

# Z7.1 Hull Surveys for General Dry Cargo Ships

(June 2002  
as Z10.6)

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- Note 1: UR Z7.1 (Rev.1, June 2003) replaces ex-UR Z10.6(June 2002).
- Note 2: Changes introduced in Rev.2 are to be applied by all Members and Associates from 1 July 2006.
- Note 3: Changes introduced in Rev.3 are to be uniformly applied by IACS Societies on surveys commenced on or after 1 January 2007.
- Note 4: Changes introduced in Rev. 4 (paragraphs 1.1.1, 2.6 and 3.3) are to be uniformly applied by IACS Societies at special and annual surveys, as applicable, carried out after the ship has been made compliant with the requirements of SOLAS II-1/23-3 and II-1/25, and commenced on or after 1 July 2007.
- Note 5: Changes introduced in Rev.5 are to be uniformly applied by IACS Societies for surveys commenced on or after the 1 January 2009.
- Note 6: Changes introduced in Rev.6 are to be uniformly applied by IACS Societies for surveys commenced on or after 1 July 2010.
- As for the requirements regarding semi-hard coatings, these coatings, if already applied, will not be accepted from the next special or intermediate survey commenced on or after 1 July 2010, whichever comes first, with respect to waiving the annual internal examination of the ballast tanks.
- Note 7: Changes introduced in Rev.7 are to be uniformly applied by IACS Societies for surveys commenced on or after 1 July 2012.
- Note 8: Changes introduced in Rev.8 are to be uniformly applied by IACS Societies for surveys commenced on or after 1 January 2013.
- Note 9: Changes introduced in Rev.9 are to be uniformly applied by IACS Societies for surveys commenced on or after 1 July 2014.
- Note 10: Changes introduced in Rev.10 are to be uniformly applied by IACS Societies for surveys commenced on or after 1 January 2015.
- Note 11: Changes introduced in Rev.11 are to be uniformly applied by IACS Societies for surveys commenced on or after 1 July 2016.
- Note 12: Changes introduced in Rev.12 are to be uniformly applied by IACS Societies for surveys commenced on or after 1 July 2017.
- Note 13: Changes introduced in Rev.13 are to be uniformly applied by IACS Societies for surveys commenced on or after 1 January 2019.
- Note 14: Changes introduced in Rev.14 are to be uniformly applied by IACS Societies for surveys commenced on or after 1 January 2019.

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## ENCLOSURES:

Table I: Minimum requirements for Close-up Surveys at Hull Special Surveys of General Dry Cargo Ships.

Table II: Minimum requirements to Thickness Measurements at Hull Special Surveys of General Dry Cargo Ships.

Table III: Guidance for Additional Thickness Measurements in Way of Substantial Corrosion.

Table IV: Procedures for Certification of Firms Engaged in Thickness Measurement of Hull Structures.

Figure 1: Areas for Close-up Survey of General Dry Cargo Ships.

Figure 2: Areas for Close-up Survey of General Dry Cargo Ships.

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## 1. GENERAL

### 1.1 Application

1.1.1 The requirements apply to all self-propelled General Dry Cargo Ships of 500gt and above carrying solid cargoes other than (see Footnote 1):

- ships subject to **UR Z10.2 or UR Z10.5**;
- dedicated container carriers;
- ro-ro cargo ships;
- refrigerated cargo ships;
- dedicated wood chip carriers;
- dedicated cement carriers;
- livestock carriers;
- deck cargo ships (see Footnote 2);
- general dry cargo ships of double-side skin construction, with double-side skin extending for the entire length of the cargo area, and for the entire height of the cargo hold to the upper deck.

1.1.2 For General Dry Cargo Ships with hybrid cargo hold arrangements, e.g. with some cargo holds of single-side skin and others of double-side skin, the requirements of UR Z7.1 are to be applied only to structure in way of the single-side skin cargo hold region.

1.1.3 The requirements apply to surveys of hull structure and piping systems in way of cargo holds, cofferdams, pipe tunnels, void spaces and fuel oil tanks within the cargo area and all ballast tanks. The requirements are additional to the classification requirements applicable to the remainder of the ship. Refer to Z7.

1.1.4 The requirements contain the minimum extent of examination, thickness measurements and tank testing. The survey is to be extended when Substantial Corrosion and/or structural defects are found and include additional Close-up Survey when necessary.

### 1.2 Definitions

#### 1.2.1 Ballast Tank

A Ballast Tank is a tank that is being used primarily for salt water ballast.

#### 1.2.2 Spaces

Spaces are separate compartments including holds and tanks.

#### 1.2.3 Overall Survey

An Overall Survey is a survey intended to report on the overall condition of the hull structure and determine the extent of additional Close-up Surveys.

#### 1.2.4 Close Up Survey

A Close-up Survey is a survey where the details of structural components are within the close visual inspection range of the surveyor, i.e. normally within reach of hand.

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Footnote 1: The requirements of paragraphs 2.6 and 3.3 also apply to those cargo ships, which, although belonging to the ship types listed in 1.1.1 that are excluded from the application of this UR, are fitted with a single cargo hold.

Footnote 2: A deck cargo ship is a ship that is designed to carry cargo exclusively above deck without any access for cargo below deck.

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### 1.2.5 Transverse Section

A Transverse Section includes all longitudinal members such as plating, longitudinals and girders at the deck, sides, bottom, inner bottom and hopper side plating, longitudinal bulkheads and bottom plating in top wing tanks. For transversely framed vessels, a transverse section includes adjacent frames and their end connections in way of transverse sections.

### 1.2.6 Representative Space

Representative Spaces are those which are expected to reflect the condition of other Spaces of similar type and service and with similar corrosion prevention systems. When selecting Representative Spaces account is to be taken of the service and repair history on board and identifiable Critical Structural Areas and/or Suspect Areas.

### 1.2.7 Critical Structural Area

Critical Structural Areas are locations which have been identified from calculations to require monitoring of from the service history of the subject ship or from similar ships or sister ships, if applicable, to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship.

### 1.2.8 Suspect Area

Suspect Areas are locations showing Substantial Corrosion and/or are considered by the surveyor to be prone to rapid wastage.

### 1.2.9 Substantial Corrosion

Substantial Corrosion is an extent of corrosion such that assessment of corrosion pattern indicates a wastage in excess of 75% of allowable margins, but within acceptable limits.

### 1.2.10 Corrosion Prevention System

A Corrosion Prevention System is normally considered a full hard protective coating.

Hard Protective Coating is usually to be epoxy coating or equivalent. Other coating systems, which are neither soft nor semi-hard coatings, may be considered acceptable as alternatives provided that they are applied and maintained in compliance with the manufacturer's specifications.

### 1.2.11 Coating Condition

Coating Condition is defined as follows:

<b>GOOD</b>	condition with only minor spot rusting.
<b>FAIR</b>	condition with local breakdown at edges of stiffeners and weld connections and/or light rusting over 20% or more of areas under consideration, but less than as defined for POOR condition.
<b>POOR</b>	condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration.

### 1.2.12 Cargo Length Area

Cargo Length Area is that part of the ship which contains all cargo holds and adjacent areas including fuel tanks, cofferdams, ballast tanks and void spaces.

### 1.2.13 Special Consideration

Special Consideration or specially considered (in connection with close-up surveys and thickness measurements) means sufficient close-up inspection and thickness

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measurements are to be taken to confirm the actual average condition of the structure under the coating.

### 1.2.14 Prompt and Thorough Repair

A Prompt and Through Repair is a permanent repair completed at the time of survey to the satisfaction of the surveyor, therein removing the need for the imposition of any associated condition of classification.

### 1.2.15 Remote Inspection Techniques(RIT)

Remote Inspection Technique is a means of survey that enables examination of any part of the structure without the need for direct physical access of the surveyor(refer to Rec.42).

## 1.3 Repairs

1.3.1 Any damage in association with wastage over the allowable limits (including buckling, grooving, detachment or fracture), or extensive areas of wastage over the allowable limits, which affects or, in the opinion of the Surveyor, will affect the vessel's structural, watertight or weathertight integrity, is to be promptly and thoroughly (see 1.2.14) repaired. Areas to be considered include:

- side shell frames, their end attachments and adjacent shell plating;
- deck structure and deck plating;
- bottom structure and bottom plating;
- watertight bulkheads;
- hatch covers and hatch coamings.
- items in 3.2.3.5, 3.2.3.6 and 3.2.3.8 of UR Z7.

For locations where adequate repair facilities are not available, consideration may be given to allow the vessel to proceed directly to a repair facility. This may require discharging the cargo and/or temporary repairs for the intended voyage.

1.3.2 Additionally, when a survey results in the identification of structural defects or corrosion, either of which, in the opinion of the surveyor, will impair the vessel's fitness for continued service, remedial measures are to be implemented before the ship continues in service.

1.3.3 Where the damage found on structure mentioned in Para. 1.3.1 is isolated and of a localised nature which does not affect the ship's structural integrity, consideration may be given by the surveyor to allow an appropriate temporary repair to restore watertight or weather tight integrity and impose a Recommendation/Condition of Class in accordance with IACS PR 35, with a specific time limit.

## 1.4 Thickness measurements and close-up surveys

1.4.1 In any kind of survey, i.e. special, intermediate, annual or other surveys having the scope of the foregoing ones, thickness measurements, when required by Table II, of structures in areas where close-up surveys are required, shall be carried out simultaneously with close-up surveys.

1.4.2 Consideration may be given by the attending Surveyor to allow use of Remote Inspection Techniques (RIT) as an alternative to close-up survey. Surveys conducted using a RIT are to be completed to the satisfaction of the attending Surveyor. When RIT is used for a close-up survey, temporary means of access for the corresponding thickness measurements as specified in this UR is to be provided unless such RIT is also able to carry out the required thickness measurements.

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### 1.5 Remote Inspection Techniques (RIT)

1.5.1 The RIT is to provide the information normally obtained from a close-up survey. RIT surveys are to be carried out in accordance with the requirements given here-in and the requirements of IACS Recommendation 42 'Guidelines for Use of Remote Inspection Techniques for surveys'. These considerations are to be included in the proposals for use of a RIT which are to be submitted in advance of the survey so that satisfactory arrangements can be agreed with the Classification Society.

1.5.2 The equipment and procedure for observing and reporting the survey using a RIT are to be discussed and agreed with the parties involved prior to the RIT survey, and suitable time is to be allowed to set-up, calibrate and test all equipment beforehand.

1.5.3 When using a RIT as an alternative to close-up survey, if not carried out by the Society itself, it is to be conducted by a firm approved as a service supplier according to UR Z17 and is to be witnessed by an attending surveyor of the Society.

1.5.4 The structure to be examined using a RIT is to be sufficiently clean to permit meaningful examination. Visibility is to be sufficient to allow for a meaningful examination. The Classification Society is to be satisfied with the methods of orientation on the structure.

1.5.5 The Surveyor is to be satisfied with the method of data presentation including pictorial representation, and a good two-way communication between the Surveyor and RIT operator is to be provided.

1.5.6 If the RIT reveals damage or deterioration that requires attention, the Surveyor may require traditional survey to be undertaken without the use of a RIT.

### 1.6 Thickness measurements Acceptance Criteria

The acceptance criteria for thickness measurements are according to the Rules of the individual Classification Society and/or specific IACS URs depending on ship's age and structural elements concerned, e.g. UR S18<sup>1</sup> for corrugated transverse bulkhead, UR S21A<sup>2</sup> for all cargo hatch covers and coamings on exposed decks

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<sup>1</sup> UR S18 Revision 7 or subsequent revisions or corrigenda as applicable.

<sup>2</sup> UR S21A applies for ships contracted for construction on or after 1 July 2012, Rev.1 of UR S21A applies for ships contracted for construction on or after 1 July 2016.

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(cont'd)**2. SPECIAL SURVEY \*****2.1 Schedule**

2.1.1 Special Surveys are to be carried out at 5 years intervals to renew the Classification Certificate.

2.1.2 The first Special Survey is to be completed within 5 years from the date of the initial classification survey and thereafter within 5 years from the credited date of the previous Special Survey. However, an extension of class of 3 months maximum beyond the 5th year can be granted in exceptional circumstances. In this case, the next period of class will start from the expiry date of the Special Survey before the extension was granted.

2.1.3 For surveys completed within 3 months before the expiry date of the Special Survey, the next period of class will start from the expiry date of the Special Survey. For surveys completed more than 3 months before the expiry date of the Special Survey, the period of class will start from the survey completion date. In cases where the vessel has been laid up or has been out of service for a considerable period because of a major repair or modification and the owner elects to only carry out the overdue surveys, the next period of class will start from the expiry date of the special survey. If the owner elects to carry out the next due special survey, the period of class will start from the survey completion date.

2.1.4 The Special Survey may be commenced at the 4th Annual Survey and be progressed with a view to completion by the 5th anniversary date. When the Special Survey is commenced prior to the 4th Annual Survey, the entire survey is to be completed within 15 months if such work is to be credited to the Special Survey.

2.1.5 A survey planning meeting is to be held prior to the commencement of the survey.

2.1.6 Concurrent crediting to both Intermediate Survey (IS) and Special Survey (SS) for surveys and thickness measurements of spaces are not acceptable.

**2.2 Scope****2.2.1 General**

2.2.1.1 The Special Survey is to include, in addition to the requirements of the Annual Surveys, examination, tests and checks of sufficient extent to ensure that the hull and related piping, as required in 2.2.1.3, are in a satisfactory condition and fit for the intended purpose for the new period of class of 5 years to be assigned, subject to proper maintenance and operation and to periodical surveys being carried out at the due dates.

2.2.1.2 All cargo holds, water ballast tanks, including double bottom tanks, pipe tunnels, cofferdams and void spaces bounding cargo holds, decks and outer hull are to be examined, and this examination is to be supplemented by thickness measurement and testing as required in 2.4 and 2.5, to ensure that the structural integrity remains effective.

The aim of the examination is to discover Substantial Corrosion, significant deformation, fractures, damages or other structural deterioration, that may be present.

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\* Some member Societies use the term "Special Periodical Survey" others use the term "Class Renewal Survey" instead of the term "Special Survey".



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2.2.1.3 All piping systems within the above spaces are to be examined and operationally tested to working pressure to attending Surveyor's satisfaction to ensure that tightness and condition remain satisfactory.

2.2.1.4 The survey extent of ballast tanks converted to void spaces is to be specially considered in relation to the requirements for ballast tanks.

Note: For survey of automatic air pipes refer to 2.2.13 of UR Z7.

## 2.2.2 Dry Dock Survey

2.2.2.1 A survey in dry dock is to be a part of the Special Survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo holds and water ballast tanks are to be carried out in accordance with the applicable requirements for special surveys, if not already performed.

Note: Lower portions of the cargo holds and ballast tanks are considered to be the parts below light ballast water line.

## 2.2.3 Tank Protection

2.2.3.1 Where provided, the condition of corrosion prevention system of ballast tanks is to be examined. For tanks used for water ballast, excluding double bottom tanks, where a hard protective coating is found in POOR condition and it is not renewed, where soft or semi-hard coating has been applied, or where a hard protective coating was not applied from time of construction, the tanks in question are to be examined at annual intervals. Thickness measurements are to be carried out as deemed necessary by the surveyor.

When such breakdown of hard protective coating is found in water ballast double bottom tanks and it is not renewed, where a soft or semi-hard coating has been applied, or where a hard protective coating was not applied from the time of construction, the tanks in question may be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.

2.2.3.2 Where the hard protective coating in spaces is found to be in a GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered.

## 2.2.4 Hatch Covers and Coamings

The hatch covers and coamings are to be surveyed as follows:

2.2.4.1 A thorough inspection of the items listed in 3.2.3 is to be carried out.

2.2.4.2 Checking of the satisfactory operation of all mechanically operated hatch covers is to be made, including:

- stowage and securing in open condition;
- proper fit and efficiency of sealing in closed conditions;
- operational testing of hydraulic and power components, wires, chains and link drives.

2.2.4.3 Checking the effectiveness of sealing arrangements of all hatch covers by hose testing or equivalent is to be carried out.

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2.2.4.4 Close-up survey and thickness measurement<sup>1</sup> of the hatch cover and coaming plating and stiffeners is to be carried out as given in Table I and Table II.

**2.3 Extent of Overall and Close-up Survey**

2.3.1 An Overall Survey of all tanks and spaces, excluding fuel oil, lube oil and fresh water tanks, is to be carried out at each Special Survey.

Note: For fuel oil, lube oil and fresh water tanks, reference is to be made to UR Z7, Table 3.

2.3.2 The minimum requirements for close-up surveys at special survey are given in Table I.

2.3.3 The Surveyor may extend the close-up survey as deemed necessary taking into account the maintenance of the spaces under survey, the condition of the corrosion prevention system and where spaces have structural arrangements or details which have suffered defects in similar spaces or on similar ships according to available information.

2.3.4 For areas in spaces where hard protective coatings are found to be in a GOOD condition, the extent of close-up surveys according to Table I may be specially considered.

Note: For examination of automatic air pipe heads, reference is to be made to UR Z7, Table 4.

**2.4 Extent of Thickness Measurement**

2.4.1 The minimum requirements for thickness measurements at Special Survey are given in Table II.

2.4.2 The Surveyor may extend the thickness measurements as deemed necessary. When thickness measurements indicate substantial corrosion, the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table III may be used as guidance for these additional thickness measurements.

2.4.3 For areas in spaces where hard protective coatings are found to be in a GOOD condition, the extent of thickness measurement according to Table II may be specially considered.

2.4.4 Transverse sections are to be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

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<sup>1</sup> Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures.

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**2.5 Extent of Tank Testing**

2.5.1 All boundaries of water ballast tanks and deep tanks used for water ballast within the cargo length area are to be pressure tested. For fuel oil tanks, the representative tanks are to be pressure tested.

2.5.2 The Surveyor may extend the tank testing as deemed necessary.

2.5.3 Tank testing of fuel oil tanks is to be carried out with a head of liquid to the highest point that liquid will rise under service conditions. Tank testing of fuel oil tanks may be specially considered based on a satisfactory external examination of the tank boundaries, and a confirmation from the Master stating that the pressure testing has been carried out according to the requirements with satisfactory results.

**2.6 Additional requirements for single hold cargo ships (see Footnote 1 to 1.1.1) after determining compliance with SOLAS II-I/23-3 and II-I/25**

2.6.1 For ships complying with the requirements of SOLAS II-I/23-3 and II-I/25 for hold water level detectors, the special survey is to include an examination and a test of the water ingress detection system and their alarms.

**Z7.1**  
(cont'd)**3. ANNUAL SURVEY****3.1 Schedule**

3.1.1 Annual Surveys are to be held within 3 months before or after anniversary date from the date of the initial classification survey or of the date credited for the last Special Survey.

**3.2 Scope**

## 3.2.1 General

3.2.1.1 The survey is to consist of an examination for the purpose of ensuring, as far as practicable, that the hull, hatch covers, coamings and piping are maintained in a satisfactory condition.

## 3.2.2 Examination of the Hull

3.2.2.1 Examination of the hull plating and its closing appliances as far as can be seen.

3.2.2.2 Examination of watertight penetrations as far as practicable.

## 3.2.3 Examination of weather decks, hatch covers and coamings

3.2.3.1 Confirmation is to be obtained that no unapproved changes have been made to the hatch covers, hatch coamings and their securing and sealing devices since the last survey.

3.2.3.2 Where mechanically operated steel covers are fitted, checking the satisfactory condition of:

- hatch covers; including close-up survey of hatch cover plating;
- tightness devices of longitudinal, transverse and intermediate cross junctions (gaskets, gasket lips, compression bars, drainage channels);
- clamping devices, retaining bars, cleating;
- chain or rope pulleys;
- guides;
- guide rails and track wheels;
- stoppers, etc.;
- wires, chains, gypsies, tensioning devices;
- hydraulic system essential to closing and securing;
- safety locks and retaining devices.

Where portable covers, wooden or steel pontoons are fitted, checking the satisfactory condition where applicable of:

- wooden covers and portable beams, carriers or sockets for the portable beam, and their securing devices;
- steel pontoons;
- tarpaulins;
- cleats, battens and wedges;
- hatch securing bars and their securing devices;
- loading pads/bars and the side plate edge;
- guide plates and chocks;
- compression bars, drainage channels and drain pipes (if any).

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3.2.3.3 Checking the satisfactory condition of hatch coaming plating and their stiffeners including close-up survey.

3.2.3.4 Random checking of the satisfactory operation of mechanically operated hatch covers is to be made including:

- stowage and securing in open condition;
- proper fit and efficiency of sealing in closed condition;
- operational testing of hydraulic and power components, wires, chains, and link drives.

Note: For survey of air pipes, flame screens on vents and ventilators refer to 3.2.3.5 to 3.2.3.8 of UR Z7.

### 3.2.4 Suspect Areas

Suspect Areas identified at previous surveys are to be examined. Thickness measurements are to be taken of the areas of substantial corrosion and the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table III may be used as guidance for these additional thickness measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

### 3.2.5 Examination of Cargo Holds

3.2.5.1 For Ships 10-15 years of age, the following is to apply:

- a) Overall Survey of one forward and one after cargo hold and their associated tween deck spaces.
- b) When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table III may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

3.2.5.2 For Ships over 15 years of age, the following is to apply:

- a) Overall Survey of all cargo holds and tween deck spaces.
- b) Close-up examination of sufficient extent, minimum 25% of frames, to establish the condition of the lower region of the shell frames including approx. lower one third length of side frame at side shell and side frame end attachment and the adjacent shell plating in a forward lower cargo hold and one other selected lower cargo hold. Where this level of survey reveals the need for remedial measures, the survey is to be extended to include a Close-up Survey of all of the shell frames and adjacent shell plating of those cargo holds and associated tween deck spaces (as applicable) as well as a Close-up Survey of sufficient extent of all remaining cargo holds and tween deck spaces (as applicable).

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- c) When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table III may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.
- d) Where the protective coating in cargo holds, as applicable, is found to be in GOOD condition the extent of close-up surveys may be specially considered.
- e) All piping and penetrations in cargo holds, including overboard piping, are to be examined.

### 3.2.6 Examination of Ballast Tanks

3.2.6.1 Examination of ballast tanks when required as a consequence of the results of the Special Survey and Intermediate Survey is to be carried out. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements are to be increased to determine the extent of areas of substantial corrosion. Table III may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the annual survey is credited as completed.

### **3.3 Additional requirements for single hold cargo ships (see Footnote 1 to 1.1.1) after determining compliance with SOLAS II-I/23-3 and II-I/25**

3.3.1 For ships complying with the requirements of SOLAS II-I/23-3 and II-I/25 for hold water level detectors, the annual survey is to include an examination and a test, at random, of the water ingress detection system and of their alarms.

**Z7.1**  
(cont'd)**4. INTERMEDIATE SURVEY****4.1 Schedule**

4.1.1 The Intermediate Survey is to be held at or between either the 2nd or 3rd Annual Survey.

4.1.2 Those items which are additional to the requirements of the Annual Surveys may be surveyed either at or between the 2nd and 3rd Annual Survey.

4.1.3 A survey planning meeting is to be held prior to the commencement of the survey.

4.1.4 Concurrent crediting to both Intermediate Survey (IS) and Special Survey (SS) for surveys and thickness measurements of spaces are not acceptable.

**4.2 Scope****4.2.1 General**

4.2.1.1 The survey extent is dependent on the age of the vessel as specified in 4.2.2 to 4.2.4.

4.2.2 Ships 5 - 10 Years of Age, the following is to apply :

**4.2.2.1 Ballast tanks**

- a) For tanks used for water ballast, an Overall Survey of Representative Tanks selected by the Surveyor is to be carried out. If such overall survey reveals no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains efficient.
- b) Where POOR coating condition, soft or semi-hard coating, corrosion or other defects are found in water ballast tanks or where a hard protective coating was not applied from the time of construction, the examination is to be extended to other ballast tanks of the same type.
- c) In water ballast tanks other than double bottom tanks, where a hard protective coating is found in POOR condition, and it is not renewed, where soft or semi-hard coating has been applied, or where a hard protective coating was not applied from time of construction, the tanks in question are to be examined and thickness measurements carried out as considered necessary at annual intervals. When such breakdown of hard protective coating is found in water ballast double bottom tanks, where a soft or semi-hard coating has been applied, or where a hard protective coating has not been applied, the tanks in question may be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements are to be carried out.
- d) In addition to the requirements above, areas found suspect at previous surveys are to be surveyed in accordance with the provisions indicated in 3.2.4.

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## 4.2.2.2 Cargo Holds

- a) An Overall Survey of one forward and one after cargo hold and their associated tween deck spaces.
- b) Areas found suspect at previous surveys are to be surveyed in accordance with the provisions indicated in 3.2.4.

## 4.2.3 Ships 10-15 Years of Age, the following is to apply:

## 4.2.3.1 Ballast Tanks

- a) For tanks used for water ballast, an overall survey of all tanks is to be carried out. If such overall survey reveals no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains efficient.
- b) The requirements of 4.2.2.1 c) and d) also apply.

## 4.2.3.2 Cargo Holds

- a) An Overall Survey of all cargo holds and tween deck spaces.
- b) Areas found suspect at previous surveys are to be surveyed in accordance with the provisions indicated in 3.2.4.
- c) When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement is to be carried out. If the results of these thickness measurements indicate that Substantial Corrosion is found, then the extent of thickness measurements is to be increased to determine the extent of areas of substantial corrosion. Table III may be used as guidance for these additional measurements. These extended thickness measurements are to be carried out before the survey is credited as completed.

## 4.2.4 Ships over 15 Years of Age, the following is to apply :

4.2.4.1 The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey as required in 2, except for item 2c) in column 4 of Table II. However, tank testing specified in 2.5, survey of automatic air pipe heads (see Notes in 2.2.1.4 and 2.3.4) and internal examination of fuel oil, lube oil and fresh water tanks (see 2.3.1) are not required unless deemed necessary by the attending surveyor.

4.2.4.2 In application of 4.2.4.1, the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey in lieu of the application of 2.1.4.

4.2.4.3 In lieu of the requirements of 2.2.2, an in water survey, according to the provisions of item 3.1.3 of UR Z3, may be considered as equivalent.



**Z7.1**  
(cont'd)**5 PREPARATION FOR SURVEY****5.1 Conditions of Survey**

5.1.1 The Owner is to provide the necessary facilities for a safe execution of the survey.

5.1.2 Tanks and Spaces are to be safe for access, i.e. gas freed, ventilated and illuminated.

5.1.3 In preparation for survey and thickness measurements and to allow for a thorough examination, all spaces are to be cleaned including removal from surfaces of all loose accumulated corrosion scale. Spaces are to be sufficiently clean and free from water, scale, dirt, oil residues etc. to reveal corrosion, deformation, fractures, damages, or other structural deterioration. However, those areas of structure whose renewal has already been decided by the owner need only be cleaned and descaled to the extent necessary to determine the limits of the areas to be renewed.

5.1.4 Sufficient illumination is to be provided to reveal corrosion, deformation, fractures, damages or other structural deterioration.

5.1.5 Where soft or semi-hard coatings have been applied, safe access is to be provided for the surveyor to verify the effectiveness of the coating and to carry out an assessment of the conditions of internal structures which may include spot removal of the coating. When safe access cannot be provided, the soft or semi-hard coating is to be removed.

**5.2 Access to Structures**

5.2.1 For Overall Survey, means are to be provided to enable the surveyor to examine the hull structure in a safe and practical way.

5.2.2 For Close-up Surveys, one or more of the following means for access, acceptable to the Surveyor, is to be provided:

- permanent staging and passages through structures;
- temporary staging, e.g. ladders, and passages through structures;
- hydraulic arm vehicles such as conventional cherry pickers, lifts and movable platforms
- boats or rafts
- other equivalent means

5.2.3 For Surveys conducted by use of a remote inspection technique, one or more of the following means for access, acceptable to the Surveyor, is to be provided:

- Unmanned robot arm.
- Remotely Operated Vehicles (ROV).
- Unmanned Aerial Vehicles / Drones.
- Other means acceptable to the Classification Society.

**Z7.1**

(cont'd)

**5.3 Equipment for Survey**

5.3.1 Thickness measurement is normally to be carried out by means of ultrasonic test equipment. The accuracy of the equipment is to be proven to the Surveyor as required.

5.3.2 One or more of the following fracture detection procedures may be required if deemed necessary by the Surveyor:

- radiographic equipment
- ultrasonic equipment
- magnetic particle equipment
- dye penetrant

**5.4 Survey at Sea or at Anchorage**

5.4.1 Survey at sea or at anchorage may be accepted provided the Surveyor is given the necessary assistance from the personnel on board. Necessary precautions and procedures for carrying out the survey are to be in accordance with 5.1, 5.2, and 5.3.

5.4.2 A communication system is to be arranged between the survey party in the tank and the responsible officer on deck. This system must also include the personnel in charge of ballast pump handling if boats or rafts are used.

5.4.3 When boats or rafts are used, appropriate life jackets are to be available for all participants. Boats or rafts are to have satisfactory residual buoyancy and stability even if one chamber is ruptured. A safety checklist is to be provided.

5.4.4 Surveys of tanks by means of boats or rafts may only be undertaken at the sole discretion of the Surveyor, who is to take into account the safety arrangements provided, including weather forecasting and ship response in reasonable sea conditions.

See footnote\*

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\* Reference is made to IACS Recommendation 39 - Guidelines for use of Boats or Rafts for Close-up surveys.

**Z7.1**  
(cont'd)**6. PROCEDURES FOR THICKNESS MEASUREMENTS****6.1 General**

6.1.1 The required thickness measurements, if not carried out by the Society itself, are to be witnessed by a surveyor of the Society. The surveyor is to be on board to the extent necessary to control the process.

6.1.2 The thickness measurement company is to be part of the survey planning meeting to be held prior to commencing the survey.

6.1.3 Thickness measurements of structures in areas where close-up surveys are required shall be carried out simultaneously with close-up surveys.

**6.2 Certification of Thickness Measurement Company**

6.2.1 The thickness measurements are to be carried out by a company certified by the Classification Society according to principles stated in Table IV.

**6.3 Reporting**

6.3.1 A thickness measurement report is to be prepared. The report is to give the location of measurements, the thickness measured as well as corresponding original thickness. Furthermore, the report is to give the date when the measurements were carried out, type of measurement equipment, names of personnel and their qualifications and has to be signed by the operator.

6.3.2 The Surveyor is to review the final thickness measurement report and countersign the cover page.

TABLE I

TABLE OF THE MINIMUM REQUIREMENTS FOR CLOSE-UP SURVEY AT HULL  
SPECIAL SURVEYS OF GENERAL DRY CARGO SHIPS

Special Survey No.1 Age ≤ 5	Special Survey No.2 5 < Age ≤ 10	Special Survey No. 3 10 < Age ≤ 15	Special Survey No. 4 and Subsequent Age > 15
<p>(A) Selected shell frames in one forward and one aft cargo hold and associated tween deck spaces.</p> <p>(B) One selected cargo hold transverse bulkhead.</p> <p>(D) All cargo hold hatch covers and coamings (plating and stiffeners).</p>	<p>(A) Selected shell frames in all cargo holds and tween deck spaces.</p> <p>(B) One transverse bulkhead in each cargo hold.</p> <p>(B) Forward and aft transverse bulkhead in one side ballast tank, including stiffening system.</p> <p>(C) One transverse web with associated plating and framing in two representative water ballast tanks of each type (i.e. topside, hopper side, side tank or double bottom tank).</p> <p>(D) All cargo hold hatch covers and coamings (plating and stiffeners).</p> <p>(E) Selected areas of all deck plating and underdeck structure inside line of hatch openings between cargo hold hatches.</p> <p>(F) Selected areas of inner bottom plating.</p>	<p>(A) All shell frames in the forward lower cargo hold and 25% frames in each of the remaining cargo holds and tween deck spaces including upper and lower end attachments and adjacent shell plating.</p> <p>(B) All cargo hold transverse bulkheads.</p> <p>(B) All transverse bulkheads in ballast tanks, including stiffening system.</p> <p>(C) All transverse webs with associated plating and framing in each water ballast tank.</p> <p>(D) All cargo hold hatch covers and coamings (plating and stiffeners).</p> <p>(E) All deck plating and underdeck structure inside line of hatch openings between cargo hold hatches.</p> <p>(F) All areas of inner bottom plating.</p>	<p>(A) All shell frames in all cargo holds and tween deck spaces including upper and lower end attachments and adjacent shell plating.</p> <p>Areas (B –F) as for Special Survey No. 3.</p>

- (A) Cargo hold transverse frames.
- (B) Cargo hold transverse bulkhead plating, stiffeners and girders.
- (C) Transverse web frame or watertight transverse bulkhead in water ballast tanks.
- (D) Cargo hold hatch covers and coamings. Subject to cargo hold hatch covers of approved design which structurally have no access to the internals, close-up survey/thickness measurement shall be done of accessible parts of hatch covers structures.
- (E) Deck plating and underdeck structure inside line of hatch openings between cargo hold hatches.
- (F) Inner bottom plating.

See Figs 1 and 2 for the areas corresponding to (A), (B), (C), (D), (E) and (F).

- Note:** Close-up survey of cargo hold transverse bulkheads to be carried out at the following levels:
- Immediately above the inner bottom and immediately above the tween decks, as applicable.
  - Mid-height of the bulkheads for holds without tween decks.
  - Immediately below the main deck plating and tween deck plating.

TABLE II

**TABLE OF MINIMUM REQUIREMENTS FOR THE THICKNESS MEASUREMENT AT  
HULL SPECIAL SURVEYS OF GENERAL DRY CARGO SHIPS**

Special Survey No. 1 <b>Age ≤ 5</b>	Special Survey No. 2 <b>5 &lt; Age ≤ 10</b>	Special Survey No. 3 <b>10 &lt; Age ≤ 15</b>	Special Survey No. 4 and Subsequent <b>Age &gt;15</b>
1. Suspect areas.	1. Suspect areas.  2. One transverse section of deck plating in way of a cargo space within the amidships 0.5L.  3. Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table I.	1. Suspect areas.  2. Two transverse sections within the amidships 0.5L in way of two different cargo spaces.  3. Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table I.  4. Within the cargo length area, each deck plate outside line of cargo hatch openings.  5. All wind and water strakes within the cargo length area.  6. Selected wind and water strakes outside the cargo length area.	1. Suspect areas.  2. Within the cargo length area: a) A minimum of three transverse sections within the amidships 0.5L. b) each deck plate outside line of cargo hatch openings. c) Each bottom plate, including lower turn of bilge. d) Duct keel or pipe tunnel plating and internals.  3. Measurement for general assessment and recording of corrosion pattern of those structural members subject to close-up survey according to Table I.  4. All wind and water strakes full length

**Notes:**

1. Thickness measurement locations should be selected to provide the best representative sampling of areas likely to be most exposed to corrosion, considering cargo and ballast history and arrangement and condition of protective coatings.
2. For ships less than 100 metres in length, the number of transverse sections required at Special survey No. 3 may be reduced to one and the number of transverse sections at Special Survey No. 4 and subsequent surveys may be reduced to two.

**Z7.1**  
(cont'd)

TABLE III

**GUIDANCE FOR ADDITIONAL THICKNESS MEASUREMENTS IN WAY OF  
SUBSTANTIAL CORROSION**

<b>Structural Member</b>	<b>Extent of Measurement</b>	<b>Pattern of Measurement</b>
Plating	Suspect area and adjacent plates.	5 point pattern over 1 square meter.
Stiffeners	Suspect area.	3 measurements each in line across web and flange.

TABLE IV

**PROCEDURES FOR CERTIFICATION OF FIRMS ENGAGED IN THICKNESS MEASUREMENT OF HULL STRUCTURES**

**1. Application**

This guidance applies for certification of the firms which intend to engage in the thickness measurement of hull structures of the vessels. UR Z17 also applies.

**2. Procedures for Certification**

(1) Submission of Documents:

Following documents are to be submitted to the society for approval;

- a) Outline of firms, e.g. organization and management structure.
- b) Experiences of the firms on thickness measurement inter alia of hull structures of the vessels.
- c) Technicians careers, i.e. experiences of technicians as thickness measurement operators, technical knowledge of hull structure etc. Operators, are to be qualified according to a recognized industrial NDT Standard.
- d) Equipment used for thickness measurement such as ultra-sonic testing machines and its maintenance/calibration procedures.
- e) A guide for thickness measurement operators.
- f) Training programmes of technicians for thickness measurement.

(2) Auditing of the firms:

Upon reviewing the documents submitted with satisfactory results, the firm is audited in order to ascertain that the firm is duly organised and managed in accordance with the documents submitted, and eventually is capable of conducting thickness measurement of the hull construction of the ships.

(3) Certification is conditional on an onboard demonstration at thickness measurements as well as satisfactory reporting.

**3. Certification**

(1) Upon satisfactory results of both the audit of the firm in 2(2) and the demonstration tests in 2(3) above, the Society will issue a Certificate of Approval as well as a notice to the effect that the thickness measurement operation system of the firm has been certified by the Society.

(2) Renewal/endorsement of the Certificate is to be made at intervals not exceeding 3 years by verification that original conditions are maintained.

**4. Information of any alteration to the Certified Thickness Measurement Operation System**

In case where any alteration to the certified thickness measurement operation system of the firm is made, such an alteration is to be immediately informed to the Society. Re-audit is made where deemed necessary by the Society.

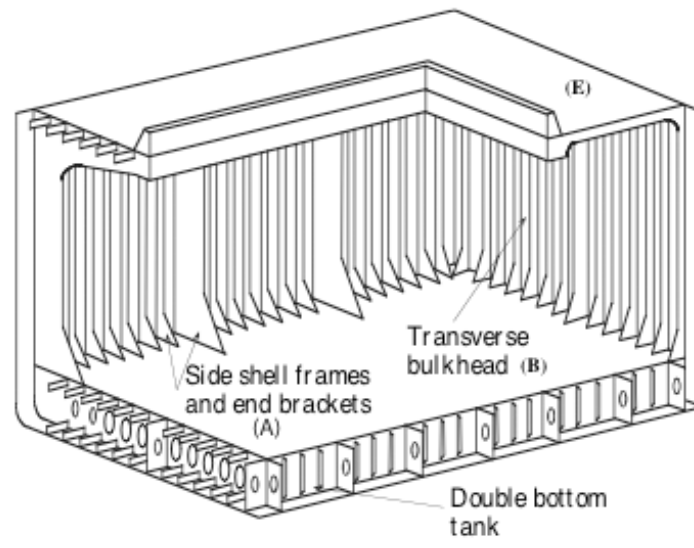
**Z7.1**  
(cont'd)

**5. Cancellation of Approval**

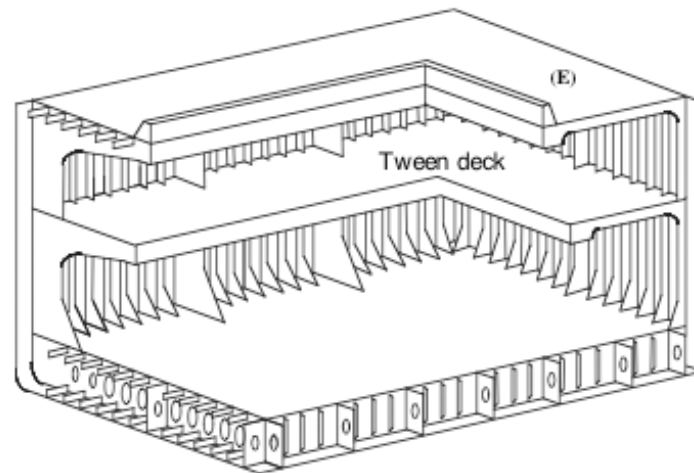
Approval may be cancelled in the following cases:

- (1) Where the measurements were improperly carried out or the results were improperly reported.
- (2) Where the Society's surveyor found any deficiencies in the approved thickness measurement operation systems of the firm.
- (3) Where the firm failed to inform of any alteration in 4 above to the Society.



**Z7.1**  
(cont'd)

(a) Single Deck Ship



(b) Tween Deck Ship

**Figure 1** Areas for Close-Up Survey of General Dry Cargo Ships

**Z7.1**  
(cont'd)

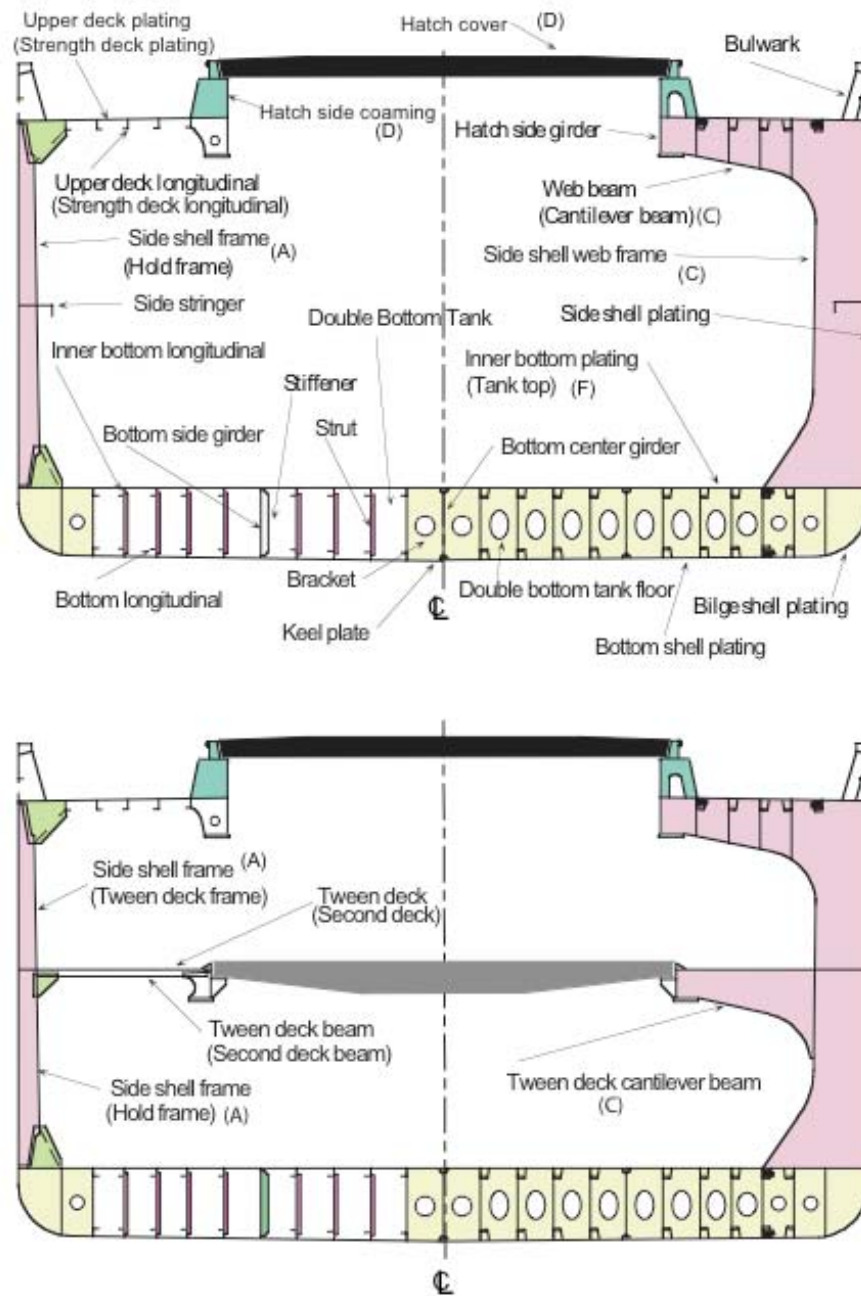


Figure 2 Areas for Close-Up Survey of General Dry Cargo Ships

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