

§ 172.095

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at least 15 foot-degrees (4.57 meter-degrees) up to the smallest of the following angles:

(i) The angle of maximum righting arm.

(ii) The downflooding angle.

(b) If the vertical center of gravity of the cargo is below the weather deck at the side of the tank barge amidships, it must be shown by design calculations that the barge has at least the following metacentric height (GM) in feet (meters) in each condition of loading and operation:

$$GM = \frac{(K)(B)}{fe}$$

where—

K=0.3 for river service.

K=0.4 for lakes, bays and sounds and Great Lakes summer service.

K=0.5 for ocean and Great Lakes winter service.

B=beam in feet (meters).

fe=effective freeboard in feet (meters).

(c) The effective freeboard is given by—

fe=f + fa ; or

fe=d, whichever is less.

where—

f=the freeboard to the deck edge amidships in feet (meters).

fa=(1.25)(a/L)((2b/B)-1)(h); or

fa=h, whichever is less.

where—

a=trunk length in feet (meters).

L=LOA in feet (meters)

b=breadth of a watertight trunk in feet (meters).

B=beam of the barge in feet (meters).

h=height of a watertight trunk in feet (meters).

d=draft of the barge in feet (meters).

(d) For the purpose of this section, downflooding angle means the static angle from the intersection of the vessel's centerline and waterline in calm water to the first opening that does not close watertight automatically.

§ 172.095 Intact longitudinal stability.

Each tank barge must be shown by design calculations to have a longitudinal metacentric height (GM) in feet (meters) in each condition of loading and operation, at least equal to the following:

$$GM = \frac{0.02(L)^2}{d}$$

where—

L=LOA in feet (meters)

d=draft in feet (meters).

§ 172.100 Watertight integrity.

(a) Except as provided in paragraph (b) of this section, each Type I or II hopper barge hull must have a weather-tight weather deck.

(b) If a Type I or II barge hull has an open hopper, the fully loaded barge must be shown by design calculations to have at least 2 inches (50 mm) of positive GM when the hopper space is flooded to the height of the weather deck.

(c) When doing the calculations required by this section, credit may be given for the buoyancy of the immersed portion of cargo tanks if the tank securing devices are shown by design calculations to be strong enough to hold the tanks in place when they are subjected to the buoyant forces resulting from the water in the hopper.

§ 172.103 Damage stability.

Each tank barge must be shown by design calculations to meet the survival conditions in §172.110 assuming the damage specified in §172.104 to the hull type specified in Table 151.05 of part 151 of this chapter.

§ 172.104 Character of damage.

(a) Type I barge hull not in an integrated tow. If a Type I hull is required and the barge is not a box barge designed for use in an integrated tow, design calculations must show that the barge can survive damage at any location including the intersection of a transverse and a longitudinal bulkhead.

(b) Type I barge hull in an integrated tow. If a Type I barge hull is required and the barge is a box barge designed for operation in an integrated tow, design calculations must show that the barge can survive damage—

(1) At any location on the bottom of the tank barge except on a transverse watertight bulkhead; and