

space must be as listed in Table 172.060(b).

(b) Calculations in which a machinery space is treated as a floodable space must be based on an assumed machinery space permeability of 85%, unless the use of an assumed permeability of less than 85% is justified in detail.

(c) If a cargo tank would be penetrated under the assumed damage, the cargo tank must be assumed to lose all cargo and refill with salt water up to the level of the tankship's final equilibrium waterline.

#### § 172.195 Survival conditions.

A vessel is presumed to survive assumed damage if it meets the following conditions in the final stage of flooding:

(a) *Final waterline.* The final waterline, in the final condition of sinkage, heel, and trim, must be below the lower edge of an opening through which progressive flooding may take place, such as an air pipe, or an opening that is closed by means of a weathertight door or hatch cover. This opening does not include an opening closed by a—

- (1) Watertight manhole cover;
- (2) Flush scuttle;
- (3) Small watertight cargo tank hatch cover that maintains the high integrity of the deck;
- (4) A Class 1 door in a watertight bulkhead within the superstructure;
- (5) Remotely operated sliding watertight door; or
- (6) A side scuttle of the non-opening type.

(b) *Heel angle.* The maximum angle of heel must not exceed 30 degrees.

(c) *Range of stability.* Through an angle of 20 degrees beyond its position of equilibrium after flooding, a tankship must meet the following conditions:

- (1) The righting arm curve must be positive.
- (2) The maximum righting arm must be at least 3.94 inches (10 cm).
- (3) Each submerged opening must be weathertight.

(d) *Progressive flooding.* If pipes, ducts, or tunnels are within the assumed extent of damage, arrangements must be made to prevent progressive flooding to a space that is not assumed

to be flooded in the damaged stability calculations.

(e) *Buoyancy of superstructure.* The buoyancy of any superstructure directly above the side damage is to be disregarded. The unflooded parts of superstructures beyond the extent of damage may be taken into consideration if they are separated from the damaged space by watertight bulkheads and no progressive flooding of these intact spaces takes place.

(f) *Metacentric height.* After flooding, the tank ship's metacentric height must be at least 2 inches (50 mm) when the vessel is in the upright position.

(g) *Equalization arrangements.* Equalization arrangements requiring mechanical aids such as valves or cross-flooding lines may not be considered for reducing the angle of heel. Spaces joined by ducts of large cross-sectional area are treated as common spaces.

(h) *Intermediate stages of flooding.* If an intermediate stage of flooding is more critical than the final stage, the tank vessel must be shown by design calculations to meet the requirements in this section in the intermediate stage.

#### § 172.205 Local damage.

(a) Each tankship must be shown by design calculations to meet the survival conditions in paragraph (b) of this section in each condition of loading and operation assuming that local damage extending 30 inches (76 cm) normal to the hull shell is applied at any location in the cargo length:

(b) The vessel is presumed to survive assumed local damage if it does not heel beyond the smaller of the following angles in the final stage of flooding:

- (1) 30 degrees.
- (2) The angle at which restoration of propulsion and steering, and use of the ballast system is precluded.

#### Subpart H—Special Rules Pertaining to Great Lakes Dry Bulk Cargo Vessels

SOURCE: CGD 80-159, 51 FR 33059, Sept. 18, 1986, unless otherwise noted.