K = 38 in English units.
K = 13.93 in metric units.

(c) When a heeling arm curve, calculated in accordance with paragraph (d) of this section, is plotted against the vessel's righting arm curve—

(1) Equilibrium must be reached before the downflooding angle; and

(2) The residual righting energy must be at least 2 foot-degrees (.61 meter-degrees) up to the smallest of the following angles:

(i) The angle of maximum righting arm.

(ii) The downflooding angle.

(iii) 40 degrees.

(d) The heeling arm curve specified in paragraph (c) of this section must be calculated by the following equation:

$$HA = \frac{2\,(N)(P \times D)^{2/3}}{(s)(h)(\cos\theta)}{K\Delta}$$

where—

HA = heeling arm.
θ = angle of heel.
N, P, D, K, s, h, and Δ are as defined in paragraph (b) of this section.

(e) 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.

(f) For the purpose of this section, at each angle of heel, a vessel's righting arm may be calculated considering either—

(1) The vessel is permitted to trim free until the trimming moment is zero; or

(2) The vessel does not trim as it heels.

PART 174—SPECIAL RULES PERTAINING TO SPECIFIC VESSEL TYPES

Subpart A—General

Sec.

Subpart B—Special Rules Pertaining to Deck Cargo Barges

Subpart C—Special Rules Pertaining to Mobile Offshore Drilling Units

Subpart D [Reserved]

Subpart E—Special Rules Pertaining to Tugboats and Towboats

Subpart F [Reserved]

Subpart G—Special Rules Pertaining to Offshore Supply Vessels

Subpart H—Special Rules Pertaining to Liftboats

Subpart I—Hopper Dredges With Working Freeboard Assignments

AUTHORITY: 42 U.S.C. 9118, 9119, 9153; 43 U.S.C. 1333; 46 U.S.C. 3306, 3703; E.O. 12234, 45 FR 58801, 3 CFR, 1980 Comp., p. 277; Department of Homeland Security Delegation No. 0170.1. Section 174.180 also issued under sec. 617, Pub. L. 111–281, 124 Stat. 2905.

SOURCE: CGD 79–023, 48 FR 51048, Nov. 4, 1983, unless otherwise noted.

Subpart A—General

§ 174.005 Applicability.

Each of the following vessels must comply with the applicable provisions of this part:

(a) Deck cargo barge.

(b) Mobile offshore drilling unit (MODU) inspected under subchapter IA of this chapter.

(c) Tugboat and towboat inspected under subchapter I of this chapter.

(d) Self-propelled hopper dredge having an assigned working freeboard.

(e) Oceangoing ships of 500 gross tons or over, as calculated by the International Convention on Tonnage Measurement of Ships, 1969, designed primarily for the carriage of dry cargoes, including roll-on/roll-off ships.

(f) Offshore supply vessel inspected under subchapter L of this chapter.

(g) Liftboat inspected under subchapter L of this chapter.

[CGD 95–012, 60 FR 48052, Sept. 18, 1995; 60 FR 50120, Sept. 28, 1995, as amended by CGD 82–004, CGD 86–074, 60 FR 57671, Nov. 16, 1995; CGD 82–004 and CGD 86–074, 62 FR 49353, Sept. 19, 1997]

§ 174.007 Incorporation by reference.

(a) Certain material is incorporated by reference into this part with the approval of the Director of the Federal Register under 5 U.S.C. 552(a) and 1 CFR part 51. To enforce any edition other than that specified in this section, the Coast Guard must publish a notice of change in the FEDERAL REGISTER and the material must be available to the public. All approved material is available for inspection at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030 or go to *http://www.archives.gov/federal__register/code__of__federal__regulations/ibr__locations.html*. It is also available for inspection at Coast Guard Headquarters. Contact Commandant (CG–ENG–2), Attn: Naval Architecture Division, U.S. Coast Guard Stop 7509, 2703 Martin Luther King Jr. Avenue SE., Washington, DC 20593–7509. The material is also from the sources listed in paragraphs (b) and (c) of this section.

(b) American Society for Testing and Materials (ASTM) 100 Barr Harbor Drive, West Conshohocken, PA 19428–2959.

(1) ASTM F 1196–00, Standard Specification for Sliding Watertight Door Assemblies, 2008, incorporation by reference (IBR) approved for § 174.100.

(2) ASTM F 1197–00, Standard Specification for Sliding Watertight Door Control Systems, 2007, IBR approved for § 174.100.

(c) International Maritime Organization (IMO), Publications Section, 4 Albert Embankment, London SE1 7SR, United Kingdom, + 44 (0)20 7735 7611, *http://www.imo.org/*.

(1) Resolution MSC.216(82), Adoption of Amendments to the International Convention for the Safety of Life At Sea, 1974, As Amended (IMO Res. MSC.216(82)), Adopted on 8 December 2006, IBR approved for § 174.360.

(2) [Reserved]

[USCG–2007–0030, 75 FR 78086, Dec. 14, 2010, as amended by USCG–2012–0832, 77 FR 59788, Oct. 1, 2012; USCG–2013–0671, 78 FR 60164, Sept. 30, 2013]

Subpart B—Special Rules Pertaining to Deck Cargo Barges

§ 174.010 Specific applicability.

Each barge that carries cargo above the weather deck must comply with this subpart.

§ 174.015 Intact stability.

(a) Except as provided in § 174.020, in each condition of loading and operation, each barge must be shown by design calculations to have an area under the righting arm curve up to the angle of maximum righting arm, the downflooding angle, or 40 degrees, whichever angle is smallest, equal to or greater than—

(1) 15 foot-degrees (4.57 meter-degrees) for ocean and Great Lakes winter service; and

(2) 10 foot-degrees (3.05 meter-degrees) for lakes, bays, sounds, and Great Lakes summer service.

(b) 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.

§ 174.020 Alternate intact stability criterion.

A barge need not comply with § 174.015 and subparts C and E of part 170 of this chapter if it has the following characteristics:

(a) The weather deck is watertight.

(b) The barge's hull proportions fall within any one of the ratios in categories (A) through (D) in Table 174.020.

(c) The maximum cargo height is 30 feet (9.25 meters) or a value equal to the depth of the barge amidships, whichever is less.

TABLE 174.020

Category	Beam/depth ratio	Draft/depth ratio
A	3.00 to 3.74	Equal to or less than 0.70.
B	3.75 to 3.99	Equal to or less than 0.72.
C	4.00 to 4.49	Equal to or less than 0.76.
D	4,50 to 6.00	Equal to or less than 0.80.

Subpart C—Special Rules Pertaining to Mobile Offshore Drilling Units

§ 174.030 Specific applicability.

Each mobile offshore drilling unit (MODU) inspected under Subchapter IA of this chapter must comply with this subpart.

§ 174.035 Definitions.

(a) For the purpose of this subpart the following terms have the same definitions as given in subchapter IA of this chapter:

(1) *Column stabilized unit.*

(2) *Mobile offshore drilling unit.*

(3) *Self-elevating unit.*

(4) *Surface type unit.*

(b) For the purpose of this subpart—

(1) *Downflooding* means the entry of seawater through any opening that cannot be rapidly closed watertight, into the hull, superstructure, or columns of an undamaged unit due to heel, trim, or submergence of the unit.

(2) *Downflooding angle* means the static angle from the intersection of the unit's centerline and waterline in calm water to the first opening through which downflooding can occur when subjected to a wind heeling moment (Hm) calculated in accordance with § 174.055.

(3) *Normal operating condition* means a condition of a unit when loaded or arranged for drilling, field transit, or ocean transit.

(4) *Severe storm condition* means a condition of a unit when loaded or arranged to withstand the passage of a severe storm.

§ 174.040 Stability requirements: general.

Each unit must be designed to have at least 2 inches (50mm) of positive metacentric height in the upright equilibrium position for the full range of drafts, whether at the operating draft for navigation, towing, or drilling afloat, or at a temporary draft when changing drafts.

§ 174.045 Intact stability requirements.

(a) Each unit must be designed so that the wind heeling moments (Hm) and righting moments calculated for each of its normal operating conditions

and severe storm conditions, when plotted on GRAPH 174.045, define areas that satisfy the equation:

$$\text{Area(A)} \geq (\text{K}) \times (\text{Area (B)})$$

where—

(1) K = 1.4 except that if the unit is a column stabilized unit K = 1.3;
(2) Area (A) is the area on GRAPH 174.045 under the righting moment curve between 0 and the second intercept angle or the angle of heel at which downflooding would occur, whichever angle is less; and
(3) Area (B) is the area on GRAPH 174.045 under the wind heeling moment curve between 0 and the second intercept angle or the angle of heel at which downflooding of the unit would occur whichever angle is less.

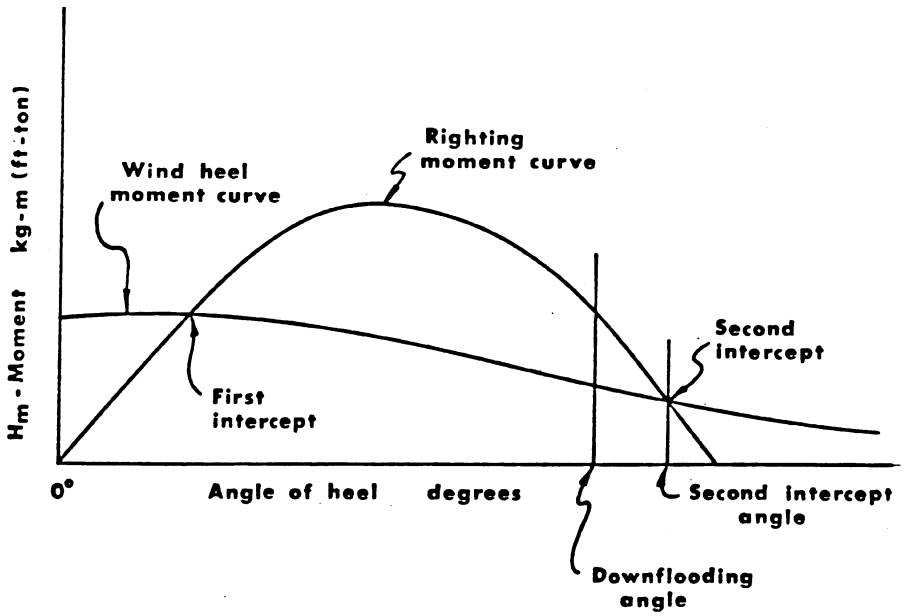
(b) Each righting moment on graph § 174.045 must be positive for all angles greater than 0 and less than the second intercept angle.

(c) For the purposes of this section, openings fitted with the weathertight closing appliances specified in § 174.100(b) are not considered as openings through which downflooding could occur if they can be rapidly closed and would not be submerged below the units' waterline prior to the first intercept angle, except that ventilation intakes and outlets for machinery spaces, crew spaces, and other spaces where ventilation is normally required are considered as openings through which downflooding could occur regardless of location.

(d) Each unit must be designed so that it can be changed from each of its normal operating conditions to a severe storm condition within a minimum period of time consistent with the operating manual required in § 109.121 of this chapter.

GRAPH 174.045

Intact Stability Curves for a Given Normal Operating or Severe Storm Mode



[CGD 79–023, 48 FR 51048, Nov. 4, 1983, as amended by CGD 83–071, 52 FR 6979, Mar. 6, 1987]

§ 174.050 Stability on bottom.

Each bottom bearing unit must be designed so that, while supported on the sea bottom with footings or a mat, it continually exerts a downward force on each footing or the mat when subjected to the forces of wave and current and to wind blowing at the velocities described in § 174.055(b)(3).

§ 174.055 Calculation of wind heeling moment (Hm).

(a) The wind heeling moment (Hm) of a unit in a given normal operating condition or severe storm condition is the sum of the individual wind heeling moments (H) calculated for each of the exposed surfaces on the unit; *i.e.*, $Hm=\Sigma H$.

(b) Each wind heeling moment (H) must be calculated using the equation:

$$H = k(v)^2(Ch)(Cs)(A)(h)$$

where—

(1) H = wind heeling moment for an exposed surface on the unit in foot-pounds (kilogram-meters);

(2) k = 0.00338 lb./(ft.^{2}-knots^2) (0.0623 (kg-sec^2)/m^4);

(3) v = wind velocity of—

(i) 70 knots (36 meters per second) for normal operating conditions.

(ii) 100 knots (51.5 meters per second) for severe storm conditions.

(iii) 50 knots (25.8 meters per second) for damage conditions.

(4) A = projected area in square feet (square meters) of an exposed surface on the unit;
(5) Ch = height coefficient for ''A'' from Table 174.055(a);
(6) Cs = shape coefficient for ''A'' from Table 174.055(b); and
(7) h = the vertical distance in feet (meters) from the center of lateral resistance of the underwater hull to the center of wind pressure on ''A''.

(c) When calculating ''A'' in the equation described in paragraph (b) of this section—

(1) The projected area of each column or leg; if the unit has columns or legs, must not include shielding allowances;

(2) Each area exposed as a result of heel must be included;

(3) The projected area of a cluster of deck houses may be used instead of the projected area of each individual deck house in the cluster; and

(4) The projected area of open truss work may be calculated by taking 30% of the projected areas of both the front and back sides of the open truss work rather than by determining the projected area of each structural member of the truss work.

TABLE 174.055(a)—CH VALUES

Feet		Meters		Ch.
Over	Not exceeding	Over	Not exceeding	
0	50	0.0	15.3	1.00
50	100	15.3	30.5	1.10
100	150	30.5	46.0	1.20
150	200	46.0	61.0	1.30
200	250	61.0	76.0	1.37
250	300	76.0	91.5	1.43
300	350	91.5	106.5	1.48
350	400	106.5	2.0	1.52
400	450	122.0	137.0	1.56
450	500	137.0	152.5	1.60
500	550	152.5	167.5	1.63
550	600	167.5	183.0	1.67
600	650	183.0	198.0	1.70
650	700	198.0	213.5	1.72
700	750	213.5	228.5	1.75
750	800	228.5	244.0	1.77
800	850	244.0	256.0	1.79
Above 850		Above 256		1.80

NOTE: The ''Ch'' value in this table, used in the equation described in section § 174.055(b), corresponds to the value of the vertical distance in feet (meters) from the water surface at the design draft of the unit to the center of area of the ''A'' value used in the equation.

TABLE 174.055(b)—CS VALUES

Shape	Cs.
Cylindrical shapes	0.5
Hull (surface type)	1.0
Deckhouse	1.0
Cluster of deckhouses	1.1
Isolated structural shapes (cranes, angles, channels, beams, etc.)	1.5
Under deck areas (smooth surfaces)	1.0
Under deck areas (exposed beams and girders)	1.3
Rig derrick (each face and open truss works)	1.25

NOTE: The ''Cs'' value in this table, used in the equation described in § 174.055(b), corresponds to the shape of the projected ''A'' in the equation.

[CGD 79–023, 48 FR 51048, Nov. 4, 1983, as amended by USCG–2014–0688, 79 FR 58287, Sept. 29, 2014]

§ 174.065 Damage stability requirements.

(a) Each unit must be designed so that, while in each of its normal operating conditions and severe storm conditions, its final equilibrium waterline would remain below the lowest edge of any opening through which additional flooding could occur if the unit were subjected simultaneously to—

(1) Damage causing flooding described in §§ 174.075 through 174.085; and

(2) A wind heeling moment calculated in accordance with § 174.055(b) using a wind velocity of 50 knots (25.8 meters per second).

(b) Each unit must have a means to close off each pipe, ventilation system, and trunk in each compartment described in § 174.080 or § 174.085 if any portion of the pipe, ventilation system, or trunk is within 5 feet (1.5 meters) of the hull.

§ 174.070 General damage stability assumptions.

For the purpose of determining compliance with § 174.065, the assumptions are made that during flooding and the resulting change in the unit's waterline—

(a) The unit is not anchored or moored; and

(b) No compartment on the unit is ballasted or pumped out to compensate for the flooding described in §§ 174.075 through 174.085.

§ 174.075 Compartments assumed flooded: general.

The individual flooding of each of the compartments described in §§ 174.080 and 174.085 must be assumed for the purpose of determining compliance

with §174.065 (a). Simultaneous flooding of more than one compartment must be assumed only when indicated in §§174.080 and 174.085.

§ 174.080 Flooding on self-elevating and surface type units.

(a) On a surface type unit or self-elevating unit, all compartments within 5 feet (1.5 meters) of the hull of the unit between two adjacent main watertight bulkheads, the bottom shell, and the uppermost continuous deck or first superstructure deck where superstructures are fitted must be assumed to be subject to simultaneous flooding.

(b) On the mat of a self-elevating unit, all compartments of the mat must be assumed to be subject to individual flooding.

§ 174.085 Flooding on column stabilized units.

(a) Watertight compartments that are outboard of, or traversed by, a plane which connects the vertical centerlines of the columns on the periphery of the unit, and within 5 feet (1.5 meters) of an outer surface of a column or footing on the periphery of the unit, must be assumed to be subject to flooding as follows:

(1) When a column is subdivided into watertight compartments by horizontal watertight flats, all compartments in the column within 5 feet (1.5 meters) of the unit's waterline before damage causing flooding must be assumed to be subject to simultaneous flooding.

(2) When a column is subdivided into watertight compartments by vertical watertight bulkheads, each two adjacent compartments must be assumed subject to simultaneous flooding if the distance between the vertical watertight bulkheads, measured at the column periphery, is equal to or less than one-eighth of the column perimeter at the draft under consideration.

(3) When a column is subdivided into watertight compartments by horizontal watertight flats and vertical watertight bulkheads, those compartments that are within the bounds described in paragraph (a)(2) of this section and within 5 feet (1.5 meters) of the unit's waterline before damage causing flooding must be assumed to be subject to simultaneous flooding.

(b) Each compartment in a footing must be assumed to be subject to individual flooding when any part of the compartment is within 5 feet (1.5 meters) of the unit's waterline before damage causing flooding.

§ 174.090 Permeability of spaces.

When doing the calculations required in §174.065—

(a) The permeability of a floodable space, other than a machinery space, must be as listed in Table 174.090; and

(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.

TABLE 174.090—PERMEABILITY

Spaces and tanks	Permeability (percent)
Storeroom spaces	60.
Accommodation spaces	95.
Voids	95.
Consumable liquid tanks	95 or 0.[1]
Other liquid tanks	95 or 0.[2]

[1] Whichever results in the more disabling condition.
[2] If tanks are partially filled, the permeability must be determined from the actual density and amount of liquid carried.

§ 174.100 Appliances for watertight and weathertight integrity.

(a) Appliances to insure watertight integrity include watertight doors, hatches, scuttles, bolted manhole covers, or other watertight closures for openings in watertight decks and bulkheads.

(b) Appliances to insure weathertight integrity include weathertight doors and hatches, closures for air pipes, ventilators, ventilation intakes and outlets, and closures for other openings in deckhouses and superstructures.

(c) Each internal opening equipped with appliances to insure watertight integrity that is used intermittently during operation of the unit while afloat must meet the following:

(1) Each door, hatch, and scuttle must—

(i) Be remotely controlled from a normally manned control station, and be operable locally from both sides of the bulkhead; or

(ii) If there is no means of remote control there must be an alarm system that signals whether the appliance is open or closed both locally at each appliance and in a normally manned control station.

(2) Each closing appliance must remain watertight under the design water pressure of the watertight boundary of which it is a part.

(d) Each external opening fitted with an appliance to insure weathertight integrity must be located so that it would not be submerged below the final equilibrium waterline if the unit is subjected simultaneously to—

(1) Damage causing flooding described in §§ 174.075 through 174.085; and

(2) A wind heeling moment calculated in accordance with § 174.055 using a wind velocity of 50 knots (25.8 meters per second).

(e) If a unit is equipped with sliding watertight doors, each sliding watertight door must—

(1) Be designed, constructed, tested, and marked in accordance with ASTM F 1196 (incorporated by reference, see § 174.007);

(2) Have controls in accordance with ASTM F 1197 (incorporated by reference, see § 174.007), except that a remote manual means of closure, as specified in paragraphs 7.1 and 7.5.1, and a remote mechanical indicator, as specified in paragraph 7.5.2, will not be required; and

(3) If installed in a subdivision bulkhead, meet Supplemental Requirements Nos. S1 and S3 of ASTM F 1196 (incorporated by reference, see § 174.007), unless the watertight doors are built in accordance with plans previously approved by the Coast Guard, in which case, only Supplemental Requirements Nos. S1 and S3.1.4 of ASTM F 1196 (incorporated by reference, see § 174.007) must be met. In either case, control systems for watertight doors must have power supplies, power sources, installation tests and inspection, and additional remote operating consoles in accordance with Supplemental Requirements Nos. S1 through S4 of ASTM F 1197 (incorporated by reference, see § 174.007).

(f) Installations of sliding watertight door assemblies must be in accordance with the following:

(1) Before a sliding watertight door assembly is installed in a vessel, the bulkhead in the vicinity of the door opening must be stiffened. Such bulkhead stiffeners, or deck reinforcement where flush deck door openings are desired, must not be less than 6 inches nor more than 12 inches from the door frame so that an unstiffened diaphragm of bulkhead plating 6 to 12 inches wide is provided completely around the door frame. Where such limits cannot be maintained, alternative installations will be considered by the Marine Safety Center. In determining the scantlings of these bulkhead stiffeners, the door frame should not be considered as contributing to the strength of the bulkhead. Provision must also be made to adequately support the thrust bearings and other equipment that may be mounted on the bulkhead or deck.

(2) Sliding watertight door frames must be either bolted or welded watertight to the bulkhead.

(i) If bolted, a suitable thin heat and fire resistant gasket or suitable compound must be used between the bulkhead and the frame for watertightness. The bulkhead plating shall be worked to a plane surface in way of the frame when mounting.

(ii) If welded, caution must be exercised in the welding process so that the door frame is not distorted.

[CGD 79–023, 48 FR 51048, Nov. 4, 1983, as amended by CGD 88–032, 56 FR 35828, July 29, 1991; USCG–2000–7790, 65 FR 58464, Sept. 29, 2000]

Subpart D [Reserved]

Subpart E—Special Rules Pertaining to Tugboats and Towboats

§ 174.140 Specific applicability.

Each tugboat and towboat inspected under subchapter I of this chapter must comply with this subpart.

§ 174.145 Intact stability requirements.

(a) In each condition of loading and operation, each vessel must be shown by design calculations to meet the requirements of paragraphs (b) through (e) of this section.

(b) The area under each righting arm curve must be at least 16.9 foot-degrees (5.15 meter-degrees) up to the smallest of the following angles:

(1) The angle of maximum righting arm.

(2) The downflooding angle.

(3) 40 degrees.

(c) The area under each righting arm curve must be at least 5.6 foot-degrees (1.72 meter-degrees) between the angles of 30 degrees and 40 degrees, or between 30 degrees and the downflooding angle if this angle is less than 40 degrees.

(d) The maximum righting arm shall occur at a heel of at least 25 degrees.

(e) The righting arm curve must be positive to at least 60 degrees.

(f) For the purpose of this section, at each angle of heel, a vessel's righting arm may be calculated considering either—

(1) The vessel is permitted to trim free until the trimming moment is zero; or

(2) The vessel does not trim as it heels.

Subpart F [Reserved]

Subpart G—Special Rules Pertaining to Offshore Supply Vessels

SOURCE: CGD 82–004 and CGD 86–074, 62 FR 49353, Sept. 19, 1997, unless otherwise noted.

§ 174.180 Applicability.

This subpart applies to OSVs except liftboats inspected under subchapter L of this chapter and OSVs of at least 6,000 GT ITC (500 GRT if GT ITC is not assigned) as defined in § 125.160 of this chapter.

[USCG–2012–0208, 79 FR 48939, Aug. 18, 2014]

§ 174.185 Intact stability.

(a) Each OSV must be shown by design calculations to meet, under each condition of loading and operation, the minimal requirements for metacentric height (GM) in § 170.170 of this chapter, and in either § 170.173 of this chapter or paragraphs (b) through (e) of this section.

(b) The area under each righting arm curve must be at least 0.08 meter-radians (15 foot-degrees) up to the smallest of the following angles:

(1) The angle of maximum righting arm;

(2) The downflooding angle; or

(3) 40 degrees.

(c) The downflooding angle must not be less than 20 degrees.

(d) The righting arm curve must be positive to at least 40 degrees.

(e) The freeboard at the stern must be equal to the freeboard calculated to comply with subchapter E of this chapter or to the value taken from Table 174.185, whichever is less.

(f) For paragraphs (b) and (d) of this section, at each angle of heel an OSV's righting arm may be calculated considering either—

(1) The vessel is permitted to trim free until the trimming moment is zero; or

(2) The vessel does not trim as it heels.

(g) For the purpose of paragraphs (b) and (d) of this section, the method of calculating righting arms chosen must be the same for all calculations.

TABLE 174.185—MINIMAL FREEBOARD AT THE STERN

LBP in meters (feet)	Freeboard at stern in millimeters (inches)
Less than 20 (65)	300 (12)
20 (65) but less than 30 (100)	380 (15)
30 (100) but less than 40 (130)	400 (18)
40 (130) but less than 50 (155)	500 (20)
50 (155) but less than 60 (190)	560 (22)
60 (190) but less than 70 (230)	610 (24)
70 (230) and greater	660 (26)

§ 174.190 Collision bulkhead.

(a) Each OSV must have a collision bulkhead in compliance with §§ 171.085(c)(1), (d), (e)(2), and (f) of this chapter.

(b) Penetration of the collision bulkhead by piping must be minimal, and, where fitted, piping must meet the requirements of §§ 56.50–1(b)(1) and (c) and 128.230 of this chapter.

§ 174.195 Bulkheads in machinery spaces.

(a) The bulkhead in each machinery space of each OSV must be watertight to the bulkhead deck.

(b) Each penetration of, and each opening in, a bulkhead in a machinery space must—

(1) Be kept as high and as far inboard as practicable; and

(2) Except as provided by §174.210 of this subpart and by paragraph (c) of this section, have means to make it watertight.

(c) No penetration of a bulkhead in a machinery space by a ventilation duct need have means to make the bulkhead watertight if—

(1) Every part of the duct is at least 760 millimeter (30 inches) from the side of the OSV; and

(2) The duct is continuously watertight from the penetration to the main deck.

(d) Each penetration of a bulkhead in a machinery space by piping must meet the design requirements for material and pressure in subchapter F of this chapter.

§174.200 Damaged stability in machinery spaces for all OSVs.

Each OSV must be shown by design calculations to comply, under each afloat condition of loading and operation, with §174.207 of this subpart in case of damage between any two watertight bulkheads in each machinery space.

§174.205 Additional damaged stability for OSVs carrying more than 16 offshore workers.

(a) *Calculations.* Each OSV carrying more than 16 offshore workers must be shown by design calculations to comply, under each afloat condition of loading and operation, with §174.207 of this subpart in case of the damage specified by paragraph (b) of this section.

(b) *Character of damage.* For paragraph (a) of this section, design calculations must show that the OSV can survive damage at any place other than either the collision bulkhead or a transverse watertight bulkhead unless—

(1) The transverse watertight bulkhead is closer than the longitudinal extent of damage, specified by Table 174.207(a), to the adjacent transverse watertight bulkhead; or

(2) The transverse watertight bulkhead has a step or a recess, which must be assumed damaged, if it is both more than 3 meters (10 feet) in length and located within the transverse extent of damage specified by Table 174.207(a) of this section.

§174.207 Damaged stability criteria.

(a) *Extent of damage.* Damage must consist of penetrations having the dimensions specified by table 174.207(a) of this section, except that, if the most disabling penetrations are smaller than the penetrations specified by the table, damage must consist of the smaller penetrations.

(b) *Permeability of spaces.* The permeability of a floodable space must be as specified by Table 174.207(b) of this section.

(c) *Survival conditions.* An OSV is presumed to survive assumed damage if it meets the following conditions in the final stage of flooding:

(1) *Final waterline.* The final waterline, in the final stage 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, a tonnage opening, an opening closed by a weathertight door or hatch-cover, or a tank vent fitted with a ball check-valve. This opening does not include an opening closed by a—

(i) Watertight manhole-cover;

(ii) Flush scuttle;

(iii) Small hatch-cover for a watertight cargo-tank that maintains the high integrity of the deck;

(iv) Watertight door in compliance with §174.210 of this subpart; or

(v) Side scuttle of the non-opening type.

(2) *Angle of heel.* The angle of heel must not exceed 15 degrees.

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

(i) The righting arm curve must be positive.

(ii) The righting arm must be at least 100 millimeters (4 inches).

(iii) Each submerged opening must be weathertight. (A tank vent fitted with a ball check-valve is weathertight.)

(4) *Progressive flooding.* Piping, ducts, or tunnels within the assumed extent of damage must be either—

(i) Equipped with arrangements, such as stop check-valves, to prevent progressive flooding of the spaces with which they connect; or

(ii) Assumed in the calculations required by paragraph (a) of this section to permit progressive flooding of the spaces with which they connect.

(d) *Buoyancy of superstructure.* For paragraph (a) of this section, the buoyancy of any superstructure directly above the side damage must be considered in the most unfavorable condition.

TABLE 174.207(a)—EXTENT OF DAMAGE

	Collision Penetration
Longitudinal extent (vessels with LBP not greater than 45 meters [143 feet]).	.1L or 1.8 meters (6 feet), whichever is greater in length.
Longitudinal extent (vessels with LBP greater than 45 meters [143 feet]).	3 meters (10 feet) + .03L.
Transverse extent*	760 millimeters (30 inches).
Vertical extent.	From baseline upward without limit.

*The transverse penetration applies inboard from the side of the vessel, at right angles to the centerline, at the level of the deepest load waterline.

TABLE 174.207(b)—PERMEABILITY OF SPACES

Spaces and tanks	Permeability
Storerooms	60 percent.
Accommodations	95 percent.
Machinery	85 percent.
Voids and passageways	95 percent.
Dry-bulk tanks	0 (*) or 95 percent.
Consumable-liquid tanks	0 (*) or 95 percent.
Other liquid tanks	0 (*) 0 (**) or 95 percent.

*Whichever results in the more disabling condition.
**If tanks are partly filled, the permeability must be determined from the actual density and amount of liquid carried.

§ 174.210 Watertight doors in watertight bulkheads.

(a) This section applies to each vessel with watertight doors in bulkheads made watertight in compliance with this chapter.

(b) Except as provided by paragraph (c) of this section, each watertight door must comply with subpart H of part 170 of this chapter.

(c) A Class-1 door may be installed at any place if—

(1) The door has a quick-acting closing-device operative from both sides of the door;

(2) The door is designed to withstand a head of water equivalent to the depth from the sill of the door to the bulkhead deck or 3 meters (10 feet), whichever is greater; and

(3) The vessel's pilothouse contains a visual indicator showing whether the door is open or closed.

(d) Each watertight door must be marked in compliance with §131.893 of this chapter.

(e) If a Class-1 door is installed, the vessel's stability letter will require the master to ensure that the door is always closed except when being used for access.

§ 174.215 Drainage of weather deck.

The weather deck must have open rails to allow rapid clearing of water, or must have freeing ports in compliance with §42.15–70 of this chapter.

§ 174.220 Hatches and coamings.

(a) Each hatch exposed to the weather must be watertight, except that the following hatches may be only weathertight:

(1) Each hatch on a watertight trunk that extends at least 430 millimeters (17 inches) above the weather deck.

(2) Each hatch in a cabin top.

(b) Each hatch cover must—

(1) Have securing-devices; and

(2) Be attached to the hatch frame or coaming by hinges, captive chains, or other devices to prevent its loss.

(c) Each hatch that provides access to quarters or to accommodation spaces for crew members or offshore workers must be capable of being opened and closed from either side.

(d) Except as provided by paragraph (e) of this section, a weathertight door with a permanent watertight coaming at least 380 millimeters (15 inches) high must be installed for each opening in a deckhouse or companionway that—

(1) Gives access into the hull; and

(2) Is in an exposed place.

(e) If an opening in a deckhouse or companionway has a Class-1 watertight door installed, the height of the watertight coaming need only accommodate the door.

§ 174.225 Hull penetrations and shell connections.

Each overboard discharge and shell connection except an engine exhaust must comply with §§ 56.50–95 and 128.230 of this chapter.

Subpart H—Special Rules Pertaining to Liftboats

SOURCE: CGD 82–004 and CGD 86–074, 62 FR 49355, Sept. 19, 1997, unless otherwise noted.

§ 174.240 Applicability.

Each liftboat inspected under subchapter L of this chapter must comply with this subpart.

§ 174.245 General.

Each liftboat must comply with §§ 174.210 through 174.225.

§ 174.250 Unrestricted service.

Each liftboat not limited to restricted service must comply with subpart C of this part in each condition of loading and operation.

§ 174.255 Restricted service.

This section applies to each liftboat unable to comply with § 174.250 and limited to restricted service as defined by § 125.160 of this chapter.

(a) *Intact stability*. (1) Each liftboat must be shown by design calculations to meet, under each condition of loading and operation afloat, the following requirements:

(i) Those imposed by § 174.045, given a ''K'' value of at least 1.4.

(ii) A range of positive stability of at least 10 degrees extending from the angle of the first intercept of the curves of righting moment and wind heeling moment, either to the angle of the second intercept of those curves or to the angle of heel at which downflooding would occur, whichever angle is less.

(iii) A residual righting energy of at least 0.003 meter radians (5 foot-degrees) between the angle of the first intercept of the curves of righting moment and wind heeling moment, either to the angle of the second intercept of those curves or to the angle of heel at which downflooding would occur, whichever angle is less.

(2) For this section, each wind heeling moment must be calculated as prescribed by § 174.055 of this part using winds of 60 knots for normal conditions of operation afloat and of 70 knots for severe-storm conditions of operation afloat.

(3) For paragraph (a)(1) of this section, the initial metacentric height must be at least 300 millimeters (1 foot) for each leg position encountered while afloat including the full range of leg positions encountered while jacking.

(b) *Damaged stability*. (1) Each liftboat must be designed so that, while it is in each of its normal operating conditions, its final equilibrium waterline will remain below the lowest edge of any opening through which additional flooding can occur if the liftboat is subjected simultaneously to—

(i) Damage causing flooding described by paragraph (b)(4) of this section; and

(ii) A wind heeling moment calculated in compliance with § 174.055(b) using a wind speed of 50 knots.

(2) Each liftboat must have a means of closing off each pipe, ventilation system, and trunk in each compartment described by paragraph (b)(4) of this section if any part of the pipe, ventilation system, or trunk is within 760 millimeters (30 inches) of the hull.

(3) For compliance with paragraph (b)(1) of this section, no compartment on the liftboat may be ballasted or pumped out to compensate for the flooding described by paragraph (b)(4) of this section.

(4) For compliance with paragraph (b)(1) of this section, each compartment within 760 millimeters (30 inches) of the hull, excluding the bottom of the liftboat, between two adjacent main watertight bulkheads and the uppermost continuous deck or first superstructure deck where superstructures are fitted must be assumed subject to simultaneous flooding.

(5) In the calculations required by paragraph (b)(1) of this section, the permeability of a floodable space must be as listed by Table 174.205(d).

(c) *On-bottom stability*. Each liftboat must be shown by design calculations to exert a continuous downward force on each footing when the vessel is supported on the bottom with footings and

is subjected to the forces of waves, currents, and winds of 70 knots under normal conditions of operation, and winds of 100 knots under severe-storm conditions of operation when elevated in a safe place, if this place is other than a harbor of safe refuge. The waves and currents must be appropriate for the winds and place.

§ 174.260 Freeboard.

(a) Each liftboat not required to obtain and maintain a loadline in compliance with subchapter E of this chapter must place markings on each side of the vessel amidships. These markings must each consist of a horizontal line 460 millimeters (18 inches) in length and 25 millimeters (1 inch) in height. The upper edges of the markings must be at a distance equal to the authorized freeboard measured vertically below the intersection of the continuation outwards of the upper surface of the weather deck and the outer surface of the shell. This distance must be at least 610 millimeters (24 inches).

(b) The markings required by paragraph (a) of this section may not be submerged in any condition of loading or operation.

Subpart I—Hopper Dredges With Working Freeboard Assignments

SOURCE: CGD 76–080, 54 FR 36977, Sept. 6, 1989, unless otherwise noted.

§ 174.300 Specific applicability.

This subpart applies to each self-propelled hopper dredge for which a working freeboard assignment is being sought under part 44, subpart C, of this chapter.

§ 174.305 Definitions.

Hopper dredge has the same meaning as contained in § 44.310 of this chapter.

Length has the same meaning as contained in § 42.13–15(a) of this chapter.

Working freeboard has the same meaning as contained in § 44.310 of this chapter.

CALCULATIONS

§ 174.310 General.

(a) Each hopper dredge under this subpart must be shown by design calculations based on the assumptions under paragraphs (b), (c), (d), and (e) of this section, that it meets—

(1) The requirements in §§ 170.170, 170.173, and 170.300 of this chapter in each condition of loading and operation; and

(2) The survival conditions of § 174.320 in each condition of loading and operation assuming the character and extent of damage specified in § 174.315.

(b) The calculations required by paragraph (a) of this section must assume:

(1) The hoppers are full of seawater;

(2) The permeability of flooded spaces is as provided by Table 174.310;

(3) The equalization provisions of § 174.325; and

(4) The jettisoning provisions of § 174.330.

(c) The calculations required by this section must take into account a sufficient number of loading conditions to identify the condition in which the vessel is least stable, including, but not limited to, the most severe loading condition, and the:

(1) Specific gravity of the dredge spoil, from 1.02 up to and including the maximum required by paragraph (e)(1) of this section; and

(2) Draft, up to and including the draft corresponding to the working freeboard for the full range of trim.

(d) The calculations required by this section for a dredge with open hoppers may include spillage of spoil from the hopper resulting from changing the angle of heel and trim.

(e) The following assumptions must be made when doing the calculations required by this section:

(1) Dredged spoil in the hopper is a homogeneous liquid with a maximum specific gravity for the areas of operation.

(2) When calculating the vessel's righting arm, it is assumed at each angle of heel that the vessel trims free and the trimming moment is zero.

TABLE 174.310—PERMEABILITY OF FLOODABLE SPACES

Spaces and tanks	Permeability
Storerooms	0.60
Accommodation spaces	0.95
Consumable liquid tanks	0.00 or 0.95—whichever results in the more disabling condition.

TABLE 174.310—PERMEABILITY OF FLOODABLE SPACES—Continued

Spaces and tanks	Permeability
Machinery space	0.85—unless otherwise supported by calculations.
Cargo tanks	Determined from the actual density and amount of liquid carried in the tank.

§ 174.315 Extent and character of damage.

(a) The calculations required by § 174.310 must show that the dredge can survive damage at any location along the length of the vessel including at a transverse bulkhead in accordance with paragraph (b) of this section.

(b) The calculations required by paragraph (a) of this section must assume the most disabling side penetration with the damage collision penetration provided by Table 174.315, except that if the most disabling damage collision penetrations would be less than those provided by Table 174.315, the smaller damage collision penetration must be assumed.

TABLE 174.315—EXTENT OF DAMAGE COLLISION PENETRATION

Longitudinal extent	0.495L$^{2/3}$ or 47.6 feet. [(1/3)(L)$^{2/3}$ or 14.5 meters] whichever is less.
Transverse extent [1]	B/5 or 37.7 feet. (11.5 meters), whichever is less.
Vertical extent	From the base line upward without limit.

[1] Damage applied inboard from the vessel's side at a right angle to the centerline at the draft corresponding to the working freeboard assigned under subchapter E of this chapter.

§ 174.320 Damage survival.

A hopper dredge survives assumed damage if it meets the following conditions:

(a) The maximum angle of heel in each stage of flooding must not exceed 30 degrees or the angle of downflooding whichever is less.

(b) The final waterline, taking into account sinkage, heel, and trim, must be below the lowest edge of each opening through which progressive flooding may take place.

(c) The righting arm curve calculated after damage must:

(1) Have a minimum positive range of 20 degrees beyond the angle of equilibrium; and

(2) Reach a height of at least 4 inches (100mm) within the 20 degree positive range.

(d) Each opening within, or partially within, the 20 degree range beyond the angle of equilibrium must be weathertight.

(e) After flooding or equalization as allowed by § 174.325, the hopper dredge's metacentric height must be at least 2 inches (50mm) when the dredge is in an upright position.

§ 174.325 Equalization.

When doing the calculations required by § 174.310 of this subpart—

(a) Equalization arrangements requiring mechanical aids, such as valves, may not be assumed to be effective in reducing the angle of heel; and

(b) Spaces joined by ducts may be assumed to be common spaces only if equalization takes place within 15 minutes after flooding begins.

§ 174.330 Jettisoning of spoil.

(a) When doing the calculations required by § 174.310 for a hopper dredge with bottom doors, it may be assumed that the spoil is jettisoned immediately after damage and that the bottom doors remain open if:

(1) The bottom doors are designed so that they may be fully opened from:

(i) The closed position within two minutes even if the main power source is lost or the bottom door actuating mechanism is damaged; and

(ii) The navigating bridge;

(2) The discharge area through the bottom doors is equal to or greater than 30 percent of the maximum cross sectional area of the hopper measured in a plane parallel to the waterline; and

(3) Asymmetrical jettisoning of the spoil is impossible.

(b) When doing the calculations required by § 174.310 for a hopper dredge with a split hull, it may be assumed that the spoil is jettisoned immediately after damage if—

(1) The hull is designed so that—

(i) The complete separation is effected within two minutes even if the

main power source is lost or the actuating means is damaged; and

(ii) The actuating means can be operated from the navigating bridge;

(2) It is shown to the Commanding Officer, Marine Safety Center, either by calculations or by operational tests, that the hulls can separate sufficiently to allow the dredged material to dump without bridging; and

(3) Asymmetrical jettisoning of the spoil is impossible.

DESIGN

§ 174.335 Watertight doors.

(a) Each hopper dredge must have sliding watertight doors (Class 3) approved under §170.270 of this chapter if the sill for the door is—

(1) Installed below the bulkhead deck; and

(2) Less than 24 inches above the final waterline as shown by the calculations required by §174.310 in each damage condition up to and including the maximum amount of assumed damage.

(b) Each hopper dredge must have sliding watertight doors (Class 3) approved under §170.270 of this chapter, or quick acting hinged watertight doors (Class 1) approved under the same subpart if the sill of the watertight door is—

(1) Installed below the bulkhead deck; and

(2) Greater than 24 inches above the final waterline as shown by the calculations required by §174.310 in each damage condition up to and including the maximum amount of assumed damage.

[CGD 76–080, 54 FR 36977, Sept. 6, 1989, as amended by CGD 95–072, 60 FR 50468, Sept. 29, 1995]

§ 174.340 Collision bulkhead.

Each hopper dredge must have a collision bulkhead that is located not less than 5 percent of the length abaft of the forward perpendicular.

Subpart J—Special Rules Pertaining to Dry Cargo Ships

SOURCE: CGD 87–094, 58 FR 17320, Apr. 1, 1993, unless otherwise noted.

§ 174.350 Specific applicability.

This subpart applies to each new ship of 500 gross tons or over, as calculated by the International Convention on Tonnage Measurement of Ships, 1969, designed primarily for the carriage of dry cargoes, including roll-on/roll-off ships and integrated tug and barges (ITBs) when operating as a combined unit.

§ 174.355 Definitions.

New ship means a ship:

(1) For which the building contract is placed on or after February 1, 1992; or

(2) In the absence of a building contract, the keel of which is laid or which is at a similar stage of construction on or after August 1, 1992; or

(3) The delivery of which is on or after February 1, 1997; or

(4) For which application for reflagging is made on or after February 1, 1997; or

(5) Which has undergone a major conversion:

(i) For which the contract is placed on or after February 1, 1992; or

(ii) In the absence of a contract, the construction work of which is begun on or after August 1, 1992; or

(iii) Which is completed on or after February 1, 1997.

§ 174.360 Calculations.

Each ship to which this subpart applies must comply with the minimum standard of subdivision and damage stability applicable to that ship under IMO Res. MSC.216(82), (incorporated by reference, see §174.007). Compliance with the applicable requirements must be demonstrated by calculations and reflected in information on loading restrictions, such as a maximum height of the center of gravity (KG) or minimum metacentric height (GM) curve, that is part of the stability information required by §170.110 of this chapter.

[USCG–2007–0030, 75 FR 78086, Dec. 14, 2010]