

## Section 3 Surveys - General Requirements

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in a condition which may cause corrosion damages affecting vessel's class to occur before the next dry-docking, the vessel is to be dry-docked.

### **C.2 Thickness measurements and corrosion tolerances**

#### **C.2.1 General**

**C.2.1.1** The thickness of structural elements is checked by measurements, in order to assess whether or not the values stipulated in the Construction Rules are observed, taking into account the admissible tolerances. Unless severe corrosion has occurred owing to particular service conditions, thickness measurements will not be required until Class Renewal II, see [C.1.2.2](#) and [C.1.3.2.1.5](#).

**C.2.1.2** Thickness measurements are to be carried out in accordance with recognized methods, by authorized personnel or companies, see [C.2.2](#). Rust and contamination are to be removed from the components to be examined. The Surveyor is entitled to require check measurements or more detailed measurements to be performed in his presence. The thickness measurements on board are to be witnessed by the Surveyor. This requires the Surveyor to be on board while the gauging is taken, to the extent necessary to control the process.

The scope of thickness measurements as well as the reporting shall be fixed in a survey planning meeting between the surveyor(s), representatives of the owner and the approved thickness measurement operator/firm well in advance of measurements and prior to commencing the survey.

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

#### **C.2.2 Authorization**

**C.2.2.1** The personnel or the company entrusted with thickness measurements (as well as the procedure for documentation) shall be approved by GL for this purpose.

**C.2.2.2** Validity of an approval granted will depend on the continued qualification. The approval will have to be renewed after a period not exceeding 3 years.

#### **C.2.3 Scope of measurements**

##### **C.2.3.1 Main hull structural elements**

In Class Renewal II and all subsequent ones the plate thickness of the main hull (essential longitudinal and transverse) structural elements are to be checked by measurements. The number of measurements depends on the vessel's maintenance condition and is left to the Surveyor's discretion. The minimum requirements for thickness measurements on the occasion of Class Renewal Surveys are stated in Table 3.2, depending on the ship's age. Respective thickness measurements to determine the general level of corrosion are to be carried out.

**C.2.3.2** The extent of thickness measurements may be reduced, in comparison with Table 3.2, providing that during the close-up examination the Surveyor is satisfied that there is no structural diminution and the protective coating, where applied, continues to be good. This special consideration only applies for the number of the measurement spots within the structures mentioned in Table 3.2.

The Surveyor may extend the scope of the thickness measurement as deemed necessary. This applies especially to areas with substantial corrosion.

Transverse sections should be chosen where largest corrosion rates are suspected to occur or are revealed by deck plating measurements.

##### **C.2.3.3 Ballast tanks**

In the case of major corrosion damages, the structural elements of ballast tanks are to be checked by thickness measurements, see [C.1.2.2](#).

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**Table 3.2 Class Renewal Surveys (Hull)**  
**Minimum Requirements for Thickness Measurements**

Class renewal survey [No.] and ship's age [years]			
I. age ≤ 5	II. 5 < age ≤ 10	III. 10 < age ≤ 15	IV. and subsequent, age > 15
Suspect Areas throughout the vessel			
	One transverse section in way of a cargo space within the amidships 0.5 L	Two transverse sections in way of cargo spaces within the amidships 0.5 L, in way of two different cargo spaces	Three transverse sections in way of cargo spaces within the amidships 0.5 L
		All cargo hold hatch covers and coamings (plating and stiffeners)	
		All exposed main deck plating within 0.5 L amidships	All exposed main deck plating full length
		All wind- and water strakes within 0.5 L amidships	All wind- and water strakes full length
		Internals in forepeak and after peak tanks	Internals in forepeak and after peak tanks
		Lowest strake and strakes in way of tween decks of selected transverse bulkheads in cargo spaces together with internals in way	Lowest strake and strakes in way of tween decks of all transverse bulkheads in cargo spaces together with internals in way
			Representative exposed super-structure deck plating (poop, bridge, and forecastle deck)
			All keel plates full length. Also, additional bottom plates in way of cofferdams, machinery space and aft ends of tanks
			Plating of sea chests. Shell plating in way of overboard discharges as considered necessary by the Surveyor.

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**C.2.3.4** Where special reasons exist, the Surveyor may demand thickness measurements to be carried out already on the occasion of Class Renewal I, also outside the area of 0.5 L amidships, see [C.1.3.2.1.5](#). The same applies in the case of conversion or repair of a ship.

**C.2.3.5** In order to be used as a basis for class renewal, thickness measurements should, as far as practicable, be carried out already on the occasion of the fourth annual survey.

### **C.2.3.6 Equipment**

In Class Renewal II and all subsequent Class Renewals the cross sectional areas of the anchor chain cables are to be determined. The mean diameters of the anchor chain cables are to be determined by representative measurements, approx. 3 links per length of 27.5 m, made at the ends of the links where the wear is greatest.

**C.2.3.7** For additional details on thickness measurements for special ship types, see [Section 4](#).

### **C.2.4 Corrosion and wear tolerances**

**C.2.4.1** Where thickness measurements according to [C.2.3](#) result in corrosion and wear values exceeding those stated in the following, the respective hull structural elements will have to be renewed.

GL reserves the right where applicable to modify the indicated values according to C.2.4.3 and [C.2.4.7.3](#) referring to the maximum permissible large-surface corrosion allowances.

Where reduced material thickness was admitted for the new building (effective system of corrosion prevention), the permissible corrosion allowances are to be based on the unreduced rule thickness.

#### **C.2.4.2 Longitudinal strength**

Maximum permissible reduction of midship section modulus: 10 %.

#### **C.2.4.3 Local strength**

$t_k$  : maximum permissible large-surface reduction of plate thickness and web thickness of profiles:

$$t_k = 1.5 \text{ mm} \quad \text{for} \quad t \leq 11.5 \text{ mm}$$

$$t_k = 0.09 t + 0.45 \text{ mm, max. 3.0 mm} \quad \text{for} \quad t > 11.5 \text{ mm}$$

$t$  : plate and/or web thickness in [mm], as stipulated in the GL Construction Rules.

Maximum permissible locally limited reduction of thickness: 0.2 t

In ballast tanks in way of 1.5 m below the weather deck, if the weather deck is the tank deck:  $t_k = 2.5 \text{ mm}$

In cargo oil tanks in way of 1.5 m below the weather deck, if the weather deck is the tank deck, and for horizontal structural elements in cargo oil and fuel tanks:  $t_k = 2.0 \text{ mm}$ .

In dry cells, such as fore-to-aft passageways of container ships and comparable spaces:

$$t_k = 1.0 \text{ mm} \quad \text{for} \quad t \leq 11.5 \text{ mm}$$

$$t_k = 0.09 \cdot t, \text{ max. 2.5 mm} \quad \text{for} \quad t > 11.5 \text{ mm}$$

For hatch covers of dry cargo holds:  $t_k = 1.0 \text{ mm}$

Maximum permissible surface reduction of the side shell in way of the ice belt: 2.0 mm.

#### **C.2.4.4 Hatch covers**

For single skin hatch covers and for the plating of double skin hatch covers, steel renewal is required where the gauged thickness is less than  $t_{net} + 0.5 \text{ mm}$ . Where the gauged thickness is within the range  $t_{net} + 0.5 \text{ mm}$  and  $t_{net} + 1.0 \text{ mm}$ , coating (applied in accordance with the coating manufacturer's requirements) or annual gauging may be adopted as an alternative to steel renewal. Coating is to be maintained in GOOD condition, as defined in UR Z10.2.1.2.

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For the internal structure of double skin hatch covers, thickness gauging is required when hatch cover top or bottom plating renewal is to be carried out or when this is deemed necessary, at the discretion of the surveyor, on the basis of the plating corrosion or deformation condition. In these cases, steel renewal for the internal structures is required where the gauged thickness is less than  $t_{\text{net}}$ .

For corrosion addition  $t_k = 1.0$  mm the thickness for steel renewal is  $t_{\text{net}}$  and the thickness for coating or annual gauging is when gauged thickness is between  $t_{\text{net}}$  and  $t_{\text{net}} + 0.5$  mm.

### C.2.4.5 Vessels with Class Notation CSR

For hull structural parts on vessels built in compliance with IACS Common Structural Rules for Bulk Carriers and Oil Tankers (Class Notation **CSR**) applicable corrosion allowances are noted in structural drawings or described in the CSR Rules.

### C.2.4.6 Anchor equipment

Maximum permissible reduction of the mean diameter of chain links: 12 %.

Maximum permissible reduction in weight of anchors: 10 %.

### C.2.4.7 High speed craft

**C.2.4.7.1** For high speed (seagoing) craft as defined in GL Rules for [High Speed Craft \(I-3-1\)](#) the following corrosion and wear tolerances apply, see also Section 2, C.3.3.5.

#### C.2.4.7.2 Longitudinal strength

Maximum permissible reduction of midship section modulus: 10 %.

#### C.2.4.7.3 Local strength

Where applicable, the maximum permissible large-surface reduction  $t_k$  of plate thickness and web thickness of profiles is:

$$\begin{array}{ll} t_k = 0.5 \text{ mm} & \text{for } t \leq 10.5 \text{ mm} \\ t_k = 0.03 t + 0.2 \text{ mm, max. } 1.0 \text{ mm} & \text{for } t > 10.5 \text{ mm} \end{array}$$

For tank bottoms:  $t_k = 1.0$  mm

Maximum permissible locally limited reduction of thickness: 0.1 t.

If the measures for corrosion prevention described in the GL Rules for High Speed Craft (I-3-1), Section 3, C.3.1.8 are fully applied and maintained according to a document available on board and specifying all maintaining procedures, the corrosion reduction  $t_k$  can be assumed as 0.0 mm for steel and the aluminium alloys.

**C.2.4.7.4** For anchor chain cables the maximum permissible reduction of the mean diameter of chain links is 10 %.

## C.3 Additional requirements for General Dry Cargo ships

**C.3.1** The following additional requirements refer to the hull structure and piping systems of all self-propelled general dry cargo ships carrying solid cargoes other than:

- bulk carriers with Class Notation ESP <sup>10</sup>
- dedicated container carriers
- ro-ro cargo ships
- refrigerated cargo ship
- dedicated wood chip carriers

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<sup>10</sup> Requirements see UR Z 10.2 or UR Z 10.5 of IACS

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- dedicated cement carriers
- livestock carriers
- deck cargo ships
- 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

**C.3.2** The additional survey requirements <sup>11</sup> 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.

**C.3.3** 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 will include additional close-up survey where deemed necessary by the Surveyor. The extent of the survey may be reduced provided there is no structural diminution and the protective coating is found in good condition <sup>12</sup>.

**C.3.4** Unless otherwise regulated in the following requirements of [C.3](#) the applicable provisions of this Section shall be observed.

### **C.3.5 Annual surveys**

**C.3.5.1** The survey is to ensure that the hull, hatch covers, coamings and piping are maintained in satisfactory condition, as stipulated in [C.1.1](#)

**C.3.5.2** In addition, suspect areas <sup>13</sup> identified at previous Class Renewal or Intermediate Surveys shall be overall and close-up surveyed. Thickness measurements shall be taken of the areas of substantial corrosion and the number of thickness measurements shall be increased to determine the extent of substantial corrosion. For ballast tanks see also [C.1.1.2.6](#).

**C.3.5.3** For General Dry Cargo Ships over 10 years of age, an overall survey of a representative forward and aft cargo hold and their associated tween deck spaces shall be carried out. Where this level of survey reveals substantial corrosion or the need for remedial measures, the survey shall be extended as deemed necessary by the Surveyor.

**C.3.5.4** For General Dry Cargo ships over 15 years of age, an overall survey of all cargo holds and tween deck spaces and a close up examination of minimum 25 % of frames to establish the condition of the lower one-third of the shell frames, adjacent shell plating and lower frame connections in a forward lower and one other selected lower cargo hold shall be carried out. Where this level of survey reveals substantial corrosion or the need for remedial measures, the survey shall be extended, as deemed necessary by the Surveyor. Where the protective coating in cargo holds is found to be in good condition, the extent of the close-up surveys may be specially considered. All piping and penetrations in cargo holds, included overboard piping, shall be examined.

### **C.3.6 Intermediate Surveys**

**C.3.6.1** In addition to the surveys and checks listed in C.3.5 and as stipulated in [C.1.2](#), the following requirements are to be observed. For bottom surveys see also [B.1.6](#)

**C.3.6.2** An overall survey of one representative forward and one representative aft cargo hold and their associated tween deck spaces for ships aged 5 to 10 years shall be carried out. For ships aged 10 to 15 years, an overall survey of all cargo holds and tween deck spaces shall be performed. For ballast tanks see also [C.1.2.2](#)

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<sup>11</sup> For the additional survey requirements see UR Z 7.1 of IACS

<sup>12</sup> Good condition: Condition with only minor spot rusting, see UR Z 7.2 (1.2.10)

<sup>13</sup> Suspect Areas: Locations showing substantial corrosion and/or considered by the Surveyor to be prone to rapid wastage.

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**C.3.6.3** In case of ships exceeding 15 years of age the intermediate survey shall be to the same extent as the previous Class Renewal Survey according to C.1.3 and C.3.7. However, testing of ballast tanks and cargo holds used for ballast water as well as the maximum permissible reduction of the mean diameter of chain links and weight of anchors is not required unless deemed necessary by the Surveyor.

### C.3.7 Class Renewal Surveys

**C.3.7.1** In addition to the surveys and checks listed in C.3.6 above and as stipulated in C.1.3, the following requirements are to be observed. For dry-docking see also C.1.3.1.3

**C.3.7.2** An overall survey of all tanks and spaces, excluding fuel oil, lube oil and fresh water tanks, shall be carried out at each Class Renewal Survey, see also Table 3.1. Each Class Renewal Survey shall include a close-up examination of sufficient extent to establish the condition of the shell frames and their end attachments in all cargo holds and ballast tanks as indicated in Table 3.3. For ballast tanks see also C.1.2.2

**C.3.7.3** The minimum requirements for additional thickness measurements at the Class Renewal Survey as per Table 3.2 are given in Table 3.4. Thickness measurements to determine both general and local level of corrosion in the shell frames and their end attachments in all cargo holds and ballast tanks, as well as on the transverse bulkhead plating shall be carried out. The thickness measurement may be dispensed with provided the Surveyor is satisfied by the close-up examination, that there is no structural diminution, and the protective coating where applied remains efficient and in good condition<sup>12</sup>. The Surveyor may extend the thickness measurements as deemed necessary.

**Table 3.3 Class Renewal Surveys of General Dry Cargo Ships (Hull)**  
**Minimum Additional Requirements for Close-up Surveys**

Class Renewal survey [No.] and ship's age [years]			
I. age ≤ 5	II. 5 < age ≤ 10	III. 10 < age ≤ 15	IV. and subsequent, age >15
Selected shell transverse frames in one forward and one aft cargo hold and associated tween deck spaces	Selected shell transverse frames in all cargo holds and associated tween deck spaces	All shell frames in the forward lower cargo hold and 25 % of frames in each of the remaining cargo holds, and tween deck spaces including upper and lower end attachments and adjacent shell plating	All shell frames in all cargo holds and tween deck spaces including upper and lower end attachments and adjacent shell plating
One selected cargo hold transverse bulkhead including bulkhead plating, stiffeners and girders	One transverse bulkhead in each cargo hold including bulkhead plating, stiffeners and girders  Forward and aft transverse bulkhead in one side ballast tank including stiffening system	All cargo hold transverse bulkheads including bulkhead plating, stiffeners and girders  All transverse bulkheads in ballast tanks including stiffening system	Other items:  As for class renewal survey  No. III
All cargo hold hatch covers and coamings ( plating and stiffeners )			

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	One transverse web frame or watertight transverse bulkhead with associated plating and framing in two representative water ballast tanks of each type	All transverse web frames with associated plating and framing in each water ballast tank	
	Selected areas of all deck plating and under deck structure inside line of hatch openings between all cargo hold hatches  Selected areas of inner bottom plating	All deck plating and under deck structure inside line of hatch openings between cargo hold hatches  All areas of inner bottom plating	
<p><b>Note</b></p> <p>Close-up survey of cargo hold transverse bulkheads to be carried out at the following levels:</p> <ul style="list-style-type: none"> <li>• immediately above the inner bottom and immediately above the tween decks, as applicable</li> <li>• mid-height of the bulkheads for holds without tween decks</li> <li>• immediately below the main deck plating and tween deck plating</li> </ul>			

When thickness measurements indicate substantial corrosion, the number of thickness measurements shall be increased to determine the extent of substantial corrosion. Transverse sections shall be chosen where the largest reductions are suspected to occur or are revealed from deck plating measurements.

**C.3.7.4** All boundaries of ballast tanks and deep water tanks used for ballast within the cargo area length shall be pressure tested. For fuel oil tanks, only the representative tanks shall be tested. The Surveyor may extend the tank testing as deemed necessary. Tanks are to be tested with a head of liquid to the top of the air pipes for ballast tanks, deep tanks or fuel oil tanks. For tightness and pressure tests see also [C.1.3.2.1.4](#).

**C.3.7.5** For Class Renewal Surveys of General Dry Cargo Ships (hull), the Continuous Class Renewal procedure described in [B.1.3.6](#) is excluded.

#### **C.3.8 Additional requirements for single hold cargo ships after determining compliance with SOLAS II-1/23-3 and 25**

For ships complying with the requirements of **SOLAS II-1/23-3** and **25** for hold water level detectors, the Class Annual, Intermediate and Renewal Surveys are to include an examination and a test of the water ingress detection system and their alarms. The requirements also apply to those cargo ships, which although belonging to the ship types listed in [C.3.1](#) that are excluded from the application of these requirements, are fitted with a single hold.



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**Table 3.4 Class Renewal Surveys of General Dry Cargo Ships (Hull)**  
**Minimum Additional Requirements for Thickness Measurements**

Class Renewal survey [No.] and ship's age [years]			
I. age ≤ 5	II. 5 < age ≤ 10	III. 10 < age ≤ 15	IV. and subsequent, age >15
	Measurement for general assessment and recording of corrosion pattern of those structural members subject to close up survey according to <a href="#">Table 3.3</a>		
		All exposed main deck plating within the cargo length area	All exposed main deck plating full length
		All wind and water strakes within the cargo length area Selected wind and water strakes outside the cargo length area	All wind and water strakes full length
			Each bottom plate including lower turn of the bilge Duct keel or pipe tunnel plating and internals

#### C.4 Damage and repair surveys

**C.4.1** Where damage has occurred to the ship's hull, machinery, including the electrical plant, the automatic/remote-control systems, etc., the damaged parts are to be made accessible for inspection in such a way that the kind and extent of the damage can be thoroughly examined and ascertained, see also [Section 2, B.2.3](#).

In the case of grounding, dry-docking or, alternatively, an in-water survey is required.

If deemed necessary, the Surveyor may at his own discretion inspect other parts of the ship as well.

**C.4.2** The repair measures are to be agreed with the Surveyor such as to render possible confirmation of the class without reservation upon completion of the repairs. In general, a confirmation of class with Conditions of Class, e. g. in the case of a preliminary repair ("emergency repair"), requires to be approved by GL Head Office.

**C.4.3** Surveys conducted in the course of repairs are to be based on the latest technical knowledge and instructions by GL. In exceptional cases advice is to be obtained from GL Head Office, in particular where doubts exist as to the cause of damage.

**C.4.4** For older ships, in the case of repairs and/or replacement of parts subject to classification, as a matter of principle, the Construction Rules in force during their period of construction continue to be applicable.

This does not apply in the case of modifications required to the structure in the light of new knowledge gained from damage analyses, with a view to avoiding recurrence of similar damages.

**C.4.5** Regarding the materials employed and certificates required, the requirements for new buildings are applicable, see [Section 2, B.3](#).

**C.4.6** Regarding damages or excessive wastage beyond allowable limits that affect the vessel's class, see [Section 2, B.2.4](#).