

S14 Testing Procedures of Watertight Compartments

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S14.1 — General

S14.1.1 — Definitions

~~Shop primer is a thin coating applied after surface preparation and prior to fabrication as a protection against corrosion during fabrication.~~

~~Protective coating is a final coating protecting the structure from corrosion.~~

~~Structural testing is a hydrostatic test carried out to demonstrate the tightness of the tanks and the structural adequacy of the design. Where practical limitations prevail and hydrostatic testing is not feasible (for example when it is difficult, in practice, to apply the required head at the top of the tank), hydropneumatic testing may be carried out instead. When a hydropneumatic test is performed, the conditions should simulate, as far as practicable, the actual loading of the tank.~~

~~Hydropneumatic testing is a combination of hydrostatic and air testing, consisting in filling the tank with water up to its top and applying an additional air pressure. The value of the additional air pressure is at the discretion of the Society, but is to be at least as defined in S14.2.2.~~

~~Leak testing is an air or other medium test carried out to demonstrate the tightness of the structure.~~

~~Hose testing is carried out to demonstrate the tightness of structural items not subjected to hydrostatic or leak testing and to other components which contribute to the watertight or weathertight integrity of the hull.~~

S14.1.2 — Application

~~The following requirements determine the testing conditions for:~~

- ~~— gravity tanks, excluding independent tanks of less than 5 m³ in capacity,~~
- ~~— watertight or weathertight structures.~~

~~The purpose of these tests is to check the tightness and/or the strength of structural elements at the time of the ship's construction and on the occasion of major repairs.~~

~~Tests are to be carried out in the presence of the Surveyor at a stage sufficiently close to completion so that any subsequent work would not impair the strength and tightness of the structure.~~

~~For the general testing requirements, see items S14.3 and S14.4.~~

~~This UR does not apply to CSR Bulk Carriers and Oil Tankers.~~

S14.2 — Testing methods

S14.2.1 — Structural testing

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Structural testing may be carried out after application of the shop primer.

Structural testing may be carried out after the protective coating has been applied, provided that one of the following two conditions is satisfied:

- a) all the welds are completed and carefully inspected visually to the satisfaction of the Surveyor prior to the application of the protective coating;
- b) leak testing is carried out prior to the application of the protective coating.

In absence of leak testing, protective coating should be applied after the structural testing of:

- all erection welds, both manual and automatic;
- all manual fillet weld connections on tank boundaries and manual penetration welds.

S14.2.2 — Leak testing

Where leak testing is carried out, in accordance with Table 1, an air pressure of 0.15×10^5 Pa is to be applied during the test.

Prior to inspection, it is recommended that the air pressure in the tank is raised to 0.20×10^5 Pa and kept at this level for about 1 hour to reach a stabilized state, with a minimum number of personnel in the vicinity of the tank, and then lowered to the test pressure.

Individual Societies may accept that the test is conducted after the pressure has reached a stabilized state at 0.20×10^5 Pa, without lowering the pressure, provided they are satisfied of the safety of the personnel involved in the test.

Welds are to be coated with an efficient indicating liquid.

A U-tube filled with water up to a height corresponding to the test pressure is to be fitted to avoid overpressure of the compartment tested and verify the test pressure. The U-tube should have a cross section larger than that of the pipe supplying air.

In addition, the test pressure is also to be verified by means of one master pressure gauges. The Society may accept alternative means which are considered to be equivalently reliable.

Leak testing is to be carried out, prior to the application of a protective coating, on all fillet weld connections on tank boundaries, penetrations and erection welds on tank boundaries excepting welds made by automatic processes. Selected locations of automatic erection welds and pre-erection manual or automatic welds may be required to be similarly tested at the discretion of the Surveyor taking account of the quality control procedures operating in the shipyard. For other welds, leak testing may be carried out, after the protective coating has been applied, provided that these welds were carefully inspected visually to the satisfaction of the Surveyor.

Any other recognized method may be accepted to the satisfaction of the Surveyor.

S14.2.3 — Hose testing

When hose testing is required to verify the tightness of the structures, as defined in Table 1, 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. The nozzle diameter is not to be less than 12 mm.

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(cont)~~S14.2.4 — Hydropneumatic testing~~

~~When hydropneumatic testing is performed, the same safety precautions as for leak testing (see S14.2.2) are to be adopted.~~

~~S14.2.5 — Other testing methods~~

~~Other testing methods may be accepted, at the discretion of the Society, based upon equivalency considerations.~~

S14.3 — General testing requirements

General requirements for testing are given in Table 1.

S14.4 — Additional requirements for special type vessels/tanks

In addition to the requirements of Table 1, particular requirements for testing of certain spaces within the cargo area of:

- ~~— liquefied gas carriers,~~
- ~~— edible liquid carriers,~~
- ~~— chemical carriers,~~

are given in Table 2.

~~These requirements intend generally to verify the adequacy of the structural design of the tank, based on the loading conditions which prevailed when determining the tank structure scantlings.~~

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Table 1 – General testing requirements

Item number	Structure to be tested	Type of testing	Structural test pressure	Remarks
1	Double bottom tanks	Structural testing [1]	The greater of the following: <ul style="list-style-type: none"> • head of water up to the top of overflow • head of water up to the margin line 	Tank boundaries tested from at least one side
2	Double side tanks	Structural testing [1]	The greater of the following: <ul style="list-style-type: none"> • head of water up to the top of overflow • 2.4 m head of water above highest point of tank 	Tank boundaries tested from at least one side
3	Tank bulkheads, deep tanks	Structural testing [1]	The greater of the following [2]: <ul style="list-style-type: none"> • head of water up to the top of overflow • 2.4 m head of water above highest point of tank • setting pressure of the safety relief valves, where relevant 	Tank boundaries tested from at least one side
	Fuel oil bunkers	Structural testing		
4	Ballast holds in bulk carriers	Structural testing [1]	The greater of the following: <ul style="list-style-type: none"> • head of water up to the top of overflow • 0.90 m head of water above top of hatch 	
5	Fore peak and after peak used as tank	Structural testing	The greater of the following: <ul style="list-style-type: none"> • head of water up to the top of overflow • 2.4 m head of water above highest point of tank 	Test of the after peak carried after the stern tube has been fitted
	Fore peak not used as tank	Refer to SOLAS Ch. II.1 Reg. 14		
	After peak not used as tank	Leak testing		
6	Cofferdams	Structural testing [3]	The greater of the following: <ul style="list-style-type: none"> • head of water up to the top of overflow • 2.4 m head of water above highest point of tank 	
7	Watertight bulkheads	Refer to SOLAS Ch. II.1 Reg. 14 [4]		
8	Watertight doors below freeboard or bulkhead deck	Refer to SOLAS Ch. II.1 Reg. 18		
9	Double plate rudders	Leak testing		
10	Shaft tunnel clear of deep tanks	Hose testing		
11	Shell doors	Hose testing		
12	Watertight hatch covers of tanks in bulk carriers	Hose testing		
	Watertight hatch covers of tanks in combination carriers	Structural testing [1]	The greater of the following: <ul style="list-style-type: none"> • 2.4 m head of water above the top of the hatch cover • setting pressure of the safety relief valves, where relevant 	At least every 2 nd hatch cover are to be tested

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Item number	Structure to be tested	Type of testing	Structural test pressure	Remarks
13	Weather-tight hatch covers and closing appliances	Hose testing		
14	Chain locker (if aft of collision bulkhead)	Structural testing	Head of water up to the top	
15	Independent tanks	Structural testing	Head of water up to the top of the overflow, but not less than 0.9 m	
16	Ballast ducts	Structural testing	Ballast pump maximum pressure	

Note:

- [1] Leak or hydropneumatic testing may be accepted under the conditions specified in S14.2.2, provided that at least one tank for each type is structurally tested, to be selected in connection with the approval of the design. In general, structural testing need not be repeated for subsequent vessels of a series of identical newbuildings. This relaxation does not apply to cargo space boundaries in tankers and combination carriers and tanks for segregated cargoes or pollutants. If the structural test reveals weakness or severe faults not detected by the leak test, all tanks are to be structurally tested.
- [2] Where applicable, the highest point of tank is to be measured to the deck and excluding hatches. In holds for liquid cargo or ballast with large hatch covers, the highest point of tank is to be taken at the top of the hatch.
- [3] Leak or hydropneumatic testing may be accepted under the conditions specified in S14.2.2 when, at the Society's discretion, the latter is considered significant also in relation to the construction techniques and the welding procedures adopted.
- [4] When hose test cannot be performed without damaging possible outfitting (machinery, cables, switchboards, insulation, etc.) already installed, it may be replaced, at the Society's discretion, by a careful visual inspection of all the crossings and welded joints; where necessary, dye penetrant test or ultrasonic leak test may be required.

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Table 2 - Additional testing requirements for spaces within the cargo area of certain types of ships

Item number	Types of ships	Structure to be tested	Testing requirements	Structural test pressure	Remarks
1	Liquefied gas carriers	Integral tanks	Refer to UR-G1		
		Hull structure supporting membrane or semi-membrane tanks	Refer to UR-G1		
		Independent tanks type-A	Refer to UR-G1		
		Independent tanks type-B	Refer to UR-G1		
		Independent tanks type-C	Refer to UR-G2		
2	Edible liquid carriers	Independent tanks	Structural testing	Head of water up to the top of overflow without being less than 0.9 m	
3	Chemical carriers	Integral or independent tanks	Structural testing of cargo tanks boundaries from at least one side	The greater of the following: <ul style="list-style-type: none"> ■ 2.4 m head of water above highest point of tank ■ setting pressure of the safety relief valves, where relevant 	

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(cont)S14.1 Application

Revision 4 of this UR is to be complied with in respect of the testing of watertight compartments in accordance with Notes 1 and 2.

S14.2 General

Testing procedures of watertight compartments is to be carried out in accordance with ANNEX I, the "PROCEDURES FOR TESTING TANKS AND TIGHT BOUNDARIES".

Notes:

1. Revision 4 of this UR is to be applied by IACS Societies to ships contracted for construction on or after 1 July 2013.

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

ANNEX I**S14**
(cont)**PROCEDURES FOR TESTING TANKS AND TIGHT BOUNDARIES****1 GENERAL**

These test procedures are to confirm the watertightness of tanks and watertight boundaries, the structural adequacy of tanks and weathertightness of structures/shipboard outfitting. The tightness of tanks and tight boundaries of:

- New ships prior to delivery, and
- Structures involved in, or affected by, major conversions or repairs¹ is to be confirmed by these test procedures.

2 APPLICATION

2.1 All gravity tanks² and other boundaries required to be watertight or weathertight are to be tested in accordance with this Procedure 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.

2.2 The testing of the cargo containment systems of liquefied gas carriers is to be in accordance with standards deemed appropriate by the Classification Society.

2.3 Testing of structures not listed in Table 1 or 2 is to 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.

¹ Major repair means a repair affecting structural integrity.

² Gravity tank means a tank that is subject to vapour pressure not greater than 70 kPa.

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3.2 Definition of each type of test is as follows:

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

4 TEST PROCEDURES

4.1 General

Tests are to 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 the 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, 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 Tests

- .1 A structural test is to be carried out for at least one tank of the same construction (i.e. tanks of the same structural design and configuration and same general workmanship as determined by the attending Surveyor) on each vessel provided all subsequent tanks are tested for leaks by an air test.

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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. For sister ships built several years after the last ship of the series, such exemption may be reconsidered. In any case, structural testing is to be carried out for at least one tank for each vessel in order to verify structural fabrication adequacy.

- .2 For watertight boundaries of spaces other than tanks (excluding chain lockers), structural testing may be exempted, provided that the watertightness in all boundaries of exempted spaces are verified by leak tests and thorough inspection.
- .3 These subsequent tanks may require structural testing if found necessary after the structural testing of the first tank.
- .4 Tanks for structural test are to be selected so that all representative structural members are tested for the expected tension and compression.

4.3 Leak test procedures

For the leak test specified in Table 1, a tank air test, compressed air fillet weld test, vacuum box test in accordance with 4.4.3 to 4.4.6, or their combination will be acceptable. A hydrostatic or hydropneumatic test may also be accepted as the leak test provided 4.5 and 4.6 are complied with. A hose test will also be acceptable for the locations as specified in Table 1 with note 3.

A joint air test may be carried out in the block stage provided all work on 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 the joint and their summary in Table 3.

4.4 Details of Tests

4.4.1 Hydrostatic Test

Unless other liquid is approved, the 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 is to be specially considered.

4.4.2 Hydropneumatic test

A hydropneumatic test where approved is to 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 the hydropneumatic test.

4.4.3 Hose test

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

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Where a 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 are to be examined in accordance with the approved procedure and under a pressure differential above atmospheric 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 being 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 is to be arranged. The cross sectional area of the U-tube is not to be 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 is to be approved.

4.4.5 Compressed air fillet weld test

In this air test, compressed air is injected from one end of a fillet welded joint and the pressure verified at the other end of the joint by a pressure gauge on the opposite side. Pressure gauges are to 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 a leak test of partial penetration welding is required and the root face is sufficiently large (i.e., 6-8mm), the compressed air test is to be applied in the same manner as for a fillet weld

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 transmitter placed 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 applying a low surface tension liquid to one side of a compartment boundary. When no liquid is detected on the opposite side of the boundary after expiration of a definite time, the verification of tightness of the compartments boundary can be assumed.

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.

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(cont)**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 the leak test of the space bounded by the joint.

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

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

4.5.2 Temporary coating

Any temporary coating which may conceal defects or leaks is to 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 is to be provided. See also Table 3.

Table 1
Test Requirements for Tanks and Boundaries

	<u>Tank or boundary to be tested</u>	<u>Test type</u>	<u>Test head or pressure</u>	<u>Remarks</u>
<u>1</u>	<u>Double bottom tanks</u> ^{*4}	<u>Leak & Structural</u> ^{*1}	The greater of - top of the overflow, - to 2.4m above top of tank ^{*2} , or - to bulkhead deck	
<u>2</u>	<u>Double bottom voids</u> ^{*5}	<u>Leak</u>	See 4.4.4 through 4.4.6, as applicable	
<u>3</u>	<u>Double side tanks</u>	<u>Leak & Structural</u> ^{*1}	The greater of - top of the overflow, - to 2.4m above top of tank ^{*2} , or - to bulkhead deck	
<u>4</u>	<u>Double side voids</u>	<u>Leak</u>	See 4.4.4 through 4.4.6, as applicable	
<u>5</u>	<u>Deep tanks other than those listed elsewhere in this table</u>	<u>Leak & Structural</u> ^{*1}	The greater of - top of the overflow, or - to 2.4m above top of tank ^{*2}	
<u>6</u>	<u>Cargo oil tanks</u>	<u>Leak & Structural</u> ^{*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	
<u>7</u>	<u>Ballast hold of bulk carriers</u>	<u>Leak & Structural</u> ^{*1}	The greater of - top of the overflow, or - top of cargo hatch coaming	
<u>8</u>	<u>Peak tanks</u>	<u>Leak & Structural</u> ^{*1}	The greater of - top of the overflow, or - to 2.4m above top of tank ^{*2}	<u>After peak to be tested after installation of stern tube</u>
<u>9</u>	a. <u>Fore peak voids</u>	<u>Leak</u>	See 4.4.4 through 4.4.6, as applicable	
	b. <u>Aft peak voids</u>	<u>Leak</u>	See 4.4.4 through 4.4.6, as applicable	<u>After peak to be tested after installation of stern tube</u>
<u>10</u>	<u>Cofferdams</u>	<u>Leak</u>	See 4.4.4 through 4.4.6, as applicable	
<u>11</u>	a. <u>Watertight bulkheads</u>	<u>Leak</u>	See 4.4.3 through 4.4.6, as applicable ^{*7}	
	b. <u>Superstructure end bulkhead</u>	<u>Leak</u>	See 4.4.3 through 4.4.6, as applicable	
<u>12</u>	<u>Watertight doors below freeboard or bulkhead deck</u>	<u>Leak</u> ^{*6, 8}	See 4.4.3 through 4.4.6, as applicable	

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13	<u>Double plate rudder blade</u>	<u>Leak</u>	<u>See 4.4.4 through 4.4.6, as applicable</u>	
14	<u>Shaft tunnel clear of deep tanks</u>	<u>Leak *3</u>	<u>See 4.4.3 through 4.4.6, as applicable</u>	
15	<u>Shell doors</u>	<u>Leak *3</u>	<u>See 4.4.3 through 4.4.6, as applicable</u>	
16	<u>Weathertight hatch covers and closing appliances</u>	<u>Leak *3, 8</u>	<u>See 4.4.3 through 4.4.6, as applicable</u>	<u>Hatch covers closed by tarpaulins and battens excluded</u>
17	<u>Dual purpose tank/dry cargo hatch cover</u>	<u>Leak *3, 8</u>	<u>See 4.4.3 through 4.4.6, as applicable</u>	<u>In addition to structural test in item 6 or 7</u>
18	<u>Chain locker</u>	<u>Leak & Structural</u>	<u>Top of chain pipe</u>	
19	<u>Independent tanks</u>	<u>Leak & Structural*1</u>	<u>The greater of - top of the overflow, or - to 0.9m above top of tank</u>	
20	<u>Ballast ducts</u>	<u>Leak & Structural*1</u>	<u>The greater of - ballast pump maximum pressure, or - setting of any pressure relief valve</u>	

Note: *1 Structural test is to be carried out for at least one tank of the 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 is carried out. In any case, structural testing is to be carried out for at least one tank for each vessel in order to verify 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 been 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.

*7 Where a hose test is not practicable, other testing methods listed in 4.4.7 through 4.4.9 may be applicable subject to adequacy of such testing methods being verified. See SOLAS regulation II-1/11.1.

*8 As an alternative to the hose testing, other testing methods listed in 4.4.7 through 4.4.9 may be applicable subject to the adequacy of such testing methods being verified. See SOLAS regulation II-1/11.1.

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

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	
			<u>Before Leak Test</u>	<u>After Leak Test & before Structural Test</u>	<u>Leak Test</u>	<u>Structural Test</u>
<u>Butt</u>	<u>Automatic</u>	<u>Not required</u>	<u>Allowed</u>	<u>N/A</u>	<u>Not required</u>	<u>Not required</u>
	<u>Manual or Semi-automatic</u>	<u>Required</u>	<u>Not allowed</u>	<u>Allowed</u>	<u>Required</u>	<u>Not required</u>
<u>Fillet</u>	<u>Boundary including penetrations</u>	<u>Required</u>	<u>Not allowed</u>	<u>Allowed</u>	<u>Required</u>	<u>Not required</u>

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.

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