S17 Longitudinal Strength of Hull Girder in Flooded Condition for Bulk Carriers

S17 (1997) (Rev.1 1997) (Rev.2 1998) (Rev.3 Sep 2000) (Rev.4 June 2002) (Rev.5 June 2003) (Rev.6 July 2004) (Rev.7 Feb 2006) (Corr.1 Oct 2009) (Rev.8 May 2010)

S17.1 General

Revision 7 of this UR is to be complied with in respect of the flooding of any cargo hold of bulk carriers, as defined in UR Z11.2.2, with notation BC-A or BC-B, as defined in UR S25, in accordance with Note 2.

Such ships are to have their hull girder strength checked for specified flooded conditions, in each of the cargo and ballast loading conditions defined in UR S11.2.1.2 to S11.2.1.4. and in every other condition considered in the intact longitudinal strength calculations, including those according to UR S1 and S1A, except that harbour conditions, docking condition afloat, loading and unloading transitory conditions in port and loading conditions encountered during ballast water exchange need not be considered.

This UR does not apply to CSR Bulk Carriers.

S17.2 Flooding conditions

S17.2.1 Floodable holds

Each cargo hold is to be considered individually flooded up to the equilibrium waterline.

S17.2.2 Loads

The still water loads in flooded conditions are to be calculated for the above cargo and ballast loading conditions.

The wave loads in the flooded conditions are assumed to be equal to 80% of those given in UR S11.

Note:

1. The “contracted for construction” date means the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. For further details regarding the date of “contract for construction”, refer to IACS Procedural Requirement (PR) No. 29.

2. Revision 7 of this UR is to be applied by IACS Societies to ships contracted for construction on or after 1 July 2006.

S17
(cont)

S17.3 Flooding criteria

To calculate the weight of ingressed water, the following assumptions are to be made:

a) The permeability of empty cargo spaces and volume left in loaded cargo spaces above any cargo is to be taken as 0.95.

b) Appropriate permeabilities and bulk densities are to be used for any cargo carried. For iron ore, a minimum permeability of 0.3 with a corresponding bulk density of 3.0 t/m^3 is to be used. For cement, a minimum permeability of 0.3 with a corresponding bulk density of 1.3 t/m^3 is to be used. In this respect, "permeability" for solid bulk cargo means the ratio of the floodable volume between the particles, granules or any larger pieces of the cargo, to the gross volume of the bulk cargo.

For packed cargo conditions (such as steel mill products), the actual density of the cargo should be used with a permeability of zero.

S17.4 Stress assessment

The actual hull girder bending stress σ_{fld}, in N/mm^2, at any location is given by:

$$\sigma_{fld} = \frac{M_{sf} + 0.8M_W}{W_Z} \cdot 10^3$$

where:

M_{sf} = still water bending moment, in kNm, in the flooded conditions for the section under consideration

M_W = wave bending moment, in kNm, as given in UR S11.2.2.1 for the section under consideration

W_Z = section modulus, in cm^3, for the corresponding location in the hull girder.

The shear strength of the side shell and the inner hull (longitudinal bulkhead) if any, at any location of the ship, is to be checked according to the requirements specified in UR S11.4 in which F_S and F_W are to be replaced respectively by F_{SF} and F_{WF}, where:

F_{SF} = still water shear force, in kN, in the flooded conditions for the section under consideration

F_{WF} = 0.8 F_W

F_W = wave shear force, in kN, as given in UR S11.2.2.2 for the section under consideration

S17.5 Strength criteria

The damaged structure is assumed to remain fully effective in resisting the applied loading.

Permissible stress and axial stress buckling strength are to be in accordance with UR S11.

End of Document