

CHAPTER 2: CARRIAGE OF COMBUSTIBLE AND FLAMMABLE CARGO

A. INTRODUCTION

Combustible and flammable liquids are classed as hazardous materials. Regulatory authority and applications are determined by the classification of the cargo. Classification is divided into two main areas: "bulk" shipments and "packaged" cargo. This chapter provides guidance for the carriage of combustible and flammable cargoes in either packaged or bulk shipments. The remaining chapters of MSM II, Section F provide guidance for other hazardous materials shipments.

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B. INTEGRAL, PORTABLE, OR FIXED INDEPENDENT TANKS

These tanks may carry flammable or combustible products in bulk aboard cargo, miscellaneous, or passenger vessels in limited quantities, as permitted by the regulations found in 46 CFR 30.01-5, 70.05-30, 90.05-1, and 90.05-35.

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C. DEFINITIONS AND INTERPRETATIONS

A determination of whether the cargo is considered a "bulk" or "packaged" shipment is of primary importance in identifying the proper authority and guidance for tank approvals, authorized products, and vessel operating requirements. Vessel inspection requirements are affected by the interpretations of "principal purpose" and "limited quantities." The following criteria and definitions apply in interpreting the regulations for the use of portable and independent tanks:

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1. **Packaged or Bulk Cargo** Portable tanks, regardless of capacity (tank approvals limit capacity), are deemed "packaged" cargo if the tank contents are not transferred aboard the vessel. The filling, discharge, or recirculating of cargo in a marine portable tank (MPT) or independent tank on board a vessel is regarded as carriage in bulk.

 2. **Combustible or Flammable Determinations** If the cargo is carried as "packaged," use the definitions in 49 CFR 173.115; 46 CFR 30.10-15 and 30.10-22 apply to bulk shipments.

 3. **Cargo or Passenger Vessel Designation** Vessel type definitions for the carriage of packaged cargo are contained in 49 CFR 171.8. Offshore supply vessels (OSV's) are interpreted as cargo vessels for the purpose of packaged cargo regulations.

 4. **Cargo** Oil and other combustible or flammable liquids are considered cargo when transported to, and offloaded at, a destination. Fuel oil carried by a vessel in its own integral tanks and for its own use, is not subject to the requirements of 46 CFR 30.01-5. Exceptions to this definition include OSV's and some fishing vessels.

 5. **Deadweight Tonnage (DWT)** DWT is a measure of a vessel's carrying capacity. It is the difference in displacement between the vessel's "deepest load waterline" and its "lightweight" conditions. Deadweight capacity includes: crew and effects, passengers and luggage, provisions and stores, fresh water, fuel, ballast, and cargo. The "lightweight" condition is defined in 46 CFR 170.055(i). The vessel's "deepest load waterline" is the deepest draft permitted by the applicable regulations for the vessel.

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6. **Limited Quantity** Flammable and combustible cargo carried in bulk in an amount not to exceed 20 percent of the vessel's DWT is considered limited quantity. For Grade E drilling fluids (mud), the 20 percent volume may be computed using a specific gravity of 1.0.
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7. **Principal Purpose** When it is deemed that the principal purpose of the vessel is to carry combustible or flammable liquids in bulk in either MPT's or independent tanks, the vessel must be certificated under Subchapter D. Generally, a vessel carrying less than 20 percent of its DWT is not deemed to be principally carrying bulk combustible or flammable cargo.
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D. PORTABLE TANKS

These tanks are approved containers designed to be loaded into, on, or temporarily attached to a vehicle or vessel. The tank is designed with approved handling arrangements, such as skids, lifting lugs, or intermodal container castings. Portable tanks may be handled or lifted full or empty and are treated as "packaged" containers. Transfer, fill, discharge, or re-circulation of cargo to portable tanks other than MPT's, while on board a vessel, is prohibited. Portable tanks for flammable and combustible liquids fall into four primary categories:

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1. **Department of Transportation (DOT) Specification Tanks** These are DOT-51, DOT-57, IM-101, and IM-102 tanks regulated under 49 CFR 178.

 2. **Special Tanks** These are approved by Commandant (MSC) under 49 CFR 176.340, and are issued a Coast Guard letter of authorization for combustible liquids shipped as packaged cargo. One example is a tank approved for combustible oil based drilling mud, with an open lid top which can be shut gas-tight.

 3. **DOT-E (Exemption) Tanks** Also called non-specification portable tanks, these may be used to transport regulated commodities when authorized by a Materials Transportation Bureau (MTB) exemption. These tanks are for packaged shipments only. Exemption procedures are outlined in 49 CFR 107. Although exemptions are issued by the MTB, the Coast Guard is consulted if the shipment involves marine transportation.

 4. **MPT's** Constructed and inspected in accordance with 46 CFR 64, MPT's are designed to be lifted full of cargo (up to 55,000 pounds) and may be considered "packaged." MPT's are also approved for "bulk" shipments and are designed for the transfer of cargo while on board the vessel. Pumping and piping equipment associated with filling or discharging an MPT must meet the applicable requirements of Subchapter F. Endorsement of the Certificate of Inspection (COI) is required for bulk shipments (See paragraph G.2 below).

NOTE: Approval of portable tanks constructed and inspected under 46 CFR 98.35 expired on 1 October 1984. No extensions or waivers are authorized.

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E. INDEPENDENT TANKS

These are authorized on miscellaneous vessels and OSV's for the carriage of Grade B and lower petroleum products. They are approved by the Marine Safety Center (MSC) and the cognizant Officer in Charge, Marine Inspection (OCMI) for Grades D and E. Requests for the carriage of cargo classed higher than Grade D must be forwarded through the cognizant OCMI and District Commander (m) to Commandant (G-MOC) for approval. There are no size limitations, except for a 20 percent deadweight capacity limitation. Independent tanks may only be loaded or offloaded empty, and are always considered bulk shipments. The following is a list of conditions for the approval of fixed independent tanks:

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1. **Design** Tank structure and design arrangements must be submitted to the MSC for approval. The tank may be designed as a gravity tank.

 2. **Stability and Loading** The vessel's owner or operator must submit stability and deck loading calculations to the MSC showing that the intact stability and structural arrangements of the vessel are adequate with the tank on board. The calculations must cover all intended loading conditions of the tank for the route specified on the vessel's COI. The vessel's stability letter must be amended to indicate any limitations on the carriage of the tank based on stability considerations.

 3. **Venting** The tank must be fitted with a flame screen and pressure vacuum relief valve, or other suitable pressure relief device.

 4. **Inspection** The tank must be gas-freed for internal inspection, and hydrostatically tested at least every 4 years.

 5. **Securing Devices** The tank must be provided with adequate securing devices, and must be secured to the vessel both in accordance with conditions listed on the vessel's stability letter, and to the satisfaction of the cognizant OCMI.

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- 6. Nameplate** The tank must have a durable nameplate permanently affixed to the tank structure in an accessible location listing:
- a. Manufacturer's name, date of manufacture, and serial number;
 - b. Design pressure and test pressure in psig;
 - c. Volumetric capacity in gallons;
 - d. Maximum net weight and maximum gross weight in tons; and
 - e. Hydrostatic test date.
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F. AUTHORIZED PRODUCTS

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- 1. Portable Tanks** Products which may be carried in portable tanks are specified in 49 CFR 173.119 and the IM tank table published by the MTB (for IM tanks only). Portable tanks approved under 49 CFR 176.340 may only be used for combustible liquids (flashpoint (FP) between 100 and 200° F) having no other hazard.

 - 2. MPT's** MPT's may carry combustible liquids on cargo and passenger vessels. The carriage of flammable liquids (FP below 100° F) is limited by 49 CFR 173.119(a)(29) to cargo vessels engaged in offshore oil well drilling activities.

 - 3. Independent Tanks** Fixed independent tanks may carry flammable and combustible liquids in bulk, Grade B and lower, as authorized for vessels under 46 CFR 30.01-05 and 90.05-35.
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G. VESSEL OPERATING REQUIREMENTS WHEN CARRYING PORTABLE OR FIXED INDEPENDENT TANKS

1. Tonnage Measurement Independent tanks are subject to inclusion in gross tonnage if they meet certain size criteria and cannot be considered as deck cargo (freight). Addition or removal of such tanks on a vessel which has already been assigned gross and net tonnages could require vessel remeasurement and assignment of new tonnages. Refer to Navigation and Vessel Inspection Circular (NVIC) 11-93 for details.

2. COI Endorsement Except for portable tanks on Subchapter T vessels, a COI is not required for the carriage of flammable or combustible liquids in packaged form. Endorsements are required for all bulk combustible and flammable liquid cargo shipments. The COI should be endorsed for all independent tanks and MPT's equipped with fill or discharge piping, as follows:

- a. For the carriage of fixed independent tanks, the COI endorsement shall include a statement that the tank shall be lifted on or off the vessel only when completely empty, and a list of specific cargoes permitted to be carried.
- b. For the carriage of bulk cargo in an MPT, the COI endorsement shall include a list of specific cargoes authorized, and an authorization to transfer to and from the MPT.
- c. For the carriage of combustible cargo in integral tanks, a sample COI endorsement is "inspected for the carriage of Grade E combustible liquid drilling fluids in the following tanks: (specify each tank and capacity in gallons)."
- d. For packaged hazardous materials on Subchapter T vessels in portable tanks, a sample COI endorsement is:

"Approved for the carriage, on open deck, of portable tanks containing hazardous materials as authorized by 49 CFR 172.101. For flammable or combustible liquids, additional fire protection is to be provided in accordance with 49 CFR 176.315. Tanks may not be discharged or filled on board. Not more than 16 passengers may be carried when portable tanks are not certified gas free."

3. Firefighting The vessel's firefighting capabilities must meet the requirements of 46 CFR 98.30-37 and 39 for bulk carriage, and 49 CFR 176.315 for packaged shipments. No endorsement on the COI for the extra firefighting equipment is necessary.

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- 4. Fixed Firefighting** 46 CFR 95.05-10(g) requires a fixed firefighting system to be installed in all tanks carrying combustible cargo. This has been shown to be impractical for drilling mud and other cargoes which could clog a fixed system. Further relaxation of this regulation have been granted to OSV's. In view of the high FP of Grade E cargoes, and the tank arrangements on OSV's, this requirement may be relaxed on OSV's carrying Grade E cargoes at ambient temperatures. This requirement will not be relaxed for Grade D cargoes or for Grade E cargoes at elevated temperatures. Fixed firefighting requirements do not apply to MPT's or fixed independent tanks.
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- 5. Tank Fill/ Discharge** Cargo may not be transferred or recirculated from or to portable tanks, other than approved MPT's, while on board a vessel. Fixed independent tanks must be loaded and offloaded while on the vessel and can only be moved when completely empty. MPT's are specifically designed to be transported either empty or full. Pumping and piping equipment associated with MPT's and fixed independent tanks must meet the applicable requirements of Subchapters F and J.
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- 6. Stability** The carriage of portable or independent tanks must be in accordance with the vessel's stability letter or booklet, regardless of any endorsement required on the COI.
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- 7. Stowage** Portable tanks containing flammable liquids, or combustible liquids with an FP less than 141° F that are insoluble in water, are restricted by 49 CFR 176.76(g)(3) to "on deck" stowage. Other combustible liquids in portable tanks may be stowed on deck or underdeck on passenger and cargo vessels.
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- 8. Tankerman** A tankerman is not required when transferring to or from an OSV's fuel tank. A tankerman is required for transfer to, from or between MPT's, independent tanks, or integral cargo tanks.
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H. VESSEL TYPE REQUIREMENTS

- 1. OSV's** Special consideration for OSV's was provided in P.L. 96-378, now 46 U.S.C. 3710(a). However, the considerations of principal purpose and limiting quantities apply to OSV's. An OSV may not carry more than 20 percent of its deadweight in bulk liquid cargo. Regardless of the subchapter under which they are certificated, OSV's are considered cargo vessels for the purposes of 49 CFR, and may carry combustible or flammable liquids in approved portable tanks. Bulk combustible or flammable cargo is authorized under 46 CFR 90.05-35. The COI shall be endorsed for cargo carried in bulk.

- 2. Small Passenger (Subch. T) Vessels/ Crew Boats** For the purposes of 49 CFR Subchapter C, T-boats on domestic voyages are considered "cargo vessels" when carrying 16 or less passengers and "passenger vessels" when carrying more than 16 passengers (see 49 CFR 171.8 for the definitions of "cargo vessel" and "passenger vessel"). Hazardous materials may be carried in approved portable tanks only when operating as a "cargo vessel" and specifically authorized by COI endorsement. Transfer of cargo to or from a portable tank or other packaging on board the vessel (with or without passengers aboard) is not authorized.

- 3. Subchapter I Barges** Cargo barges certificated under Subchapter I may not carry combustible or flammable liquids in any quantity in bulk. They may carry MPT's if the tank is not equipped to transfer cargo.

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I. SPECIAL PRODUCTS

1. Drilling Fluids The composition of drilling fluids, such as mud, may vary depending upon its use and source. Drilling mud with a FP greater than 200° F is not regulated as a hazardous material under 49 U.S.C. 1801-1812 (49 CFR 100-177). Because drilling fluids are considered a product and service unique to the offshore oil industry, the "limited quantity" is defined as 20% of the DWT at a specific gravity of 1.0 for OSV's carrying Grade E drilling fluids. (See Section A, Chapter 1 for requirements when carrying Grade D and above cargoes.)

Mud Characteristics

a. **Mud Characteristics.** There are two general categories of mud: water based and oil based. Water based mud which does not contain any oil is not subject to the requirements of combustible liquids. Industry may designate mud as water based even though it contains oil. Oil in any amount will subject the mud to the requirements of this chapter. Generally, mud containing oil is considered a Grade E combustible liquid. However, it may be classed even higher (such as for "spent" or recycled mud). It is the shipper's responsibility to know the characteristics of the mud.

Carriage

b. **Carriage.** Oil based mud must be carried in integral, portable, independent, or other approved tanks under the same considerations as other bulk combustible cargo. Oil based mud may not be carried in open hopper type tanks, or in any other non-approved independent tanks.

Quantity

c. **Quantity.** Because of the densities of mud, special considerations should be given for stability of the vessel and sizing of independent tanks. The 20% deadweight limit is computed using a specific gravity of 1.0. Special consideration may be given by Commandant (G-MOC) for existing vessels to carry greater amounts.

2. Oil Field Wastes

Wastes, solids, cuttings, etc., that contain oil in any quantity are considered hazardous materials under the FWPCA. Material which has been contaminated by oil, even if washed, processed, or otherwise diluted to a low combustibility hazard, are regulated as Grade E products if capable of leaving a sheen. Therefore, transportation in nonapproved tanks or uninspected barges, (such as open hopper) is not authorized.

3. Lube Oil

Lube oil and other Grade E products with an FP greater than 200° F are not regulated under 49 CFR when carried in packaged form.

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4. Methanol

Methanol (Methyl Alcohol) is a Grade C flammable liquid that is used by the offshore oil industry. The carriage of methanol in either integral or fixed independent tanks on OSVs is authorized, provided the following conditions are met:

- a. Paragraph 11.H, Applicable Tank Vessel Requirements, of this chapter applies.
- b. Paragraph 11.I, Vessel Operating Requirements, of this chapter applies.
- c. A B-V semi-portable fire extinguisher must be provided on the open deck capable of reaching the methanol cargo tanks, tank vents, and transfer connections. A fixed extinguishing system meeting the requirements of 46 CFR 34.05-5 must be provided to protect methanol pump rooms. Portable fire extinguishers must be provided as denoted for cargo areas in 46 CFR Table 34.50-10(a). If used, the foam extinguishing agent for semi-portable and portable fire extinguishers protecting methanol areas must be of the polar solvent (alcohol resistant) type.
- d. Methanol tanks may not be located vertically below the vessel's accommodations, service spaces, or navigating stations.