

MSC Guidelines for Independent Fuel Tanks

Procedure Number: E1-16

Revision Date: 08/01/2017

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References:

- a. 46 CFR 58.50 (Independent Fuel Tanks)
- b. 46 CFR 119.440 (Independent Fuel Tanks)
- c. 46 CFR 182.440 (Independent Fuel Tanks)
- d. CG-5213 Policy Letter 9260 dated January 12, 2011, "Notice Regarding Flanged Cleanouts for Independent Fuel Tanks Located on Weather Decks of Unmanned Barges"

Contact Information

If you have any questions or comments concerning this document, please contact the Marine Safety Center by e-mail or phone, referring to Procedure Number: **E1-16**.

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Responsibilities:

Using applicable portions of references (a) through (d), the submitter shall provide sufficient documentation and plans to indicate compliance with the applicable requirements. Design calculations are required for tanks larger than 400 gallons. To facilitate plan review and project management, all plans and information specified in these guidelines should be submitted as one complete package through a single point of contact for the project.

General Guidance:

Independent tanks are freestanding; that is, the tank boundaries are not common to the ship's structure. Independent tanks are permanently affixed to the vessel and are not intended for removal from the vessel. Independent tanks intended for storage of combustible or flammable products or hazardous NLS must be designed in accordance with 46 CFR 58.50 or an industry standard which provides a level of safety equivalent to that required by 46 CFR 58.50.

General design criteria for rectangular tanks having capacity < 400 gallons (Subchapter F)

- ❑ Materials and plate thickness shall not be less than those listed in Table 58.50-10(a).

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- ❑ Vertical baffle plates shall be provided at intervals not to exceed 30 inches in any horizontal dimension. The plates shall be of the same material and not less than the minimum required plate thickness. (46 CFR 58.50-10(a)(7))
- ❑ Where baffle plates are provided at less than 30 inch intervals, baffles plates are omitted completely or the design is not in accordance with 58.50, the following design criteria are acceptable:
 - a) ABS Deep Tank rules; the design head shall be based on a height not less than four feet above the tank top. Use ABS Steel Vessels on Rivers & Intracoastal Waterways, Steel Vessels < 295 Feet, or Steel Vessel rules, as appropriate, to verify the design.
 - b) Other acceptable industry design standards may be utilized. The design head shall be equal to hydrostatic load at 4 feet above the tank top **PLUS** dynamic load estimated by the following:

Dynamic load = $K(L_h)/(B + 1)$, where:

K = 0 for rivers routes

1 for lakes bays and sound routes

2 for oceans routes

L_h = Hydrostatic Load

B = Number of baffles

General design criteria for rectangular tanks having capacity > 400 gallons (Subchapter F)

- ❑ Plate thickness and structures must be determined by calculations; however, materials and plate thickness shall not be less than those listed in Table 58.50-10(a).
- ❑ The design shall provide a safety factor of 4 based on the ultimate strength of the plating materials. The design head (load) shall be based on a height of not less than 4 feet above the tank top.
- ❑ Vertical baffle plates shall be provided at intervals not to exceed 30 inches in any horizontal dimension. The plates shall be of the same material and not less than the minimum required plate thickness.
- ❑ Where baffle plates are provided at less than 30 inch intervals, baffles plates are completely omitted or the design is not in accordance with 58.50, the following design criteria are acceptable:

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- a) ABS deep tank rules; the design head shall not be less than four feet above the tank top. Use ABS Steel Vessels on Rivers & Intracoastal Waterways, Steel Vessels < 295 Feet, or Steel Vessel rules, as appropriate.
- b) Other acceptable industry design standards may be utilized. The design head shall be equal to hydrostatic load at 4 feet above the tank top **PLUS** dynamic load as noted for tanks < 400 gallons.

General design criteria for cylindrical tanks (Subchapter F)

- Tank design may be in accordance with ASME Boiler and Pressure Vessel Code (BPVC), Section V111, Division 1. Materials and plate thickness shall not be less than those listed in Table 58.50-10(a).
 - a) The design shall provide a safety factor of 4 based on the ultimate strength of the plating materials. The design head (load) shall be based on a height of not less than 4 feet above the tank top.
 - b) Part UG of BPVC shall be used for head and shell design and Part UW for weld details. A joint efficiency (E) of 1 is acceptable. Radiography is not required.
 - c) Flat heads must be designed to have the appropriate stiffeners and support. Use of ABS deep tank rules or ASME Pressure vessel code is acceptable for the flat head design.
- Vertical baffle plates shall be provided at intervals not to exceed 30 inches in any horizontal dimension. The plates shall be of the same material and not less than the minimum required plate thickness.
- Where baffle plates are provided at less than 30 inch intervals, baffles plates are completely omitted or the design is not in accordance with 58.50, the design head shall be equal to hydrostatic load at 4 feet above the tank top **PLUS** dynamic load as noted for tanks < 400 gallons.

Requirements for all tanks (subchapter F)

- Fill, return, and vent openings shall be located on the tank top. Openings in the bottom or sides of the tank are limited to supply piping, a threaded plug or cap for cleaning purposes and level gauges. Location of machinery fuel supply piping penetrations is unrestricted. Use of manholes located on the tank sides or bottom is prohibited. (Title 46 CFR 58.50-10(a)(4))

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- a) Independent tanks located on unmanned barge weather decks may be provided with a nozzle and blank flange assembly for cleanout purposes subject to the following: (reference (d))
 - i. Location on the tank is unrestricted
 - ii. Nozzle must be welded to the tank
 - iii. Flange must be at least ASME B16.5, Class 150
 - iv. Gasket must be appropriate for the fluid in the tank
 - v. Flange shield is required on the flange IAW ASTM F1138.
- ❑ Liquid level gauge connections shall be located at more than two inches from the bottom of the tank. The gauges shall be constructed of heat resistant materials, be adequately protected from damage and be fitted with self-closing valves located at the tank connection. (46 CFR 58.50-10(a)(4) & (6))
- ❑ Positive shut-off valves, located at the tank, are required in piping subject to head pressure from the fuel in the tanks. The valve shall be operable from outside the space in which the tank is located. (46 CFR 56.50-60(d))
- ❑ Fuel oil tank vents shall extend above the weather deck at a location not less than three feet from any opening into any living quarters. (46 CFR 56.50-85(a)(4))
- ❑ Small tanks may have a vent not more than 25% greater in cross sectional area than the fill line; otherwise the tank vent size shall not be less than 2.5 inches. (46 CFR 56.50-85(a)(10))
- ❑ Fuel tank vents shall be fitted with a single flame screen of 30 by 30 mesh or two screens of at least 20 by 20 mesh. (46 CFR 56.50-85(a)(8))
- ❑ Tanks shall be electrically bonded to the common ground. (46 CFR 58.50-10(b)(5))
- ❑ Installation of portable fuel tanks is not permitted. (46 CFR 58.50-10(b)(4))
- ❑ The *interior* of tanks shall not be galvanized. The *exterior* of the tanks shall be protected from corrosion. (46 CFR 58.50-10(a)(9))
- ❑ Fuel tanks shall be located as near as possible to the space being served. Tanks used for emergency lighting systems shall be located on an open deck

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- or in an adequately ventilated metal compartment. Maximum compartment temperature for all tanks is 150° F. (46 CFR 58.50-10(b)(1))
- ❑ Longitudinal seams on cylindrical tanks shall be located at the top of the tank. (46 CFR 58.50-10(b)(2))
 - ❑ Tanks with flanged up edges which may trap moisture are prohibited. (46 CFR 58.50(a)(3))
 - ❑ Nozzle, flange and pipe connections shall be brazed or welded to the tank. (46 CFR 58.50-10(a)(5))
 - ❑ Baffle plates shall be connected to the walls by welding or brazing. Limber holes shall be provided at the bottom and top of the baffle plates. (46 CFR 58.50-10(a)(7))
 - ❑ The location of tanks shall be such to allow for examinations, testing and cleaning. (46 CFR 58.50-10(b)(3))

Tanks on small passenger vessels (subchapters T and K)

- ❑ Tank material and thickness must be as indicated in Table 182.440(a)(1) or 119.440(a)(1), as appropriate. Tanks having a capacity over 570 liters (150 gallons) must be designed to withstand maximum head that they may be subject to, but in no case can thickness be less than specified in the appropriate table. (46 CFR 182.440(a)(1), 46 CFR 119.440(a)(1))
- ❑ Other materials that provide an equivalent level of safety can be approved by the Commandant. (46 CFR 182.440(a)(3), 46 CFR 119.440(a)(3))
- ❑ FRP tanks may be used for diesel fuel tanks provided:
 - a) The material is fire retardant (flammability determined by ASTM D 635 and ASTM D 2863). Average extent of burning must be less than 10mm (0.394in), the average burn time is less than 50 seconds, and the limiting oxygen index is greater than 21. (46 CFR 182.440(a)(2)(i), 46 CFR 182.440(a)(2)(i))
 - b) The tanks meet UL 1102. (46 CFR 182.440(a)(2)(ii), 46 CFR 119.440(a)(2)(ii))
 - c) Baffle plates, if installed, must be the same material and not less than the minimum thickness of the tank walls. Limber holes at the bottom and air

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holes at the top must be provided. (46 CFR 182.440(a)(2)(v), 46 CFR 119.440(a)(2)(v))

- ❑ Openings for fill, vent, and fuel supply pipes must be on the topmost surfaces of the tank except for threaded plugs or caps for tank cleaning or openings for supply piping or tubular gauge glasses in diesel fuel tanks. (46 CFR 182.440(a)(5), 46 CFR 119.440(a)(5))
- ❑ All tank joints, nozzles, flanges, or other pipe connection fittings to a metal tank must be welded or brazed. (46 CFR 182.440(a)(6-7), 46 CFR 119.440(a)(6-7))
- ❑ Vertical baffle plates must be fitted for metal tanks that exceed 760mm (30in) in any horizontal direction. (46 CFR 182.440(a)(8), 46 CFR 119.440(a)(8))
- ❑ Baffles must be the same material and not less than the minimum thickness required in the tank walls. They must be connected by welding or brazing. (46 CFR 182.440(a)(9), 46 CFR 119.440(a)(9))
- ❑ There must be a means of accurately determining the amount of fuel in each tank. (46 CFR 182.445(b), 46 CFR 119.445(b))
- ❑ Gasoline fill pipes and sounding pipes must extend to within one-half of their diameter from the bottom of the tank on vessels certificated under subchapter T. The use of gasoline in independent fuel tanks on vessels certificated under subchapter K is only acceptable on a case-by-case basis, as determined by the Commandant. (46 CFR 182.445(e), 46 CFR 119.405)
- ❑ Each unpressurized fuel tank must be fitted with a vent pipe connected to the highest point of the tank, and that vent pipe must be protected by a flame screen or flame arrestor. (46 CFR 182.450, 46 CFR 119.450)

Disclaimer:

This guidance is not a substitute for applicable legal requirements, nor is it itself a rule. It is not intended to nor does it impose legally-binding requirements on any party. It represents the Coast Guard's current thinking on this topic and may assist industry, mariners, the general public, and the Coast Guard, as well as other federal and state regulators, in applying statutory and regulatory requirements. You can use an alternative approach for complying with these requirements if the approach satisfies the requirements of the applicable statutes and regulations. If you want to discuss an alternative, you may contact the Marine Safety Center (MSC), the unit responsible for implementing this guidance.
