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is desired, longitudinal strength calculations shall be submitted.

[CGFR 70–10, 35 FR 3714, Feb. 25, 1970, as amended by CGD 79–023, 48 FR 51009, Nov. 4, 1983]

§ 151.10–20 Hull construction.

(a) *Construction features.* (1) Each barge hull shall be constructed with a suitable bow form (length, shape, and height of headlog) to protect against diving at the maximum speed at which the barge is designed to be towed. In any integrated tow, only the lead barge need comply with this requirement.

(2) All ''open hopper'' type barges shall be provided with coamings around the hopper space and a 36–inch minimum height plowshare breakwater on the forward rake. The plowshare breakwater may be omitted, if it is demonstrated to the satisfaction of the Commandant that sufficient protection is achieved without it. Coamings shall have a minimum height of 36 inches forward and may be graduated to a minimum height of 24 inches at midlength and 18 inches thereafter. All hopper barges constructed with a weathertight rain shield over the hopper space are exempt from these requirements, except that they shall be provided with an 18–inch minimum coaming all around the hopper.

(3) All ''open hopper'' type barges modified for the carriage of chlorine in bulk shall be provided with 36–inch minimum height coamings around the hopper.

(4) All barges in ocean or coastwise service shall be provided with a structural deck and hatches in accordance with the applicable provisions of subchapter E of this chapter and the scantling requirements of the American Bureau of Shipping.

(b) *Hull structural requirements.* (1) All Types I, II, and III barges shall comply with the basic structural requirements of the American Bureau of Shipping for barges of the ordinary types and the applicable supplementary requirements of this section.

(2) Types I and II barges in inland service: A grounding condition shall be assumed where the forward rake bulkhead rests upon a pinnacle at the water surface. The maximum hull and tank bending moment and tank saddle reactions (if applicable) shall be determined. The hull bending stress shall not exceed the applicable limits of paragraphs (b)(2) (i), (ii), or (iii) of this section. The maximum tank bending moment and saddle reaction shall be used in the tank design calculations required by § 151.15–2(b)(3).

(i) Independent tanks supported by only two saddles do not contribute to the strength and stiffness of the barge hull. In such case, the hull stress shall not exceed either 50 percent of the minimum ultimate tensile strength of the material or 70 percent of the yield strength when specified, whichever is greater.

(ii) Independent tanks supported by three or more saddles contribute to the strength and stiffness of the hull. In such case, the hull stress shall not exceed the percentage stress values prescribed in § 151.10–20(b)(2)(i), multiplied by the quantity

$$(1.5 - SWT/UTS),$$

where *SWT* is the stress calculated without including the effect of the tanks, and *UTS* is the minimum ultimate tensile strength of the material. The value *SWT*, however, shall in no case be more than 75 percent of *UTS*.

(iii) Integral tanks may be considered as contributing to the strength and stiffness of the barge hull. The hull stresses for integral tank barges shall not exceed the percentage stress values prescribed in paragraph (b)(2)(i), of this section.

(3) Types I and II barges in ocean service:

(i) Independent tank barges with tanks supported by three or more saddles shall be subjected to a $0.6L^{0.6}$ trochoidal wave hogsag analysis to determine the maximum hull and tank bending moments and tank saddle reactions.

(ii) All independent tank barges, regardless of the number of saddle supports shall be subject to a still water bending analysis to determine the hull bending moment. For those barges with independent tanks supported by three or more saddles, this analysis shall consider tank-hull interaction so as to determine tank bending moments and saddle reactions.

(iii) The still water tank bending moments and saddle reactions shall be superimposed upon those obtained by simultaneous application of the following dynamic loadings:

(*a*) Rolling 30° each side (120° full cycle) in 10 seconds.

(*b*) Pitching 6° half amplitude (24° full cycle) in 7 seconds.

(*c*) Heaving *L*/80 half amplitude (*L*/20 full cycle) in 8 seconds.

(iv) The hull structure and saddle support system shall be analyzed, using the maximum hull bending moments and saddle reactions obtained from the foregoing. Bending stress shall not exceed 60 percent of the yield strength or 42 percent of the minimum tensile strength of the material, whichever is less. Critical buckling strength shall be at least 75 percent greater than calculated buckling stresses. The maximum tank bending moments and saddle reactions shall be used in the tank design calculations required by § 151.15–3(b)(8).

Subpart 151.12—Equipment and Operating Requirements for Control of Pollution From Category D NLS Cargoes

SOURCE: CGD 81–101, 52 FR 7777, Mar. 12, 1987, unless otherwise noted.

§ 151.12–5 Equipment for Category D NLS.

The Coast Guard endorses the Certificate of Inspection and for ships making foreign voyages issues the endorsed NLS Certificate required by § 151.12–10 for an oceangoing non-self-propelled ship to carry as bulk cargo the following Category D NLSs if the ship meets the requirements of this part and the requirements applying to ships that carry Category D NLS cargoes in §§ 153.470, 153.486, and 153.490 of this chapter:

Acetic acid
Acrylic acid
Adiponitrile
Aminoethylethanolamine
Ammonium bisulfite solution
Butyl methacrylate
Caustic soda solution
Coal tar pitch
Cyclohexanone
Dichloromethane
2,2-Dichloropropionic acid
Diethylenetriamine
N,N-Dimethylacetamide
Dimethylethanolamine
Dimethylformamide
1,4-Dioxane
Ethanolamine
N-Ethylcyclohexylamine
Ethylene cyanohydrin
Ethylene glycol monoalkyl ethers
Ethyl methacrylate
Formic acid
Glutaraldehyde solution
Hydrochloric acid
Mesityl oxide
Methyl methacrylate
Morpholine
1- or 2-Nitropropane
Phosphoric acid
Polyethylene polyamines
Polymethylene polyphenyl isocyanate
Propionic acid
iso-Propyl ether
Pyridine
Tetraethylenepentamine
Tetrahydrofuran
Triethanolamine
Triethylenetetramine

[CGD 81–101, 52 FR 7777, Mar. 12, 1989, as amended by CGD 88–100, 54 FR 40040, Sept. 29, 1989; CGD 92–100, 59 FR 17028, Apr. 11, 1994; CGD 94–900, 59 FR 45139, Aug. 31, 1994; CGD 94–902, 60 FR 34043, June 29, 1995]

§ 151.12–10 Operation of oceangoing non-self-propelled ships Carrying Category D NLS.

(a) An oceangoing non-self-propelled ship may not carry in a cargo tank a Category D NLS cargo listed under § 151.12–5 unless the ship has on board a Certificate of Inspection and for ships making foreign voyages an NLS Certificate endorsed under that section to allow the cargo tank to carry the NLS cargo.

(b) The person in charge of an oceangoing non-self-propelled ship that carries a Category D NLS listed under § 151.12–5 shall ensure that the ship is operated as prescribed for the operation of oceangoing ships carrying Category D NLSs in §§ 153.901, 153.909, 153.1100, 153.1102, 153.1104, 153.1106, 153.1124, 153.1126, 153.1128, 153.1130 and 153.1132 of this chapter.

[CGD 81–101, 52 FR 7777, Mar. 12, 1987, as amended by CGD 81–101, 53 FR 28974, Aug. 1, 1988 and 54 FR 12629, Mar. 28, 1989]