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

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attachment
27	7/4.4.2.1	Question	bow flare slamming pressure	2006/4/5	As gamma decreased, the bow flare slamming pressure should increase. Please incorporate this effect. It is well known the smaller bow flare angle gives the greater impact pressure due to pitch motion.	The Rules are concerned with the bow impact pressure (not bow flare slamming pressure) as a result of the bluff bow of the ship moving forwards into the on-coming waves. Because most tankers have very full bows, then the phenomena of bow flare slamming as a consequence of the combined heave and pitch of the ship to the waves is not so critical. Hence this has not been addressed in this version of the Rules.	
66	7/2.1.4	Question	loading condition	2006/5/5	The calculated value is much higher than that of the actual loading condition, especially at midship and forward part. So, this requirement is to be deleted or mitigated.	The Rule required still water shear force is in line with the shear generated from the loading patterns used in the finite element analysis and also close to that shown in actual loading manuals. The minimum shear requirements have been included to ensure a certain degree of operational flexibility regardless of conditions in the manual. It should be further noted that the minimum values are in no way extreme as they are based on conditions with all cargo tanks across empty on a draught of 0.55Tsc/0.9Tsc for ships with two and one longitudinal bulkhead respectively and draught of 0.8Tsc/0.6Tsc for all cargo tanks across full for ships with two and one longitudinal bulkhead respectively. Review of typical loading manuals show that the Rule minimum value is less than typical maximums found in the manual but higher than the permissible limits for bulkheads that are not designed for uneven loading. The consequence of the Rule minimum shear requirement is that there will be no change in scantlings for the bulkhead in way of maximum shear from manual but the longitudinal bulkhead in way of some of the other transverse bulkheads might need a slight increase locally. The amount of patch work strengthening will be reduced and the operational flexibility will be increased.	
83	7/4.2.3.6	Question	sloshing pressure	2006/9/5	For tanks with internal longitudinal stringers and or girder/web frames, the distribution of sloshing pressure across these members is shown in Figure 7.4.4.It is understood that the sloshing pressure for the brackets of these members is 20 kPa as discribed in 7/4.2.4.1. This answer is now superseded by the answer to KC ID 899.	Correct. This is also clarified in Section 8/6.2.2	
125	7/2.2.3.1 & 7/2.2.3.5	Question	ρ for ships carrying cargo with high specific gravity	2006/9/26	What is the value of ρ to be used for Harbour condition and Tank testing calculation in the case of ships designed to carry cargo with high specific gravity?	The value of ρ to be used is as follows: In Harbour --- Designed specific gravity of the tank Tank Test --- 1.025	

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143	7/3.3.3.3	CI	Definition of Cb-LC	2006/9/27	In 7/3.3.3.3, the definition of Cb-LC is not provided. How this definition should be interpreted ?	The definition of Cb-LC is to be interpreted as: Cb-LC = DeltaLC / (L B TLC) where: DeltaLC: moulded displacement volume at TLC, in m^3; TLC: draught at amidships, in the loading condition being considered, in m.	
199	7/4.2.1	Question	impact assessment	2006/11/5	As for the additional impact assessment, assessment procedure should be unified by IACS.	The majority of tank dimensions will comply with the limits quoted for the applicability of the sloshing formula. Therefore it is not expected that an impact assesment will be carried out for conventional designs as a matter of routine. For this reason the agreement of a unified assessment procedure for sloshing is included in the "list of items for long term" development.	
235	7/4.3.2	Question	BWE conditions	2006/11/30	The operation of ballast water exchange in heavy weather is assumed in the bottom slamming requirement. This is considered excessive because ballast water exchange should be carried out in calm sea. The loading condition for ballast water exchange should be excluded from the conditions on which the reinforcement for bottom slamming is based.	Comment is noted. We are conducting investigating into the issue raised.	
240	7/4.2.1.2	Question	impact assessment	2006/10/30	Corrigenda 2, Text 7/4.2.1.2 1) Editorial correction. Instead of 0.095, it should be 0.95hmax. 2) As for the additional impact assessment, the assessment procedures should be unified by IACS.	1)This has been corrected in Corrigenda 2. 2)The majority of tank dimensions will comply with the limits quoted for the applicability of the sloshing formula. Therefore it is not expected that an impact assesment will be carried out for conventional designs as a matter of routine. For this reason the agreement of a unified assessment procedure for sloshing is included in the "list of items for long term" development.	
241	Fig 7.4.6	Question	bow impact angle	2006/11/8	Please correct Figure 7.4.6 according to the description of bow impact angle.	The figure is correct, but we will consider clarifying the rule text.	
335	7/4.3.1	Question	BWE conditions	2007/1/23	Where minimum draft of some loading conditions during the sequential ballast water exchange is less than 0.02 L (e.g. about 0.016L on a VLCC), how to determine the reinforcements for slamming in this case?	The requirement was based on LR Rules for Ships, Part 3, Chapter 5, Section 1.5 and the formulae were good for minimum draft forward between 0.01L and 0.045L. Therefore it is technically acceptable to apply the requirements for ships having bottom draft not less than 0.01L.	
421	7/2.2.3.3	Question	Flow Through Pressure	2007/6/11	Even if Flow-Through Method is used, it might be possible to reduce the pressure during pump operation by special consideration for pipe arrangement or pumping operation. In such cases, is it possible to use the actual pressure drop less than the default value of 25kN/m2?	The pressure drop for calculation of flow-through pressure should be taken as a minimum 25kN/m2. This value needs to be increased where piping arrangements may lead to a higher pressure drop in accordance with Section 7/2.2.3.3.	

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434	7.4.6	Question	Formula	2007/5/1	According to the formula of the bow impact pressure, the maximum pressure is found for a flare angle of 90 degrees. However, if we follow the figure 7.4.6, 90-degree flare angle means a absolute vertical side shell. This kind of bow shape should have lower wave impacting pressure. Can you confirm your formula and/or your figure?	The formula and figure are correct. The Rules are concerned with the bow impact pressure as a result of the bluff bow of the ship moving forwards into the on-coming waves. Because most tankers have very full bows, then the phenomena of bow flare slamming as a consequence of the combined heave and pitch of the ship to the waves is not so critical. Hence this has not been addressed in the current Rules.	
435	7/2.2.3.3	Question	Ballast Tank	2007/6/12	According to Table 7.6.1, the pressure in Static (harbour/tank testing) condition of ballast tanks (excluding flow-through BWE operation) is to be taken as the greater of: a) Pin-test, and b) Pin-air + Pdrop where, Pdrop is added overpressure due to sustained liquid flow-through air pipe or overflow pipe in the case of overfilling or filling during flow through ballast water exchange as defined in Section 7/2.2.3.3. In this connection, is it necessary to add Pdrop of 25kN/m2 in the above item b)? Please note that in general “overfilling” is not supposed to be done. Also, flow through ballast water exchange is not applicable since this question is for “static” condition.	Water discharging out of air pipes may be unacceptable in general. However, accidental overfilling ballast tanks is not unusual event. Therefore, the added overpressure Pdrop of 25kN/m2 is to be applied for such accidental overfilling.	
503	7/4.3.2	Question	Slamming Pressure	2007/8/27	Slamming pressure : The operation of ballast water exchange in heavy weather is assumed in the bottom slamming requirement. This is considered excessive because ballast water exchange should be carried out in calm sea. The loading condition for ballast water exchange should be excluded from the conditions on which the reinforcement for bottom slamming is based.	This question has been handled also previously in the Knowledge Center and the answer was "Comment is noted. We are conducting investigating into the issue raised." We have investigated the possibility to change this requirement and concluded that we will keep the requirement as is at the moment. Bottom slamming calculation at minimum ballast water exchange draught was introduced consistently for CSR Bulk and Tank at late stage of the CSR development as a response to question from Owner representatives on when and under what conditions ballast water exchange can take place. Another option considered was to introduce a new "operational condition" and this would have complicated the rules further.	
506	7/3.4	Question	Reducing the dynamic hull girder loads	2007/9/5	Is there a possibility to reduce the dynamic hull girder loads for a CSR Tanker, if it operates solely in a restricted area, like the Caspian Sea?	In case the tanker is designed particularly for operation in lake or river and will not be ocean going, then the CSR notation is not mandatory. However in case the CSR notation required or desired for possible future ocean going operation, then the dynamic loads given in the rules need to be applied without reduction.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attachment
575 attc	7/4, 8/2, App.B & App.C	CI	Tank approval procedure for cargo tanks	2008/3/28	Please clarify CSR tank approval procedure for cargo tanks design for carriage of high density cargo with partial filling and restriction on max filling height.	Please see attached file: 2.9 - (CIP) Common Interpretations April 2008	Y
588	7/6.2.1.1 & Table 7.6.1	Question	Ballast water exchange with Dilution method	2008/1/26	According to Table 7.6.1, no requirements are given for ballast water exchange with "Dilution Method". Dilution Method means that the ballast water is filled through the top of the tank and simultaneous discharged from the bottom at the same flow rate. The ballast exchange system maintains this process to keep a constant level in the tank. In case of malfunction of ballast exchange system or of the discharge pump it can happen that the ballast water can flow through overflow or other arrangements. Kindly please clarify how to handle the method.	The pressure in the tank during ballast water exchange with "Dilution Method" is assumed equal to or lowers than pressure with full ballast tank. Introduction of a particular design load case is therefore not considered applicable.	
710	7/2.1.3.2	CI	Longitudinal bulkhead scantling	2008/4/14	1) What is the CSR rule requirement for longitudinal bulkhead scantling between T.BHD and mid of cargo tank against the assigned SWSF? 2) For determination of scantling at the mentioned area, can you accept the scantling based on the structural capacity as built against the envelop values from the loading manual rather than the scantling determined by interpolation between BHD and mid of cargo tank? In CSR Tanker Rule, the permissible still water shear force is mentioned as follows; 2.1.3.2 The permissible hull girder positive and negative still water shear force limits are to be given at each transverse bulkhead in the cargo area, at the middle of cargo tanks, at the collision bulkhead and at the engine room forward bulkhead. 2.1.3.3 The permissible hull girder positive and negative still water shear force envelope is given by linear interpolation between values at the longitudinal positions given in 2.1.3.2.	1)Scantlings should be sufficient to cover envelope curve of permissible SWSF at the longitudinal position being checked. 2)No, shear force permissible envelop values shall be used.	
865	7/3.5.2.3	Question	dynamic wave pressure	2009/1/14	Intermediate values of the dynamic wave pressure pseudo-amplitude, Pex-amp between the still waterline and z = TLC + hWL (or D) are to be obtained by linear interpolation. When 'TLC+hWL' is greater than 'D', Pex-amp will be zero at 'D' by the paragraph, 'Pex-amp = 0 for z ≥ TLC + hWL or D, whichever is the lesser' and intermediate values will be obtained on the basis of 'Pex-amp is zero at D'. The question is that our application is correct or not. If possible, please explain why the application of dynamic wave pressure is different between the scantling requirements and fatigue strength. For the calculation of the dynamic wave pressure of scantling requirements, there is no limitation of 'D' (Sec.7/3.5.2.2)	The pressure for fatigue is based on a probability level of 10^-4 and the scantling requirements based on a pressure derived from a probability level of 10^-8. This leads to a difference in the pressure. For the scantling evaluation at 10-8 green sea is considered. The wave at 10^-4 probability level is not expected to reach the deck and hence not considered in fatigue considerations. The limitation in "D" is to ensure the pressure is zero at deck level.	

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886 attc	7/3.5.2.3	CI	dynamic wave pressure	2009/6/17	1. Dynamic wave pressure for fatigue strength below waterline is to be obtained by linear interpolation according to Fig.7.3.7. It may be obvious that the pressure at waterline is to be calculated by using y-coordinate equal to Blocal/2. However, it seems that the definition of y-coordinate for another pressure at lower end (at z=0 or z=Tlc - hwl) is not clear. Please confirm if the following understandings are correct. (1) In case of (Tlc - hwl)<=0, the pressure at z=0 is to be used for the interporation. In such a case, the pressure should be calculated by using y-coordinate at flat bottom end or start point of bilge-R. (2) In case where side shell plate is not vertical and y-coordinates of side shell are not constant, y-coordinate of the side shell at z=(Tlc - hwl) should be used. Please refer to the attached sketch. 2. Although Fig.7.3.7 indicates that dynamic wave pressure above waterline is also to be obtained by linear interpolation, the text does not give specific instructions. Please clarify. It is understood that, if (Tlc+hwl)>D, the interpolation should use pressures of Pwl/2 at waterline and 0(zero) at D.	1. (1) P_blocal should be used. (2) Actual co-ordinate should be used. 2. If (Tlc+hwl)>D, the pressure should be obtained by linear interpolation between pressure of Pwl/2 at waterline and 0(zero) at D.	Y
899	7/4.2.2.6	Question	sloshing pressure	2009/10/29	For tanks with internal transverse bulkhead stringers and/or web frames, the distribution of sloshing pressure across these members is shown in Figure 7.4.3. Is it understood that the sloshing pressure for the brackets of these members is 20 kPa as described in 7/4.2.4.1?	The actual calculated sloshing pressure is to be applied; 8/6.2.5 to be applied so the greatest one among Pshl-lng, Pshl-t, Pshl-wf and Pshl-min to be applied to the PSM and stiffeners, bracket(tripping) on PSM. Note: The answer in the previous KC ID 83 is superseded by the above answer.	
925	Text 7/4.4.2	Question	design ballast draught	2009/6/17	The minimum design ballast draught is considering the normal ballast condition for bow impact, (CSR Tanker Section 7/4.4.2). However, all local scantling is to be applied the minimum design ballast draught for any ballast loading condition, (CSR Tanker Section 4/1.1.5.2). Which ballast condition to be applied for bow impact, the "normal ballast condition" or "any ballast loading condition"?	The ballast draught in 7/4.4.2.1 is to be taken as the minimum design ballast draught as defined in Section 4/1.1.5.2.	
1011	Table 7.6.5	CI	Accelaration factors	2010/1/19	In Table 7.6.5, there are two acceleration factors for longitudinal acceleration for Load cases 4a and 4b, i.e. "a_lng-mid" and "a_lng-ctr", and it is not clear which of these is to be used for U-shape ballast tank. Please confirm.	"a_lng-ctr" is to be used since it represents the factor for a center of the geometry of U-shape ballast tank.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attachment
1053 attc	7/3.5.2.3	Question	Dynamic wave pressure, clarification of answer to KC ID 886	2010/8/12	According to the answer to KC886, the pressure at z=0 is to be calculated by using a y-coordinate equal to Blocal/2 in the case of (Tlc-hwl) <=0. We wish to confirm the following two points: 1) In case of Tlc-hwl<=0: We understand that the pressures for stiffeners located i.w.o bilge R section are to be obtained through linear interpolation by using y=Blocal/2. (See attachment (1)) Please confirm. 2) In case the side shell is not vertical: Although actual coordinate values are used for calculation point when Tlc-hwl>0, are y=Blocal/2 and z=0 used when Tlc-hwl<=0? If so, the pressure should be much different depending on the sign of "Tlc-hwl". (See attachment (2)) Please confirm.	Item 1) Your understanding is not correct. The pressure at P_blg is obtained by interpolating between P_blocal and the pressure at Blocal/4 (Note the pressure at P_blocal is a reference point). The same principle is applied to the side shell. The pressure P1 is obtained by interpolating between P_blg and the pressure at the upper turn of the bilge. Item 2) When Tlc-hwl<0 the pressure Pex-dyn should be used with actual y co-ordinate. Note: Your attachment uses the term P_blg different from the Rules Pbilge (see Figure 7.6.1, 7.6.2).	Y
1070	Text 7/4.2.2.1, Tanker 7/4.2.3, 4.2.4, 8/6.2	RCP	Sloshing pressure in tanks due to longitudinal or transverse liquid motion	2010/11/4	The sloshing pressure in tanks due to longitudinal or transverse liquid motion is defined in rules Sec. 7/4.2.2 through 4.2.4. In Sec.8/6.2, the scantling requirements for boundary and internal structure of the tanks subject to sloshing loads are specified which the scantling formulas have the same form of table 8.2.4, but the pressure is well-defined as the max value of sloshing pressure Pslh-lng,Pslh-t, Pslh-min. It's to be noted that other static and dynamic loads are not considered. According to CSR OT TB, rules for assessment of sloshing pressure and scantling requirement are based on DNV Rule Pt.3 Ch.1 Sec.4 C306, which indicate the sloshing pressure is considered together with other load (P1~P9) as defined in table1 in Pt.3 Ch.1 Sec7, Sec8 and Sec9. Therefore the pressure P for scantling assessment should be P=Pslh+max(P1~P9). Please clarify the difference between current CSR OT rules and DNV rules.	The application of sloshing pressure in DNV rule is same as CSR. Your interpretation (P=Pslh+max(P1~P9)is not correct since the greater of "minimum sloshing pressures given in Table in Pt.3 Ch.1 Sec7 to Sec9 and the calculated sloshing pressure according to Pt.3 Ch.1 Sec.4 C306 to C310" shall be applied. Basically the sloshing pressure can not be added to the normal pressure for scantlings.	
1092	7/6.1.1.1	RCP	Sloshing pressure to include also the still water pressure	2011/2/7	Please refer to KC 1070. We understand that the dynamic loads part (level1 and level2) in sloshing is considered by CSR, but impulsive loads are not, which is refered to individual Classification Society rules. According to the rules of CSR OT Ch7 Sec6 design load combination, S, S+D and A are to be use for scantling calculation. However sloshing pressure applied in scantling calculation is treated as dynamic load, D. So it is conflicting to the definition of load combination. We think sloshing pressure in CSR should include still pressure part, and is to be in compliance with "S+D" of load combination .	1) In Table 2.5.1, it is found that sloshing is one of the load combination types to itself. 2) In Section 2/5.4.1.8, it is clearly explained that AC1 is applicable to sloshing case. 3) For the scantling against sloshing pressure, Table 8.6.1 and Table 8.6.2 should be considered.	

CI-T 2
(Mar. 2008)

Approval of high density cargo limitation on max filling height

Rule Section

7/4	Sloshing and impact loads
8/2	Cargo Tank Region
App. B	Structural Strength Assessment
App. C	Fatigue Strength Assessment

Description

What calculation procedure applies for approval of high density cargo with restriction on max filling height?

Common Procedure

Filling height of high density liquid cargo, h_{HL}, is not to exceed the following:

$$h_{HL} = h_{tk}\left(\frac{\rho_{appd}}{\rho_{HL}}\right)$$

where,

h_{tk}: tank height
ρ_{appd}: maximum density approved for full filling
ρ_{HL}: density of intended high density cargo

LSM/PSM pres. requirements (Sec.8/2)
no additional checks (assuming ρ_{HL} results in bottom pressures equal to that resulting from density of sea water)

Sloshing(7/4)
- Density of intended high density cargo at maximum filling height and below to be used
- If multiple densities of heavy cargo are intended, it may be necessary to assess sloshing with multiple densities with each corresponding maximum filling height.

Fatigue assessment
Sec.2/3.1.8.2 cargo density of homogeneous fulload condition at full load design draught, T_{full}, minimum 0.9tonnes/m^3.
The cargo density of 0.9 tonnes/m^3 or the cargo density of homogeneous full load design draught, T_{full}, whichever is greater, is to be used. 2. As specified in Section 2/3.1.10.1.(g), higher cargo density for fatigue evaluation for ships intended to carry high density cargo in part load conditions on a regular basis is an owner's extra. Such owner's extra is not covered by the Rules, and need not be considered when evaluating fatigue strength unless specified in the design documentation.

FE assessment
Additional load cases for reduced filling height of a tank are to be based on the standard load cases (full tank) with the density modified as:
$\rho_{appd} = \rho_{HL} \times (h_{HL} / h_{tk})$

Loading Manual
Maximum permissible filling height of high density liquid cargo is to be indicated in the loading manual.

Implementation date

This CI is effective from 1 April 2008.

Background

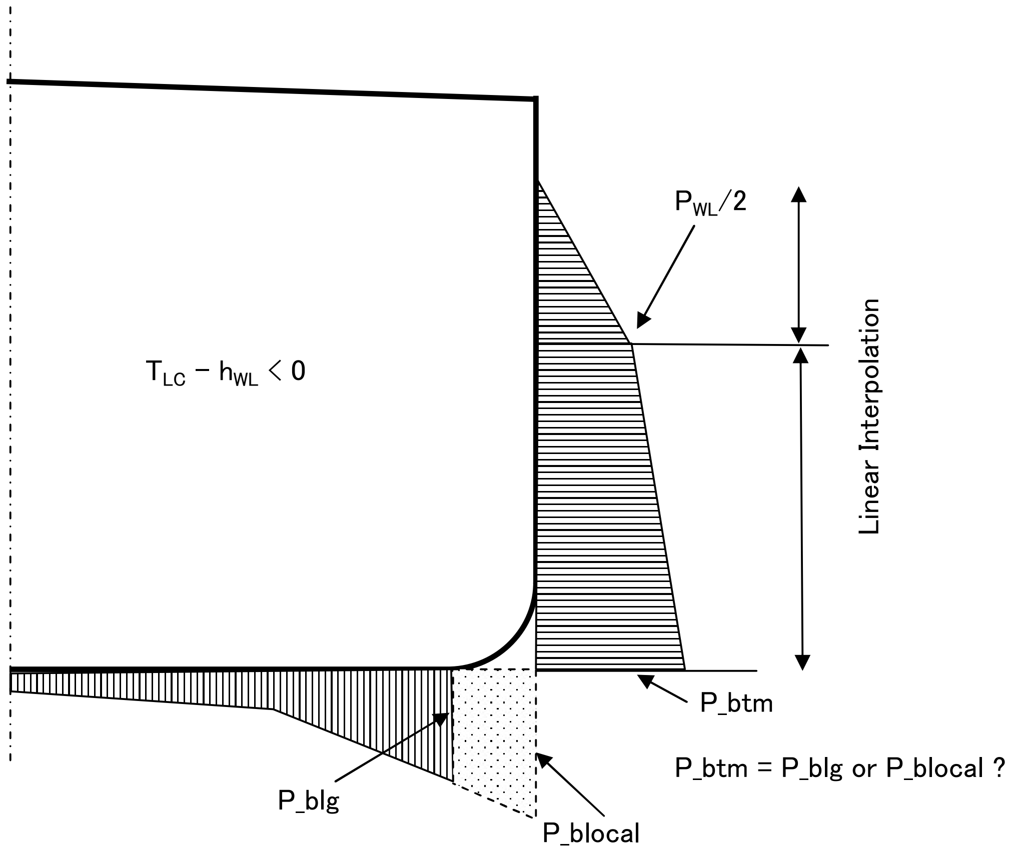
LSM/PSM pres. requirements (Sec.8/2):
Based on density of sea water, which gives same pressures (within a small margin) as that of reduced filling, hence no additional calculations necessary

Sloshing
HL filling will give increased sloshing pressures, hence need to be checked

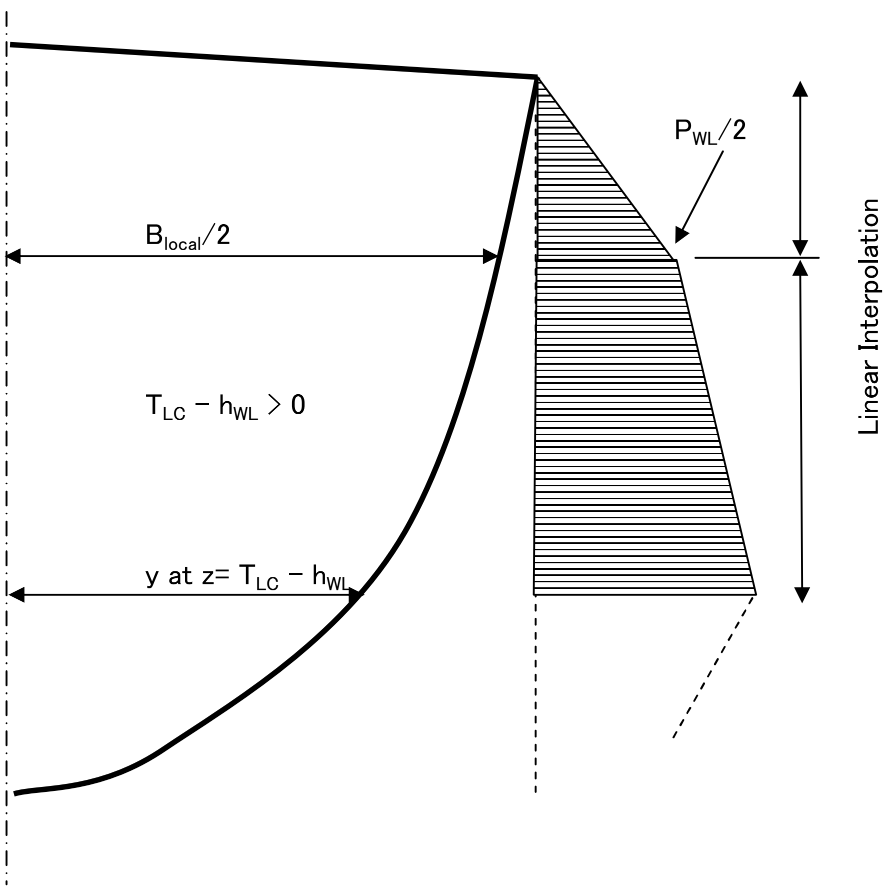
Fatigue assessment
Requirement is given in Sec.2/3.1.8.2. Is normally based on cargo density from loading manual, however it is shown that increased density have no effect on fatigue life (dominated by ballast condition below NA) except from uppermost stiffeners in cargo tank, which will not be subject to pressure due to reduced filling.

FE assessment
The principle in CSR is that there are predefined load cases and additional load cases need to be added if the loading manual shows more severe conditions than that assumed in the CSR load cases.

KC#886

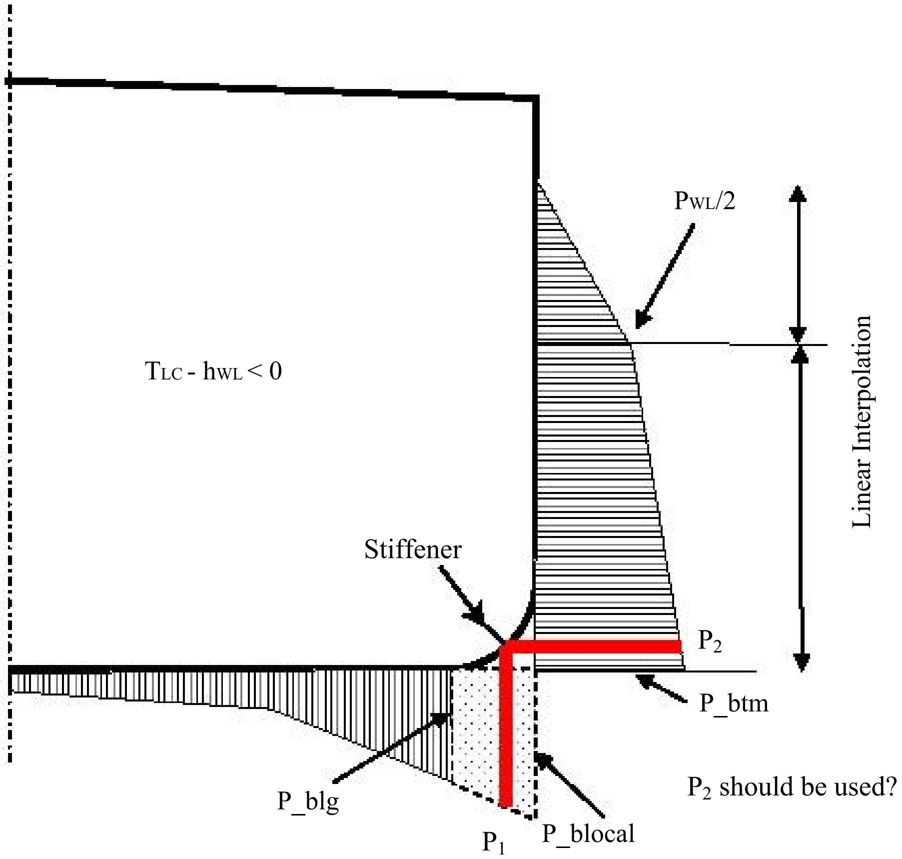


$P_{WL}/2$
$T_{LC} - h_{WL} < 0$
Linear Interpolation
P_btm
P_btm = P_blg or P_blocal ?
P_blg
P_blocal

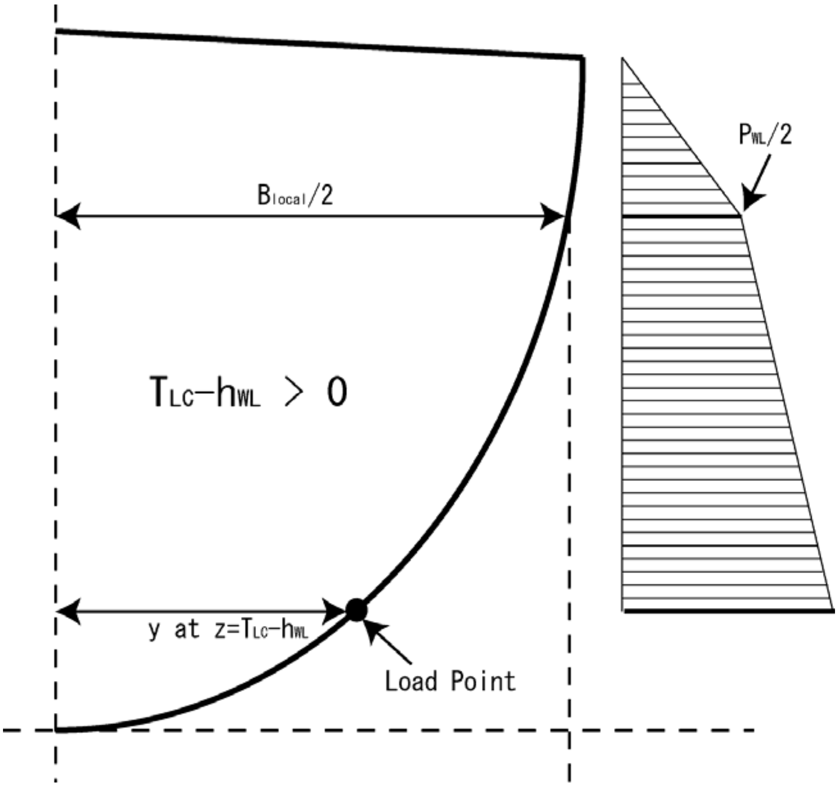


$P_{WL}/2$
$B_{local}/2$
Linear Interpolation
$T_{LC} - h_{WL} > 0$
y at z= $T_{LC} - h_{WL}$

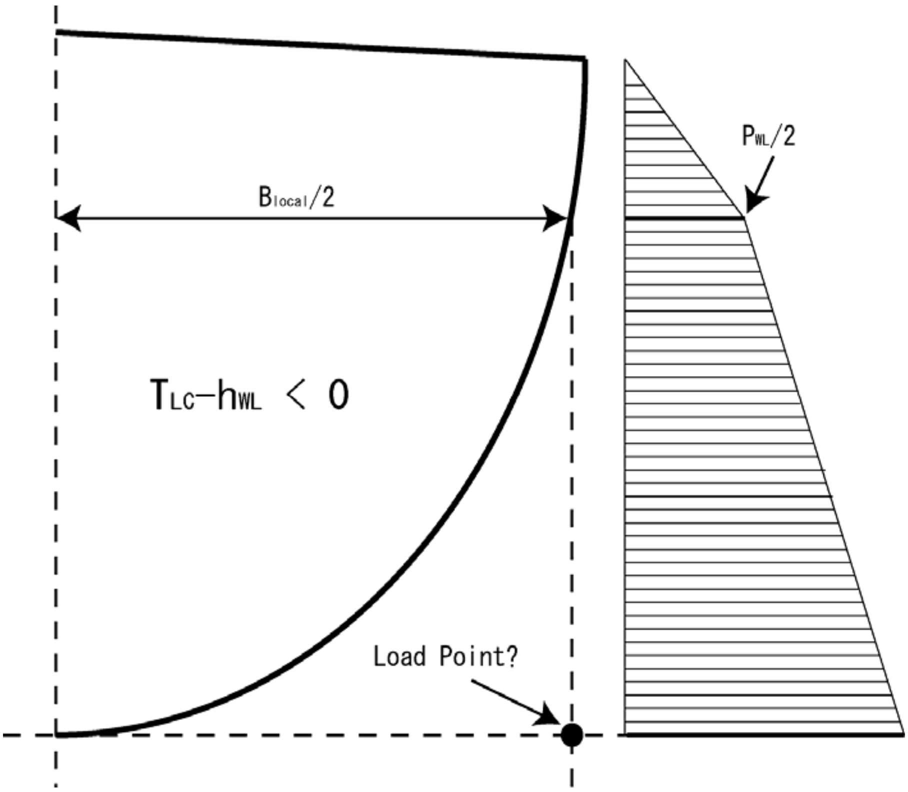
KC#1053



PWL/2
TLC - hWL < 0
Linear Interpolation
Stiffener
P2
P_btm
P2 should be used?
P_blg
P1
P_blocal



$P_{WL}/2$
$B_{local}/2$
$T_{LC}-h_{WL} > 0$
y at z=$T_{LC}-h_{WL}$
Load Point



$P_{WL}/2$
$B_{local}/2$
$T_{LC}-h_{WL} < 0$
Load Point?