

§ 42.20-9

withstand the flooding of any two adjacent fore and after compartments excluding the machinery space;

(2) If the vessel is over 225 meters (738 feet) in length, the flooding standard of paragraph (a)(1) of this section must be applied, treating the machinery space, taken alone, as a floodable compartment.

(b) When doing the calculations required in paragraph (a) of this section, the following permeabilities must be assumed:

(1) 0.95 in all locations except the machinery space.

(2) 0.85 in the machinery space.

[CGD 79-153, 48 FR 38648, Aug. 25, 1983]

§ 42.20-9 Initial conditions of loading.

When doing the calculations required in §§ 42.20-6(a), 42.20-7(a) and 42.20-8(a), the initial condition of loading before flooding must be assumed to be as specified in this section:

(a) The vessel is assumed to be loaded to its summer load waterline with no trim.

(b) When calculating the vertical center of gravity, the following assumptions apply:

(1) The cargo is assumed to be homogeneous.

(2) Except as specified in paragraph (b)(3) of this section, all cargo compartments are assumed to be fully loaded. This includes compartments intended to be only partially filled. In the case of liquid cargoes, fully loaded means 98 percent full.

(3) If the vessel is intended to operate at its summer load waterline with empty compartments, these empty compartments are assumed to be empty rather than fully loaded if the resulting height of the vertical center of gravity is not less than the height determined in accordance with paragraph (b)(2) of this section.

(4) Fifty percent of the total capacity of all tanks and spaces fitted to contain consumable liquids or stores must be assumed to be distributed to accomplish the following:

(i) Each tank and space fitted to contain consumable liquids or stores must be assumed either completely empty or completely filled.

(ii) The consumables must be distributed so as to produce the greatest pos-

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sible height above the keel for the center of gravity.

(5) Weights are calculated using the following values for specific gravities:

Salt water—1.025
Fresh water—1.000
Oil fuel—0.950
Diesel oil—0.900
Lube oil—0.900

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§ 42.20-10 Free surface.

When doing the calculations required in §§ 42.20-6(a), 42.20-7(a) and 42.20-8(a), the effect of free surface of the following liquids must be included:

(a) For each type of consumable liquid, the maximum free surface of at least one transverse pair of tanks or a single centerline tank must be included. The tank or combination of tanks must be that resulting in the greatest free surface effect.

(b) For cargo liquids, unless the compartment is assumed to be empty as required by § 42.20-9(b)(3), the free surface of those compartments containing liquids is calculated at an angle of heel of not more than 5 degrees.

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§ 42.20-11 Extent of damage.

When doing the calculations required by §§ 42.20-6(a), 42.20-7(a) and 42.20-8(a), the following must be assumed:

(a) The vertical extent of damage in all cases must be assumed to be from the baseline upward without limit.

(b) The transverse extent of damage is assumed to be equal to B/5 or 11.5 meters (37.7 feet), whichever is less. The transverse extent is measured inboard from the side of the ship perpendicularly to the center line at the level of the summer load waterline.

(c) If damage of a lesser extent than that specified in paragraph (a) or (b) of this section results in a more severe condition, the lesser extent must be assumed.

(d) The following assumptions apply to the transverse damage specified in paragraph (b) of this section for a stepped or recessed bulkhead:

(1) A transverse watertight bulkhead that has a step or recess located within the transverse extent of assumed damage may be considered intact if the

step or recess is not more than 3.05 meters (10 feet) in length.

(2) If a transverse watertight bulkhead has a step or recess of more than 3.05 meters (10 feet) in length, within the transverse extent of assumed damage, the two compartments adjacent to this bulkhead must be considered as flooded.

(3) If within the transverse extent of damage, a transverse bulkhead has a step or recess more than 3.05 meters (10 feet) in length that coincides with the double bottom tank top or the inner boundary of a wing tank, respectively, all adjacent compartments within the transverse extent of assumed damage must be considered to be flooded simultaneously.

(e) If a wing tank has openings into adjacent compartments, the wing tank and adjacent compartments must be considered as one compartment. This provision applies even where these openings are fitted with closing appliances except:

(1) Valves fitted in bulkheads between tanks which are controlled from above the bulkhead deck.

(2) Secured manhole covers fitted with closely spaced bolts.

(f) Only transverse watertight bulkheads that are spaced apart at least $\frac{1}{3}(L)^{\frac{2}{3}}$ or 14.5 meters (0.495(L) $^{\frac{2}{3}}$ or 47.6 feet), whichever is less, may be considered effective. If transverse bulkheads are closer together, then one or more of these bulkheads must be assumed to be non-existent in order to achieve the minimum spacing between bulkheads.

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§ 42.20-12 Conditions of equilibrium.

The following conditions of equilibrium are regarded as satisfactory:

(a) *Downflooding.* The final waterline after flooding, taking into account sinkage, heel, and trim, is below the lower edge of any opening through which progressive flooding can take place. Such openings include air pipes, ventilators, and openings which are closed by means of weathertight doors (even if they comply with § 42.15-10) or covers (even if they comply with § 42.15-30 or § 42.15-45(d)) but may exclude those openings closed by means of:

(1) Manhole covers and flush scuttles which comply with § 42.15-40;

(2) Cargo hatch covers which comply with § 42.09-5(b);

(3) Hinged watertight doors in an approved position which are secured closed while at sea and so logged; and

(4) Remotely operated sliding watertight doors, and side scuttles of the non-opening type which comply with § 42.15-65.

(b) *Progressive flooding.* If pipes, ducts, or tunnels are situated within the assumed extent of damage penetration as defined in § 42.20-11 (a) and (b), progressive flooding cannot extend to compartments other than those assumed to be floodable in the calculation for each case of damage.

(c) *Final angle of heel.* The angle of heel due to unsymmetrical flooding does not exceed 15 degrees. If no part of the deck is immersed, an angle of heel of up to 17 degrees may be accepted.

(d) *Metacentric height.* The metacentric height of the damaged vessel, in the upright condition, is positive.

(e) *Residual stability.* Through an angle of 20 degrees beyond its position of equilibrium, the vessel must meet the following conditions:

(1) The righting arm must be positive.

(2) The maximum righting arm must be at least 0.1 meter (4 inches).

(3) The area under the righting arm curve within the 20 degree range must not be less than 0.0175 meter-radians (0.689 inch-radians).

(4) Each submerged opening must be weathertight (e.g. a vent fitted with a ball check valve).

(f) *Intermediate stages of flooding.* The Commandant is satisfied that the stability is sufficient during intermediate stages of flooding.

[CGD 79-153, 48 FR 38649, Aug. 25, 1983]

§ 42.20-13 Vessels without means of propulsion.

(a) A lighter, barge, or other vessel without independent means of propulsion is assigned a freeboard in accordance with the provisions of this subpart as modified by paragraphs (b), (c), and (d) of this section.

(b) A barge that meets the requirements of § 42.09-5(b) may be assigned