Bulker Q&As and CIs on the IACS CSR Knowledge Centre

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
119	4/3.2.2.2	Question	wave bending moments	2006/8/18	What is the probability level of the vertical wave bending moments (Mwv.h) and (Mwv.s) used in the formulae defining the design still water bending moments ?	The vertical wave bending moments (Mwv.h) and (Mwv.s) used in the formulae defining the design still water bending moments are at the probability level of 10-8, i.e. calculated as defined in [3.1] with (fp) equal to 1.0.	
176	4/App2/Tab3	Question	DSA calculation	2006/9/27	The DSA calculation results in Loading condition No.10 in Table 3 of chapter 4, Appendix 2 are much larger than one in normal, especially for ships whose length is less than 200m.	The loading condition No.10 in the Tab.3 of Chap.4, App.2 is extracted from IACS UR S25, which is applicable to "Bulk Carriers" having length of 150m or above. For ships having notation "BC-A" and length of 200m or less, scantling impact are very large, comparing to those not applied to IACS UR S25.	
226	4/6.2.1.2	Question	BWE	2006/12/14	When checking the condition under the ballast water exchange operation by means of the flow through method, static pressure for direct strength analysis is specified in Ch 4, Sec 6, 2.1.2, but there is no description of dynamic pressure. 1. Should the loading cases and wave conditions under consideration comply with the requirements of Ch 4, App 2? 2. The inertial pressure due to ballast is not to be considered according to the requirement in Ch 4, Sec 6, 2.2.1. Does this mean that only static pressure due to ballast defined in Ch 4, Sec 6, 2.1.2 and external pressure defined in Ch 4, Sec 5 are to be considered for direct strength analysis?	1. There is no need to comply with the requirements of Ch4App2. In the loading case specified in the loading manual with regard to ballast exchange, the static load is considered for direct strength analysis. 2. Yes, the dynamic external pressure should be considered for direct strength analysis.Where the ballast water exchange is carried out on the flow through method, the direct strength analysis will be separately required on the ballast water exchange condition in additional sea going ballast loading condition, taking into account all EDWs.	
280	4/3.2.4.2 & 4/6.3.3.5	Question	permeability	2007/1/8	Minimum permeability of dry bulk cargoes: According to CSR Ch.4 Sec.3 [2.4.2], it is stated that "appropriate permeability should be used" while minimum permeability of 0.3 is also specified for iron ore and cement. In addition, coal cargoes are mentioned in Ch.4 Sec.6 [3.3.5]. For sake of order, minimum permeability should also be specified for grain and other mineral ore materials. Unless other data is justified, we propose to define a minimum permeability of 0.5 for grain and 0.3 for other mineral ore materials in addition to coal, cement and iron ore. The permeability in Ch.4 Sec.6 [3.3.5] should be replaced by reference to Ch.4 Sec.3 [2.4.2].	We will consider the following interpretation on "appropriate permeability" and the treatment in flooded condition. - Minimum permeabilty value for grain to be 0,3. - Determination of still water bending moment in flooded condition is to be based on actual loading conditions specified in the trim/stability booklet. - Check of local strength check in flooded condition is to be based on cargo density as defined in Table 1 of Ch.4/Sec.6.	

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283 attc	4/3.2.2.1 & 4/3.2.2.2 & 5/1.4.2.1 & 5/1.4.2.2 & 5/1.4.2.4 & 5/1.4.3.1	Question	design still water bending moment	2007/1/16	Design still water bending moments in CSR Bulk rules - 3 sub-questions with diagrams (see attachment)	Question 1 . We assume the figure in attached file is related to the Fig 2 of Ch 4 Sec 3 [2.2.2] using the formulas of MSW,H & MSW,S and the extent within 0.4L amidships is shown by parallel line drawn in blue color in attached file. In addition the values of the blue line at AE & FE should not be 0 but should be corrected as 0.2MSW in line with Fig 2 of Ch 4 Sec 3 [2.2.2]. At the end of the design process the still water bending moment used for scantling check and FEA has to represent the individual envelope curve (CH4, Sec3, 2.1.1, first sentence). This corresponds to the green line in the figures. Question2 . Ch 4, Sec 3, [2.2.2] should be considered only as a preliminary distribution of SWBM. It is not a minimum value of SWBM. Regarding the strength point of view, the section modulus is to be checked according to its minimum value (see Ch 5, Sec 1, [4.2.1] and [4.2.4]), and to its value based on the permissible distribution of SWBM (see Ch 5, Sec 1, [4.2.2] and [4.3.1]) which may be the preliminary value of SWBM, if the permissible one coming from loading booklet is unknown. Question 3. There is definition of a value of the SWBM in flooded condition. It has to be calculated and included in the loading booklet and used for the checking of hull girder strength according to Ch 5, Sec 1, [4.2.2] and [4.3.1], in addition of the checks in intact condition.	Y
317	Ch 4/ 6	Question	sea pressure	2007/1/12	According to Ch4, Sec5, [1.1.1] external sea pressure is defined as summation of hydrostatic pressure and hydrodynamic pressure but should not be negative. However, Sec6 does not clearly specify whether negative pressures are allowed in case of dry cargo or liquid. We would like to confirm if the following interpretation is acceptable. - Internal pressure due to dry cargo or liquid is to be obtained as summation of pressure in still water and inertial pressure but is not to be negative. - In case where two kinds of internal pressures act on a considered location each internal pressure is not to be negative. Example: In case of bulkhead plate between No.4 and 5 holds From No.4: Static=100, Inertial=-80, Sum=20 From No.5: Static=60, Inertial=-80, Sum=0 (Differential pressure=20)	Regarding the first item, the answer is, "Yes". Your interpretation is correct. The total pressure obtained by adding the static pressure to dynamic pressure is not to be negative as specified in Ch 5 Sec 1 [1.1.1]. This is the basic principle. Regarding the second item, we assume that two kinds of internal pressure mean the example as shown in the question. The total internal pressure acting on one side of the boundary is not to be negative and the total internal pressure acting on the opposite side of the boundary is also not to be negative, according to the basic principle as mentioned above. The grand total pressure acting on the boundary is obtained from the difference between both internal pressure.	
358	4/5.4.2.1	Question	bottom slamming	2007/2/22	Ch4 Sec5 [4.2.1] specifies the design bottom slamming pressure. The pressure is defined from almost 0.5L to fore end. Ch9 Sec1 [5] specifies the required sturctural scantlings using the pressure. However the strengthening required by Ch9 is forward of 0.2Vx(root L) from fore perpendicular end.There may be a zone between abt. 0.5L and 0.2Vx(root L) where there is no requirement to structural scantlings in Ch6 using the slamming pressure. Please confirm that there is no scantling requirement in this zone using the slamming prressure.	Your undestanding is correct.	

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364	4/6.3.2.1	Question	Vertical Acceleration	2007/3/20	In flooding scenario, do we apply the vertical acceleration aZ for "intact" condition as defined in Ch 4 Sec 2 [3.2.1]?	Yes. The draft and total weight of ships in intact condition is slightly different from those in flooded condition. But the difference is very small and there is no significant effect due to flooding for the acceleration or the motion of a ship. Therefore, the vertical acceleration az for "intact condition" is applied to the formula in flooded condition specified in Ch 4 Sec 2 [3.2.1].	
401	4/7.3.4, 4/2.2.1.1, 4/App.2. Table 1	Question	Discription of Symbols of "Kr" and "GM"	2007/7/1	According to CH 4, Sec 7, 3.4 Cargo holds have to be loaded with a theoretical cargo mass [t] of M_HD + 0.1 x M_H with rho = 3 t/m. This loading condition has to be used for prescriptive requirements as defined in CH 6 and FEA. Such a concentrated load has a significant higher GM than in homogeneous full load condition. Table 1 of Ch 4, Sec 2 takes the different loading conditions (alternate / homogeneous) not into account. (1)Is it correct, to consider the described loading condition for prescriptive requirements? (2)If yes, the main influence for the dynamic loads are neglected by using the same GM and k_r values for homogeneous full loading condition and alternate loading condition. Do we have to use the GM value for the alternate full loading condition of the loading manual? (cargo masses are different!!!) (3)k_r values are not included in the loading manuals. Which formula can be used to derive k_r to the individual corresponding GM of the loading manual? (4)In case of FEA, concentrated loading conditions have to be evaluated according Ch 4, App. 2, Table 1 ff. In these cases the used GM values, derived with Table 1 of Ch 4, Sec 2 are wrong. It should be recommended, that only GM values defined in the loading manual have to be used for these analyses.	As specified in the description of symbols of "Kr" and "GM" in 2.1.1 of Ch 4 Sec 2, when the value of Kr and GM are not known, the values indicated in Table 1 may be assumed. This means that the actual values of Kr and GM in the loading manual should be used in the calculations of the ships motions and accelerations in Ch 4 Sec 2 as a principle. The values of GM and Kr indicated in Table 1 have been proposed as the typical and actual values for usual conditions such as the full alternate or homogeneous load condition (even distribution of mass in transverse section) in order to provide these values when they are not known at the initial stage.	

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406	4/6.3.3.2, Symbol 4.6, 4/6.1	CI	Pressure	2007/10/23	Questions related to interpretation of the pressure in Ch. 4 Sec.6 : Q1 Ch.4 Sec.6 [3.3.2] Please advise how to check the load scenario as stated in the last sentence of Ch.4 Sec.6 [3.3.2] which reads; "the maximum mass of cargo which may be carried in the hold is also to be considered to fill that hold up to the upper deck level at centreline." Cargo density is given in Ch.4 Sec.6 [Symbols] when the hold is filled up to the upper deck for BC-A and BC-B. This however assumes homogeneous loaded condition Mh at maximum draught. Q2 Ch.4 Sec.6 [Symbols] Do we not check alternate full hold in BC-A vessel filled up to upper deck? •As far as we understand, this is not in line with URS18 and Ch4 Sec.6 [3.3.2] •Regarding intact condition for BCA. Only rho = 3 is to be checked according to Ch.4Sec.6 [Symbols] E.g. for ships are set up with cement loading in alternate condition, at least two conditions should be calculated as they are decisive for different elements. Cond 1: M = MHD +10%MH with density, rho= 3 ReposeAngle=35 deg. Cond 2: M = MHD +10%MH with density, rho= 1.25 ReposeAngle=25 deg. Please consider revising. Q3: Ch. 4 Sec.6 [1] Equivalent cargo filling height hc is calculated according to Ch.4 Sec.6 [1.1.1] when the cargo hold is loaded "up to the top of hatch coaming". This does not correspond to the load scenario in [3.3.2] as mentioned above "to fill that hold "up to the upper deck level at centerline". The same applies for the filling height as defined in the last sentence in [1.1.2]. Please clarify. Q4: Ch. 4 Sec.6 [1] According to Ch.4 Sec.6 [3.3.3], the load scenario with cargo density 1.78 t/m3 at flooding level of 0.9D1 can be a dimensioning load case for bending capacity of vertical corrugation in flooded condition. In this load scenario, cargo hold is normally not loaded up to the upper deck. How to calculate hc according to Ch.4 Sec.6 [1.1.2] when the cargo hold (alternate full hold in BC-A vessel) is not filled up to upper deck. Cargo surface is close to upper deck touching the topside tank sloping bottom. This is not assumed in the formula as illustrated in Figure 4.6.2. Please clarify.	A1 For bulkhead strength check under flooded condition, the cargo mass, cargo density and cargo upper surface are as follows. (1)Homogeneous loading condition (a)Cargo density is less than 1.78 t/m3 Cargo Mass: The maximum cargo mass in case where the cargo is loaded up to the upper deck in homogeneous loading condition at maximum draught. Cargo density: According to loading manual Upper surface of cargo: Upper deck level at center line of cargo hold. However, for hold of cylindrical shape, the upper surface of cargo may be evaluated by the requirement of 1.1.1. (b)Cargo density is not less than 1.78 t/m3 Cargo Mass: The maximum cargo mass in case where the cargo is not loaded up to the upper deck in alternate loading condition at maximum draught. Cargo density: According to the loading manual Upper surface of cargo: The upper surface of cargo can be obtained by the formula specified in 1.1.2. (2)Alternate loading condition (a)Cargo density is less than 1.78 t/m3 Cargo Mass: The maximum cargo mass in case where the cargo is loaded up to the upper deck in alternate loading condition at maximum draught. Cargo density: According to loading manual Upper surface of cargo: Upper deck level at center line of cargo hold. However, for hold of cylindrical shape, the upper surface of cargo may be evaluated by the requirement of 1.1.1. (b)Cargo density is not less than 1.78 t/m3 Cargo Mass: The maximum cargo mass in case where the cargo is not loaded up to the upper deck in alternate loading condition at maximum draught. Cargo density: According to the loading manual Upper surface of cargo: The upper surface of cargo can be obtained by the formula specified in 1.1.2. A2 The 2nd sentence in Ch.4 Sec.6 [3.3.2] reads:"The most severe combinations of cargo induced loads and flooding loads are to be used for the check of the scantlings of each bulkhead .....". Accordingly if the cement loading in alternate loading should be the severest, transverse vertically corrugated watertight bulkheads needs to be checked in such condition. Therefore there is no need to change the current rules. (Continues to the next page)	

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406	4/6.3.3.2, Symbol 4.6, 4/6.1	CI	Pressure	2007/10/23	(Refer to the former page)	(Continuation of the former page) A3 The filling height specified in the requirement of 1.1.1 of Ch 4 Sec 6 is based on the experiments and their findings to evaluate the cargo load under intact condition. Hence, it is different from the load scenario for flooded condition which the permeability should be considered in addition to the cargo filling height. But in order to estimate the cargo filling height for non-cylindrical shape by ample and easy procedure, the last sentence of 1.1.2 can be accept the same procedure on cargo filling height under flooded condition. A4 When the cargo is not loaded up to the upper deck but close to upper deck touching the topside tank sloping plate, the cargo filling height can be obtained by the requirement of 1.1.2 neglecting the topside tank.	

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456	4/6.2.2.1	CI	Ballast water exchange	2007/7/13	It is considered literal that Ch.4, Sec.6-2.2.1 ruling out the inertial pressure is framed on the assumption that a ballast water exchange by means of flow-through method is carried out in calm sea and dynamic pressure (inertial pressure) is ignored. In that case, the following interpretations to be clarified arise when calculating lateral pressures due to liquid. (1) External pressure When considering external (sea) and internal (ballast water) pressures simultaneously according to Ch.6, Sec.1-1.3.1, it should be possible that the external dynamic pressure (hydrodynamic pressure) is similarly ignored both for prescriptive Rule calculations and Direct Strength Assessment (DSA). (2) Wave bending moment It should be possible that vertical and horizontal bending moments are ignored both for prescriptive Rule calculations (e.g. Ch.6, Sec.1-3.1.5) and DSA. (3) Question ID:226 Should the above interpretations be the case, it is considered necessary that the Q&A ID:226 about DSA as quoted below is reviewed. *****QUOTE***** Question ID: 226 Approved: 12/01/07 Rule Ref.: Text 4/6.2.1.2 Question: When checking the condition under the ballast water exchange operation by means of the flow through method, static pressure for direct strength analysis is specified in Ch 4, Sec 6, 2.1.2, but there is no description of dynamic pressure. 1. Should the loading cases and wave conditions under consideration comply with the requirements of Ch 4, App 2? 2. The inertial pressure due to ballast is not to be considered according to the requirement in Ch 4, Sec 6, 2.2.1. Does this mean that only static pressure due to ballast defined in Ch 4, Sec 6, 2.1.2 and external pressure defined in Ch 4, Sec 5 are to be considered for direct strength analysis? Answer: 1. There is no need to comply with the requirements of Ch4App2. In the loading case specified in the loading manual with regard to ballast exchange, the static load is considered for direct strength analysis. 2. Yes, the dynamic external pressure should be considered for direct strength analysis. Where the ballast water exchange is carried out on the flow through method, the direct strength analysis will be separately required on the ballast water exchange condition in additional sea going ballast loading condition, taking into account all EDWs. *****UNQUOTE*****	Unless the external dynamic pressure and hull girder wave moment are considered for local scantling check and DSA as you mentioned, all scantlings of hull structure are not determined in such load conditions. Then, we made the answer specified in KC 226. On the other hand, in tanker CSR, all dynamic loads are considered based on the assumption that a ballast water exchange by means of flow-through method is carried out in sea going condition. We think this assumption should be harmonized between tanker CSR and bulker CSR. Therefore, the interpretation is not necessary and the answer specified in KC 226 is kept as it is, till harmonization work will be done.	

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465 attc	4/7.2.2.1	Question	Ballast Conditions	2007/7/12	According to Background document for CSR BC, Page 26 – Ch 4: Design Loads, it is said the regulation on ballast tank capacity and disposition is in accordance with IACS UR S25. IACS URS25: 4.4.1(b) Heavy ballast condition: ii. at least one cargo hold adapted for carriage of water ballast at sea, where required or provided, is to be full. CSR BC, Ch 4, Sec 7:Heavy ballast condition: Heavy ballast condition is a ballast (no cargo) condition where: at least one cargo hold adapted for carriage of water ballast at sea is to be full. My understanding to UR S25 is that cargo hold for water ballast is just an option or choice, not definitely/mandatorily required by UR S25. But if required or provided as necessary, then it is to be full in heavy ballast condition. While according to CSR BC, the condition clause "where required or provided" in UR S25 was deleted in CSR BC, then at least one cargo hold for water ballast should be arranged. Do you think this requirement in UR S25 is consistent with that in CSR BC? As to BC of Double Side Skin Structure, if ballast tank with enough capacity, should at least one cargo hold also used as water ballast tank? The attached is the typical section of a ship, normally considered as multi-purpose container vessel. In my opinion/understanding, CSR BC does not apply to such a kind of ship, but shipowner want to have the notation of BC and CSR. If as required by CSR BC, at least one cargo hold should be as water ballast. There are double rows of hatches in weather deck, then how to calculate the internal pressure on weather deck and hatch cover? Can we calculate the internal pressure on weather deck and hatch cover seperately for each hatch assuming the central longitudinal box girder as longitudinal bulkhead? It's very difficult to arrange the locking device to resist the upward force due to internal pressure.	In CSR for Bulker, a heavy ballast condition is considered as a ballast condition where at least one cargo hold adapted for carriage of water ballast at sea is full. If a ship does not have a cargo hold for carriage of water ballast, heavy ballast condition does not exist in such a ship in CSR for Bulker. In addition, providing a cargo hold for carriage of water ballast to a ship is not mandatory in CSR for Bulker. Regarding the multi-purpose container vessel, CSR for Bulker does not apply to such a kind of ship.	Y
471	4/6.1.1.1 & 4/6.1.1.2	Question	CSR-BC internal pressure	2007/7/11	Could you confirm that for CSR-BC internal pressure: 1. The total pressure (pcs+pcw) should not be negative 2. For loading condition where the cargo hold is loaded to the upper deck (Chapter 4, section 6, 1.1.1), for the point above the local height HC, (i) The static pressure PCs is zero (ii) The vertical dynamic pressure az KC aZ (hC + hDB – z) is zero (iii) Therefore PCW =ρC *0.25aY (y – yG) 3. For loading condition where the cargo hold is not loaded to the upper deck (Chapter 4, section 6, 1.1.2) for the point above the local height HC, (i) The static pressure PCS is zero (ii) The dynamic pressure PCW is zero.	A1. Your understanding is correct: the total pressure (pcs+pcw) should not be negative. A2. For loading condition where the cargo hold is loaded to the upper deck (Ch 4, Sec 6, 1.1.1), for the point above the local height HC: the static pressure and the inertial pressure pCW are equal to zero. A3. For loading condition where the cargo hold is not loaded to the upper deck (Ch 4, Sec 6, 1.1.2) for the point above the local height HC, the static pressure and the inertial pressure pCW are equal to zero.	

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474	Ch.4 App.1	CI	Determining the hold mass curves	2007/7/2	Ch. 4 Appendix 1: 1) When determining the hold mass curves according to Appendix 1 we assume that weight of masses concealed in the double bottom in between margin girders are to be considered both when generating the hold mass curves and when utilizing them in operation phase. (E.g. Heavy fuel oil, water ballast) Please confirm. 2) Please advise how to handle ship trim both when generating the hold mass curves and later when utilizing the curves. Please consider a rule clarification.	A1) CSR regulates to determine the maximum allowable mass and the minimum required mass of the hold mass curve on basis of strength estimation in Ch4 Sec7, App1 and App2. The maximum allowable mass refers to the loading mass at the strength estimation in full load condition. Filling rate in the double bottom in full load condition tanks is regulated as follows; a. FOT: Full b. WBT: Empty a. Carriage in DBFOT in full loading condition in the strength estimation is assumed full as the most severe situation. The mass in DBFOT is not necessary to be considered when generating and utilizing the hold mass curve. b. Carriage in DBWBT in full loading condition in the strength estimation is assumed empty as the standard loading pattern. If water ballast is carried in DBT in full loading condition, the strength estimation including such loading condition should be carried out also. Namely full loading condition with full DBWBT, should be considered in the strength estimation as the most severe condition. In such case, the mass in DBWBT is not necessary to be considered when generating and utilizing the hold mass curve. A2)Trim should be taken into account as follows as similar to UR S1A.2.1 requirements: (i)Maximum allowable and minimum required mass of cargo and double bottom contents of each hold to be as a function of the draught at mid-hold poistion (ii)Maximum allowable and minimum required mass of cargo and double bottom contents of any two adjacent holds to be as a function of the mean draught in way of these holds. This mean draught may be calculated by averaging the draught of the two mid-hold positions.	
478	4/5.3.4.1	CI	Minimum Lateral pressure	2007/8/3	In Table 9, Minimum lateral pressure, P_Amin, is defined for the 4th tier with P_Amin=2.5kN/m. In the GL-Rules this minimum pressure has a value of 12.5kN/m. Is this a typo?	This is a typo. The correct minimum pressure for the 4th tier and above is 12.5kN/m2. **Also Included in Corrigenda 5**	
479	4/5.3.4.1	CI	Definition of "n"	2007/8/23	Please explain in the definition of "n", what is the actual distance?	This is a typo. The complete sentence reads as follows: "However, where the actual distance (D-T) exceeds the minimum non-corrected tabular freeboard according to ILLC as amended by at least one standard superstructure height as defined in Ch 1, Sec 4, [3.18.1], this tier may be defined as the 2nd tier and the tier above as the 3rd tier." This definition based on the definition, given in IACS UR S3. **Also Included in Corrigenda 5**	

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485 attc	Table 4.4.3	CI	Load combination factor	2007/7/16	"Load combination factors, LCF in Ch 4, Sec 4, Table 3, in the case that the encounter wave comes from the starboard side are left unspecified thus there is a possibility of unnecessary confusion unless they are clarified, especially for ships having unsymmetrical hull sections. Pease see the attachment and confirm if the signs marked in red from what we understand are correct. If not, please supply correct signs together with technical backgrounds."	When the starboard is the weather side, the reference hull girder loads and motions of ship and load combination factor are shown in the attached file.	Y
486	Ch 4 Sec 7	CI	Loading conditions	2007/8/7	The loading conditions which are required by Ch.4 Sec 7 are only for checking the longitudinal strength, direct strength analysis and for capacity and disposition of ballast tanks and stability purposes as mentioned in 1.2.4. Therefore, these loading conditions will not included the loading manual but shall be just submitted for assessment of structure-wise. Above conditions will not be applied to hold flooding calculation and intermediate condition calculation. Our understanding is that the loading condition required Ch.4 Sec 7 and Sec 8 have different concept. So when we check the hull structure strength, loading conditions required by sec 7 should be necessary. And then the loading conditions should be prepared in loading manual within permissible limit which is result of hull scantling	1 - The loading conditions which are required by Ch 4, Sec 7 are "artificial loading conditions" considered for the check of strength. 2 - Regarding flooding conditions, our interpretation is that they should have to be considered only for loading conditions defined in Ch 4, Sec 8, as they are really navigation conditions. 3 - Regarding intermediate conditions required in Ch 4, Sec 3, [2.1.1], if considered more severe, they are to be considered for loading conditions defined in Ch 4, Sec 7 and Sec 8. **" This answer is superseded by the anwswer to KC ID 622. Please refer to KC ID 622"**	

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489	4/6.1.3.1, 4/6.2.2.1, 4/5	CI	Inertial Pressures	2007/8/2	Inertial pressures Chapter. 4 Section 6 Reference is made to Ch. 4Section. 6 [1.3.1] “Inertial pressure due to bulk cargo” and [2.2.1] “Inertial pressure due to liquid”. Both items have a statement that the longitudinal term may be “freezed” in x direction at two points in the tank. According to [1.3.1] “ (x-xg) is to be taken at 0.25lH in the load case H1 or -0.25lH in the load case H2..(..)” Pressures from these two points may be utilized for local scantling according to Ch.6 and Ch.8. Q1: Please advise if this statement is valid also for scantling of transverse tank boundaries such as cargo hold bulkheads and plane bulkheads separating BW tanks according to relevant requirements of Ch.6. Q2: According to Ch. 6 Sec.1 [1.3.1] and Sec.2 [1.3.1] “(..) If the compartment adjacent to the outer shell is intended to carry liquids, this still water and wave internal pressures are to be reduced from the corresponding still water and wave external sea pressures.” When the internal pressure is constant in x-direction according to Ch. 4 Sec. 6 [2.2.1] what is the correct application of Ch.6 Sec. 1 [1.3.1] and Sec.2 [1.3.1]? Note. Ch. 4 Sec. 5 “External pressures” have no statement fixing the x location. a.Combine the internal pressure according to Ch. 4 Sec. 6 [2.2.1] with the sea pressure at the x location considered b.Combine the internal pressure according to Ch. 4 Sec.6 [2.2.1] with the sea pressures located at (x-xB) = 0.75 (H2) and -0.75 (H2) ?	A1: This requirement is also valid for scantling of tank boundaries. A2: According to the Rule, “a” is correct.	
490	Symbol 4.6	CI	Design Density for fuel oil	2007/7/13	Ch. 4 Section 6 Symbols The minimum design density for fuel oil is not specified in Ch.4 Sec.6 Please advise minimum rhoL for fuel oil to be used for strength verification purpose. Please consider updating the rules with this information.	CSR for bulk carrier does not specify the minimum design density for fuel oil. The design density for fuel oil shall be determined by the designer or shipbuilder with agreement of the owner.	

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491	4/7.2.1.1	CI	Determination of the maximum cargo mass in cargo holds	2007/7/2	Ch. 4 Sec. 7 [2.1.1] "For determination of the maximum cargo mass in cargo holds, the condition corresponding to the ship being loaded at maximum draught with 50% of consumables is to be considered." [2.1.1] is stating that a typical short voyage condition should be the basis for strength verification. Please advise correct interpretation of this paragraph for a typical BC-A vessel. "Empty holds": Maximum cargo mass from loading manual is normally the mass MH from homogenous condition. This mass is normally smaller than the Mfull mass according to [3.2.1]. Maximum cargo mass in cargo hold is therefore Mfull. It is therefore assumed that [2.1.1] is automatically fulfilled for empty holds. Please confirm. "Ore loaded holds": Maximum cargo mass MHD from the loading manual is normally the maximum cargo mass in cargo holds. MHD + 10% MH is, according to [4.4.1], used for strength assessment. Please advise if the mass MHD according to [2.1.4]/[3.2.1] should be established based on a short voyage condition with 50% consumables with even filling at scantling draft.	According to the provision of [2.1.1] maximum cargo mass Mh or Mhd should be obtained from loading conditions at full scantling draft and with 50% consumables. In general the maximum cargo mass (Mh) for an empty hold (Mh) corresponds to the cargo mass in homogeneous full condition at scantling draft and with 50% consumables. Hence Mhd corresponds to the cargo mass in alternate loading condition at scantling draft and with 50% consumables. Mfull is an artificial cargo mass and the maximum permissible cargo mass for an empty cargo hold in connection with the determination of hold mass curve.	
492	4/7.2.1.4	Question	Loading conditions	2007/7/13	Ch. 4 Section 7 2.1.4 BC-A Please consider following example. 1.BC-A vessel with minimum loading conditions as per Section Which comply with both [2.1.1] and [2.1.4]. 2.Additionally, vessel's loading manual has a short voyage alternate condition with more severe filling than prescribed by minimum conditions as defined by the item 1 above. For strength verification of 2), should same rate of filling and cargo density as per [2.1.4] be required for such short voyage condition?	Sea going condition and harbour condition are specified in CSR. A short voyage condition is not specified in CSR but it is obvious that it is not a harbour condition. Therefore, where a short voyage alternate loading condition with more severe filling than the minimum loading condition in [2.1.1] and [2.1.4] is specified in the loading manual, strength check for such more severe loading condition should be carried out in accordance with the CSR requirements.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
501	4/7.1.2.4, 4/7.1.2.2, & 4/7.2.3.1	Question	Loading conditions	2007/8/2	Q1: In Ch.4 Sec.7 [1.2.4], it is stated that "the loading conditions listed in [2] are to be applied for the check of longitudinal strength ----, for capacity and disposition of ballast tanks and stability purposes". Are these loading conditions, which satisfy the departure and arrival conditions as stated in [2.3.1], intended to fulfil the requirements as stated in Sec.8 [2.2.2] and shall be included in the vessel's Loading Manual? Q2: In Ch.4 Sec.7 [1.2.2], it is stated that "these requirements are not intended to prevent any other loading conditions to be included in the loading manual ---." Does this mean that loading conditions required in Sec.8 [2.2.2] can be different from those stated in Sec.7 [2]? Q3: According to SOLAS Reg.V/22, navigation bridge visibility is required minimum "two ship lengths or 500 m, whichever is less". Is it required for the design loading conditions as stated in Ch.4 Sec.7 [2], which satisfy the departure and arrival conditions as stated in [2.3.1], to fulfil the bridge visibility requirements? We assume that any other loading conditions as stated in Ch.4 Sec.7 [1.2.2] shall satisfy the visibility requirements. Q4: In connection with the above, please also clarify what is meant by "Unless otherwise specified" as stated in Ch.4 Sec.7 [2.3.1]. Who specifies what and where?	1 - The loading conditions which are required by Ch 4, Sec 7 are "artificial" loading conditions" considered for the check of strength. 2 - Regarding flooding conditions, our interpretation is that they should have to be considered only for loading conditions defined in Ch 4, Sec 8, as they are really navigation conditions. 3 - Regarding intermediate conditions required in Ch 4, Sec 3, [2.1.1], if considered more severe, they are to be considered for loading conditions defined in Ch 4, Sec 7 and Sec 8. A3: It is not necessary. A4: This requirement is the same of IACS UR S25 [4.5]	
515 attc	4/A1.3.1.2	RCP	The correct formula to deal with different cargo mass in each hold	2007/10/22	Please see the attached file.	The correct formula is as follows. Wmax(Ti) = MHD,fore + 0.1*MH,fore + MHD,aft + 0.1*MH,aft Wmax(Ti) = MFull,fore + MFull,aft whichever is the greater, for Ts ≥ Ti ≥ 0.67*Ts in order to deal with possibly different cargo mass in each hold.	Y
533	4/5.4.1.1	RCP	Flare angle "a"	2007/9/19	With regard to the flare angle α, "α" is not defined in this paragraph. So, please explain how to determine the "α" and add the definition of it.	The flare angle alpha at the load calculation point is to be measured in plane of the frame between a vertical line and the tangent to the side shell plating. **Also Included in Corrigenda 5**	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
549	Table 4.6.2	Question	Testing Load height of a ballast hold	2007/10/9	In table 2 of CH4, Sec6 the following formula is given for the testing load height of a ballast hold: z_st = z_h + 0,9 In the GL-Rules the same formula is the constant 2,5 instead of 0,9. What is the basis of the additional height of 0,9m? Mean height of a hatch cover, experimental results, sloshing effects?	0.9m head is based on the item number 4 of Table 1 in IACS UR S14.	
565	4/6.3.3.6 & 4/6.3.3.7	CI	Net thinkness of corrugations	2008/4/24	Reference is made to KC#402 Q2. Quote: Q2:Ref. Ch. 6 Sec. 1 [3.2.3] and Sec. 2 [3.2.6] The item Ch. 6 Sec. 1 [3.2.2] is giving “Net thickness of corrugations (..) for flooded conditions” and Sec. 2 [3.2.6] is giving “Bending capacity and shear capacity (..) for flooded conditions.” Both items refer to the design resultant pressure and resultant force as defined in Ch. 4 Sec. 6 [3.3.7]. Ch. 4 Sec. 6 [3.3.7] is defining the resultant pressure in combined bulk cargo water flooding. [3.3.6] is defining the pure water flooding pressures on corrugations. This pressure seem to be overlooked in Ch.6. We assume that the reference to [3.3.6] is missing in Ch. 6. Please consider revising the definition of p in Ch. 6 Sec. 1 [3.2.3] and Sec. 2 [3.2.6] to "(..)either [3.3.6] or [3.3.7] whichever greater". Q2 Answer: Ch 6, Sec 1, [3.2.2] and Sec 2, [3.2.6] are requirements coming from UR S18. The reference to the design resultant pressure in Ch 4, Sec 6, [3.3.7] only is fully in line with UR S18. Consequently, there is no need to add any reference to [3.3.6]. Unquote. Please advise how Ch. 4 Sec. 6 [3.3.6] is accounted for when calculating the resultant pressure in [3.3.7]" or any other scantlings requirements. According to Ch. 4 Sec. 6 [3.3.2], the 2nd sentence reads; "In any case, the pressure due to the flooding water alone is to be considered" and the 4th line from the bottom reads; "For the purpose of this item, holds carrying packed cargoes are to be considered as empty." We understand that the pf and Ff of [3.3.6] deal with such cases but we can not find if they are referred to anywhere in CSRB. Please advise.	We agree that the pressures and forces on a corrugation on flooded empty hold specified in Ch 4, Sec 6, [3.3.6] should be considered for scantling check of corrugation in Ch 6, Sec 1, [3.2.3] and Ch 6, Sec 2, [3.2.6]. We will consider the rule change proposal in order to be in line with the 2nd sentence of Ch 4, Sec 6, [3.3.2].	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
571 attc	Ch4 App3 and Ch7 sec 4	Question	fatigue strength assessment	2008/8/9	Please answer to the attached question for fatigue of Bulker CSR.	A1. For fatigue strength assessment, the cargo density used is to be as much "realistic" as possible. Therefore, the cargo density according to Ch 4 App.3 should be used for fatigue strength assessment not only by direct analysis specified in Ch 8 Sec 3 but also simplified method specified in Ch 8 Sec 4. We will consider the rule change proposal accordingly A2. We think that Ch 7 Sec 4 3.3.2 referred in the question is Ch 7 Sec 4 3.2.2 correctly. The the definition of lamda for "welded intersection between plane plates" is applicable for intersection of two plates and intersection of plating and bracket. A3 The correction factor of Ch 7 Sec 4 [3.2.2] is applicable to the case where the stress at the 0.5 t from the hot spot is slightly greater than the stress at the 1.5 t from the hot spot.	Y
604	1/4.2.1.1 & 4/3.2.4	Question	Longitudinal Strength Calculation	2008/5/6	It is mandatory to make Longitudinal Strength Calculation for one flooded hold for Bulk Carriers having length of 150 m or above; according to SOLAS Ch. XII Reg. 5. For that calculation the length of the ship is to be taken as Loadline Length according to SOLAS Ch. XII Reg. 1 SOLAS Rule Reference: SOLAS Ch. XII Reg. 1 (for length definition) & SOLAS Ch. XII Reg. 5 (for Strength Calculation). According to CSR for Bulk Carriers the same calculation for flooded hold should be carried out but in CSR it is stated that the length of the ship is to be taken as the Rule Length. CSR Rule Reference: CSR Ch.1 Sec. 4 2.1.1 (for length definition) & CSR Ch.4 Sec. 3 2.4 (for Strength Calculation) In our project, the Rule Length < 150 m while the Loadline Length > 150 m. Would you please advise what kind of application should be followed? Should the strength calculation be made in this particular case? Which length should be taken into consideration?"	The rule length as defined in Ch 1, Sec 4, [3.1.1] should be used for the determination of still water bending moment and still water shear force in flooded condition according to Ch 4, Sec 3, [2.4].	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
622	Ch.4, Sec.7	Question	Loading conditions	2008/4/11	With regard to loading conditions used for flooding, KC ID. 486 says 'Regarding flooding conditions, our interpretation is that they should have to be considered only for loading conditions defined in Ch 4, Sec 8, as they are really navigation conditions.' This reply seems to mean that loading conditions define in Ch 4, Sec 7, which comes from UR S25, does not need to be applied to flooding. However, UR S25-2.2 and Note (2) clearly says that the loading conditions listed in UR S25-4 are to be used for the checking of rules criteria regarding longitudinal strength required by UR S17. It is our understanding that the requirements of the CSR BC Rules have to be the same as those of UR S25 since both are IACS requirements. Hence it is requested to clarify the discrepancy above.	As you pointed out, CSR requirements for flooding conditions are the same as those requirements of IACS UR S25 and S17. The loading conditions defined in CSR Ch 4 Sec.7 [2], which come from IACS UR S25.4, are to satisfy the requirement of the longitudinal strength in flooded condition. The loading conditions for local strength defined in CSR Ch 4 Sec.7 [3], which come from IACS UR S25.5 need not satisfy the requirement of the longitudinal strength in flooded condition. Accordingly, the answer in KC ID #486 has now been modified as follows. 1. The loading conditions which are required by Ch 4, Sec 7 [3] are "artificial loading condition" considered for the check of local strength only and need not satisfy longitudinal strength. 1bis. The loading conditions specified in Ch 4, Sec 7 [2] are required to check the longitudinal strength and are to be described in the loading manual specified in Ch 4 Sec 8. 2.Regarding flooding condition, the loading conditions in Ch 4 Sec 7 [2] are required to check the longitudinal strength. 3.Regarding intermediate conditions required in Ch 4, Sec 3, [2.1.1], if considered more severe, they are to be considered for loading conditions defined in Ch 4, Sec 7 and included in the loading manual specified in Ch 4, Sec 8.	
625	Ch.4, Sec.5	CI	Ambiguity found in determining x/L	2008/4/11	This question relates to the ambiguity found in determining x/L in the following cases as x is on the global co-ordinate system whereas L is Rule length. (i) In Ch.4, Sec.5, 1.3.1, clarification is requested in case x/L lies at a position less than 0 or more than 1.0 in calculating kl. (ii) In Ch.4, Sec.5, 1.3.1, clarification is requested in case |x-0.5L| lies at a position less than 0 or more than 1.0 in calculating kp. (iii) In Ch.4, Sec.5, 2.2.1, Table 4, clarification is requested in case x/LLL lies at a position less than 0 or more than 1.0 in calculating pw.	A-1 If x/L is less than 0 or greater than 1.0, x/L is taken equal to 0 or 1.0, respectively. A-2 If x is less than 0 or greater than L, x is taken equal to 0 or x=L, respectively. A-3 If x/LLL is less than 0 or greater than 1.0, x/LLL is taken equal to 0 or 1.0 respectively.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
626	4/5.1.3.1	CI	pHF When the relevant hull section is totally above the waterline	2008/2/21	This question relates to pHF(Ch4. Sec.5, 1.3.1) when the relevant hull section is totally above the waterline. It is noted that there are some totally above the waterline in the aft and fore parts of ships in normal or heavy ballst condition. Bi at the location in the above condition is regarded as 0. When considering external pressure under H1, H2, F1 and F2, clarification on how to calculate pHF is requested when Bi=0. Is |2y|/Bi=1 applicable?	When the considered location is above the waterline, Bi is regarded as 0. In this case, the pHF at the considered waterline is calculated assuming |2y|/Bi=1 and then the pressure at the considered location is corrected according to 1.6.1 of Ch 4 Se 5.	
627 attc	4/6.3.3	CI	Flooded conditions for Transverse vertically corrugated watertight bulkheads	2008/2/21	Regarding lateral pressures and forces in flooded conditions for Transverse vertically corrugated watertight bulkheads (Ch.4, Sec.6-3.3) originated from IACS UR S18, it should be that the density of dry bulk cargo (ρc) and cargo filling level (hc) in Ch.4, Sec.6-3.3 are the same as for those in UR S18. In calculating scantling of corrugated transverse bulkheads in flooded conditions for BC-A ships, it is interpreted that the Rules are requiring scantlings using the ρc defined in Table 1 of Ch.4, Sec.6 (probably, 1.0 for homogeneous load condition and 3.0 for alternate load condition) and an imaginary hc defined in Ch.4, Sec.6-1.1. If this is the case, the likelihood is that a required net scantling determined by bending capacity is less than that required by UR S18 as in our experienced cases where it is shown that a density such as 1.5 resulting from M_HD/V_H with the cargo filling to deck at centre has frequently been critical. As shown in our calculation attached, the required net bending capacity by the CSR BC Rules is less than that by UR S18 by around 10 %. Such being the case, it is considered neccessary to avoid a case where scantlings less than those determined by applying UR S18 is accepted. To this end, any density of dry bulk cargoes (ρc) and cargo filling to deck at centre should be considered for flooded conditions.	We will consider the rule change proposal regarding flooding condition.	Y

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
628	4/5.2.2.1 & 4/5.5.2.1	Question	External pressures on exposed forecastle deck	2008/5/28	With respect to external pressures on exposed forecastle deck and a hatch cover if arranged thereon, it is requested that the following are clarified. 1. External pressures on freeboard deck and forecastle deck are explicit as set out in Ch.4, S.5, 2.2.1. Tables 4 and 5, would lead you to believe that the pressure Pw on forecastle will be linearly increased to a maximum at the fore perpendicular. 2. It is our understanding that this is not the case as the linear increase in pressures is only applicable to exposed freeboard decks iaw Reg 16.2 of the 1988 Protocol to the ILLC 1966 (Loadline Convention) 3. If the coefficients in Tables 4 and 5 were applied the pressures on the forecastle would grow to such a disproportionate extent such as 90 kN/m2 as compared to the constant pressure of 34.3 kN/m2 on a hatch cover applicable as set out in Ch.4, S.5, 5.2.1 and Regulation 16 (2) (d) in the 1988 Protocol to the ILLC 1966 (LL Convention) defining Positions for hatchways.) 4.It is assumed that the conceptual background of the Rule is that pressures on exposed decks in Load Cases H1, H2, F1 and F2, are the same as those on hatchways in the LL Convention and the rules should be amended to reflect this more explicitly. 5. CSRPT1 should be requested to confirm our assumption and propose an amendment to the rules to clarify this issue.	The assumption made by LR is right and we will consider the Rule change proposal to clarify this issue.	
633 attc	Ch.4, Appendix 1	RCP	Hold Mass Curves	2008/7/2	A change of the Rules regarding hold mass curves set out in Ch.4, Appendix 1 is proposed as described in the attachment. Hold mass curves are to be based on design loading conditions for local strength as defined and specified in Ch. 4, Sec. 7, Para. 3 of the Rules. However, it has been found that hold mass curves to be drawn up in a practical manner do not completely reflect the design loading conditions defined in Ch.4, Sec.7, Para.3. It is proposed that the Rules are part changed as drafted therein for review and consideration, where the wordings underlined by red and the figures rounded by red line denote the proposed changes.	The content of the proposal will be studied and - if needed - the impact on scantling will be quantified. This may lead to a Rule Change Proposal.	Y

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
648	4/5.4.2.1 & 4/5.4.2.2	CI	Design bottom slamming pressure	2008/7/2	Reference is made to Ch.4Sec.5 [4.2.1]/[4.2.2] Design bottom slamming pressure [4.2.1] TBFP “Smallest design ballast draught, in m, defined at forward perpendicular for normal ballast conditions. Where the sequential method for ballast water exchange is intended to be applied, TBFP is to be considered for the sequence of exchange.” [4.2.2] “It is the master`s responsibility to observe, among other, the weather conditions and the draught at forward perpendicular during water ballast exchange operations, in particular when the forward draught during these operations is less than TBFP. The above requirement and the draught TBFP is to be clearly indicated in the operating manuals.” Technical background for CSR Bulk: 4.2.2.a To limit the slamming loads at acceptable level, the smallest design ballast draught at forward perpendicular should only be undercut in cases where bottom slamming is not expected. Please comment our understanding (Continues to the next page)	Answer 1-3: Yes with no need for further clarifications of rule text changes. Answer 4:The minimum draught forward in case of heavy weather is indicated on the shell-expansion and should be mentioned in the loading manual. Draughts that undercut the "minimum draught forward in case of heavy weather" are to be used at the masters descretion as per Ch4, Sec 5, [4.2.2].	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
648	4/5.4.2.1 & 4/5.4.2.2	CI	Design bottom slamming pressure	2008/7/2	(Continuation of the former page) Q1. We assume the “smallest design ballast draught(..) for normal ballast conditions” is referring to the ballast condition of Sec.7 [2.2.2]. Please confirm. If yes, please add the reference in the rules for sake of clarity. Q2. Regarding sequential ballast operation. According to [4.2.1] “Where the sequential method for ballast water exchange (..) is applied, TBFP is to be considered for the sequence of exchange”. Ch.4 Sec. 8 [2.2.2] require that “typical sequences for change at sea, where applicable” are included in the lading manual. In order to evaluate [4.2.1] we understand that the loading sequence for ballast exchange is required in the loaing manual in case of sequential ballast operation. Please confirm. If yes, please clarify rules. Q3. Regarding sequential ballast operation. We assume design draft for slamming, TBFP, is minimum among TBFP, according to Sec7 [2.2.2] And TBFP, Ballast exchange in LM Sec8 [2.2.2] Please advice. Please amend rules for clarity. Q4. Masters responsibility. According to [4.2.2] and CSR TB we understand that TBFP may be undercut if weather permits. If the loading manual includes more than one ballast exchange condition e.g: WB Seagoing (Sec.7 [2.2.2]) TBFP = 7m WB Exchange cond. 1 TBFP = 6 m WB Exchange cond. 2 TBFP = 6.5 m if no explicit request exist from designers, we assume TBFP for bottom forward scantling may be chosen to be TBFP=6.5 m. The limitation to TBFP will be stated in the vessel operating manual. It is then the masters responsibility to utilize WB Exchange cond. 1 only when weather permits according to [4.2.2] Please advise.	(Refer to the former page)	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
649	4/7.2.1.1	Question	Maximum Cargo Mass	2008/10/10	Reference is made to Ch. 4 Sec. 7 [2.1.1] and KC Id. 491. In KC #491 we asked the basis for MHD/MH according to [2.1.1] **Quote** Question: Ch. 4 Sec. 7 [2.1.1] “For determination of the maximum cargo mass in cargo holds, the condition corresponding to the ship being loaded at maximum draught with 50% of consumables is to be considered.” [2.1.1] is stating that a typical short voyage condition should be the basis for strength verification. Please advise correct interpretation of this paragraph for a typical BC-A vessel. “Empty holds”: Maximum cargo mass from loading manual is normally the mass MH from homogenous condition. This mass is normally smaller than the Mfull mass according to [3.2.1]. Maximum cargo mass in cargo hold is therefore Mfull. It is therefore assumed that [2.1.1] is automatically fulfilled for empty holds. Please confirm. “Ore loaded holds”: Maximum cargo mass MHD from the loading manual is normally the maximum cargo mass in cargo holds. MHD + 10% MH is, according to [4.4.1], used for strength assessment. Please advise if the mass MHD according to [2.1.4]/[3.2.1] should be established based on a short voyage condition with 50% consumables with even filling at scantling draft. According to the provision of [2.1.1] maximum cargo mass Mh or Mhd should be obtained from loading conditions at full scantling draft and with 50% consumables. In general the maximum cargo mass (Mh) for an empty hold (Mh) corresponds to the cargo mass in homogeneous full condition at scantling draft and with 50% consumables. Hence Mhd corresponds to the cargo mass in alternate loading condition at scantling draft and with 50% consumables. Mfull is an artificial cargo mass and the maximum permissible cargo mass for an empty cargo hold in connection with the determination of hold mass curve. **Unqoute** We can not see that PT answered whether or not these conditions should be based on “even filling at scantling draft.” Please advise.	[2.1.1] is applicable only to [2.1.2] thru [2.1.4]. The latter paragraphs require same filling ratio in all loaded cargo holds.	
653	4/5.4.1.1	CI	pS and pW	2009/3/3	In Ch 4, Sec 5, [4.1.1], the definition of pS and pW is not clear, there are two different interpretations: 1. the pS & pW is calculated at position TB at side shell, whatever is the value of z 2. the pS & pW is calculated at the exact value of z of the loading point where the bow pressure P_FB is to be estimated What is the correct interpretation?	Interpretation 2 is correct. In order to clarify the requirement together with the clarification of the calculation point, we will consider the rule change proposal.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
662	4/6.2.2.1	CI	Inertial pressure due to liquid	2008/5/28	CSR_JBP_Chapter4_Section6_[2.2.1] Inertial pressure due to liquid [Quote] When checking ballast water exchange operations by means of the flow through method, the inertial pressure due to ballast water is not to be considered for local strength assessments and direct strength analysis. [End quote] Please be kindly requested to clarify that when the ship's ballast water change method is designed as flow through method, only hydrostatic water ballast pressure, regardless of inertial pressure, would be considered for local strength check as per Chapter 6 and to carry out the direct strength analysis as per Chapter 4_Appendix 2 (e.g. analysis of the transverse bulkhead under heavy ballast load condition).	Please consider the answer to question in KC ID 226.	
671	4/5.2.2.1 & Table 4.5.4	RCP	External pressures on exposed decks	2008/7/16	A separate definition of x (load point in the reference co-ordinate system defined in Ch.1, Sec.4) appropriate for pressures defined in Ch.4, Sec.5, Table 4 is necessary. External pressures on exposed decks (on hatch covers in Ch.9, Sec.5 as well) for load case H1, H2, F1 and F2 are calculated based on x/LLL where LLL is a freeboard length as defined in Ch.1, Sec.4, 3.2, while x is the X co-ordinate of the load calculation point from the aft end of the scantling length L. The aft end (AE) in Ch.1, Sec.4, Figure 4 is relevant to the scantling length L only despite the fact that positions of the aft end and fore end in L are not the same as those in LLL. It is therefore proposed that x in Table 4 is to read 'xLL' measured from the aft end of freeboard length LLL to be aligned with the text in the amended ILLC or IACS UR S21, the origin of the requirement. A background of this proposal is a sample calculation below indicating a considerable difference in pressures between CSR-BC and IACS UR S21. For exposed deck in way of No.1 cargo hold of a capesize bulk carrier where LLL=279.622 m, a=0.356. 1) x(from aft end of L)=250.787 m, pw=80.564 kN/m2 according to the current CSR-BC Ch.4, Sec.5, 2.2.1. 2) x(from fore end of LLL=24.872 m, pw=85.028 kN/m2 according to IACS UR S21,2. In this case x(from aft end of LLL)=254.750 m. The difference in pressure exceeding 5% should not be ignored.	We will consider the rule change proposal in order to be in line with IACS UR S21.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
673 attc	4/3.2.2.2, & 4/3.3.1.1	CI	Still Water bending moments	2008/4/18	Please see attached Question	The assumed still water bending moments specified in Ch 4 Sec 3, 2.2.2 are used for strength check other than fatigue strength when the design still water bending moments are not defined at the preliminary design stage. In this case, the coefficient fp should be taken as 1.0. The assumed still water bending moments may be used for fatigue check when the design still water bending moments are not defined at the preliminary design stage. In this case, the coefficient fp should be taken as 1.0 too, because the static load components are independent of the probability of occurrence. Therefore, our interpretation is given as follows. In applying the requirement 2.2.2 of Ch 4 Sec 3, MWV,H and MWV,S are calculated by 3.1.1 with fp=1.0.	Y
694 attc	4/5.4.1.1	Question	Bow flare reinforcemen t	2008/4/24	The bow flare reinforcement should be considered above the normal ballast waterline in the fore part, with reference to the bow flare area pressure regulated in Ch4 Sec5, 4.1.1 Just above the normal ballast waterline, the flare angle, alpha, may be inclined inside as the attached sketch. Please show how to treat the flare angle, alpha, in the case as above.	Reinforcements due to large dynamic pressures, caused by bow flare, are only necessary, when the flare angle is positive. Large "flare loads" on the top of the bulbous bow are not physical possible.	Y
716	Table 4/A.2.1	CI	DSA	2008/10/3	CSR_JBP_Chapter4_Appendix 2 Standard loading condition(e.g table1 No.5 load pattern) for DSA. With respect to the ballast water load pattern of the deepest ballast condition, current rule gives one standard loading pattern(e.g. load pattern No.5 in table 1), in which the upper wing tanker in way of the middle cargo hold is fully filled but hopper tank and double bottom tank in way of the middle cargo hold are empty. However, in many actual design practice, the wing ballast tank is normally connected to the hopper ballast tank. In addition, the ballast tank is sometimes designed to cover two cargo hold region. Therefore, there would be three loading pattern options for DSA, as illustrated in attached document. Please kindly clarify or provide common interpretation that, Which load pattern exactly is to be used for DSA ?	The loading pattern 5 in Table 1 of Ch 4 Appendix 1 corresponds to the requirement of Ch 4 Sec 7 [3.2.3]. Where the topside water ballast tank is connected to bilge hopper or double bottom water ballast tank or where the ballast tanks are designed to cover two cargo hold region, the topside water ballast tank or the ballast tanks extended over two cargo hold region should be empty in order to be empty with all double bottom tanks in way of cargo hold being empty. In this case, the deepest ballast tank specified in the loading manual should be used.	
721	Chapter 4	Question	design loads	2009/6/2	Rules for protected/non-watertight decks cannot be found. Please clarify the design load for protected decks; platform decks in engine room or upper deck under superstructure.	Presently, design loads for protected/non-watertight decks, including platform decks in engine room and upper deck under superstructure, are based on individual society Rules.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
736	4/2.2.1.1	CI	load conditions	2008/9/10	Chapter4_Sec2_[2.1.1] - GM & Kr value for others load conditions . The value of GM and Kr will affect the roll motion and consequently affect the inertia loads. Current CSR Bulk carrier rule only specify GM & Kr for three standard load conditions (i.e. full load condition, normal ballast and heavy ballast). However, regarding some load condition used for DSA (e.g.multiport load condition), there is no any specification in the rules on how to decide GM and Kr for such conditions. It is found that CSR Tanker rules provide the instruction for those non-standard load conditions as follows, "For optional loading conditions with a mean draught other than the values defined, GM is to be obtained by linear interpolation based on values for 0.6Tsc and 0.9Tsc."[JTP section 7/3.1.3.2] Please kindly advise how to calculate the kr & GM for those load conditions, which is not specified in the table 1 of CH4_SEC2_[2.1.1], particularly for the multiport load condition.	The GM and k_R values as given in Table 1 are only preliminary values. The scantlings and the approval have to be based on the actual values. For the purpose to make an initial design, the designer has to choose preliminary values from his/her experience or from the mentioned table. In case of a multi port loading condition you may use the GM and k_R values for full load condition.	
741	4/6.1.1.2	CI	cargo parameters	2009/5/25	The last sentence in Ch.4, Sec.6,[1.1.2] reads:"For holds of non-cylindrical shape, and in case of prescriptive rule requirements, the upper surface of the bulk cargo may be taken at the upper deck level with a density of dry bulk cargo equal to M/V_H.". Please clarify how to determine the parameters, h_HPU, B_H, h_0 when the cargo is loaded to the top of hatch coaming , since those parameters are variable within the non-cylindrical holds.	For holds of non-cylindrical shape, only the last sentence in Ch.4 Sec.6 [1.1.2] is applicable. In this case, cargo height (hc) is measured from the inner bottom to upper deck level at the centerline of the mid hold and the density of the dry bulk cargo is taken equal to max (1.0, M/VH), where M and VH are defined in "Symbol" in Ch 4 Sec 6. There is no need to define the parameters h_HPU, B_H and h_0 since [1.1.1] is not applicable such holds.	
747	4/5.2	Question	DSA	2008/9/10	Regarding Direct Strength Assessment (DSA) for cross deck, while loads on cross deck and hatch cover are stipulated in Ch.4, Sec.5-2, it is not clear how to consider the load on cross deck from hatch cover through hatch end coaming or stay. Hence it would be appreciated to clarify how to assess the cross deck by DSA, considering load from hatch cover.	Normally, the strength of hatch cover and hatch coaming is evaluated by the prescriptive requirement and FEA using the loads thereon separately from the hold structures. Hence, the cargo hold FEA is carried out using the cargo hold FE model excluding the hatch cover. This seems a practical way. Therefore, in principle the wave loads on hatch cover need not be considered for the cargo hold FEA. In addition, the cross deck structure is normally assessed by the cargo hold FEA under the loading conditions specified in Ch 4 Appendix 2. However in case special cargoes are loaded on hatch cover such as timber, etc., the strength of supporting deck structures in such a loading condition should be assessed appropriately	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
801	Text 4/6.2.2.1	Question	inertial pressure	2009/6/19	Ch4 Sec6, 2.2.1 requires that the inertial pressure due to ballast water is not to be considered, when checking ballast water exchange operations by means of the flow through method. With regard to the treatment of hydrodynamic external pressure under such conditions, KC226 has interpreted that hydrodynamic external pressure should be considered. On assuming ballast exchange operations are normally carried out under calm sea condition, the inertial pressure due to ballast water is considered negligible, and then the requirement in Ch 4 Sec 6 [2.2.1] seems to be reasonable and practicable. However, the interpretation, which requires to consider hydrodynamic external pressure corresponding to the probability level of 10^-8, seems to be excessive and inconsistent with the treatment of hydrodynamic internal pressure. Please reconsider the treatment of hydrodynamic external pressure under ballast water exchange operations by means of the flow through method.	The approach described in KC 226 is still valid. Dynamic internal pressure is not explicitly defined but the internal static pressure pBS defined in Ch.4 Sec.6 [2.1.2] contains an overhead of 25 kN/m2 which covers the dynamic internal pressure of BWE operations by means of the flow through method. However, this matter is relevant to harmonisation with CSR OT and will be submitted to the harmonisation team.	
804	Text 4/6.2.2	Question	inertial pressure	2009/6/23	In Ch 4, Sec 6, [2.2], the parameter (x-xB) in the definition of the inertial pressure pBW for load case H is taken equal to a default value for "local strength by Ch 6" and for "fatigue check for longitudinal stiffeners by Ch 8". Could you specify what is the meaning of "local strength by Ch 6" and "fatigue check for longitudinal stiffeners by Ch 8"? Could you also specify what value of the parameter should be used for "direct calculation (i.e. FEM)"?	A1: Local strength by Ch 6: checking of plating and ordinary stiffeners, including buckling check, by using the prescriptive formulae defined in Ch 6, all sections included. fatigue check for longitudinal stiffeners by Ch 8: checking of fatigue at ends of longitudinal stiffeners by using the simplified procedure defined in Ch 8, Sec 4. A2: For direct calculations, including buckling and fatigue, xB should be used as defined in Ch 4, Sec 6, [2.2] (i.e. X co-ordinate of the aft end ..., or of the fore end...) where the reference point B is defined in the same requirement by the angle "phi" for load cases H1 and H2.	
805	4/6.3.3 & 7.3.4	Question	high density cargo	2009/1/24	Regarding the mass of high density cargo used for strength check of transversely corrugated watertight bulkheads in flooded condition, please advise on the following questions: 1) Ch.4 Sec.6 [3.3.4] & [3.3.5] refer hc. We understand hc should be calculated according to either Ch.4 Sec.6 [1.1.1] or [1.1.2]. In case of non-homogeneous loading conditions which should be the mass MHD or MHD+0.1MH for BC-A ships? 2) In case of homogeneous loading conditions (e,g, homogeneous ore loading conditions, etc.) which should be the mass MHD or MHD+0.1MH for BC-A ships? 3) We understand for BC-B ships the mass should be MHD, of which please confirm.	The cargo mass to consider for flooding assessment of a BC-A in alternate is MHD. The value of hc is then to be calculated with respect to the used cargo density. A2 : The cargo mass to consider for flooding assessment of a BC-A in homogeneous is MH. The value of hc is then to be calculated with respect to the used cargo density. A3 : The cargo mass to consider for flooding assessment of a BC-B in homogeneous is MH. The value of hc is then to be calculated with respect to the used cargo density. As a "background", it is stated in S18 and now in CSR BC Ch.4 Sec.6 [3.3.2] that the loading conditions to consider for flooding assessment are those of the loading manual, i.e. "real conditions". The use of MHD + 0.1 MH for a BC-A in alternate comes from UR S25 - now CSR BC Ch.4 Sec.7 [3.4] and is only intended for design checks.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
818	Text 4/6.1.1.1	Question	non-cylindrical hold	2009/6/23	In Ch 4, Sec 6, [1.1.1], the distance hc is defined for cylindrical hold. The determination of hc is not provided for hold completely filled when the cargo hold is of non-cylindrical shape as it is provided for the requirement [1.1.2] at the last paragraph.	For the determination of hc in Ch 4, Sec 6, [1.1.1] for holds of non-cylindrical shape and in case of prescriptive rule requirements, the upper surface of the bulk cargo may be taken at the upper deck level. We will consider a corrigenda to clarify this.	
819	4/7.3.4.2	CI	Loading conditions - high density cargo	2009/9/8	The requirements 4/7.3.4.2 has the purpose to cover the most severe case with high density cargo. In a case we faced the max cargo density was 3. The compliance for this requirement was checked with density equal to 3. However a worst case appeared for the upper part of the transverse Bhd with a smaller density (1.3) filling the cargo hold for the considered MHD+0.1 MH. In conclusion the proposed interpretation should be considered for being sure that all the most severest cases are covered by consideration of 2 extreme cases: one with the highest density and the 2nd with the smallest density corresponding to the filling of the cargo hold.	This question and the draft answer you submitted will be considered in KC 872 which has a larger scope.	
830	4/5.3.4.1	Question	vertical stiffeners	2009/3/10	Load calculation point for plating. In case of vertical stiffeners, what is the load calculation point for plating? Is it a) the middle of the plate field, or b) the lower edge of the EPP or strake, as described in Ch.6 Sec.1 [1.5.1]?	Load calculation point for plating in case of vertical stiffener is the lower edge of the EPP or strake, as described in Ch 6 Sec 1 [1.5.1]. We will consider a Rule Change Proposal.	
851 attc	4/6.1.1.2 & Figure 4.6.2	Question	Ore cargo surface (small amount of mass)	2010/1/27	Ch.4 Sec.6 [1.1.2] defines the cargo surface when the cargo hold is not loaded up to the upper deck. There are cases of cargo loading as attached which is differenet from Ch.4 Sec.6 Figure 2. It seems that the formulas of h_c, h_HPL, h_1 and h_2 are not applicable. Please advise the formulas to define the cargo surface and cargo height h_c as well as V_TS in such cases	For the case of cargo loading as attached, the height of loaded cargo from the inner bottom to upper surface of cargo is calculated by as follows. The section profile is to be as per the shaded area in the attached file, assuming the plane surface of width the parameter BH/2 in the centerline and the inclined parts with an angle equal to psi/2. The profile is assumed to maintain throughout the length of the cargo hold. The virtual cargo section profile is to be determined so that the consequent cargo volume is equal to M/rho_c. In calculating the cargo volume, 1) the upper stool is to be disregarded, 2) the volume of lower stool is to be deducted which is cut by the virtual section profile. Anyway, as the formula in [1.1.2] of Ch 4 Sec 6 is not used for the questioned cases, we will consider a RCP in order to deal with such cases.	Y

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859	4/6.3.3.2	Interpretation	Load combinations used for checking bulkhead scantlings	2010/2/15	Reference is made to KC#402 Questions related to interpretation of the following sentence in Ch.4 Sec.6 3.3.2 Please advise the interpretation of following sentence. "The most severe combinations of cargo induced loads and flooding loads are to be used for the check of scantlings of each bulkhead, depending on the loading conditions included in the loading manual." In ship with BC-A notation, most of ships may be intended to carry, in non-homogeneous condition, the dry cargo in bulk with density between 0.9 and 3.0. We have examined the strength of corrugate BHD according to URS18 and Ch.4. Sec.6 3.3.3. The most severe case is the flooded non-homogeneous condition with the cargo density of 1.78 t/m3. If the loading manual does not include the condition with the density 1.78t/m3, the case of 1.78ton/m3 is considered or not? And if the corrugated bulkhead with density 1.78 t/m3 is not considered, the ship have the limitation about the cargo with density 1.78 t/m3? Please clarify!!!	This question will be considered together with KC 872. A Common Interpretation will be made to clarify applicable loads, density and angle of repose for intact, flooded and fatigue condition.	
860	4/6.2.2.1	Question	reference point	2009/1/24	In CSR-BC Ch 4, Sec 6, [2.2.1], there are two possible methods for the determination of the reference point B for load cases R and P: - the first one is defined through the definition of yB and zB and the figure 3, - the second one is defined as being the upper most point after rotation by the angle "phi". For some geometries of the ship section considered, in particular depending on the angle of the sloping top side tank plate or when the deck is not horizontal, the point B obtained through the two methods are different. Our interpretation is that only the second method (B being the upper most point after rotation by the angle "phi") should be applied as it is the most physical and it is a general method. Please confirm our interpretation?	The interpretation is correct: only the second method (B being the upper most point after rotation by the angle "phi"). It should be applied for local strength, direct strength and fatigue check.	
873	4/5.2.4.2	Interpretation	Concentrated forces due to unit load on exposed decks	2010/8/6	Ch4 Sec5, 2.4.2 requires concentrated force due to unit load. However, the scantling determination procedure of the structure, which is loaded with this concentrated force, is not clearly indicated in CSR. Please confirm the procedure to determine the scantling of following members in cases where a unit load is carried on an exposed deck; 1. Plating 2. Stiffeners 3. Primary supporting members, including the cases that direct strength assessment in Ch7 applies.	The structural member under heavy concentrated load should be adequately stiffened by local support in general, and its scantling, which is to be based on the net scantling approach according to Ch3, Sec2, is at the discretion of the Society. This issue will be considered in the Harmonization of the two Common Structural Rules.	

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888	Table 4A.2.5	question	FEA	2009/6/23	Ch4 App2, Table5 defines load cases to be analyzed in FEA. The cases Nos.12 to 15 are in harbour conditions and their still water bending moment are indicated as M_S,P(+) and M_S,P(-). On the other hand, Note b) of Table5 specifies M_SW,P,H and M_SW,P,S as allowable still water bending moment for harbour condition. It seems that M_S,P(+) and M_S,P(-) are identical to M_SW,P,H and M_SW,P,S respectively. Please confirm the above and correct these discrepancies.	We confirm your comment and will make an editorial correction in the Rules to replace M_S,P(+) and M_S,P(-) by M_SW,P,H and M_SW,P,S so as to in line with the other tables and the Note b).	
902	4/3.2.2, 4/3.2.3 & 4/3.2.4	RCP	margins of SWBM & SWSF	2009/7/16	Since scantling approval is based on the hull girder bending moment and shear force values contained in the preliminary loading manual, which may be subject to change (and possibly be higher) in the final loading manual. It is believed that the CSR Tanker guidance notes recommending that during initial design a margin be placed on the Still Water Bending Moment and Still Water Shear Force is a very good provision in the rules and that similar guidance notes be contained in the CSR Bulk Carrier Rules. Reference is made to CSR Tanker Sec.7, 2.1.1.6 and Sec.7, 2.1.3.6, which are as follows: Guidance note: It is recommended that, for initial design, the permissible hull girder hogging and sagging still water bending moment envelopes are at least 5% above the hull girder still water bending moment envelope from the loading conditions in the loading manual, to account for growth and design margins during the design and construction phase of the ship. Guidance note: It is recommended that, for initial design, the permissible hull girder still water shear force envelopes are at least 10% above the hull girder shear force envelope from the loading conditions in the loading manual, to account for growth and design margins during the design and construction phase of the ship. It is believed that like guidance notes for margin on bending moment and shear force values should be included in CSR Bulk Carriers for application during initial design both for values in intact and flooded condition. It is believed that the values of margins that are applied to Tankers would also be appropriate for Bulk Carriers.	The definition of the margins to be applied on the hull girder bending moment, shear force... is the responsibility of the designer at each step of its project. Rules are to be applied on the values given by the designer. This subject will also be submitted to the harmonisation team.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
907 attc	4/6.1.1.2 & 4/6.1.1.1	Q&A	Internal pressures & forces applied during FEM analysis	2010/4/14	Please see the attached PDF file containing 2 questions about CSR for bulk carrier in Chapter 4 section 6 Internal Pressures and Forces when applying them in the FEM analysis.	Q1 a)Static cargo pressure at Pos 1 and Pos 2 are not the same, since the shape of cargo gives a reduced hc outside Bh/4 from centerline. In your example the static pressure will be pCS = ρC x g x KC (ha + hDB − z). b)At your position 4 the cargo pressure will be zero c)In your example pCS = ρC x g x KC (hb + hDB − z) should be used. d)In your example hd should be used. Q2 a)For calculation of hc, psi does not need to be considered because an equivalent horizontal surface is assumed. Static pressure at top side plate is to be zero since Kc is defined to be zero for top side plate, upper deck and sloped upper stool. b)In your example the static cargo pressure is the same in region 1 and 2. c)In your example hc should be used.	Y
910	Tables 4.A2.1 & 4.A2.3	Question	Loading condition accelerations	2009/9/4	Loading condition No 1 considers homogeneous loaded cargo. According to Note 2 a density of 3t/m has to be used. Please confirm that GM and k_R of the real homogeneous loading condition (density << 3t/m) has to be used in this context and not a higher GM value, which considers the lower COG of this theoretical cargo. From our point of view the aim of this loading condition is to create maximum sea pressure at side shell without counterpressure due to cargo. Higher accelerations, based on the theoretical density of 3t/m, need not to be considered.	LC1 is a homogeneous loading condition with a density of 3.0 t/m3 which has to be included into the loading manual. The corresponding calculated values of GM and kr have to be used in FEM analysis and not those of a loading condition with a lower density. If these values are not available, default values have to be used as per Ch.4 Sec.2 tab.1.	
912	4/6.	RCP	sloshing pressure	2009/9/4	Minimum pressures for ballast tanks Please consider including minimum sloshing pressures for ballast tanks, similar to CSR Tanker 7/4.2.4.	Bulker CSR does not have the structural scantling formula according to sloshing pressure for ballast tanks. To include design pressure and scantling formula for sloshing, sufficient ramification study should be carried out. It will be discussed during harmonization process with considering the necessity of sloshing estimation in ballast tanks of bulkers.	
913	4/6.	RCP	min pressure for decks in ER	2009/7/16	Minimum pressure for platform decks in engine room. Please consider including minimum pressure for platform decks in engine rooms, similar to CSR Tanker 7/2.2.4.	A minimum thickness is currently required for platform plating in the engine room. As this differs from the CSR OT approach, this will be submitted to the harmonisation team.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
937	4/8.2.2.2 & 4/8.5.1.3	CI	Short voyage loading conditions	2010/4/9	Reference is made to Chapter 4, Section 8, 2.2.2 and 5.1.3. 1) Does short voyage condition have to be considered on a mandatory basis? 2) If the submitted Loading Manual does not include short voyage condition is it to be included in the Loading Manual? In KC ID 492, the reply is:- where a short voyage alternate loading condition with more severe filling than the minimum loading condition in [2.1.1] and [2.1.4] is specified in the loading manual, strength check for such more severe loading condition should be carried out in accordance with the CSR requirements. Please clarify?	A1) Short voyage condition is not a mandatory basis. If the ship is not intended to make such voyage, it is not relevant to add it to the loading manual. As a consequence, the ship will not be able later on to practice short voyages with more severe loading conditions than those described in the loading manual. A2) Ch.4 Sec.8 [2.2.2] gives an extensive list of loading conditions to be considered when they are pertinent. Thus if short voyages are not envisaged for the ship, they need not be included in the loading manual. A corrigendum will be issued on Ch.4 Sec.8 [2.2.2] and [5.1.3].	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
963	Table 4.6.1, Text 4/6.3.3.2, 6/1.3.2.1, 6/1.3.2.3, 6/2.3.2.3 & 6/2.3.2.6	Question	Design with non-homogeneous loading condition	2009/12/16	Please advise the answer to the question on the design with the following non-homogeneous loading conditions in the loading manual: - cargo density is 3.0 and cargo hold is not loaded up to upper deck, - cargo density is lighter than 1.78 (for instance 1.7) and cargo hold is loaded up to upper deck. For this design is local strength check required for intact condition and flooded condition for the above loading conditions according to Ch.6 Sec.1 [3.2.1] & [3.2.3] and Ch.6 Sec.2 [3.2.3] & [3.2.6] (or [3.6] by RCN1-8)?	This question is considered together with KC 851, 859 and 972	
964	4/6, 4/7 & 4/8	CI	Cargo density limits for BC-A and BC-B ships	2010/6/29	For BC-A and BC-B ships, there is a design loading condition in Ch 4, Sec 7, [2.1] requiring maximum draught with cargo density 3 t/m3. On the other hand there are cargoes which have density higher than 3t/m3. We would like to have interpretations on the two following questions: a) Is a limit in cargo density of 3t/m3 clearly stated in CSR-BC? b) In case of loading conditions within the loading manual having density higher than 3t/m3, are they specific checks to carry out in addition of those corresponding to 3t/m3?	a)The cargo density of 3.0 t/m3 is required as design basis for BC-B and BC-A vessels as stated in Ch.4 Sec.7 [1.2] and [2.1]. Based on the design loading conditions according to Sec.7, hold mass curves will be created according to Sec.8 which will control the loading and unloading of the vessel in operation. There is no limitation on cargo density in operation unless additional feature notation {maximum cargo density x.y t/m3} specifies the maximum cargo density less then 3.0 t/.m3. b)If specific cases (with high density or no) are requested by the Owner, those cases can be included in the Loading Manual and those cases should be specifiquely studied (on a case by case basis).	
983	4/3.	Question	Longitudinal strength check at flooded condition	2010/3/16	The query is regarding Chapter 4- Section 3 of CSR for Bulk Carriers, i.e. Longitudinal Strength Check at Flooded condition. 1. Do we have to assume structural damage to the Hull in this case? 2. Or, is it the water ingress from the deck through the Hatch? 3. Please explain if we have to consider the damage from side or the water ingress from top, which results only in hold flooding.	For Ch.4 Sec3, Longitudinal Strength Check at Flooded condition, water ingress of the cargo hold is assumed without any structural damage or filling of adjacent compartments.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
987 attc	4/7.3.6.1& 3, Fig 4.A1.1	RCP	Harbour mass curves for BC-A loaded holds	2010/3/16	We have found that the CSR-BC is unclear about how to construct the mass curve for the harbour condition for loaded holds. Please refer to the attached sketch. Ch 4, Sect 7, 3.6.1 results in line 1 (red). Ch 4, Sect 7, 3.6.3 results in line 2 (blue). Depending on the geometry of the vessel, Ch 4, Sect 7, 3.6.3 may result in line 3 (green). Ch 4, Appendix 1, Figure 1 (a) results in line 4 (black). Various arguments can be made to support the construction of each line. Line 1 comes from a load condition that has been analysed for the design and is therefore well supported. Lines 2 and 3 are based on a simple empirical formula within the Rules. We are not aware of cases of double bottom failure within harbour for UR S25 ships, hence the empirical formula appears valid. However, where the vessel geometry produces line 3, rather than line 2, their would be a good case for increasing the harbour maximum to line 1, which is verified by calculation. Line 4 is not backed by text in Ch 4, Sect 7 and I suggest that the labelling of Appendix 1, Figure 1 (a) is incorrect and that the brackets should be removed so that "1.15(MHD+0.1MH)" becomes "1.15MHD+0.1MH". Could this please be investigated with a view to IACS placing an interpretation on the Knowledge Centre and/or issuing a Rule Corrigenda item. Please also note this should be considered in conjunction with KC item 633 which is under study by IACS.	Ch.4 Sec.7 [3.6.1] and [3.6.3] are both valid and acceptable hence the final curve (upper limit) should be larger of the two curves. We agree that Fig.1 (a) should be corrected as suggested (Line 2) based on [3.6.3].	Y
995	4/5.2.1.1	CI	FE cargo hold model - weather loads	2010/5/7	Ch. 4, Sec. 5, Para. 2.1.1 states: "The external pressures on exposed decks are to be applied for the LOCAL SCANTLING CHECK of the structures on exposed deck but -----" This is under Para. 2.1 "General" and, therefore, Para. 2.2 Load cases H1, H2, F1 and F2" and Para. 2.3 "Load cases R1, R2, P1 and P2" are controlled by Para. 2.1. In addition, the weather loads require to be applied to the structures on exposed deck only. Please clarify if the weather loads need to be applied to the FE cargo hold model or not?	Yes, the weather loads shall be applied to FE cargo hold model. In order to clarify the Rules, the relevant paragraph is suggested to be modified as "The external pressures on exposed decks are to be applied for the scantling check of the structures on exposed deck but not applied for fatigue strength assessment." (local removed from the sentence) This will be done in the next Corrigenda.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
1023 attc	4/6.1.1.1	RCP	Definition of the dry cargo upper surface	2010/6/29	Chapter4_CSR-BC_Sec6_[1.1.1]The definition of the dry bulk cargo upper surface. It is specified in Ch4/6/1.1.1 of CSR Bulk Carrier that " When the dry bulk cargo density is such that the cargo hold is loaded to the top of hatch coaming, the upper surface of the dry bulk cargo is an equivalent horizontal surface to be determined in considering the same loaded cargo volume in the considered hold bounded by the side shell or inner hull, as the case may be." Regarding the above definition of "the hold bounded by the side shell or inner hull", it seems not very precise and might cause some misunderstandings. Take a typical dry bulk cargo hold for example, three different possible boundary definitions marked in red as shown in the attached graphic illustration might be some possible understandings. Two optional proposals for the revision are as below. 1) "When the dry bulk cargo density is such that the cargo hold is loaded to the top of hatch coaming, the upper surface of the dry bulk cargo is an equivalent horizontal surface to be determined in considering the same loaded cargo volume above the lower intersection of topside tank and side shell or inner side in the considered hold bounded by the side shell or inner hull." 2) "When the dry bulk cargo density is such that the cargo hold is loaded to the top of hatch coaming, the upper surface of the dry bulk cargo is to be taken as an equivalent horizontal surface determined by considering the same cargo volume loaded in to a cargo hold with vertical boundaries formed by the transverse bulkheads and side shell or inner side. The spaces occupied by the topside tanks and the upper bulkhead stool should be considered as part of the cargo hold space in the determination of this equivalent horizontal surface.	The Figure 2 in your attachment is correct. In order to describe the equivalent horizontal surface more clearly, a corrigenda is to be carried out. The first paragraph is to be modified as following: When the dry bulk cargo density is such that the cargo hold is loaded to the top of hatch coaming, the upper surface of the dry bulk cargo is to be taken as an equivalent horizontal surface determined by considering the same cargo volume loaded in to a cargo hold with boundaries formed by inner bottom, hopper if any, and side shell for single side skin or inner side for double side skin. Figure 1 in Ch4/Sec6 will be modified accordingly to illustrate the boundary definition	Y
1025 attc	4/6.1.1.1	CI	Hc value of dry bulk cargo in full-filled condition	2010/5/17	Chapter4_CSR-BC_Sec6_[1.1.1] Hc value of the dry bulk cargo in full-filled condition Regarding the hc value for cargo hold being loaded up to the top of hatch coaming: Ch4/Sec6/1.1.1 specifies the procedure of calculating the height of dry cargo upper surface. Meanwhile a formula for calculating the hc value is given specifically for holds of cylindrical shape. Question: For a typical bulk carrier, upper stools are generally arranged in the cargo hold. Obviously, the hc value should be different by using the above two procedures. Which procedure should be used? In other words, should the cargo hold with upper stools be considered as one of cylindrical shape or not?	For holds of cylindrical shape, the volume of upper stool is ignored when hC is calculated by the formula in Ch.4 Sec.6 [1.1.1].	Y

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
1026	4/3.3.1.3	CI	Wave induced bending moment (0.4Mw) for target BM in harbour condition	2010/5/12	Chapter4_CSR-BC_Sec3_[3.1.3] Wave-induced bending moment(0.4Mw) for target BM in harbor condition It is specified in Ch4/3/3.1.3 of CSR Bulk Carrier that the vertical wave bending moment Mwv,p in harbour condition equals to 0.4Mwv. It is not clearly specified whether 0.4Mwv should be included in the target bending moment in harbour condition for direct strength analysis. Please be kindly requested to provide clarification	The wave-induced bending moment 0.4Mwv should be included in the target bending moment in harbour condition for direct strength analysis. This will be specified in the next corrigenda.	
1042	Table 4/A2.1,2,3, 4,5,6	RCP	Loading conditions to be included in Trim & Stability booklet	2010/6/29	We do not consider the "standard loading condition for direct strength analysis" listed under Appendix 2 of CH4 is required to be included in the Trim & Stability booklet. For example, for LC No.6 "Multi Port-3" in Table 1 in Ch.4 Appendix 2, the design value of the sagging bending moment will become quite large if an imaginary loading condition is prepared on purpose to realize the condition corresponding to LC6. Thus, we would say it is not so reasonable in practice to include such an imaginary loading condition in the Trim & Stability booklet. In order to avoid unnecessary argument between Class & Builder, we suggest that the additional statement should be provided which specifies that it is not required to prepare the loading conditions to realize the LCs indicated in the Appendix 2 and that such loading conditions need not to be included in the Trim & Stability booklet.	We agree to your comment that loading conditions indicated in Appendix 2 in Ch.4 are not required to be included in the Trim & Stability booklet. The loading conditions applicable for loading manual is specified in Chapter 4 Section 7 and 8. Would you have any further question, please don't hesitate to contact the IACS Permanent Secretariat.	
1047	4/7.2.1.1	CI	Max cargo mass in cargo holds at max draught condition with 50% of consumables	2010/5/12	In Ch.4 Sec.7 [2.1.1] is written: "For the determination of the maximum cargo mass in cargo holds, the condition corresponding to the ship being loaded at maximum draught with 50% of consumables is to be considered." Is this defined for the short voyage conditions?	Ch.4 Sec.7 [2.1.1] defines the upper limit for the cargo mass in holds, i.e. the pay load, by considering only 50% of consumables at full draught. This has not to be considered as a mandatory design loading condition. This definition of the upper limit is not to be confused with definitions of short voyage conditions.	

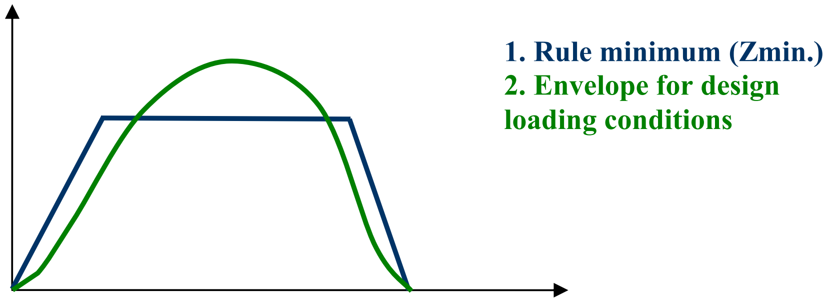
KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attach ment
1054 attc	4/6.1.1.1	Interpretati on	Hc value of dry bulk cargo in full-filled condition (Ref to KC ID 1025)	2010/8/11	With reference to KC ID 1025, it seems that the answer do not fully cover our questions. It is true that the formula should be used to calculate hc for holds of cylindrical shape. However, our question is "Should we consider the cargo hold with upper stools as one of cylindrical shape or not?". Most of CSR PT3 members assume that cylindrical shape means that a cargo is longitudinally cylindrical along its entire length and no upper stools should be arranged. For a typical bulk carrier with upper stools, our calculation shows that the two methods in Ch4/Sec6/1.1.1 of CSR-BC will result in different hc values. Therefore, we are expecting an answer of Yes or No with explanations to the question "should the cargo hold with upper stools be considered as one of cylindrical shape?". If Yes, the explanations are expected. If No, clear statements of the rule may be needed. Detailed calculation procedure is attached.	Yes, we consider a cargo hold as having a cylindrical shape if it maintains a cross sectional shape over the hold length with or without upper stools.	Y

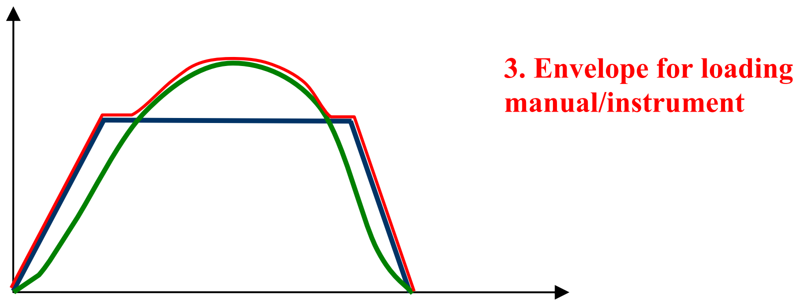
KC#283

Design still water bending moments in CSR Bulk rules.

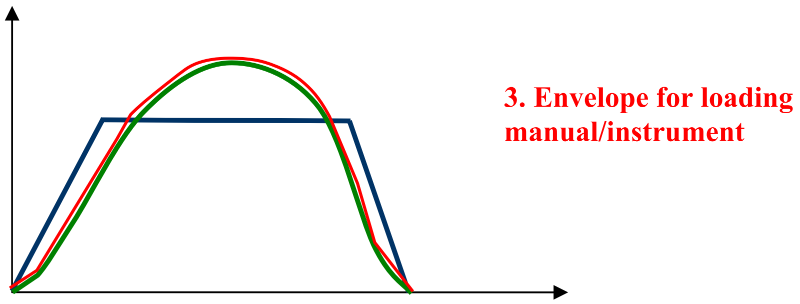
Ch.4 Sec.3 [2.2.1] and [2.2.2] and Ch.5 Sec.1 [4.2.1], [4.2.2], [4.2.4] and [4.3.1]

We assume the following interpretation is valid for design bending moments in **intact** condition:





Alt 2

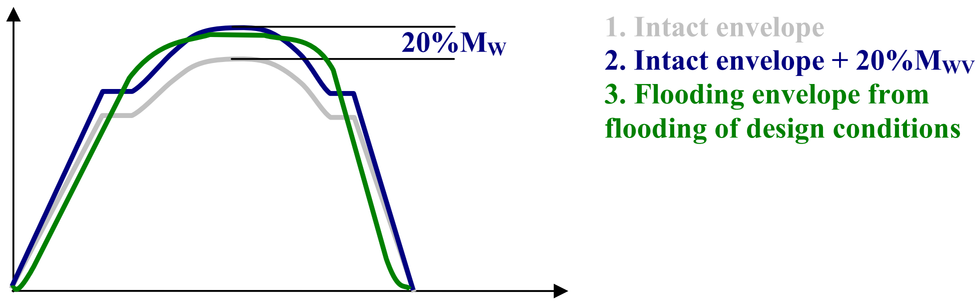


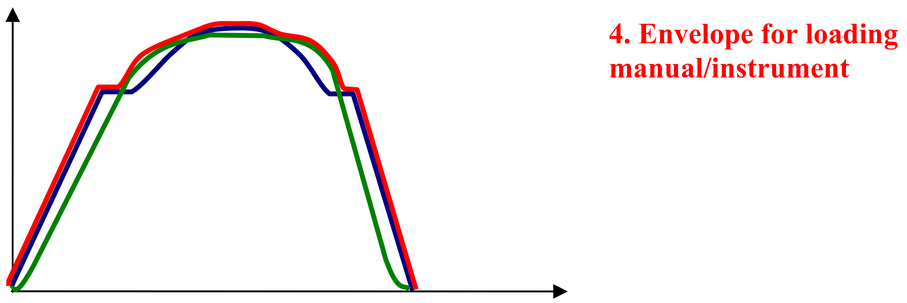
1(blue). Rule minimum Z (section modulus) is maintained within 0.4 L amidships according to Ch 5 Sec 1 [4.2.1] and [4.2.4]. Corresponding bending moments are given as preliminary design moments in Ch 4 Sec 3 [2.2.2].
2(green). Envelope curve for all loading conditions in the loading manual. For some points this may exceed the rule minimum requirement (ref. Ch.4 Sec.3 [2.2.1] and Ch.5 Sec.1 [4.2.2] and [4.3.1]).
3(red). Envelope (permissible) curve for loading manual/instrument.

Q1: As long as the item 1 is satisfied, i.e., Rule min. Z is maintained within 0.4L amidships, could “Alt 2” below be used as Envelope for the loading manual/instrument? Could “Alt 2” be used for sig-x for local scantlings and for design bending moment for FEM calculation? Note that the red line may have an uneven distribution within 0.4L amidships and might be below rule minimum (item 1 above).

Q2: In this connection, please clarify if Ch.4 Sec.3 [2.2.2] is a minimum requirement within 0.4L amidships or just a guidance. If it is not a rule minimum, and in case the Envelope (line 2) is below Min. Z (line 1), hull girder capacity of min Z is not fully utilised by the design/permissible still water bending moments of the vessel. As far as we understand, this is given as a minimum requirement for design still water bending moment in the CSR-Tanker rules. Please clarify.

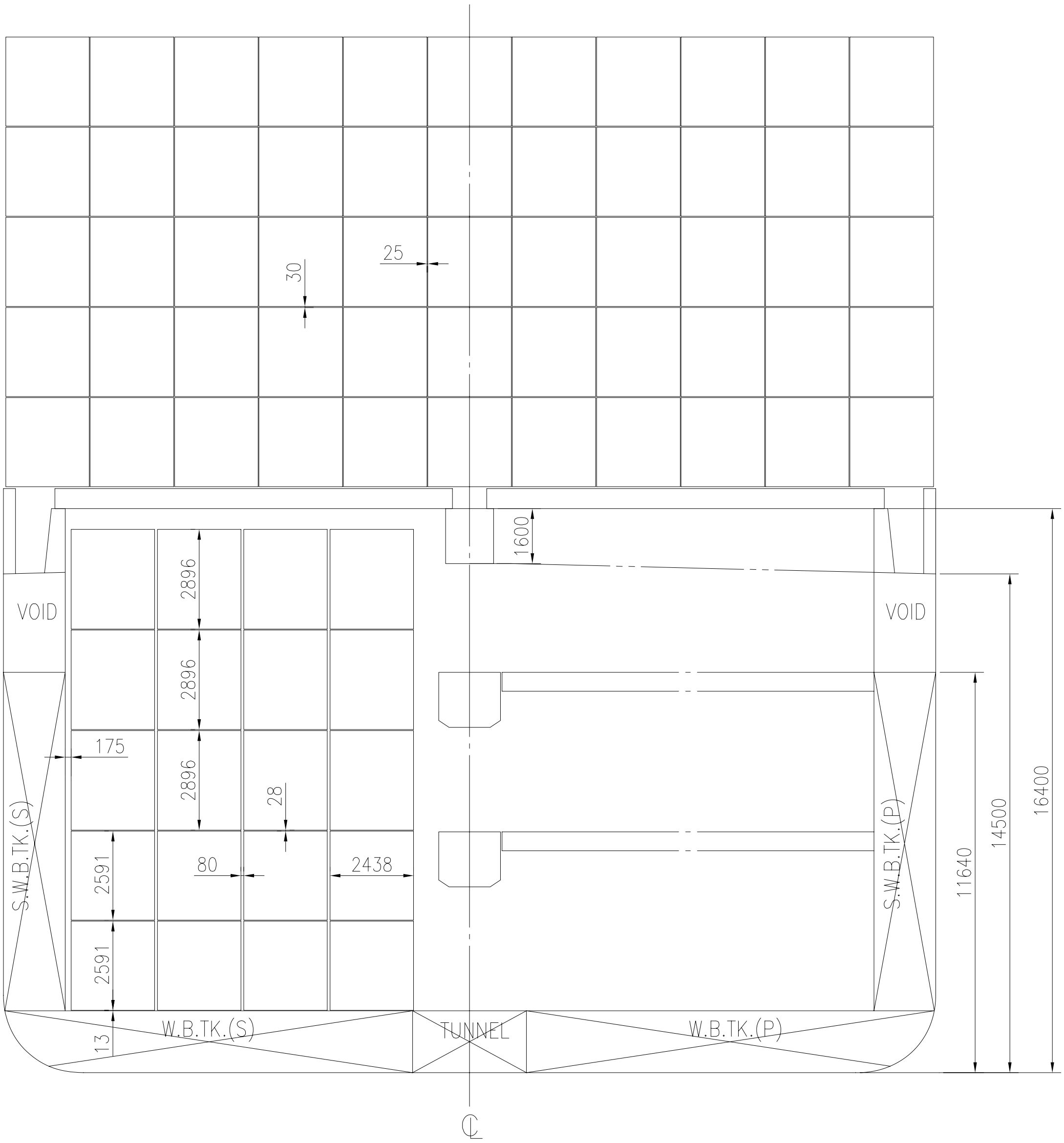
Q3: For the **flooding** condition, we assume the following relationship. We assume that the same principle also applies to harbour condition. Please confirm if our assumptions are correct.





1. The intact bending moment based on above assumptions.
2. The Intact envelope + 20%M_{VW}
3. The envelope curves from flooding of design loading conditions. This curve exceed curve 2 for certain points.
4. Design limit for the flooding condition and envelope curve for loading manual/instrument.

KC#465



TYPICAL CARGO HOLD SECTION

KC#485Q

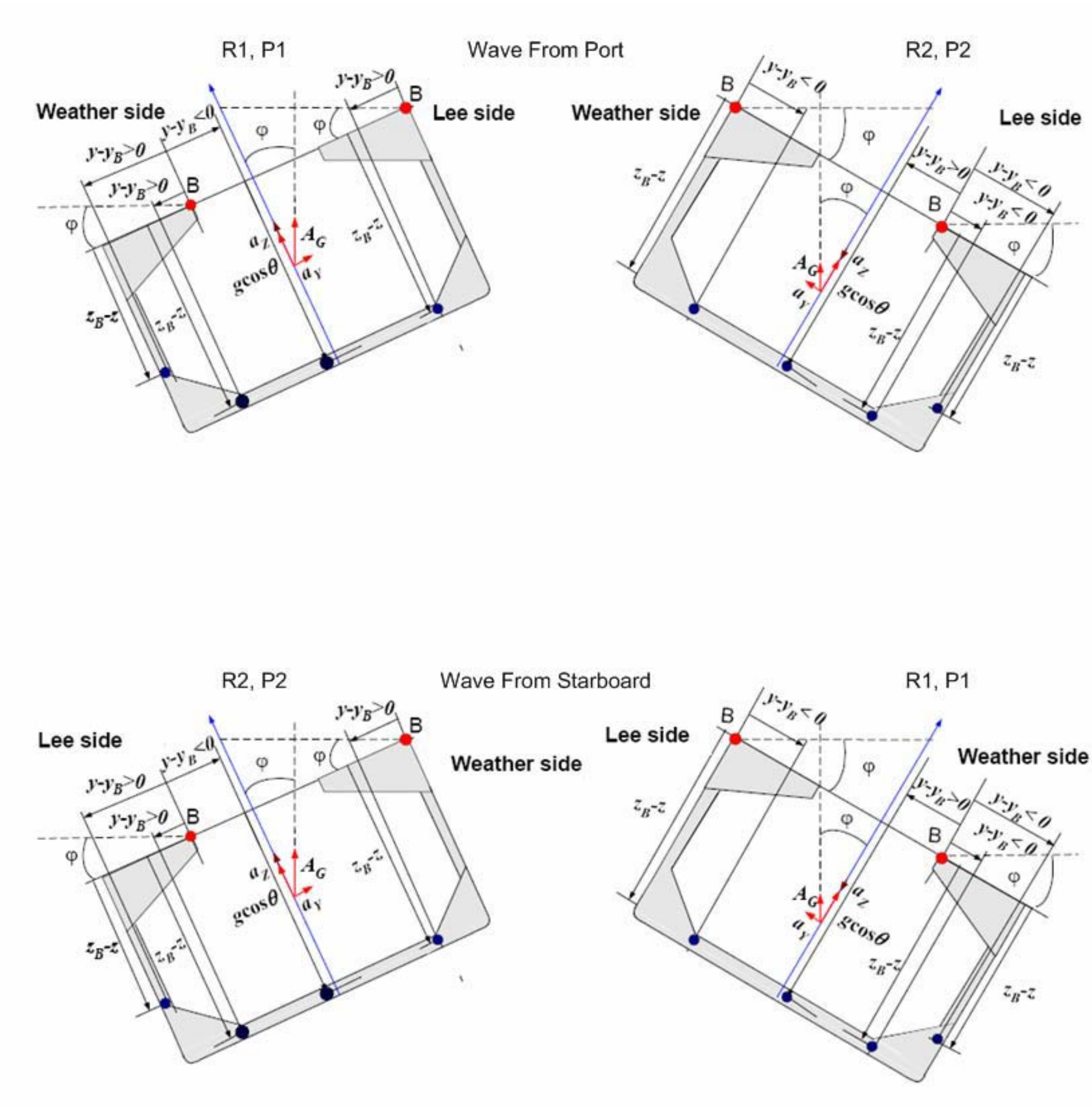
Table 2 of Chapter 4 section 4: Reference hull girder loads and motions of ship

	weather side (port)	weather side (stbd)	weather side (port)	weather side (stbd)	weather side (port)	weather side (stbd)	weather side (port)	weather side (stbd)
	R1	R1	R2	R2	P1	P1	P2	P2
Vert.BM & SF	-	-	-	-	Yes	**Yes**	Yes	**Yes**
Hor.BM	Yes	**Yes**	Yes	**Yes**	-	-	-	-
Heave	Down	**Down**	Up	**Up**	Down	**Down**	Up	**Up**
Pitch	-	-	-	-	-	-	-	-
Roll	Stbd up	**Stbd down**	Stbd down	**Stbd up**	Stbd up	**Stbd down**	Stbd down	**Stbd up**
Surge	-	-	-	-	-	-	-	-
Sway	-	-	-	-	Port	**Stbd**	Stbd	**Port**

Table 3 of Chapter 4 section 4: Load combination factors

		weather side (port)	weather side (stbd)	weather side (port)	weather side (stbd)	weather side (port)	weather side (stbd)	weather side (port)	weather side (stbd)
		R1	R1	R2	R2	P1	P1	P2	P2
ax	asurge	0	**0**	0	**0**	0	**0**	0	**0**
	apicth	0	**0**	0	**0**	0	**0**	0	**0**
	g sin	0	**0**	0	**0**	0	**0**	0	**0**
ay	asway	0	0	0	0	1	**-1**	-1	**1**
	aroll	1	**-1**	-1	**1**	0.3	**-0.3**	-0.3	**0.3**
	g sin	1	**-1**	-1	**1**	0.3	**-0.3**	-0.3	**0.3**
az	aheave	Sqrt(L)/40	**Sqrt(L)/40**	- Sqrt(L)/40	**- SQRT(L)/40**	1	**1**	-1	**-1**
	aroll	1	**-1**	-1	**1**	0.3	**-0.3**	-0.3	**0.3**
	apitch	0	0	0	0	0	0	0	0

Figure 3 of Chapter 4, section 6: Definition of Xb, Yb



KC#485A

Load Case and load combination factors for all wave directions

Table 1: Definition of load cases

Load case	***H1***	***H2***	***F1***	***F2***	***R1***	***R2***	***P1***	***P2***
EDW	"H"		"F"		"R"		"P"	
Heading	Head		Follow		Beam		Beam	
Effect	Max Bending Moment		Max Bending Moment		Max. roll		Max Ext. Pressure	
	Sagging	Hogging	Sagging	Hogging)	(+)	(-)	(+)	(-)

Table 2: Reference hull girder loads and motions of ship

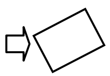
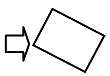
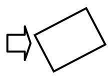
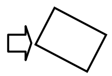
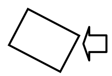
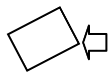
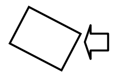
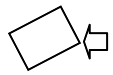
Load case	***H1***	***H2***	***F1***	***F2***	***R1***	***R2***	***P1***	***P2***	***R1***	***R2***	***P1***	***P2***
Vert. BM & SF	*Yes*		*Yes*		-		*Yes*				*Yes*	
Hor. BM	-		-		*Yes*		-		Yes			
Wave Direction	*Head*		*Follow*		*Port*				*S'board*			
Heave	*Down*	*Up*	-	-	*Down*	*Up*	*Down*	*Up*	*Down*	*Up*	*Down*	*Up*
Pitch	*Bow down*	*Bow up*	-	-	-	-	-	-	-	-	-	-
Roll	-	-	-	-	*Stbd up*	*Stbd down*	*Stbd up*	*Stbd down*	*Port up*	*Port down*	*Port up*	*Port down*
Surge	*Bow*	*Bow*	-	-	-	-	-	-	-	-	-	-
Sway	-	-	-	-	-	-	*Port*	*Port*	-	-	*S'board*	*S'board*
Weather side and ship motion in beam sea												

Table 3: Load combination factors LCF

	LCF	H1	H2	F1	F2	R1	R2	P1	P2	R1	R2	P1	P2
Wave Direction		*Head*		*Follow*		*Port*				*S'board*			
M_{WV}	C_{WV}	-1	1	-1	1	0	0	$0{,}4-\frac{T_{LC}}{T}$	$\frac{T_{LC}}{T}-0{,}4$	0	0	$0{,}4-\frac{T_{LC}}{T}$	$\frac{T_{LC}}{T}-0{,}4$
Q_{WV}	$C_{QW}{}^{*}$	-1	1	-1	1	0	0	$0{,}4-\frac{T_{LC}}{T}$	$\frac{T_{LC}}{T}-0{,}4$	0	0	$0{,}4-\frac{T_{LC}}{T}$	$\frac{T_{LC}}{T}-0{,}4$
M_{WH}	C_{WH}	0	0	0	0	$1{,}2-\frac{T_{LC}}{T}$	$\frac{T_{LC}}{T}-1{,}2$	0	0	$\frac{T_{LC}}{T}-1{,}2$	$1{,}2-\frac{T_{LC}}{T}$	0	0
a_{surge}	C_{XS}	-0.8	0.8	0	0	0	0	0	0	0	0	0	0
$a_{pitch\ x}$	C_{XP}	1	-1	0	0	0	0	0	0	0	0	0	0
$g\sin\Phi$	C_{XG}	1	-1	0	0	0	0	0	0	0	0	0	0
a_{sway}	C_{YS}	0	0	0	0	0	0	1	-1	0	0	-1	1
$a_{roll\ y}$	C_{YR}	0	0	0	0	1	-1	0.3	-0.3	-1	1	-0.3	0.3
$g\sin\theta$	C_{YG}	0	0	0	0	1	-1	0.3	-0.3	-1	1	-0.3	0.3
a_{heave}	C_{ZH}	$0{,}6\frac{T_{LC}}{T}$	$-0{,}6\frac{T_{LC}}{T}$	0	0	$\frac{\sqrt{L}}{40}$	$-\frac{\sqrt{L}}{40}$	1	-1	$\frac{\sqrt{L}}{40}$	$-\frac{\sqrt{L}}{40}$	1	-1
$a_{roll\ z}$	C_{ZR}	0	0	0	0	1	-1	0.3	-0.3	-1	1	-0.3	0.3
$a_{pitch\ z}$	C_{ZP}	1	-1	0	0	0	0	0	0	0	0	0	0

1) Note * The LCF for C_{QW} is only used for the aft part of midship section. The inverse value of it should be used for the forward part of the midship section.

KC#515

CSR_BC

Chapter 4, Appendix 1

3.1.2 BC-A ships

The maximum permissible cargo mass ($W_{\max}(T_i)$) and the minimum required cargo mass ($W_{\min}(T_i)$) for the adjacent two holds at various draughts (T_i) are determined, in t, by the following formulae:

$W_{\max}(T_i) = 2(M_{Full} or M_{HD}) + 0.1 M_H$, whichever is the greater for $T_s \geq T_i \geq 0.67 T_s$

… …

There are two sets of data M_{Full} , M_{HD} and M_H in the two adjacent cargo holds. The result values are different significantly especially at fore end and aft end cargo holds. Which data shall be applied in the formula?

The formula is proposed to be modified as follows:

$W_{\max}(T_i) = M_{Full,fwd} + M_{Full,aft}$

$W_{\max}(T_i) = M_{HD,fwd} + M_{HD,aft} + 0.1(M_{H,fwd} + M_{H,aft})/2$, whichever is the greater for $T_s \geq T_i \geq 0.67 T_s$

$M_{Full,fwd}$, $M_{HD,fwd}$, $M_{H,fwd}$: M_{Full} , M_{HD} , M_H in one cargo hold.

$M_{Full,aft}$, $M_{HD,aft}$, $M_{H,aft}$: M_{Full} , M_{HD} , M_H in adjacent cargo hold.

KC#571

1. Density for fatigue calculation is different between Ch4, App3 and Ch8, Sec4, 2.3.5.
According to Ch8, Sec4, 2.3.5, minimum density is 1.0
According to Ch4, App3, there is no minimum density.

Ch8, Sec4, 2.3.5

$p_{CW,ij(k)}$: Inertial pressure, in kN/m^2, due to dry bulk cargo specified in Ch 4, Sec 6, [1.3], with f_p = 0.5, in load case "$i1$" and "$i2$" for loading condition "(k)"

Ch4, Sec6, Table1

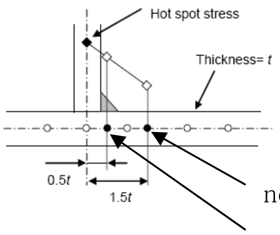
Table 1: Density of dry bulk cargo

Type of loading	Density	
	BC-A, BC-B	BC-C
Cargo hold loaded up to the upper deck	max(M_H/V_H, 1.0)	1.0
Cargo hold not loaded up to the upper deck	3.0 (1)	-
(1) Except otherwise specified by the designer.		

Ch4, App3, Remarks 1) M_H /V_H
MH : The actual cargo mass

2. Is the correction factor of Ch7, Sec4, 3.3.2 to be applied to only the intersection of two plates or both the intersection of tow plates and intersection of plating and bracket?

3. If stress of no1 element is slightly greater than no2 element, is the correction factor of Ch7, Sec4, 3.3.2 still to be applied?



KC#627

COMPARISON OF CSR BC AND UR S18

Mass of cargo (= M_HD) = 21000 (ton)

	ρc (t/m3)	Cargo upper surface	Cargo filling level: hc (m)	Bending moment (kN.m)
CSR-BC Rule ref.	-	-	4/6.1	6/2.3.2.6
CSR-BC	3.0	Not up to upper deck (4/6.1.1.2)	9.6	**2140**
UR S18	1.5	Deck at centre	19.0	**2380**

Appendix 1 – HOLD MASS CURVES

Symbols

h : Vertical distance from the top of inner bottom plating to upper deck plating at the ship's centreline, in m.

M_H : As defined in Ch 4, Sec 7

M_{Full} : As defined in Ch 4, Sec 7

M_{HD} : As defined in Ch 4, Sec 7

M_D : The maximum cargo mass given for each cargo hold, in t

M_{blk} : The maximum cargo mass in a cargo hold according to the block loading condition in the loading manual, in t

T_{HB} : As defined in Ch 4, Sec 7

T_i : Draught in loading condition No. i, at mid-hold position of cargo hold length ℓ_H , in m

V_H : As defined in Ch 4, Sec 6

V_f and V_a: Volume of the forward and after cargo hold excluding volume of the hatchway part, in m^3.

Σ : The sum of mass in forward and after holds

1. General

1.1 Application

1.1.1

The requirements of this Appendix apply to ships of 150 m in length L and above.

1.1.2

This Appendix describes the procedure to be used for determination of:

- the maximum and minimum mass of cargo in each cargo hold as a function of the draught at mid-hold position of cargo hold
- the maximum and minimum mass of cargo in any two adjacent holds as a function of the mean draught in way of these holds.

1.1.3

Results of these calculations are to be included in the reviewed loading manual which has also to indicate the maximum permissible mass of cargo at scantling draught in each hold or in any two adjacent holds, as obtained from the design review.

1.1.4

The following notice on referring to the maximum permissible and the minimum required mass of cargo is to be described in loading manual.

Where ship engages in a service to carry such hot coils or heavy cargoes that have some adverse effect on the local strength of the double bottom and that the loading is not described as cargo in loading manual, the maximum permissible and the minimum required mass of cargo are to be considered specially.

2. Maximum and minimum masses of cargo in each hold

2.1 Maximum permissible mass and minimum required masses of single cargo hold in seagoing condition

2.1.1 General

The cargo mass curves of single cargo hold in seagoing condition are defined in [2.1.2] to [2.1.5]. However if the ship structure is checked for more severe loading conditions than the ones considered in Ch 4, Sec 7, [3.7.1], the minimum required cargo mass and the maximum allowable cargo mass can be based on those corresponding loading conditions.

2.1.2 BC-A ship

- For loaded holds

  The maximum permissible mass ($W_{\max}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formulae:

  $$W_{\max}(T_S) = M_{HD} + 0.1M_H$$

  $$W_{\max}(T_i) = M_{HD} + 0.1M_H - 1.025V_H \frac{(T_S - T_i)}{h}$$

  However, $W_{\max}(T_i)$ is no case to be greater than $M_{HD.}$

  The minimum required cargo mass ($W_{\min}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formulae:

  $W_{\min}(T_i) = 0$ for $T_i \leq 0.83T_S$

  $W_{\min}(T_i) = 1.025V_H \dfrac{(T_i - 0.83T_S)}{h}$ for $T_S \geq T_i > 0.83T_S$

  The maximum permissible mass ($W_{\max}(T_i)$) at various draughts (T_i) in harbor condition should also be checked by the following formulae in addition to the requirements in [2.2.2]:

  $W_{\max}(T_i) = M_{HD}$ for $T_i \geq 0.67T_S$

  $W_{\max}(T_i) = M_{HD} - 1.025V_H \dfrac{(0.67T_S - T_i)}{h}$ for $T_i < 0.67T_S$

- For empty holds which can be empty at the maximum draught

  The maximum permissible mass ($W_{\min}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formulae:

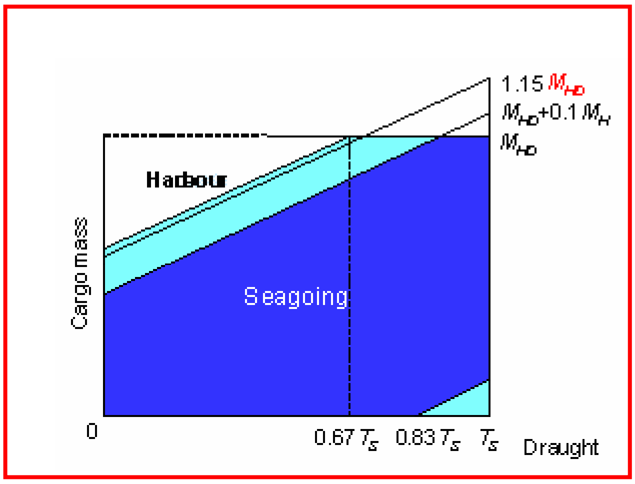
  $W_{\max}(T_i) = M_{Full}$ for $T_S \geq T_i \geq 0.67T_S$

  $W_{\max}(T_i) = M_{Full} - 1.025V_H \dfrac{(0.67T_S - T_i)}{h}$ for $T_i < 0.67T_S$

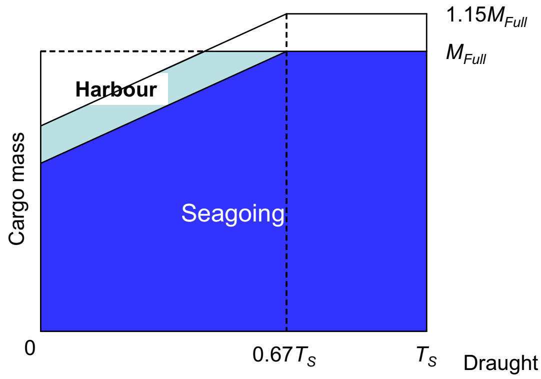
  The minimum required mass ($W_{\min}(T_i)$) is obtained, in t, by the following formula:

  $W_{\min}(T_i) = 0$ for $T_i \leq T_S$

Examples for mass curve of loaded cargo hold and cargo hold which can be empty at the maximum draught for **BC-A** ships are shown in Fig 1.



(a) Loaded hold



(b) Cargo hold which can be empty at the maximum draught

Figure 1: Example of mass curve for BC-A ships, without {No MP}

2.1.3 BC-A ship with {No MP}

- For loaded holds

The maximum permissible mass ($W_{\max}(T_i)$) at various draughts (T_i) is the same specified in [2.1.2].

The minimum required mass ($W_{\min}(T_i)$) is obtained, in t, by the lesser of the following formulae:

$$W_{\min}(T_i) = 0 \quad \text{for } T_i \le T_{HB}$$

$$W_{\min}(T_i) = 1.025 V_H \frac{(T_i - T_{HB})}{h} \quad \text{for } T_S \ge T_i > T_{HB}$$

or

$$W_{\min}(T_i) = 0.5 M_H - 1.025 V_H \frac{(T_S - T_i)}{h} \quad \text{for } T_S \ge T_i$$

$$W_{\min}(T_i) \ge 0$$

- For empty hold which can be empty at the maximum draught

The maximum permissible mass ($W_{\max}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formula:

$$W_{\max}(T_i) = M_{Full} - 1.025 V_H \frac{(T_S - T_i)}{h}$$

The minimum required mass ($W_{\min}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formula:

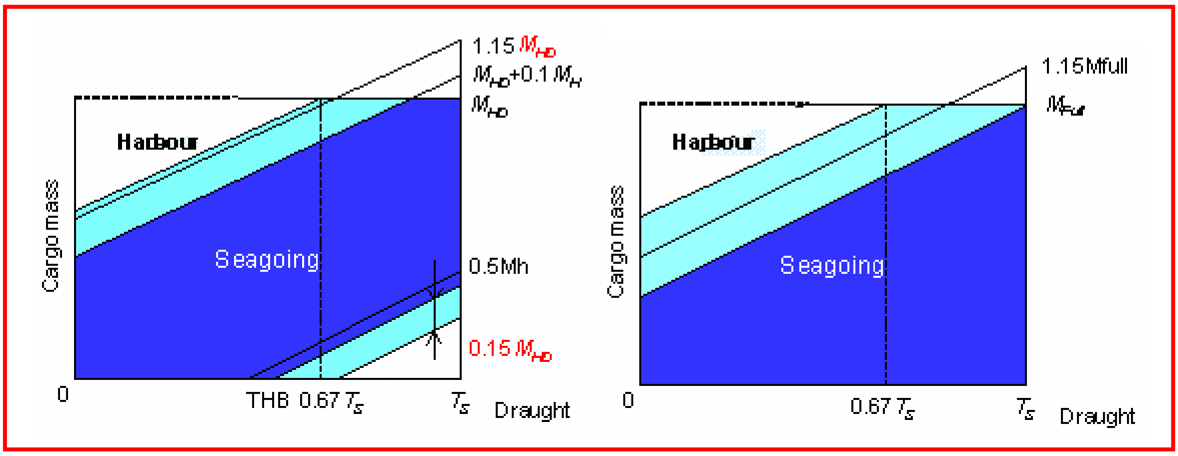
$$W_{\min}(T_i) = 0 \quad \text{for } T_i \le T_S$$

The maximum permissible mass ($W_{\max}(T_i)$) at various draughts (T_i) in harbor condition should also be checked by the following formulae in addition to the requirements in [2.2.2]:

$$W_{\max}(T_i) = M_{Full} \quad \text{for } T_S \ge T_i \ge 0.67 T_S$$

$$W_{\max}(T_i) = M_{Full} - 1.025 V_H \frac{(0.67 T_S - T_i)}{h} \quad \text{for } T_i < 0.67 T_S$$

Examples for mass curve of cargo hold for **BC-A,** {No MP} ships are shown in Fig 2.



(a) Loaded hold (b) Cargo hold which can be empty at the maximum draught

Figure 2: Example of mass curve for BC-A ships, {No MP}

2.1.4 BC-B and BC-C ships

The maximum permissible mass ($W_{\max}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formulae:

$$W_{\max}(T_i) = M_{Full} \quad \text{for } T_S \geq T_i \geq 0.67T_S$$

$$W_{\max}(T_i) = M_{Full} - 1.025V_H \frac{(0.67T_S - T_i)}{h} \quad \text{for } T_i < 0.67T_S$$

The minimum required cargo mass ($W_{\min}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formulae:

$$W_{\min}(T_i) = 0 \quad \text{for } T_i \leq 0.83T_S$$

$$W_{\min}(T_i) = 1.025V_H \frac{(T_i - 0.83T_S)}{h} \quad \text{for } T_S \geq T_i > 0.83T_S$$

2.1.5 BC-B and BC-C ships with {No MP}

The maximum permissible mass ($W_{\max}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formula:

$$W_{\max}(T_i) = M_{Full} - 1.025V_H \frac{(T_S - T_i)}{h}$$

The minimum required mass ($W_{\min}(T_i)$) is obtained, in t, by the lesser of the following formulae:

$$W_{\min}(T_i) = 0 \quad \text{for } T_i \leq T_{HB}$$

$$W_{\min}(T_i) = 1.025V_H \frac{(T_i - T_{HB})}{h} \quad \text{for } T_S \geq T_i > T_{HB}$$

or

$$W_{\min}(T_i) = 0.5M_H - 1.025V_H \frac{(T_S - T_i)}{h} \quad \text{for } T_S \geq T_i$$

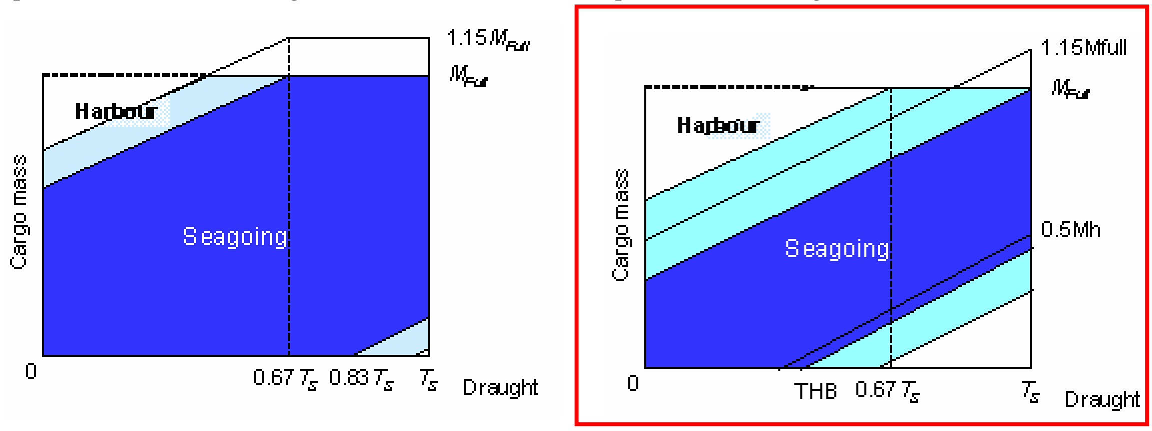
$$W_{\min}(T_i) \geq 0$$

The maximum permissible mass ($W_{\max}(T_i)$) at various draughts (T_i) in harbor condition should also be checked by the following formulae in addition to the requirements in [2.2.2]:

$$W_{max}(T_i) = M_{Full} \quad \text{for } T_S \geq T_i \geq 0.67T_S$$

$$W_{max}(T_i) = M_{Full} - 1.025V_H \frac{(0.67T_S - T_i)}{h} \quad \text{for } T_i < 0.67T_S$$

Examples for mass curve of cargo hold for **BC-B** or **BC-C** ships are shown in Fig 3.



(a) Without {No MP} (b) With {No MP}

Figure 3: Example of mass curve for BC-B or BC-C ships

2.2 Maximum permissible mass and minimum required masses of single cargo hold in harbour condition

2.2.1 General

The cargo mass curves of single cargo hold in harbour condition are defined in [2.2.2]. However if the ship structure is checked for more severe loading conditions than ones considered in Ch 4, Sec 7, [3.7.1], the minimum required cargo mass can be based on those corresponding loading conditions.

2.2.2 All ships

The maximum permissible cargo mass and the minimum required cargo mass corresponding to draught for loading/unloading conditions in harbour may be increased or decreased by 15% of the maximum permissible mass at the maximum draught for the cargo hold in seagoing condition. However, maximum permissible mass is in no case to be greater than the maximum permissible cargo mass at designed maximum load draught for each cargo hold.

3. Maximum and minimum masses of cargo of two adjacent holds

3.1 Maximum permissible mass and minimum required masses of two adjacent holds in seagoing condition

3.1.1 General

The cargo mass curves of two adjacent cargo holds in seagoing condition are defined in [3.1.2] and [3.1.3]. However if the ship structure is checked for more severe loading conditions than ones considered in Ch 4, Sec 7, [3.7.1], the minimum required cargo mass and the maximum allowable cargo mass can be based on those corresponding loading conditions.

3.1.2 BC-A ships with "Block loading"

The maximum permissible cargo mass ($W_{max}(T_i)$) and the minimum required cargo mass ($W_{min}(T_i)$) for the adjacent two holds at various draughts (T_i) are determined, in t, by the following formulae:

without {No MP},

The maximum permissible mass ($W_{max}(T_i)$) at various draughts (T_i) is obtained, in t, by the greater of the following formulae:

$$W_{max}(T_i) = \sum (M_{blk} + 0.1M_H) - 1.025(V_f + V_a)\frac{(T_S - T_i)}{h}$$

or

$$W_{max}(T_i) = \sum M_{Full} - 1.025(V_f + V_a)\frac{(0.67T_s - T_i)}{h}$$

However, $W_{max}(T_i)$ is no case to be greater than Σ Mblk.

The minimum required mass ($W_{min}(T_i)$) at various draughts (T_i) is obtained, in t, by the lesser of the following formulae:

$$W_{min}(T_i) = 0 \quad \text{for } T_i < 0.75T_S$$

$$W_{min}(T_i) = 1.025(V_f + V_a)\frac{T_i - 0.75T_S}{h} \quad \text{for } T_S \geq T_i > 0.75T_S$$

with {No MP},

The maximum permissible mass ($W_{max}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formula:

$$W_{max}(T_i) = \sum (M_{blk} + 0.1M_H) - 1.025(V_f + V_a)\frac{(T_S - T_i)}{h}$$

However, $W_{max}(T_i)$ is no case to be greater than Σ Mblk.

The minimum required mass ($W_{min}(T_i)$) at various draughts (T_i) is obtained, in t, by the lesser of the following formulae:

$$W_{min}(T_i) = 0 \quad \text{for } T_i \leq T_{HB}$$

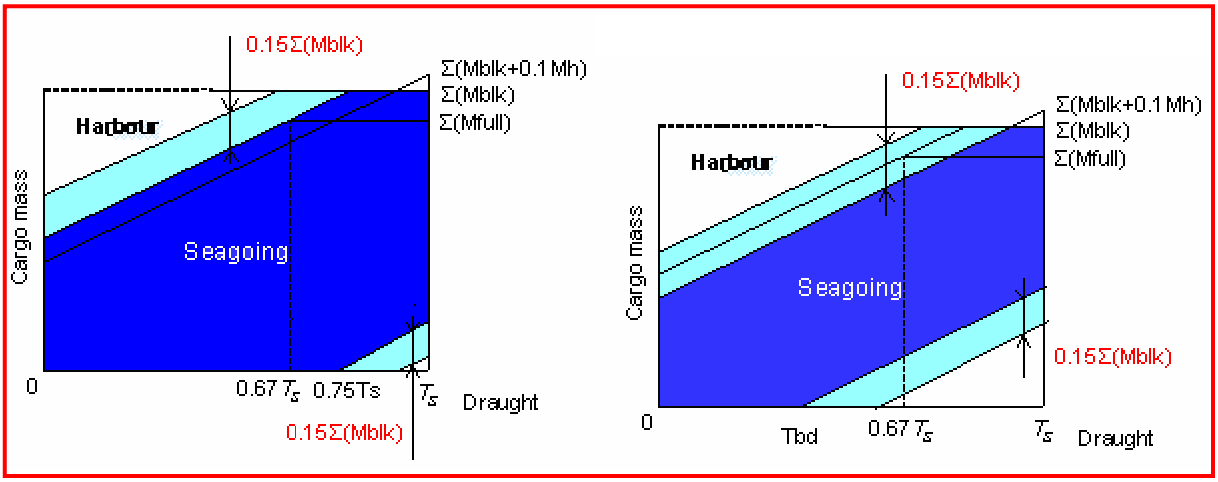
$$W_{min}(T_i) = 1.025(V_f + V_a)\frac{(T_i - T_{HB})}{h} \quad \text{for } T_S \geq T_i > T_{HB}$$

The maximum permissible mass ($W_{max}(T_i)$) at various draughts (T_i) in harbor condition should also be checked by the following formulae in addition to the requirements in [3.2.2]:

$$W_{max}(T_i) = \sum M_{Full} - 1.025(V_f + V_a)\frac{(0.67T_s - T_i)}{h}$$

$$W_{max}(T_i) \leq \sum M_{blk}$$

Examples for mass curve of cargo hold for **BC-A,** block loading ships are shown in Fig 4.



(a) Without {No MP} (b) With {No MP}

Figure 4: Example of mass curve for BC-A ships, block loading

3.1.3 BC-A ships without "Block loading" and BC-B, BC-C ships

The maximum permissible cargo mass ($W_{max}(T_i)$) and the minimum required cargo mass ($W_{min}(T_i)$) for the adjacent two holds at various draughts (T_i) are determined, in t, by the following formulae:

without {No MP},

The maximum permissible mass ($W_{max}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formulae:

$$W_{max}(T_i) = \sum M_{Full} \quad \text{for } T_S \geq T_i \geq 0.67T_S$$

$$W_{max}(T_i) = \sum M_{Full} - 1.025(V_f + V_a)\frac{(0.67T_S - T_i)}{h} \quad \text{for } T_i < 0.67T_S$$

The minimum required mass ($W_{min}(T_i)$) at various draughts (T_i) is obtained, in t, by the lesser of the following formulae:

$$W_{min}(T_i) = 0 \quad \text{for } T_i < 0.75T_S$$

$$W_{min}(T_i) = 1.025(V_f + V_a)\frac{T_i - 0.75T_S}{h} \quad \text{for } T_S \geq T_i > 0.75T_S$$

with {No MP},

The maximum permissible mass ($W_{max}(T_i)$) at various draughts (T_i) is obtained, in t, by the following formula:

$$W_{max}(T_i) = \sum M_{Full} - 1.025(V_f + V_a)\frac{(T_S - T_i)}{h} \quad \text{for } T_i < T_S$$

The minimum required mass ($W_{min}(T_i)$) at various draughts (T_i) is obtained, in t, by the lesser of the following formulae:

$$W_{min}(T_i) = 0 \quad \text{for } T_i \leq T_{HB}$$

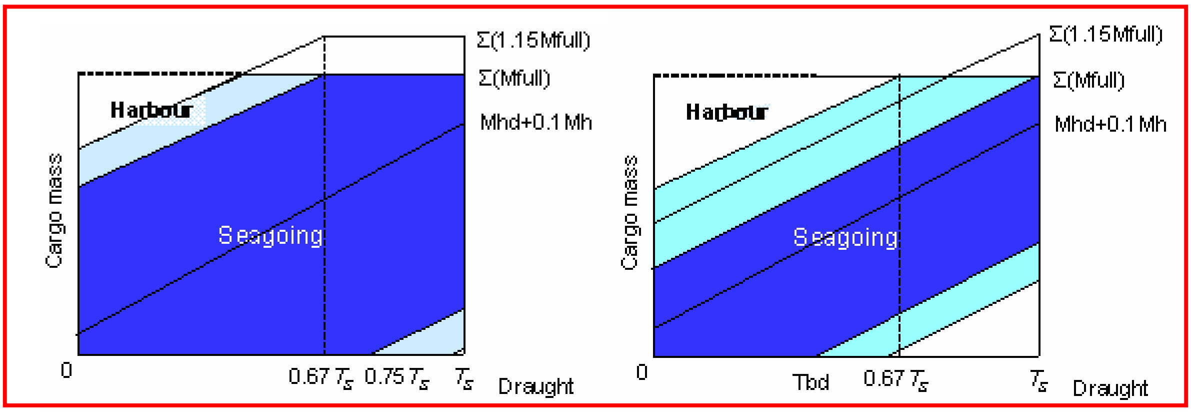
$$W_{min}(T_i) = 1.025(V_f + V_a)\frac{(T_i - T_{HB})}{h} \quad \text{for } T_S \geq T_i > T_{HB}$$

The maximum permissible mass ($W_{max}(T_i)$) at various draughts (T_i) in harbor condition should also be checked by the following formulae in addition to the requirements in [3.2.2]:

$$W_{max}(T_i) = \sum M_{Full} \quad \text{for } T_S > T_i > 0.67T_S$$

$$W_{max}(T_i) = \sum M_{Full} - 1.025(V_f + V_a)\frac{(0.67T_S - T_i)}{h} \quad \text{for } T_i < 0.67T_S$$

Examples for mass curve of cargo hold for **BC-A,** NO block loading ships and **BC-B, BC-C** are shown in Fig 5.



(a) Without {No MP} (b) With {No MP}

Figure 5: Example of mass curve for BC-A ships, NO block loading and for BC-B and BC-C ships

3.2 Maximum permissible mass and minimum required masses of two adjacent cargo holds in harbour condition

3.2.1 General

The cargo mass curves of two adjacent cargo holds in harbour condition are defined in [3.2.2]. However if the ship structure is checked for more severe loading conditions than ones considered in Ch 4, Sec 7, [3.7.1], the minimum required cargo mass can be based on those corresponding loading conditions.

3.2.2 All ships

The maximum permissible cargo mass and minimum required cargo mass corresponding to draught for loading/unloading conditions in harbour may be increased or decreased by 15% of the maximum permissible mass at the maximum draught for the cargo hold in seagoing condition. However, maximum permissible mass is in no case to be greater than the maximum permissible cargo mass at designed maximum load draught for each cargo hold.

KC#673

Regarding the determination of the still water bending moments according to Ch.4, Sec.3, 2.2.2, excerpted below:

- hogging conditions:

$$M_{SW,H} = 175CL^2B(C_B + 0.7)10^{-3} - M_{WV,H}$$

- sagging conditions:

$$M_{SW,S} = 175CL^2B(C_B + 0.7)10^{-3} - M_{WV,S}$$

The wave bending moments are given in 3.1.1, excerpted below:

- hogging conditions:

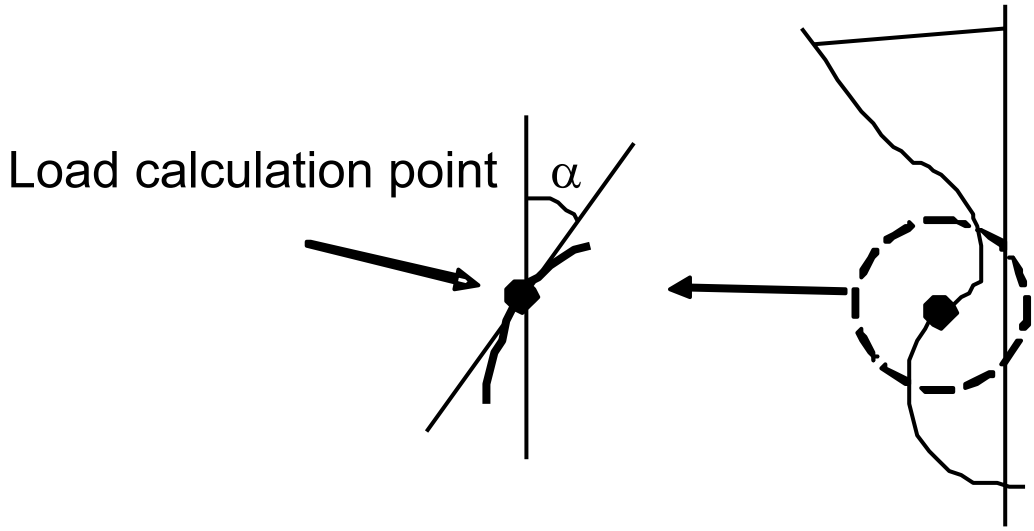
$$M_{WV,H} = 190F_M f_p CL^2BC_B10^{-3}$$

- sagging conditions:

$$M_{WV,S} = 110F_M f_p CL^2B(C_B + 0.7)10^{-3}$$

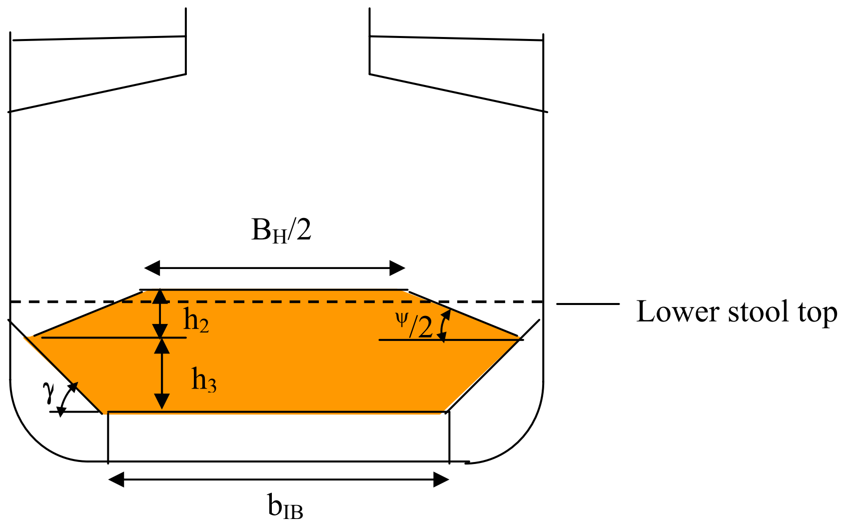
When determining the still water bending moments for fatigue, fp, used in 3.1.1 should be taken as 1.0, rather than 0.5 which is normally used for fatigue related calcs. The reason is that the Rule estimated design still water bending moments should be independent of the probability of occurrence, which is what the fp factor is.

KC#694

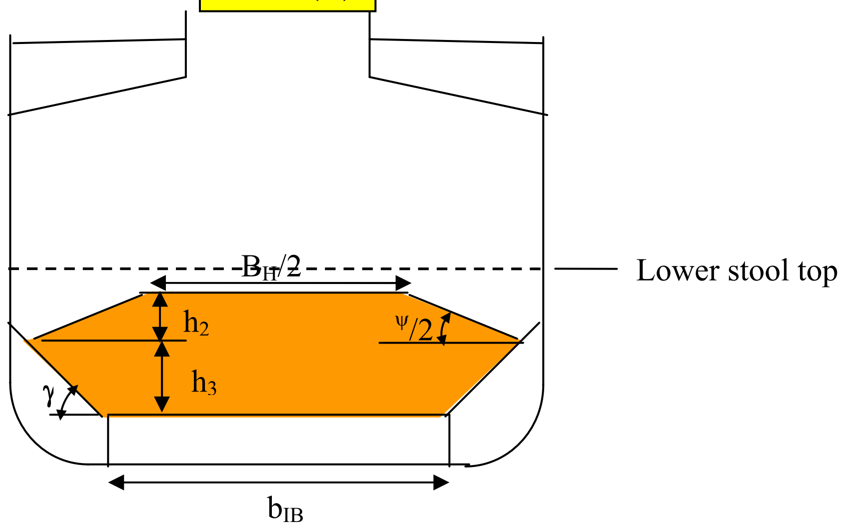


KC#851 Question

CASE (A)



CASE (B)



KC#851 Answer

Common Structural Rules for Bulk Carriers

Proposals for the calculation of the dry bulk cargo's upper surface height

20 May 2009

Revision history

Date	Author	Society	Description
20 Mai 2009	Etienne Tiphine	Bureau Veritas	Revision .

Table of contents

Overview of the problem

There is a possibility that, for certain combinations of hold geometries and cargo densities, the lower limit of the cargo's upper surface falls below the upper knuckle of the lower stool.

Unfortunately, this is not explicitly considered in the CSR BC documents.

DNV was the first to propose an approach. On this basis, this document provides another formulation, a variation on it and lastly a comparison of the results given by the current formulas in CSR BC and these 3 proposals.

DNV approach

In document "Calculation of Load height – DNV proposal – SESOL – 10th March 2009", the DNV establishes the following formula:

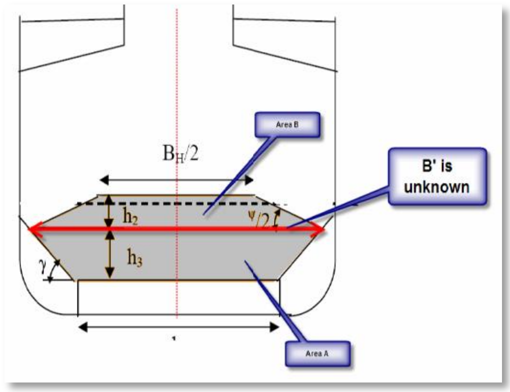


Figure 1: DNV proposal.

with the following assumptions:

- h_3 only to be calculated when h1 is less than 0
- Volume of transverse stools is assumed to be fully considered regardless of shape and height of cargo (Conservative)

The breadth B' is then given by:

$$B_{H.DNV} := \frac{\left(4\cdot\tan(\gamma)\cdot\rho_C\cdot b_{IB}^2\cdot l_H + \rho_C\cdot b_H^2\cdot l_H\cdot\tan\left(\frac{\psi}{2}\right) + 16\cdot\rho_C\cdot V_{TS} + 16\cdot M\right)^{0.5}}{2\cdot\sqrt{\rho_C}\cdot\sqrt{l_H}\cdot\sqrt{\tan(\gamma) + \tan\left(\frac{\psi}{2}\right)}}$$

BV proposals

First approach

As DNV, it is considered that the breadth of the horizontal part of the cargo's upper surface is $b_H / 2$ and that the volume of the lower transverse stool is fully considered in the calculations.

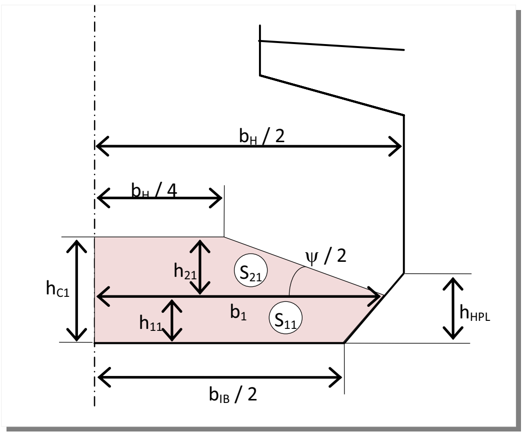


Figure 2: BV first approach.

$$b_1 := \sqrt{\frac{\frac{2}{l_H}\left(\frac{M}{\rho_C} + V_{TS}\right) + \frac{b_{IB}^2\cdot h_{HPL}}{b_H - b_{IB}} + \frac{1}{8}\cdot b_H^2\cdot\tan\left(\frac{\psi}{2}\right)}{\frac{h_{HPL}}{b_H - b_{IB}} + \frac{1}{2}\cdot\tan\left(\frac{\psi}{2}\right)}}$$

After some geometric calculations, the breadth b_1 is given by:

$$h_{11} := h_{HPL} \cdot \frac{b_1 - b_{IB}}{b_H - b_{IB}}$$

In turn, the other values are defined as follow:

$$h_{21} := \frac{1}{2} \cdot \left(b_1 - \frac{b_H}{2} \right) \cdot \tan\left(\frac{\psi}{2} \right)$$

And

$$h_{c1} := h_{11} + h_{21}$$

Second approach

Here the assumption is made that the breadth of the horizontal part of the cargo's upper surface is half of the breadth of the cargo's upper surface at its lower corner, i.e. b_2 / 2.

Similarly to DNV, the volume of the lower transverse stool is fully considered in the calculations.

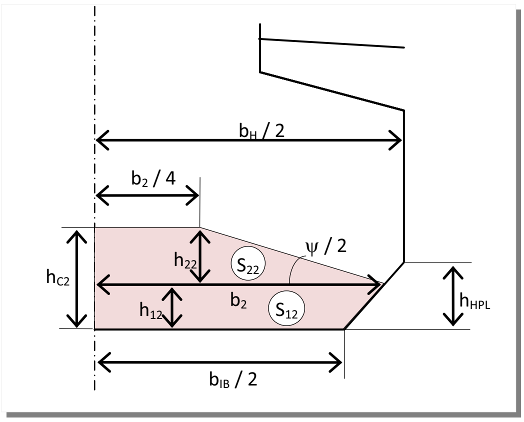


Figure 3: BV second approach.

After some other geometric calculations, the breadth b_1 is given by:

$$b_2 := \sqrt{\frac{\frac{1}{l_H}\left(\frac{M}{\rho_C} + V_{TS}\right) + \frac{1}{2}\frac{h_{HPL} \cdot b_{IB}^2}{b_H - b_{IB}}}{\frac{1}{2}\left(\frac{h_{HPL}}{b_H - b_{IB}} + \frac{3}{8}\tan\left(\frac{\psi}{2}\right)\right)}}$$

In turn, the other values are defined as follow:

$$h_{12} := h_{HPL} \cdot \frac{b_2 - b_{IB}}{b_H - b_{IB}}$$

$$h_{22} := \frac{1}{4} b_2 \cdot \tan\left(\frac{\psi}{2} \right)$$

And

$$h_{c2} := h_{12} + h_{22}$$

Sloped upper surface

The sloped part of the cargo's upper surface is given by the following formulas, provided all the heights given herein have been calculated:

CSR $$z_{CSR}(y) := h_{DB} + h_{HPL} + h_{13} - 2 \cdot \frac{h_{23}}{b_H}(2 \cdot y - b_H)$$

DNV / BV first approach $$z_{BV1}(y) := h_{DB} + h_{11} + \frac{2 \cdot h_{21}}{b_H - 2 \cdot b_1}(2 \cdot y - b_1)$$

BV second approach $$z_{BV2}(y) := h_{DB} + h_{12} - 2 \cdot \frac{h_{22}}{b_2}(2y - b_2)$$

Numerical comparisons

On the basis of the example provided by DNV in its document:

Hold geometry	Length of the hold	l_H	28.80	m
	Breadth of the hold	b_H	32.26	m
	Breadth of the inner bottom	b_{IB}	22.40	m
	Height of the hopper above the inner bottom	h_{HPL}	3.40	m
	Volume of the transverse stool	V_{TS}	187.40	m^3
Cargo description	Total mass in the cargo hold	W	8000.00	t
	Density of the cargo	ρ	3.00	t/m^3
	Angle of repose of the cargo	ψ	35.00	°

The following sets of values have been calculated:

Description	Variable	CSR BC	BV 1	BV2	DNV
Breadth of the cargo upper surface at the point of contact with the hopper	B' ; b_1 ; b_2	32.6000 m	28.6428 m	28.3136 m	28.6431 m
	h_0	3.4000 m			
	h_1	-1.7157 m	2.1527 m	2.0392 m	2.1526 m
	h_2	2.5429 m	1.9726 m	2.2318 m	1.9727 m
Height of the horizontal part of the cargo upper surface	h_C	4.2272 m	4.1253 m	4.2710 m	4.1253 m
Height of the upper surface at b_H / 4	$z(b_H / 4)$	4.2272 m	4.1253 m	3.9599 m	4.1253 m
Variations of h_C	/CSR		-2.41 %	+1.04 %	-2.41 %
	/BV1			+3.53 %	0.00 %
	/BV2				-3.53 %
Variation of B' ; b_1 ; b_2	/CSR		-12.14 %	-13.15 %	-12.14 %
	/BV1			-1.15 %	0.00 %
	/BV2				+1.15 %
Variation of $z(b_H / 4)$	/CSR		-2.41 %	-6.32 %	-2.41 %
	/BV1			-4.01 %	0.00 %

Verifications have been made by calculating the corresponding mass of cargo on the basis of the volume used by the cargo and its density. In each case, the initial value of 8000 t is obtained.

The following figure gives the different shapes of the cargo's upper surfaces.

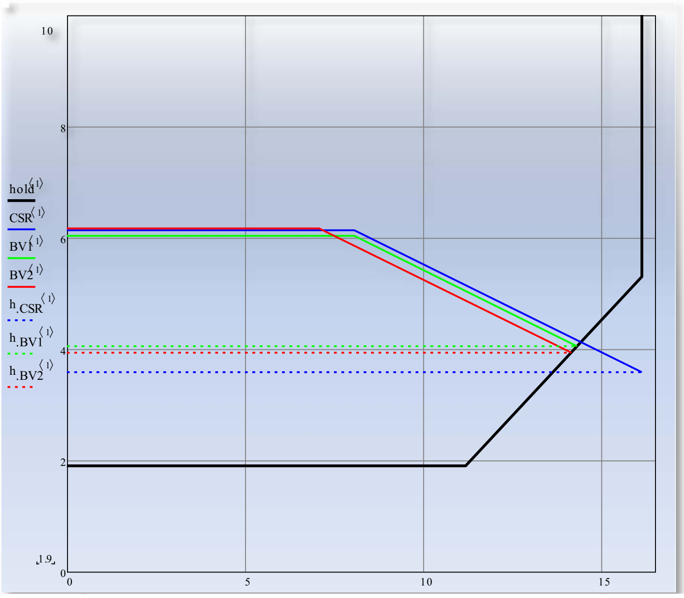


Figure 4: shapes of the cargo's upper surface.

Conclusion

The above values show that:

- DNV approach and BV first approach give the same results; the difference is only on the variables used in the formulas.
- The volume of the cargo is correctly given by the CSR formulation even for this kind of configuration.
- Regarding the differences between these 4 approaches:
  - All the horizontal parts of the cargo's upper surfaces are close from each others.
    Considering all the approximations already made for modelling the shape of the cargo, these differences are not significant;
  - The sloped parts of the cargo's upper surfaces have the same inclination.
    Hence, the only largest difference is between the current CSR approach and the second proposal made by BV, due to the difference in breadth of the horizontal part of the cargo's upper surface.
    However, these differences remain small and can be neglected;
  - The breadth of the hold submitted to the cargo load is significantly reduced in each of the 3 new propositions.

As the loads (dry bulk cargo pressure, inertial pressure, shear load…) are linear functions of the cargo height, the consequences of these differences are also limited.

The first intent of this proposal (DNV, BV1 and BV2 approaches) is to have a better description of the space used by the cargo in the hold.

The first drawback of these alternative proposals is the reduction of the breadth of the hold submitted to the cargo load compared to the current CSR BC approach.

The second drawback is the increase in the complexity of the rules for that part as it is needed to make the difference between the cases where the hold is filled above the hopper and those where the hopper is not fully covered by the cargo.

As the difference in the cargo height are not significant but as the impacted breadth of the hold is lesser with the new approach, it is more conservative and simpler to keep the CSR BC as they are.

However, it could be of interest to benefit of the forthcoming harmonisation for improving the bulk load approach.

KC#907

Dear Sir or Madam,

I have some questions about CSR for bulk carrier in Chapter 4 section 6 Internal Pressures and Forces

The dry bulk cargo pressure in still water Pcs is given by

$$p_{CS} = \rho_C g K_C (h_C + h_{DB} - z)$$

Where

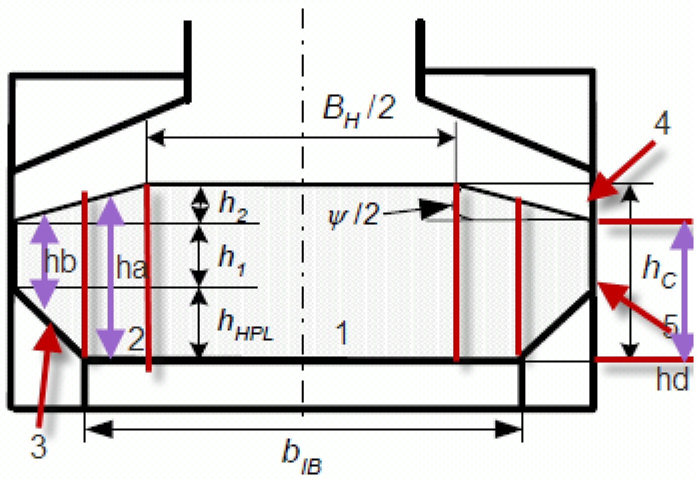
$K_C = \cos^2\alpha + (1 - \sin\psi)\sin^2\alpha$

α : Angle, in deg, between panel considered and the horizontal plane

ψ : Assumed angle of repose, in deg, of bulk cargo (considered drained and removed); in the absence of more precise evaluation, the following values may be taken:

Question 1

For loading condition where the cargo hold is not loaded to the upper deck (Chapter 4, Section 6, 1.1.2)



As shown in the figure above,

a. Whether the cargo pressures in the still water for inner bottom region 1 and 2 are the same or not since it seems that the cargo heights are different for these two areas? If not, the cargo pressure for inner bottom 2 should be $p_{CS} = \rho_C g K_C (h_a + h_{DB} - z)$ or not?

b. Whether the Pcs for the side area 4 is zero although this area is below hc ?

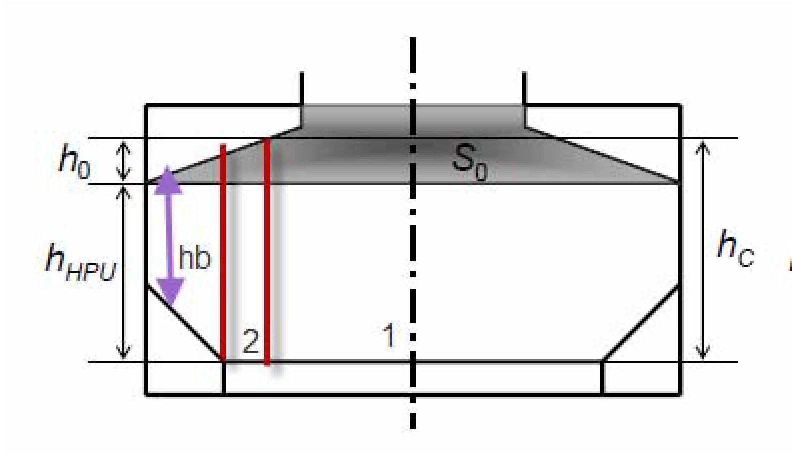
c. When calculating the still cargo pressures on the hopper tank plate, should I use

$p_{CS} = \rho_C g K_C (h_C + h_{DB} - z)$ or $p_{CS} = \rho_C g K_C (h_b + h_{DB} - z)$

d.For the cargo pressures on the side, should I use hd instead of hc?

Question 2

For loading condition where the cargo hold is loaded to the upper deck (Chapter 4, Section 6, 1.1.1)



a. In this case, what is the value of ψ? 0° or the angel between top side tank plate and the horizontal plane?

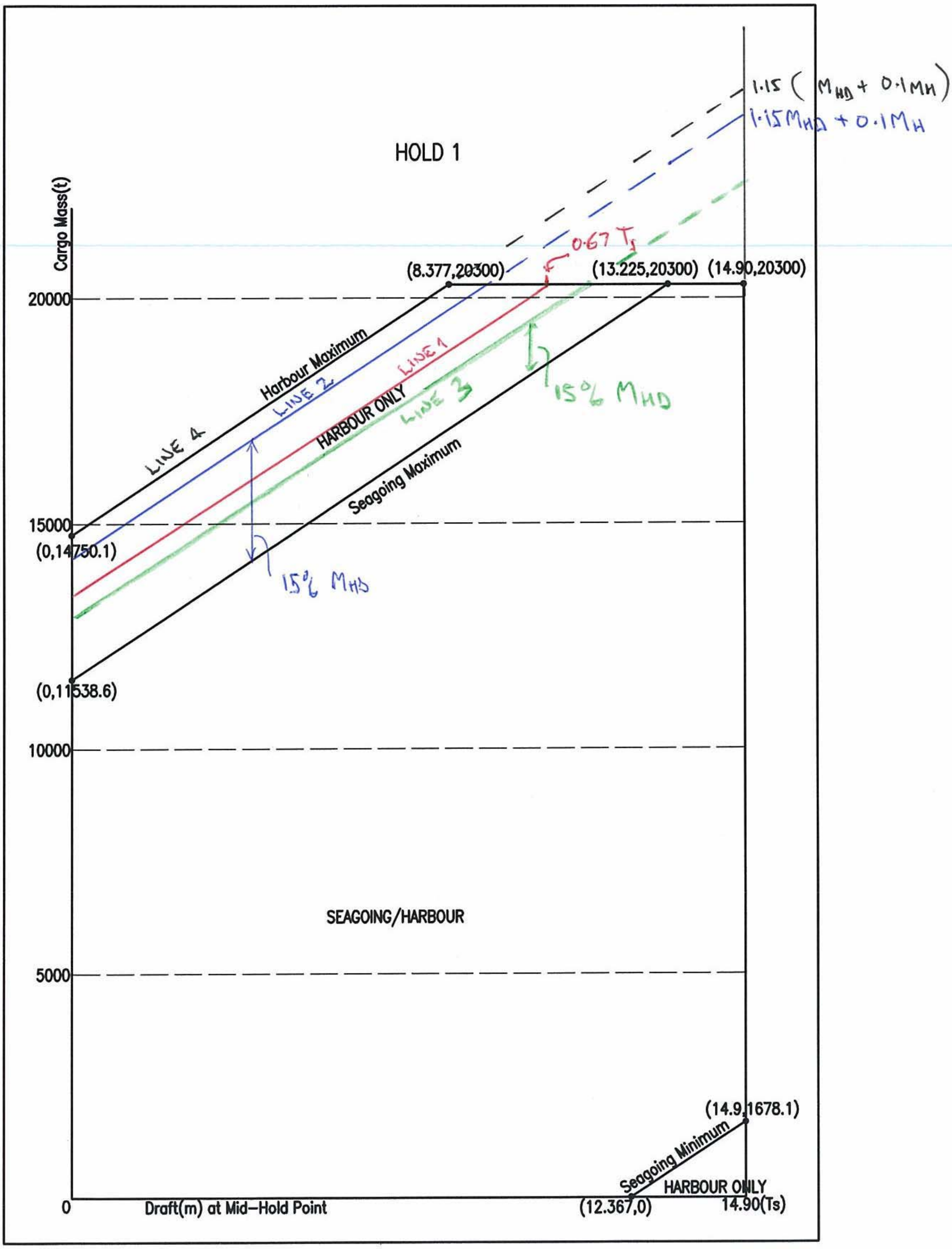
b. Whether the cargo pressures in the still water for the inner bottom region 1 and 2 are the same or not?

c. For the hopper tank plate, should I use hb instead of hc?

KC#987

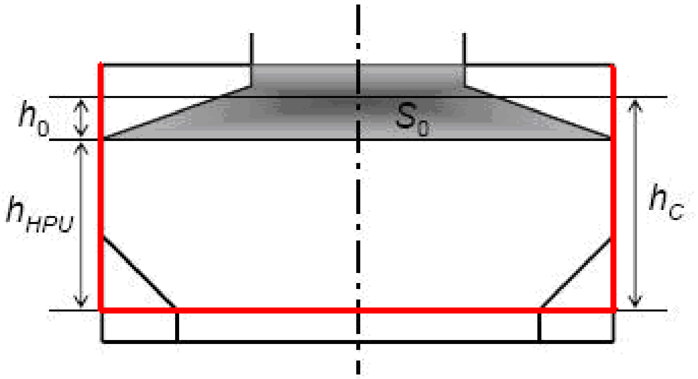
Cargo hold No.1

Cargo hold volume excluding hatch coaming,in m3	VH=12668.5 (m3)
Volume enclosed by the hatch coaming,in m3	Vhc=264.8 (m3)
Cargo hold volume including hatch coaming,in m3	Vfull=12933.3 (m3)
Maximum cargo mass in homogeneous loading,in t	MH=11100 (t)
Cargo mass with 1.0t/m3 of virtual density,in t	Mfull=12933.3 (t)
Maximum cargo mass in alternative loading,in t	MHD=20300 (t)



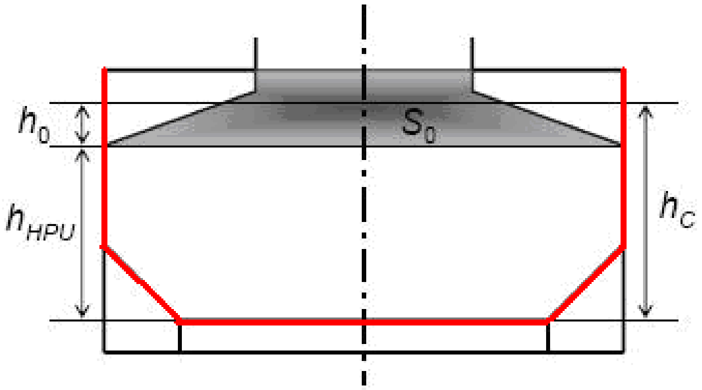
KC#1023

One:



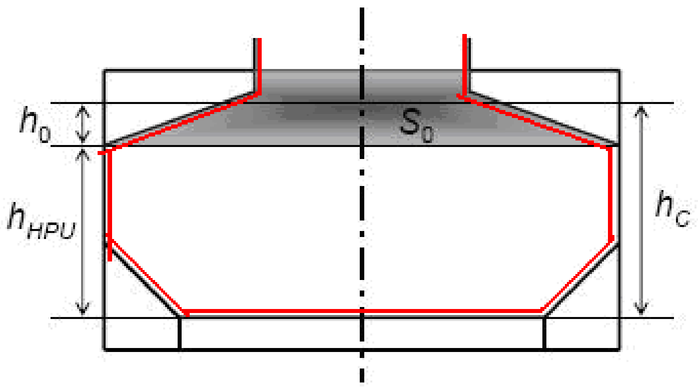
Single side bulk carrier

Two:



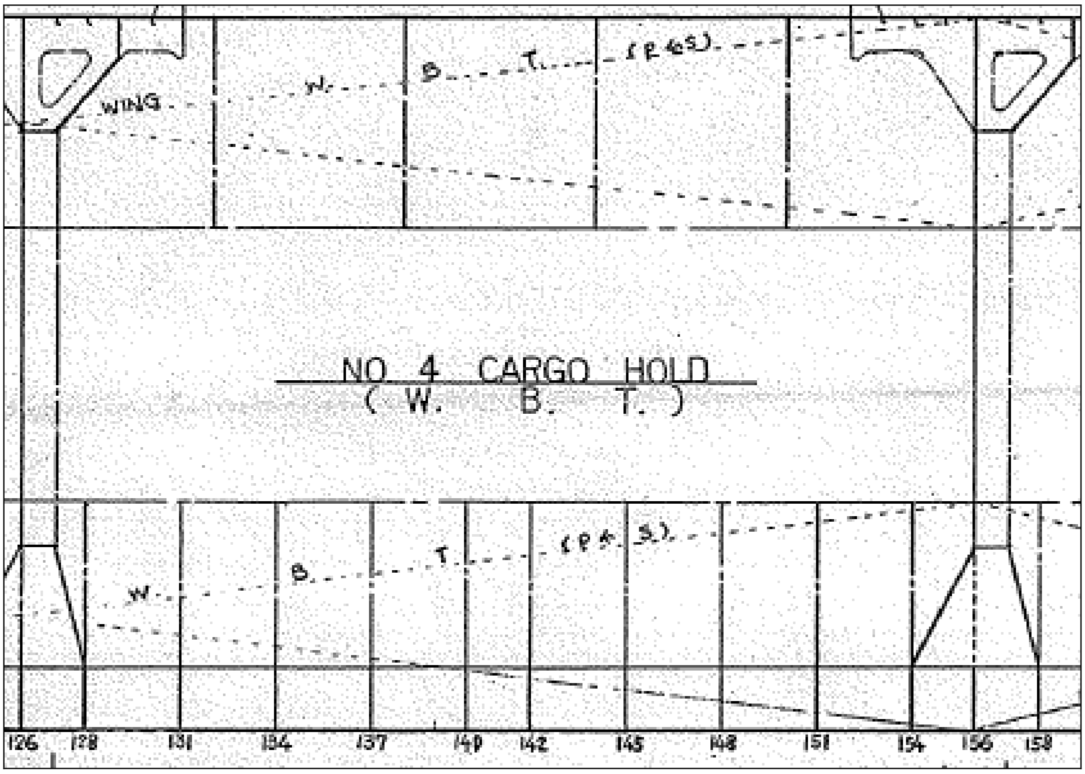
Single side bulk carrier

Three:



Single side bulk carrier

KC#1025



WING
W. B. T. (P & S)
NO 4 CARGO HOLD
(W. B. T.)
W. B. T. (P & S)
126
128
131
134
137
140
142
145
148
151
154
156
158

KC#1054

Regarding the hc value of the dry bulk cargo in full-filled condition in which the cargo hold is loaded up to the top of hatch coaming, Ch4/Sec6/1.1.1 of CSR-BC specifies the procedure of calculating the height of dry cargo upper surface(Method 1). Meanwhile a formula for calculating the hc value is given specifically for holds of cylindrical shape (Method 2).

For a typical bulk carrier, upper stools are generally arranged in the cargo hold. The hc values will be different by using the above two procedures. A detailed comparison between the two methods is given as below.

1. Method 1: Calculation of hc using "real volumes"

$hc = h_{HPU} + V_{upper\ part} / A_{lower\ part}$

$V_{upper\ part} = V_{MFULL} - V_{lower\ part}$

V_{MFULL}: Volume of the cargo hold including the volume enclosed by the hatch coaming.

$V_{lower\ part}$: Volume of the cargo hold filled up to the lower intersection of the top side tank and shell or inner side.

$A_{lower\ part}$: Area of the upper surface of $V_{lower\ part}$(red area in Fig. 2).

$V_{upper\ part}$: Volume of the cargo hold part above the lower intersection of the top side tank and shell or inner side, excluding the volume of upper stool.

h_{HPU}: Vertical distance between inner bottom and lower intersection of top side tank and shell or inner side.

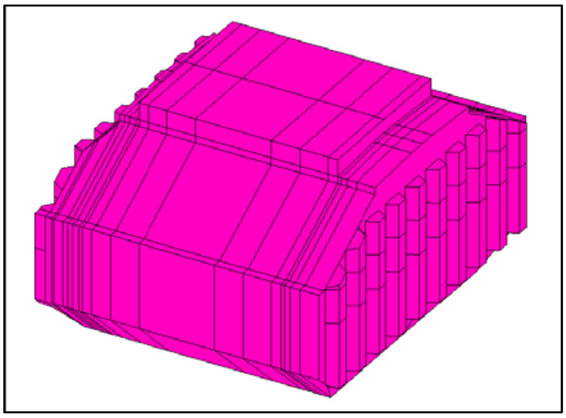


Fig1: V_{MFULL}

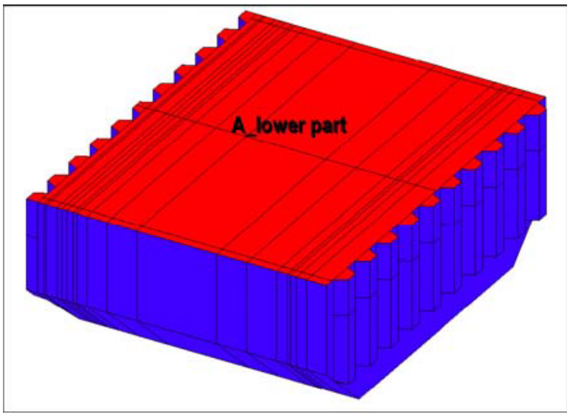


Fig2: $A_{lower\ part}$

2. Method 2: Calculation of hc using "formula"

hc = $h_{HPU} + h_0$

where:

$$h_0 = \frac{S_A}{B_H}$$

$$S_A = S_0 + \frac{V_{HC}}{\ell_H}$$

h_{HPU}: Vertical distance, in m, between inner bottom and lower intersection of top side tank

and side shell or inner side, as the case may be, as defined in Fig 3.

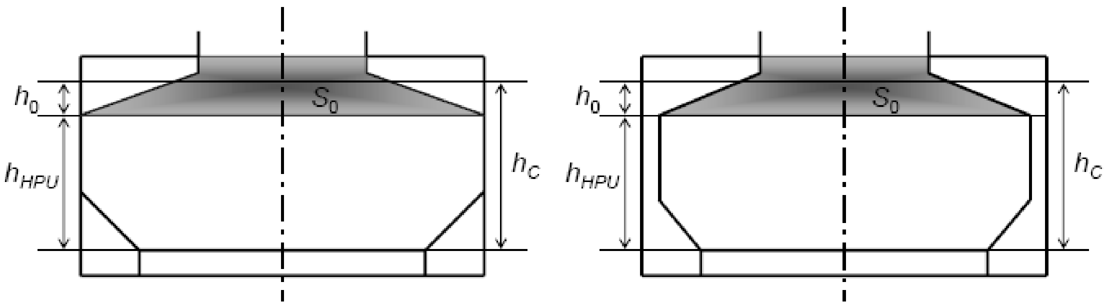
S_0: Shaded area, in m^2, above the lower intersection of top side tank and side shell or inner side, as the

case may be, and up to the upper deck level, as defined in Fig 3.

V_{HC}: Volume, in m^3, enclosed by the hatch coaming.

ℓ_H: Length, in m, of the compartment.

B_H: Mean breadth of the cargo hold, in m.



Single side bulk carrier Double side bulk carrier

Fig3: Definitions of hc, h_0, h_{HPU} and S_0

3. Pressure comparison of the two different methods for hc calculation:

Loading condition:

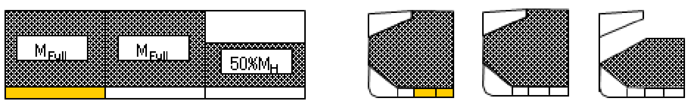


Fig4: Full-filled loading condition

Elements for pressure comparison:

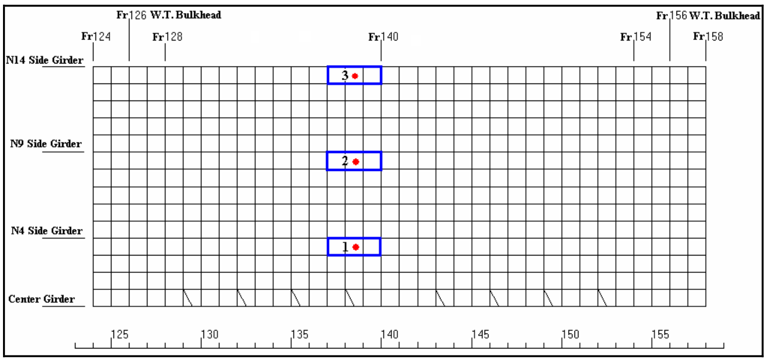


Fig5: Elements for Inner Bottom Plate

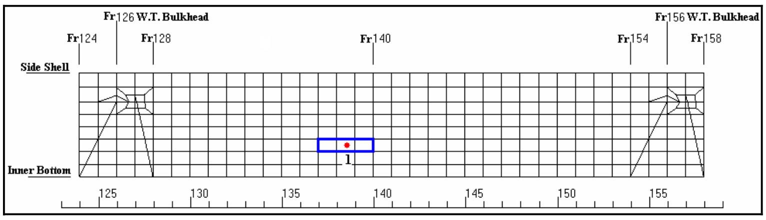


Fig6: Elements for Bilge Hopper Plate

Pressure comparison of the two different methods:

Structural Member	Point ID	Port/Starboard	Pressure(N/mm^2)	
			Method1 (hc=16.024 m)	Method2 (hc=16.212 m)
Inner Bottom Plate	1	P	0.2171	0.2196
		S	0.2128	0.2154
	2	P	0.2190	0.2215
		S	0.2110	0.2135
	3	P	0.2214	0.2239
		S	0.2086	0.2111
Bilge Hopper Plate	1	P	0.1590	0.1609
		S	0.1441	0.1460

4. Cause of the difference

In method 1, the volume of upper stool within cargo hold is deducted from the volume of upper part. The volume is real cargo volume.

In method 2, the volume of upper stool within cargo hold is included in the volume of upper part. Obviously, the volume is approximate to the real cargo volume.

There is no difference between the two methods for the cylindrical shape hold **without Upper Stool.**