be taken from a point in the loading line between the water injection equipment and the cargo tank; and

(ii) Positive provisions must be made to assure water injection equipment is operating.

(4) If 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.

(5) The analysis method for water content must be as prescribed in CGA G–2.2, "Tentative Standard Method for Determining Minimum of 0.2 percent water in Anhydrous Ammonia," (IBR, see §171.7 of this subchapter).

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

(7) Each person receiving anhydrous ammonia containing 0.2 per cent water by weight may offer for transportation or transport that ammonia without performing the prescribed analysis for water content provided:

(i) The ammonia received was certified as containing 0.2 percent water as prescribed in §§172.203(h)(1)(i) and 177.817(a) of this subchapter; and

(ii) The amount of water in the ammonia has not been reduced by any means.

(m) General. (1) A cargo tank that is commonly known as a nurse tank and considered an implement of husbandry transporting anhydrous ammonia and operated by a private motor carrier exclusively for agricultural purposes is excepted from the specification requirements of part 178 of this subchapter if it:

(i) Has a minimum design pressure of 250 psig, meets the requirements of the edition of Section VIII of the ASME Code in effect at the time it was manufactured, and is marked with a valid ASME plate.

(ii) Is equipped with pressure relief valves meeting the requirements of CGA Standard S–1.2 (IBR, see §171.7 of this subchapter);

(iii) Is painted white or aluminum;

(iv) Has a capacity of 3,000 gallons or less;

(v) Is loaded to a filling density no greater than 56 percent;

(vi) Is securely mounted on a farm wagon or meets paragraph (m)(3) of this section; and

(vii) Is in conformance with the requirements of part 172 of this subchapter except that shipping papers are not required; and it need not be marked or placarded on one end if that end contains valves, fittings, regulators or gauges when those appurtenances prevent the markings and placard from being properly placed and visible.

(2) Nurse tanks with missing or illegible ASME plates. Nurse tanks with missing or illegible ASME plates may continue to be operated provided they conform to the following requirements:

(i) Each nurse tank must undergo an external visual inspection and testing in accordance with §180.407(d) of this subchapter.

(ii) Each nurse tank must be thickness tested in accordance with §180.407(i) of this subchapter. A nurse tank with a capacity of less than 1,500 gallons must have a minimum head thickness of 0.203 inch and a minimum shell thickness of 0.239 inch. A nurse tank with a capacity of 1,500 gallons or more must have a minimum thickness of 0.250 inch. Any nurse tank with a thickness test reading of less than that specified in this paragraph at any point must be removed from hazardous materials service.

(iii) Each nurse tank must be pressure tested in accordance with §180.407(g) of this subchapter. The minimum test pressure is 375 psig. Pneumatic testing is not authorized.

(iv) Each nurse tank must be inspected and tested by a person meeting the requirements of §180.409(d) of this subchapter. Furthermore, each nurse tank must have the tests performed at
least once every five years after the completion of the initial tests.

(v) After each nurse tank has successfully passed the visual, thickness, and pressure tests, welded repairs on the tank are prohibited.

(vi) After the nurse tank has successfully passed the visual, thickness, and pressure tests, welded repairs on the tank are prohibited.

(vii) Each nurse tank owner must maintain a copy of the test inspection report prepared by the inspector. The test report must contain the results of the test and meet the requirements in §180.417(b) and be made available to a DOT representative upon request.

(3) Field truck mounted tanks. A non-DOT specification cargo tank (nurse tank) securely mounted on a field truck is authorized under the following conditions:

(i) The tank is in conformance with all the requirements of paragraph (m)(1) of this section, except that the requirement in paragraph (m)(1)(vi) does not apply;

(ii) The tank is inspected and tested in accordance with subpart E of part 180 of this subchapter as specified for an MC 331 cargo tank;

(iii) The tank is restricted to rural roads in areas within 50 miles of the fertilizer distribution point where the nurse tank is loaded; and

(iv) For the purposes of this section, a field truck means a vehicle on which a nurse tank is mounted that is designed to withstand off-road driving on hilly terrain. Specifically, the vehicle must be outfitted with stiffer suspension (for example, additional springs or airbags) than would be necessary for a comparable on-road vehicle, a rear axle ratio that provides greater low end torque, and a braking system and tires designed to ensure stability in hilly terrain. The field truck must have low annual over-the-road mileage and be used exclusively for agricultural purposes.

(n) Emergency discharge control for cargo tank motor vehicles in liquefied compressed gas service—(1) Required emergency discharge control equipment. Each cargo tank motor vehicle in liquefied compressed gas service must have an emergency discharge control capability as specified in the following table:

<table>
<thead>
<tr>
<th>§173.315(n)(1)(*)</th>
<th>Material</th>
<th>Delivery service</th>
<th>Required emergency discharge control capability</th>
</tr>
</thead>
<tbody>
<tr>
<td>(i) .........................</td>
<td>Division 2.2 materials with no subsidiary hazard, excluding anhydrous ammonia.</td>
<td>All .............................................</td>
<td>None.</td>
</tr>
<tr>
<td>(ii) .........................</td>
<td>Division 2.3 materials</td>
<td>All .............................................</td>
<td>Paragraph (n)(2) of this section.</td>
</tr>
<tr>
<td>(iii) .........................</td>
<td>Division 2.2 materials with a subsidiary hazard, Division 2.1 materials, and anhydrous ammonia.</td>
<td>Other than metered delivery service.</td>
<td>Paragraph (n)(2) of this section.</td>
</tr>
<tr>
<td>(iv) .........................</td>
<td>Division 2.2 materials with a subsidiary hazard, Division 2.1 materials, and anhydrous ammonia in a cargo tank motor vehicle with a capacity of 13,247.5 L (3,500 water gallons) or less.</td>
<td>Metered delivery service</td>
<td>Paragraph (n)(3) of this section.</td>
</tr>
<tr>
<td>(v) .........................</td>
<td>Division 2.2 materials with a subsidiary hazard, Division 2.1 materials, and anhydrous ammonia in a cargo tank motor vehicle with a capacity greater than 13,247.5 L (3,500 water gallons).</td>
<td>Metered delivery service</td>
<td>Paragraph (n)(3) of this section, and, for obstructed view deliveries where permitted by §177.840(p) of this subchapter, paragraph (n)(2) or (n)(4) of this section.</td>
</tr>
</tbody>
</table>
Pipeline and Haz. Matls. Safety Admin., DOT § 173.315

§ 173.315(n)(1)(*) Material Delivery service Required emergency discharge control capability

(vi) Division 2.2 materials with a subsidiary hazard, Division 2.1 materials, and anhydrous ammonia in a cargo tank with a capacity of greater than 13,247.5 L (3,500 water gallons).

Both metered delivery and other than metered delivery service.

Paragraph (n)(2) of this section, provided the system operates for both metered and other than metered deliveries; otherwise, paragraphs (n)(2) and (n)(3) of this section.

(2) Cargo tank motor vehicles in other than metered delivery service. A cargo tank motor vehicle in other than metered delivery service must have a means to automatically shut off the flow of product without the need for human intervention within 20 seconds of an unintentional release caused by a complete separation of a liquid delivery hose (passive shut-down capability).

(i) Designed flow of product through a bypass in the valve is acceptable when authorized by this subchapter.

(ii) The design for the means to automatically shut off product flow must be certified by a Design Certifying Engineer. The certification must consider any specifications of the original component manufacturer and must explain how the passive means to shut off the flow of product operates. It must also outline the parameters (e.g., temperature, pressure, types of product) within which the passive means to shut off the flow of product is designed to operate. All components of the discharge system that are integral to the design must be included in the certification. A copy of the design certification must be provided to the owner of the cargo tank motor vehicle on which the equipment will be installed.

(iii) Installation must be performed under the supervision of a Registered Inspector. Each wireless transmitter/receiver must be tested to demonstrate that it will close the internal self-closing stop valve and shut off all motive and auxiliary power equipment at a distance of 45.72 m (150 feet). The off-truck remote shut-off activation device must not be capable of reopening the internal self-closing stop valve after emergency activation.

(i) The emergency discharge control equipment must be installed under the supervision of a Registered Inspector. Each wireless transmitter/receiver must be tested to demonstrate that it will close the internal self-closing stop valve and shut off all motive and auxiliary power equipment upon activation by a qualified person attending the unloading of the cargo tank motor vehicle (off-truck remote shut-off). It must function reliably at a distance of 45.72 m (150 feet). The off-truck remote shut-off activation device must not be capable of reopening the internal self-closing stop valve after emergency activation.

(1) The emergency discharge control equipment must be installed under the supervision of a Registered Inspector. Each wireless transmitter/receiver must be tested to demonstrate that it will close the internal self-closing stop valve and shut off all motive and auxiliary power equipment at a distance of 45.72 m (150 feet). The off-truck remote shut-off activation device must not be capable of reopening the internal self-closing stop valve after emergency activation.

(2) Cargo tank motor vehicles in other than metered delivery service. A cargo tank motor vehicle in other than metered delivery service must have a means to automatically shut off the flow of product without the need for human intervention within 20 seconds of an unintentional release caused by a complete separation of a liquid delivery hose (passive shut-down capability).

(i) Designed flow of product through a bypass in the valve is acceptable when authorized by this subchapter.

(ii) The design for the means to automatically shut off product flow must be certified by a Design Certifying Engineer. The certification must consider any specifications of the original component manufacturer and must explain how the passive means to shut off the flow of product operates. It must also outline the parameters (e.g., temperature, pressure, types of product) within which the passive means to shut off the flow of product is designed to operate. All components of the discharge system that are integral to the design must be included in the certification. A copy of the design certification must be provided to the owner of the cargo tank motor vehicle on which the equipment will be installed.

(iii) Installation must be performed under the supervision of a Registered Inspector. Each wireless transmitter/receiver must be tested to demonstrate that it will close the internal self-closing stop valve and shut off all motive and auxiliary power equipment at a distance of 45.72 m (150 feet). The off-truck remote shut-off activation device must not be capable of reopening the internal self-closing stop valve after emergency activation.

(1) The emergency discharge control equipment must be installed under the supervision of a Registered Inspector. Each wireless transmitter/receiver must be tested to demonstrate that it will close the internal self-closing stop valve and shut off all motive and auxiliary power equipment at a distance of 45.72 m (150 feet). The off-truck remote shut-off activation device must not be capable of reopening the internal self-closing stop valve after emergency activation.

(ii) The Registered Inspector must certify that the remote control equipment is installed in accordance with the original component manufacturer's specifications and is tested in accordance with paragraph (n)(3)(i) of this section. The Registered Inspector must provide the owner of the cargo tank motor vehicle with this certification.

(4) Query systems. When a transmitter/receiver system is used to satisfy the requirements of paragraph (n)(1)(v) of this section, it must close the internal self-closing stop valve and shut off all motive and auxiliary power equipment unless the qualified person attending the unloading operation prevents it from doing so at least once.
§ 173.316 Cryogenic liquids in cylinders.

(a) General requirements. (1) A cylinder may not be loaded with a cryogenic liquid colder than the design service temperature of the packaging.

(2) A cylinder may not be loaded with any material which may combine chemically with any residue in the packaging to produce an unsafe condition.

(3) The jacket covering the insulation on a cylinder used to transport any flammable cryogenic liquid must be made of steel.

(4) A valve or fitting made of aluminum with internal rubbing or abrading aluminum parts that may come in contact with oxygen in the cryogenic liquid must be made of steel.

(5) Compliance dates. (i) Each specification MC 331 cargo tank motor vehicle with a certificate of construction issued two or more years after July 1, 1999, must have an appropriate emergency discharge control capability as specified in this paragraph (n).

(ii) No MC 330, MC 331, or nonspecification cargo tank motor vehicle authorized under paragraph (k) of this section may be operated unless it has been equipped with emergency discharge control equipment as specified in this paragraph (n).

(iii) No MC 330 or MC 331 cargo tank motor vehicle with a capacity over 13,247 L (3,500 gallons) used in metered delivery service may be operated unless it has an appropriate emergency discharge control capability as specified in this paragraph (n) no later than July 1, 2001, or the date of its first scheduled pressure retest required after July 1, 2001, whichever is earlier.

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

(1) Any hose, piping, or tubing used for loading or unloading that is mounted or carried on the motor vehicle may not be attached to any valve and must be capped at all ends to prevent the entry of moisture, except at the time of loading or unloading. Except at the time of loading and 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 motor vehicle 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 every 2 years when performing the required periodic retest in § 180.407(c) of this subchapter. Prior to each loading, the cargo tank motor vehicle 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 motor vehicle is offered for transportation.

(3) Excess flow valves on the cargo tank motor vehicle must meet the requirements of paragraph (n) of this section.

(p) Fusible elements. Each MC 330, MC 331, or nonspecification cargo tank authorized under paragraph (k) of this section must have a thermal means of closure for each internal self-closing stop valve as specified in § 178.337–8(a)(4) of this subchapter.

(q) Manifolding is authorized for cargo tanks containing anhydrous ammonia provided each individual cargo tank is equipped with a pressure relief device or valves and gauging devices as required by paragraphs (h) and (i) of this section. Each valve must be tightly closed while the cargo tank is in transit. Each cargo tank must be filled separately.


EDITORIAL NOTE: For Federal Register citations affecting § 173.315, see the List of CFR Sections Affected, which appears in the Finding Aids section of the printed volume and at www.fdsys.gov.