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

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attachment
323	Table 11.2.2 & Text 11/2.2.6.1	Question	fillet weld	2007/1/12	The fillet welds to apply for the connection of collar plates with ordinary stiffener and with web of primary members is not defined clearly in Table 2 of Chapter 11, Section 2. Please clarify this matter?	The check of welding shear section attaching shell ordinary stiffeners to primary member is effectively defined in Table 2 in Ch 11, Sec 2, considering Hull area being "General", and connection of ordinary stiffener to cut-out in way of primary supporting member, i.e. Category F2. Regarding the welding of collar plates, it is covered by the same line of the Table. However, for a better understanding, this line in the Table should be modified, replacing "ordinary stiffener" by "ordinary stiffener and collar plate, if any" and replacing "Cut-out web of primary supporting members" by "Web of primary members and collar plates, if any".	
324	Table 11.2.2 & Text 11/2.2.6.1	CI	side frames	2007/1/8	Two different requirements for welding thicknesses of side web frame in single side bulk carrier are indicated in CSR: - Ch3, Sec6, 8.3 Side frames fig 19. (URS12) - Ch11, Sec2 Welding Table 2 with Hull area side frame of single side structure. Our understanding is that the maximum of both is to be considered. Please confirm?	The welding throats as defined on Fig 19 of Ch 3, Sec 6 are only to be applied. Consequently, Tab 2 in Ch 11, Sec 2 should be modified, for the hull area "Side frame of single side structure", connection of "side frame and end bracket" to "side shell plate" by repacing "F1" by "See Ch 3, Sec 2, Fig 19". We will consider the editorial correction.	
337	3/6.10.4.7 & 11/2.2.4.3	Question	S18	2007/2/22	For the weld of corrugations and stool side plating to the stool top plate, only full penetration is accepted in the requirement of Ch 3, Sec 6, 10.4.7. On the other hand, not only full penetration but deep penetration is accepted in the requirement of Ch 11, Sec 2, 2.4.3. It is considered that this requirement is based on IACS UR 18.4.1(a), as follows: The stool side plating is to be connected to the stool top plate and the inner bottom plating by either full penetration or deep penetration welds. Therefore, the requirement of Ch 3, Sec 6, 10.4.7 should be changed to be consistent with Ch 13, Sec 2, 2.4.3 and IACS UR. Please confirm.	We will consider the editorial correction according to UR S18. **Also Included in Corrigenda 5**	
339	Ch11/2	Question	allowable stresses value of leg length	2007/7/16	what is the design criteria (allowable stress value) when a leg length should be calculated according loads? which corrosion deduction gas to be used for such calculations?	The sizes of leg are determined based on the as-built thicknesses as per Table.1 but the net thicknesses are not the basis. In case the requirements in Chapter 11 should not be applicable the leg sizes should be subject to the Societies approval	
454	Ch11/ Sec.2 Table 1	CI	Adjustments to the weld length due to corrosion	2007/5/1	According to the proposed Background document for CSR Bulk, no adjustments to the weld length due to corrosion should be made to plates with tC = 4mm. This is not in line with note 2 in Table 1, which specifies that for tC=4 the leg length is to be increased by 0.5mm. Please explain.	As you mentioned, no adjustments to the weld length due to corrosion should be made to plates with tc=4mm. Until the rule change proposal is adopted by IACS, the interpretation of the note 2 in Table 1 is as follows. +1.0mm for tc>5 +0.5mm for 5=>tc>4 0 for 4=>tc>3 -0.5mm for 3=>tc	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attachment
507	11/2.2.6.1	Question	The leg length of the fillet weld	2007/9/28	The leg length of the fillet weld is regulated in Ch11 Sec2, 2.6.1 and this section stipulates to refer to Table 1. Bulker CSR has no indication whether rounding treatment is to be applied or not, even though Tanker CSR has rounding treatment in Sec6/5.7.1.1 of Tanker CSR. Please confirm which of the following leg length is to be applied: a. leg length as specified in Table 1; b. rounded leg length as specified in Table 1, nearest half millimetre. For example, if the leg length according to Table 1 is 7.2mm, then the required leg length would be: - 7.2 mm for a; - 7.0mm for b.	We noted your comments.The draft interpritation will be submitted to Hulll Panel for their view. **Also Included in Corrigenda 5**	
508	11/2.2.6.2	RCP	Continuous fillet welds	2007/10/9	The CSR of Ch.11,sec.2,2.6.2 is unreasonable considering other category. Therefore the 2.6.2 might be reconsidered as below: "Where double continuous fillet welds in lieu of intermittent welds are applied, leg length of fillet weld is to be of Category F3."	We noted your comment. We will consider the edditorial correction. **Also Included in Corrigenda 5**	
651	Table 11.2.2	CI	Girder/Primary supporting members	2008/5/28	Reference is made to Ch. 11 Sec. 2 Table 2. Please find enclosed an extract of all girder/primary supporting entries of Table 2. 1.General requirements to welding of primary supporting members is given in "Primary supporting members" => “Web plate and girder plate” to “Shell plating, deck plating, inner bottom plating(..) => F1 for "at end (15% of span) and F2 for "Elsewhere" 2.If we refer to “Bottom and double bottom” => “Side girder (..)” to “Bottom and inner bottom plating” => F3. This is in contradiction to item 1 above where the same structural elements are specified. There is no special consideration at 15% of span at ends. (Towards bulkheads) 3.If we refer to “Side and inner side in double side structure” => “Web of primary supporting members” to “Side plating, inner side plating and web of primary supporting members” => F2. Which is in line with item 1, except that no increase is specified towards span ends. Q1: Please comment on above understanding. Q2: We assume that girder web to shell plating to inner bottom/side should be minimum F2 as given in “Primary supporting members”. Please advise.	"Primary supporting member" in "Hull area" of Table 2 means the primary supporting member arranged in the structure other than double bottom and double side structure, i.e., the primary supporting member with one plate flange. Therefore,the primary supporting members with two plate flanges such as girders or floors in double bottom, horizontal girder or transverses laying from side to side in double side are not applicable to "Primary supporting members". In order to clarify this matter, the words "and girder plate" in "Of" column for the Hull Area "Primary supporting members" should be deleted. We will issue the editorial corrections as a "Corrigenda" for clarification of this table.	
669 attc	Table 11.2.1	RCP	Thickness of abutting plate	2008/10/10	Reference is made to Chapter 11 Section 2 Table 1. Thickness of abutting plate. Ref note (1) “t is as-built thickness of the thinner of two connected members” However, in Chapter 11 Section 2 Figure 1, t refers to “as-built thickness of abutting plate”. Assuming that t1>t2 in attached figure. From a strength continuity point of view we assume t1 should be applied when evaluating the criteria. Please confirm Please update Table 1 accordingly.	Your interpretation is right. We will consider the Rule Change proposal.	Y

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attachment
672 attc	Table 11.2	Question	fillet weld	2009/3/3	Ch11 Sec2, Table2 regulates the fillet welding as follows; - The ends of stiffeners : F0. - The brackets at the ends of stiffeners : F1 In case of stiffeners which are fitted with brackets at the ends, we think it acceptable to apply F1 welding to the ends of the stiffeners. (Please refer to the attachment.) Please confirm the above.	Where a bracket is provided at the end of a PSM or an ordinary stiffener, stresses in a PSM or an ordinary stiffener may be reduced at its end. Therefore, the fillet weld size F0 may be reduced to F1 which is the same as intended for brackets. Table 2 will be updated accordingly.	Y
676	Table 11.1.1	RCP	IACS recommendation No.47	2008/5/6	As stated in Ch11 Sec1, 1.3.1, Table1 is based on IACS recommendation No.47. However, it does not match the latest one, Revision 3 of IACS recommendation No.47 issued in November 2006. We request to update Ch11 Sec1, Table1 as the latest one.	We will consider the rule change proposal.	
757	11/1.1.2.1	RCP	Bending Radius	2008/9/10	The minimum bending radius for cold forming is required to be at least 3 times the plate thickness in Ch11 Sec1, 1.2.1 of CSR for Bulkers. With reference to the relevant Technical Background (TB), this requirement originated from the standard radius when bending corrugated bulkhead in IACS Rec. No. 47. On the other hand, CSR for Tankers regulates the minimum bending radius for cold forming is required to be at least twice the plate thickness in Sec6, 4.2.3.1. We are of the opinion that the minimum bending radius, 3 times the plate thickness, should be kept only when bending corrugated bulkhead. It is requested that the minimum bending radius for cold forming in Ch11 Sec1, 1.2.1 of CSR for Bulkers be changed to twice the plate thickness.	We will condier the rule change proposal in order to be in line with IACS Rec. No. 47.	
781	Table 11.2.2	Question	Continuous fillet welds	2009/3/3	KC ID# 596 allows one side continuous fillet welding for stiffeners in deck house of CSR/Tanker except areas otherwise specified or those where such welding is not suitable. Is one side continuous fillet welding also allowed to apply to deck house of CSR/Bulker?	One side continuous fillet welding could be applied to stiffeners in a deck house subject to the following; 1. This welding method is not allowed for the area where is affected by the concentrated loads and excessive vibration such as under winches, cranes, davits and machineries and exposed to weather, and for wet spaces and tanks. 2. Welding size is to be of the fillet required by Ch.11, Sec.2, Table 1 for intermittent weld. 3. Welding at ends of the stiffeners is to be F0 according to the row "General, unless otherwise specified in the table" in Ch.11, Sec.2, Table 2. 4. The fabrication process has to assure that the deviation from the given angle of the profile to the plate is within the permissible values of the fabrication standard e.g. IACS REC47.	

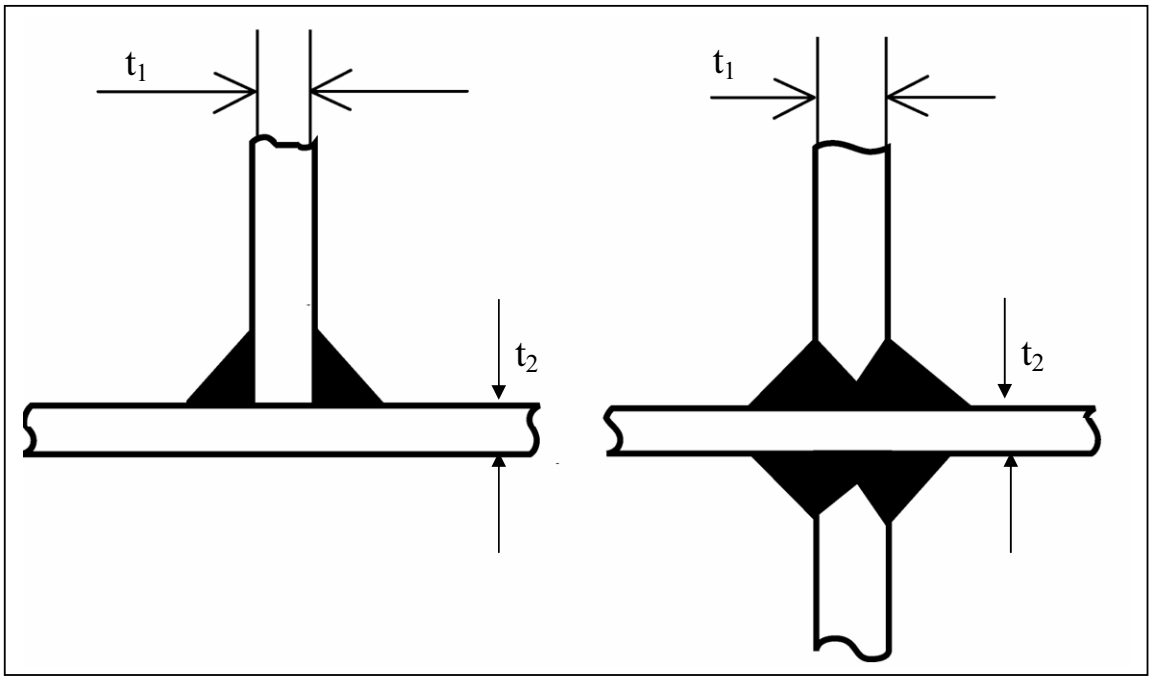
KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attachment
803	Table 11.2.2	Question	Welding Sizes of Hatch Cover	2009/3/3	1] Please advise whether Table 2 in Ch.11, Sec.2 should be applied to welding of hatch cover. 2] In case Table 2 in Ch.11, Sec.2 is not applicable to hatch cover please confirm that welding sizes should be subject to the Rules of the class. 3] In case Table 2 in Ch.11, Sec.2 should be applied to hatch cover, a) Please advise the rows and categories of welding in the table which to be applied to the following connections: (1) Stiffener web to top plate/bottom plate (2) End of stiffener web to web of primary supporting member (PSM) (3) End of stiffener face to PSM web (4) PSM web to top plate/bottom plate (5) PSM web to PSM web at outermost end connections (6) PSM web to PSM web at intermediate connections (7) Web to face plate of PSM (8) PSM web to web of horizontal/vertical stiffener which is fitted on the PSM b) Please advise for which extent of categories (F0, F1, F2 or F3) the intermittent welding category “F4” can be used alternatively. 4] Please advise if the footnote (2) in Table 1 in Ch.11, Sec.2 is to be applied to welding of hatch cover as it is. 5] Please advise whether or not the intermittent welds, which have different Length-Pitch other than “75-300” indicated in Table1 in Ch.11, Sec.2, can be accepted. If accepted, please advise how to calculate the required Leg length.	(1) and (2) Table 2 in Ch 11, Sec 2 is not applied to welding of hatch cover directly but the basic concept of Table 2 is applicable. (3) When the basic concept of Table 2 applies to welding of hatch cover, the category of the fillet weld of the following connection are as follows. [3] a) (1) Stiffener web to top plate/bottom plate: F3 or F4* (2) End of stiffener web to web of primary supporting member (PSM): i) For bracket connection: F2 ii) For no bracket connection: F1 (3) End of stiffener face to PSM web: i) For bracket connection: F2 ii) For no bracket connection: F1 (4) PSM web to top plate/bottom plate: F2 at end (15% of span) and F3 or F4* for the rest (5) PSM web to PSM web at outermost end connections: i) For bracket connection: F2 ii) For no bracket connection: F1 (6) PSM web to PSM web at intermediate connections: F2 (7) Web to face plate of PSM: F2 at ends (15% of span) and Fe3 or F4* for the rest (8) PSM web to web of horizontal/vertical stiffener which is fitted on the PSM: F4 Please note that F4 weld is not used for welding in way of intersection with PSM. b) F3 weld instead of F4 can be used. [4] The footnote 2 of Table 1 is applicable [5] If the length of filet welds is greater than 75mm and pitch is less than 300mm, such intermittent welds are acceptable. In order to this interpretation, we will consider a RCP.	
848	Text 11/2.2.4.1	Question	abutting plates	2009/6/3	Ch.11 Sec.2 [2.4.1] Abutting plate panels forming boundaries to sea below summer load waterline In CSR Tanker partial penetration welding is acceptable for welding of abutting plates forming boundaries to sea below summer load waterline when thickness is greater than 12 mm. In our opinion this should also be acceptable for CSR Bulk. Please advise.	We agree that partial penetration welding is acceptable for welding of abutting plates forming boundaries to sea below summer load waterline when thickness is greater than 12 mm as per CSR OT. We will consider a Rule Change Proposal	
855	Table 11/2.1 & Text 11/2.2.6.1	Question	fillet welds	2009/6/25	Leg length of fillet welds is adjusted corresponding to the corrosion addition as required in Ch11 Sec2, Table 1, Note (2). On the other hand, weld throats in zones “a” and “b” of side frames are required in 2.6.1 without reference to Table 1. Because this requirement originates from UR S12, adjustments of those of side frames are considered unnecessary. Please confirm the above.	Considering the fillet weld category of side frame of single side structure (connection of side frame and end bracket to side shell plate) in Tab 2 Ch11 Sec2 is not referred to one specified in Tab1 Ch11 Sec2, the note (2) of Tab1 is not applicable to fillet weld of side frame of single side structure (connection of side frame and end bracket to side shell plate)	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attachment
938	11/2.2.2.2	RCP	Welding of plates of different thicknesses	2010/3/30	Ch.11, Sec.2 /2.2.2 of CSR-B specifies as following; “In the case of welding of plates with a difference in as-built thickness equal to or greater than 4mm, the thicker plate is normally tapered.” However, the requirement in Sec.6/5.2.2.2 of CSR-T does not require plates with a difference in thickness equal to 4mm. Moreover, based on experience, we consider that this requirement of CSR-B need not include 4mm. Please revise this requirement of CSR-B so that the wording "equal to or" is removed and that it reads "as-built thickness greater than 4mm."	The tapering requirement will be harmonized to be in line with CSR OT. We will consider a rule change according to your comment.	
943	11/2.1.4.1 & 2	RCP	Documentation to be submitted relating to welding and NDE	2010/5/12	Ch.11 Sec.2 [1.4.1] and [1.4.2] need to be rewritten in order to follow UR Z23 5.1.5.	Ch.11 Sec.2 [1.4.1] is rewritten as follows: QUOTE the welding plan to be submitted for approval has to contain the necessary data relevant to the fabrication by welding of the structures. UNQUOTE Ch.11 Sec.2 [1.4.2] is rewritten as follows: QUOTE the NDE plan to be submitted for aproval has to contain the necessary data relevant to the locations and number of examinations, and the method of NDE applied. UNQUOTE This will be done within a corrigenda.	

KCID No.	Ref.	Type	Topic	Date completed	Question/CI	Answer	Attachment
966 attc	Table 11.3.1	RCP	Structural testing of ballast holds	2009/9/11	Structural Testing Requirements of CSR Rules for Bulk Carriers as applied to Ballast Holds LR Ship Rules; Part 3; Chapter 1; Section 8; Table 1.8.1 requires structural testing of the water ballast holds in bulk carriers with the head, not less than, up to the top of the hatch coaming. CSR Rules for BC; Ch. 11; Section 3.1; Table 1 requires structural testing to the greater of the head of water up to the top of overflow or 0.90 m head of water above top of hatch. Excluding bulk carriers under 90 m in length, all new bulk carriers will now be designed against these CSR Rules. Weather tight hatch cover seals for floodable cargo holds, are not suitable to retain a head of water, without leakage, so the application of the CSR Rule requirement can cause confusion for owners and shipyards. We believe this testing should be carried out to the top of the hatch coaming with the hatch covers in place. Therefore we recommend that the text of the CSR Rules for structural testing of the Ballast Hold in Bulk Carriers is amended in accordance with IACS Guidelines for Procedures of Testing Tanks and Tight Boundaries: CSR Rules for BC, Chapter 11, Section 3.1, Table 1 should be amended to :- “The greater of - top of the overflow, or - top of cargo hatch coaming” Note 2 to this table should also be amended in the final sentence to “in holds for liquid cargo or ballast with large hatch covers, the highest point of tanks is to be taken at the top of the hatch coaming."	Table 11.3.1, which comes from UR S14, is kept as it is until UR S14 is amended.	Y
1022	11/3.2.3.1	CI	Minimum pressure for hose testing in rules & UR S14 2.3	2010/3/8	Ch.11 Sec.3 [2.3.1] hose testing. The Rule requires a minimum pressure of 0.2X10^5 Pa. However, in IACS UR S14 2.3, the minmum pressure for host testing is 2X10^5 Pa. Please clarify whether there is a typo in CSR Bulk Rules or not. If not, please provide relevant background for CSR.	There is a typo in CSR BC. Ch.11 Sec.3 [2.3.1] will be corrected as follows: The minimum pressure in the hose, at least equal to 2•10^5 Pa, is to be applied at a maximum distance of 1,5 m	

KC#669

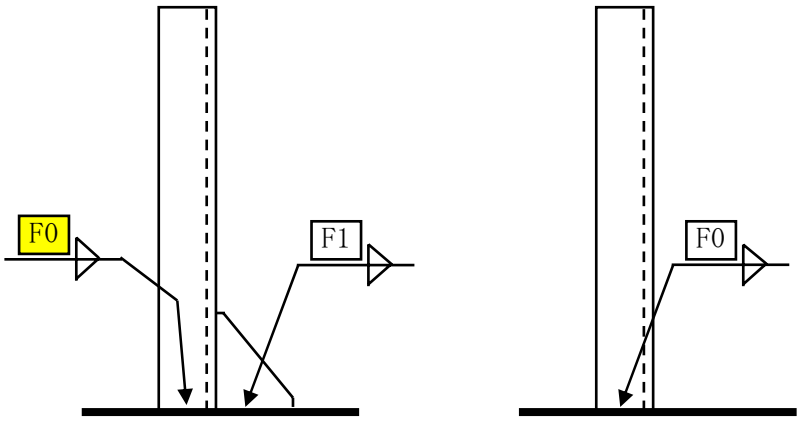
Reference is made to Chapter 11 Section 2 Table 1.
Figure



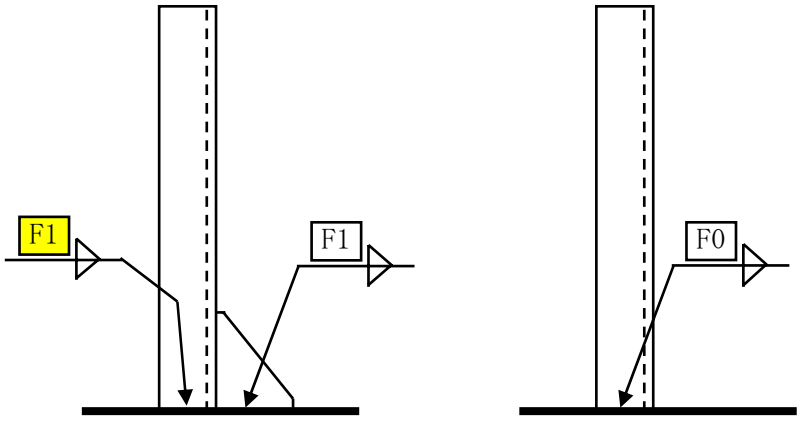
KC#672

Ch11 Sec2 Fillet welding

With reference to Table 2, the required fillet welding are as follows;



We think it acceptable to apply fillet welding as follows;



Please confirm the above.

KC#966

IACS Guideline for Procedures of Testing Tanks and Tight Boundaries

1. General

These test procedures are to ensure the weathertightness of structures/shipboard outfitting, the watertightness of tanks and watertight boundaries and structural adequacy of tanks. Tightness of all tanks and tight boundaries of the ships at the new construction and, when major conversions or repairs* have been made, those relevant to the major conversions/repairs should be confirmed by these test procedures prior to delivery of the ship.

* Major repair means a repair affecting structural integrity.

2. Application

2.1 All gravity tanks** and other boundaries required to be watertight or weathertight should be tested in accordance with this Guideline and proven tight and structurally adequate as follows:

- *Gravity Tanks* for their tightness and structural adequacy
- *Watertight Boundaries Other Than Tank Boundaries* for their watertightness, and
- *Weathertight Boundaries* for their weathertightness

** Gravity tank means a tank having a design working pressure not greater than 70 kPa at the top of the tank.

2.2 The testing of cargo containment systems of liquefied gas carriers should be in accordance with standards deemed appropriate by the Administration.

2.3 Testing of structures not listed in Table 1 or 2 should be specially considered.

3. Types of Tests and Definition of Test

3.1 The following two types of test are specified in this requirement:

Structural Test: A test to verify the structural adequacy of the construction of the tanks. This may be a hydrostatic test or, where the situation warrants, a hydropneumatic test.

Leak Test: A test to verify the tightness of the boundary. Unless a specific test is indicated, this may be a hydrostatic/hydropneumatic test or air test. *Leak*

test with remark *3 in Table 1 includes hose test as an acceptable medium of the test.

3.2 Definition of each type of test is as follows:

Hydrostatic Test: *(Leak and Structural)*	A test by filling the space with a liquid to specified head.
Hydropneumatic Test: *(Leak and Structural)*	A test wherein space is partially filled with liquid and air pressure applied on top of the liquid surface.
Hose Test: *(Leak)*	A test to verify the tightness of the joint by a jet of water.
Air Tests: *(Leak)*	A test to verify the tightness by means of air pressure differential and leak detection solution. It includes tank air test and joint air test, such as *compressed air test* and *vacuum box test*.
Compressed Air Fillet Weld Test: *(Leak)*	An air test of fillet welded tee joint and leak indicating solution applied on the fillet welds.
Vacuum Box Test: *(Leak)*	A box over a joint with leak indicating solution applied on the fillet or butt welds. Vacuum is created inside the box to detect any leaks.
Ultrasonic Test: *(Leak)*	A test to verify the tightness of a sealing by means of ultrasonic.
Penetration Test: *(Leak)*	A test to verify that no continuous leakages exist in the boundaries of a compartment by means of low surface tension liquids.

4. Test Procedures

4.1 General

Tests should be carried out in the presence of the Surveyor at a stage sufficiently close to the completion of the work with all hatches, doors, windows, etc. installed and all penetrations including pipe connections fitted, and before any ceiling and cement work is applied over the joints. Specific test requirements are given in 4.4 and Table 1. For the timing of application of coating and provision of safe access to joints, see 4.5, 4.6 and Table 3.

4.2 Structural Test Procedures

4.2.1 Type and Time of Test

Where a structural test is specified in Table 1 or Table 2, a hydrostatic test in accordance with 4.4.1 will be acceptable. Where practical limitations (strength of building berth, light density of liquid, etc.) prevent the performance of a hydrostatic test, a hydropneumatic test in accordance with 4.4.2 may be accepted as an equivalent method.

Provided the results of a leak test are confirmed satisfactory, a hydrostatic test for confirmation of structural adequacy may be carried out while the vessel is afloat.

4.2.2 Number of Structural Test

(1) Structural test should be carried out for at least one tank of same construction (i.e., same design and same workmanship) on each vessel provided all subsequent tanks are tested for leaks by an air test.
However, where structural adequacy of a tank was verified by structural testing required in Table 1, the subsequent vessels in the series (i.e., sister ships built in the same shipyard) may be exempted from such testing for other tanks which have the structural similarity to the tested tank, provided that the water-tightness in all boundaries of exempted tanks are verified by leak tests and thorough inspection should be carried out. For sister ships built several years after the last ship of the series, such exemption may be reconsidered. In any case, structural testing should be carried out for at least one tank for each vessel in order to assure structural fabrication adequacy.

(2) For watertight boundaries of spaces other than tanks (excluding chain lockers), structural testing may be exempted, provided that the water-tightness in all boundaries of exempted spaces are verified by leak tests and thorough inspection should be carried out.

(3) These subsequent tanks may require structural test if found necessary after the structural testing of the first tank.

(4) Tanks for structural test should be selected so that all representative structural members are tested for the expected tension and compression.

4.3 Leak Test Procedures

For leak test specified in Table 1, tank air test, compressed air fillet weld test, vacuum box test in accordance with 4.4.3 through 4.4.6, or their combination will be acceptable. Hydrostatic or hydropneumatic test may also be accepted as leak test provided 4.5 and 4.6

are complied with. Hose test will also be acceptable for the locations as specified in Table 1 with the foot note *3.

Joint air test may be carried out in the block stage provided all work of the block that may affect the tightness of the joint is completed before the test. See also 4.5.1 for the application of final coating and 4.6 for safe access to joint and their summary in Table 3.

4.4 Details of Tests

4.4.1 Hydrostatic Test

Unless other liquid is approved, hydrostatic test is to consist of filling the space by fresh water or sea water, whichever is appropriate for testing of the space, to the level specified in Table 1 or Table 2.

In case a tank for cargoes with higher density is to be tested with fresh water or sea water, the testing pressure height should be specially considered.

4.4.2 Hydropneumatic Test

Hydropneumatic test where approved should be such that the test condition in conjunction with the approved liquid level and air pressure will simulate the actual loading as far as practicable. The requirements and recommendations for tank air tests in 4.4.4 will also apply to hydropneumatic test.

4.4.3 Hose Test

Hose test should be carried out with the pressure in the hose nozzle maintained at least at $2 \cdot 10^5$ Pa during the test. The nozzle should have a minimum inside diameter of 12 mm and be at a distance to the joint not exceeding 1.5meters.

Where hose test is not practical because of possible damage to machinery, electrical equipment insulation or outfitting items, it may be replaced by a careful visual examination of welded connections, supported where necessary by means such as a dye penetrant test or ultrasonic leak test or an equivalent.

4.4.4 Tank Air Test

All boundary welds, erection joints and penetrations including pipe connections should be examined in accordance with the approved procedure and under a pressure differential above atmosphere pressure not less than $0.15 \cdot 10^5$ Pa with a leak indication solution applied.

It is recommended that the air pressure in the tank be raised to and maintained at about $0.20 \cdot 10^5$ Pa for approximately one hour, with a minimum number of personnel around the

tank, before lowered to the test pressure of $0.15 \cdot 10^5$ Pa.

A U-tube with a height sufficient to hold a head of water corresponding to the required test pressure should be arranged. The cross sectional area of the U-tube should be not less than that of the pipe supplying air to the tank. In addition to U-tube, a master gauge or other approved means to verify the pressure should be approved.

4.4.5 Compressed Air Fillet Weld Test

In this air test, compressed air is injected from one end of fillet welded joint and the pressure verified at the other end of joint by a pressure gauge on the opposite side. Pressure gauges should be arranged so that an air pressure of at least $0.15 \cdot 10^5$ Pa can be verified at each end of all passages within the portion being tested.

Note: *Where the leak test is required in way of the fabrication applying the partial penetration weld, compressed air test is also applied in the same manner for fillet weld where the root face is sufficiently large, i.e., 6 – 8 mm.*

4.4.6 Vacuum Box Test

A box (vacuum tester) with air connections, gauges and inspection window is placed over the joint with leak indicator applied. The air within the box is removed by an ejector to create a vacuum of $0.20 \cdot 10^5 – 0.26 \cdot 10^5$ Pa inside the box.

4.4.7 Ultrasonic Test

An arrangement of an ultrasonic echoes sender inside of a compartment and a receiver outside. A location where the sound is detectable by the receiver displays a leakage in the sealing of the compartment.

4.4.8 Penetration Test

A test of butt welds by using of a low surface tension liquid at one side of a compartment boundary. If no liquid were detected on the opposite sides of the boundaries after expiration of a definite time this means the verification of tightness of the compartments boundaries.

4.4.9 Other Test

Other methods of testing may be considered by each society upon submission of full particulars prior to commencement of the testing.

4.5 Application of Coating

4.5.1 Final Coating

For butt joints by automatic process, final coating may be applied anytime before completion of leak test of the space bounded by the joint.

For all other joints, final coating should be applied after the completion of leak test of the joint. See also Table 3.

The Surveyor reserves a right to require leak test prior to the application of final coating over automatic erection butt welds.

4.5.2 Temporary Coating

Any temporary coating which may conceal defects or leaks should be applied at a time as specified for final coating. This requirement does not apply to shop primer.

4.6 Safe Access to Joints

For leak tests, a safe access to all joints under examination should be provided. See also Table 3.

Table 1
Test Requirements for Tanks and Boundaries

	Tank or boundary to be tested	Test type	Test head or pressure	Remarks
1	Double bottom tanks[*4]	Leak & Structural[*1]	The greater of - top of the overflow, - to 2.4m above top of tank [*2], or - to bulkhead deck	
2	Double bottom voids[*5]	Leak	See 4.4.4 through 4.4.6, as applicable	
3	Double side tanks	Leak & Structural[*1]	The greater of - top of the overflow, - to 2.4m above top of tank [*2], or - to bulkhead deck	
4	Double side voids	Leak	See 4.4.4 through 4.4.6, as applicable	
5	Deep tanks other than those listed elsewhere in this table	Leak & Structural[*1]	The greater of - top of the overflow, or - to 2.4m above top of tank [*2]	
6	Cargo oil tanks	Leak & Structural[*1]	The greater of - top of the overflow, - to 2.4m above top of tank [*2], or - to top of tank [*2] plus setting of any pressure relief valve	
7	Ballast hold of bulk carriers	Leak & Structural[*1]	The greater of - top of the overflow, or - top of cargo hatch coaming	
8	Peak tanks	Leak & Structural[*1]	The greater of - top of the overflow, or - to 2.4m above top of tank [*2]	After peak to be tested after installation of stern tube
9	a. Fore peak voids	Leak	See 4.4.4 through 4.4.6, as applicable	
	b. Aft peak voids	Leak	See 4.4.4 through 4.4.6, as applicable	After peak to be tested after installation of stern tube
10	Cofferdams	Leak	See 4.4.4 through 4.6, as applicable	
11	a. Watertight bulkheads	Leak	See 4.4.3 through 4.4.6, as applicable	
	b. Superstructure end bulkhead	Leak	See 4.4.3 through 4.4.6, as applicable	

12	Watertight doors below freeboard or bulkhead deck	Leak *6	See 4.4.3 through 4.4.6, as applicable	
13	Double plate rudder blade	Leak	See 4.4.4 through 4.4.6, as applicable	
14	Shaft tunnel clear of deep tanks	Leak *3	See 4.4.3 through 4.4.6, as applicable	
15	Shell doors	Leak *3	See 4.4.3 through 4.4.6, as applicable	
16	Weathertight hatch covers and closing appliances	Leak *3	See 4.4.3 through 4.4.6, as applicable	Hatch covers closed by tarpaulins and battens excluded
17	Dual purpose tank/dry cargo hatch cover	Leak *3	See 4.4.3 through 4.4.6, as applicable	In addition to structural test in item 6 or 7
18	Chain locker	Leak & Structural	Top of chain pipe	
19	Independent tanks	Leak & Structural*1	The greater of - top of the overflow, or - to 0.9m above top of tank	
20	Ballast ducts	Leak & Structural*1	The greater of - ballast pump maximum pressure, or - setting of any pressure relief valve	

Note: *1 Structural test is to be carried out for at least one tank of same construction (i.e., same design and same workmanship) on each vessel provided all subsequent tanks are tested for leaks by an air test. However, where structural adequacy of a tank was verified by structural testing, the subsequent vessels in the series (i.e., sister ships built in the same shipyard) may be exempted from such testing for other tanks which have the structural similarity to the tested tank, provided that the water-tightness in all boundaries of exempted tanks are verified by leak tests and thorough inspection are to be carried out. In any case, structural testing is to be carried out for at least one tank for each vessel in order to assure structural fabrication adequacy. (See 4.2.2(1))

*2 Top of tank is deck forming the top of the tank excluding any hatchways.

*3 *Hose Test* may also be considered as a medium of the test. See 3.2.

*4 Including tanks arranged in accordance with the provisions of SOLAS regulation II-1/9.4

*5 Including duct keels and dry compartments arranged in accordance with the provisions of SOLAS regulation II-1/9.4

*6 Where water tightness of watertight door has not confirmed by prototype test, testing by filling watertight spaces with water is to be carried out. See SOLAS regulation II-1/16.2 and MSC/Circ.1176.

Table 2
Additional Test Requirements for Special Service Ships/Tanks

	Type of Ship/Tank	Structures to be tested	Type of Test	Test Head or Pressure	Remarks
1	Liquefied gas carrier	Cargo containment systems (See remarks)	See 4.4.1	See 4.4.1	See also Table 1 for other tanks and boundaries
2	Edible liquid tanks	Independent tanks	Leak & Structural	The greater of - top of the overflow, or - to 0.9m above top of tank *1	
3	Chemical carrier	Integral or independent cargo tanks	Leak & Structural	The greater of - to 2.4m above top of tank *1, or - to top of tank *1 plus setting of any pressure relief valve	

Note: *1 Top of tank is deck forming the top of the tank excluding any hatchways.

Table 3
Application of Leak Test, Coating and Provision of Safe Access For Type of Welded Joints

Type of Welded Joints		Leak Test	Coating *1		Safe Access *2	
			Before Leak Test	After Leak Test & before Structural Test	Leak Test	Structural Test
Butt	Automatic	Not required	Allowed	N/A	Not required	Not required
	Manual or Semi-automatic	Required	Not allowed	Allowed	Required	Not required
Fillet	Boundary including penetrations	Required	Not allowed	Allowed	Required	Not required

Note: *1 Coating refers to internal (tank/hold coating), where applied, and external (shell/deck) painting. It does not refer to shop primer.
*2 Temporary means of access for verification of the leak test