RULES

PUBLICATION 82/P

HULL SURVEYS OF LIQUEFIED GAS CARRIERS

July
2020

Publications P (Additional Rule Requirements) issued by Polski Rejestr Statków complete or extend the Rules and are mandatory where applicable.

GDAŃSK

Publication 82/P – Hull Surveys of Liquefied Gas Carriers – July 2020, based on the current IACS UR Z7.2, is an extension of the requirements contained in *Part I – Classification Regulations* of *the Rules for the Classification and Construction of Sea-going Ships.*

This Publication was approved by the PRS Board on 26 June 2020 and enters into force on 1 July 2020.

The present Publication replaces the *Publication No. 82/P – Hull Surveys of Liquefied Gas Carriers – July 2016.*

PRS/RP, 06/2020

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1 GENERAL

1.1 Application

1.1.1 The requirements apply to all self-propelled ships carrying liquefied gases in bulk

1.1.2 The requirements apply to surveys of hull structure and piping systems, except piping covered by Chapter 4 of *Publication 48/P – Requirements Concerning Gas Tankers*, in way of the pump rooms, compressor rooms, 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 *Rules for Classification and Construction of Sea-going Ships, Part I – Classification Regulations*.

Refer to *Publication 48/P – Requirements Concerning Gas Tankers* for periodical surveys of cargo installations on ships carrying liquefied gases in bulk

1.1.3 The requirements contain the minimum extent of examination, thickness measurement and tank testing. The survey shall be extended when substantial corrosion and/or structural defects are found and include additional close-up survey when necessary.

1.2 Definitions

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

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

Overall survey – a survey intended to report on the overall condition of the hull structure and to determine the extent of additional close-up surveys.

Transverse section – includes all longitudinal members such as plating, longitudinals and girders at the deck, side, bottom, inner bottom and longitudinal bulkheads.

Cargo area – that part of the ship which contains cargo tanks, cargo/ballast pump rooms, compressor rooms, cofferdams, ballast tanks and void spaces adjacent to cargo tanks and also deck areas throughout the entire length and breath of the part of the ship over the above mentioned spaces.

Coating condition is defined as follows:
GOOD – condition with only minor spot rusting,
FAIR – 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,
POOR – condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration.

Corrosion prevention system – normally considered a full hard protective coating. Hard protective coating is usually to be epoxy coating or equivalent. Other coating system, 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.

Critical structural areas – locations which have been identified from calculations to require monitoring or 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.

Prompt and thorough repair – permanent repair completed at the time of survey to the satisfaction of PRS Surveyor, therein removing the need for the issuance of any condition of class.

Representative tanks – those tanks which are expected to reflect the condition of other tanks of similar type and service and with similar corrosion prevention systems. When selecting representative tanks account shall be taken of the service and repair history on board and identifiable critical structural areas and/or suspect areas.

Special consideration or *specially considered* (in connection with close-up surveys and thickness measurements) – means sufficient close-up inspection and thickness measurements shall be taken to confirm the actual average condition of the structure under the coating.

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

Suspect areas – locations showing substantial corrosion and/or considered by PRS Surveyor to be prone to rapid wastage.

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 PRS Surveyor, will affect the ship's structural, watertight integrity, shall be promptly and thoroughly repaired. Areas to be considered include:

– side structure and side plating;
– deck structure and deck plating;
– bottom structure and bottom plating;
– watertight bulkheads;
– weld connections between air pipes and deck plating;
– air pipe heads installed on the exposed decks;
– ventilators, including closing devices, if any.

For locations where adequately repair facilities are not available, consideration may be given to allow the ship 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 PRS Surveyor, will impair the vessel's fitness for continued service, remedial measures shall be implemented before the ship continues in service.

1.3.3 Where the damage found on structure mentioned in 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 weathertight integrity and issue a condition of class with a specific time limit.

1.4 Thickness Measurements and Close-up Surveys

1.4.1 In any kind of survey, i.e. class renewal, 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 performed 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 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.

1.5 Remote Inspection Techniques (RIT)

1.5.1 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 PRS.

1.5.2 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 Rec. 42 *Guidelines for Use of Remote Inspection Techniques for surveys*. These considerations are to be included in the proposals for use of RIT which are to be submitted in advance of the survey so that satisfactory arrangements can be agreed with the Classification Society.

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

1.5.4 When using 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 IACS UR Z17 and is to be witnessed by an attending surveyor of the Society.

1.5.5 The structure to be examined using 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.

1.5.6 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 a RIT operator is to be provided.

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

2 ANNUAL SURVEY

2.1 Schedule

2.1.1 Annual Surveys shall 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 Class Renewal Survey.

2.2 Scope

2.2.1 General

2.2.1.1 The survey shall consist of an examination for the purpose of ensuring, as far as practicable, that the hull and piping are maintained in a satisfactory condition.

2.2.2 Examination of the Hull

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

2.2.2.2 Examination of watertight penetrations as far as practicable.

2.2.3 Examination of Weather Decks

2.2.3.1 Examination of flame screens on vents to all bunker tanks.

2.2.3.2 Examination of bunker and vent piping systems.

2.2.4 Examination of cargo pump rooms and compressor rooms and, as far as practicable, pipe tunnels, if fitted

2.2.4.1 Examination of all pump room and compressor room bulkheads for signs of leakage or fractures and, in particular, the sealing arrangements of all penetrations of pump room and compressor room bulkheads.

2.2.4.2 Examination of the condition of all piping systems, except those covered by Chapter 4 of *Publication 48/P – Requirements Concerning Gas Tankers.*

Note: For survey of air pipes, flame screens on vents and ventilators refer to 5.1.15 of *Part I – Rules for Classification.*

2.2.5 Suspect Areas

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

2.2.6 Examination of Ballast Tanks

2.2.6.1 Examination of ballast tanks when required as a consequence of the results of the Class Renewal Survey and Intermediate Survey shall be performed. When considered necessary by PRS Surveyor, or where extensive corrosion exists, thickness measurement shall be performed. If the results of these thickness measurements indicate that substantial corrosion is found, then the extent of thickness measurements shall be increased to determine the extent of areas of substantial corrosion. Table V may be used as guidance for those additional measures. These extended thickness measurements shall be performed before the annual survey is credited as completed.

3 INTERMEDIATE SURVEY

3.1 Schedule

3.1.1 Intermediate Survey shall be held at or between either the 2nd or 3rd Annual Survey.

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

3.1.3 A survey planning meeting shall be held prior to the commencement of the survey.

3.1.4 Surveys and thickness measurements of spaces, once credited towards class renewal survey can not be credited towards intermediate survey

3.2 Scope

3.2.1 The scope of the second or third annual survey shall be extended to include the following:

3.2.2 Ballast tanks

3.2.2.1 For ships 5-10 years of age, an overall survey of representative tanks shall be performed. If there is no hard protective coating, soft or semi-hard coating or POOR coating condition, the examination shall be extended to other ballast tanks of the same type.

3.2.2.2 For ships over 10 years of age, an overall survey of all ballast tanks shall be performed.

3.2.2.3 If such examination reveals no visible structural defects, the examination may be limited to a verification that the corrosion prevention system remains efficient.

3.2.2.4 For ballast tanks, excluding double bottom tanks, if there is no hard protective coating, soft or semi-hard coating, or POOR coating condition and it is not renewed, the tanks in question shall be internally examined at annual intervals.

3.2.2.5 When such conditions are found in double bottom tanks, the tanks in question may be internally examined at annual intervals.

3.2.2.6 The minimum requirements for close-up surveys at intermediate survey are given in Table III.

4 CLASS RENEWAL SURVEY

4.1 Schedule

4.1.1 Class Renewal Surveys shall be performed at 5 years intervals to renew the Certificate of Class.

4.1.2 The first Class Renewal Survey shall be completed within 5 years from the date of the initial classification survey and thereafter 5 years from the credited date of the previous Class Renewal 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 Class Renewal Survey before the extension was granted.

4.1.3 For surveys completed within 3 months before the expiry date of the Class Renewal Survey, the next period of class will start from the expiry date of the Class Renewal Survey. For surveys completed more than 3 months before the expiry date of the Class Renewal Survey, the period of class will start from the survey completion date.

In cases where the ship 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 perform the overdue surveys, the next period of class will start class renewal survey. If the Owner elects to perform the next due class renewal survey, the period of class will start from the survey completion date.

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

4.1.5 A survey planning meeting shall be held prior to the commencement of the survey.

4.1.6 Surveys and thickness measurements of spaces, once credited towards Intermediate Survey can not be credited towards Class Renewal Survey.

4.2 Scope

4.2.1 General

4.2.1.1 Class Renewal Survey shall include, in addition to the requirements of the Annual Survey, examination, tests and checks of sufficient extent to ensure that the hull and related piping, as required in 4.2.1.3, 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 performed at the due dates.

4.2.1.2 Ballast tanks, including double bottom tanks, pump rooms, compressor rooms, pipe tunnels, cofferdams and void spaces bounding cargo tanks, decks and outer hull shall be examined, and this examination shall be supplemented by thickness measurement and testing as required in 4.4 and 4.5, to ensure that the structural integrity remains effective.

The aim of examination shall discover substantial corrosion, significant deformation, fractures, damages and other structural deterioration, that may be presented.

4.2.1.3 All piping systems within the above spaces, except those covered by Chapter 4 of *Publication 48/P – Requirements Concerning Gas Tankers*, shall be examined and operationally tested to working pressure to attending PRS Surveyor's satisfaction to ensure that tightness and condition remain satisfactory.

4.2.1.4 The survey extent of ballast tanks converted to void spaces shall be specially considered in relation to the requirements for ballast tanks. For survey of air pipes refer to 5.4.1.10, 5.4.2.4 and 5.4.3.2 of *Rules for Classification and Construction of Sea-going Ships, Part I, Classification Regulations*.

4.2.2 Dry Dock Survey

4.2.2.1 A survey in dry dock shall be a part of the Class Renewal Survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the ballast tanks shall be per-

formed in accordance with the applicable requirements for Class Renewal Survey, if not already performed (lower portions of the ballast tanks are considered to be the parts below light ballast water line).

4.2.3 Tank Protection

4.2.3.1 Where provided, the condition of coating or corrosion prevention system of ballast tanks shall be examined. For ballast tanks, 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 the time of construction, the tanks in question shall be examined at annual internals. Thickness measurements shall be performed as deemed necessary by PRS Surveyor.

When such breakdown of hard protective coating is found in double bottom ballast 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 PRS Surveyor, or where extensive corrosion exists, thickness measurements shall be performed.

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

4.3 Extent of Overall and Close-up Survey

4.3.1 An overall survey of all tanks and spaces, excluding fuel oil, lube oil and fresh water tanks, shall be performed at each Class Renewal Survey. For fuel oil, lube oil and fresh water tanks refer to 5.4.2.3, 5.4.3.1 and 5.4.4.1 of *Rules for Classification and Construction of Sea-going Ships, Part I, Classification Regulations*.

4.3.2 The minimum requirements for close-up surveys at Class Renewal Survey are given in Table I.

4.3.3 PRS 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 ships according to available information.

4.3.4 For areas in spaces where hard protective coatings are found in a GOOD condition, the extent of close-up surveys according to Table I may be specially considered. For survey of air pipes refer to 5.4.1.10, 5.4.2.4 and 5.4.3.2 of *Rules for Classification and Construction of Sea-going Ships, Part I, Classification Regulations.*

4.4 Extent of Thickness Measurement

4.4.1 The minimum requirements for thickness measurements at Class Renewal Survey are given in Table II.

4.4.2 PRS Surveyor may extend the thickness measurements as deemed necessary. When thickness measurements indicate substantial corrosion, the extent of thickness measurements shall be increased to determine the extent of areas of substantial corrosion. Table V may be used as guidance for these additional thickness measurements.

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

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

4.5 Extent of Tank Testing

4.5.1 All boundaries of ballast tanks and deep tanks used for water ballast within the cargo area shall be pressure-tested. For fuel oil tanks, the representative tanks shall be pressure-tested.

4.5.2 PRS Surveyor may extend the tank testing as deemed necessary.

4.5.3 Tank testing of fuel oil tanks shall be performed 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 satisfactory external examination of the tank boundaries, and a confirmation from the Master stating that the pressure testing has been performed according to the requirements with satisfactory results.

5 PREPARATION FOR SURVEY

5.1 Conditions for Survey

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

5.1.2 Tanks and spaces shall 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 shall be cleaned including removal from surfaces of all loose accumulated corrosion scale. Spaces shall 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 shall 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 shall be provided for the surveyor to verify the effectiveness of the coating and to perform 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 shall be removed.

5.2 Access to Structures

5.2.1 For overall survey, means shall be provided to enable PRS 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 PRS Surveyor, shall be provided:
– permanent staging and passages through structures;
– temporary staging, e.g. ladders, and passages through structures;
– other equivalent means.
When RIT is applied – see 1.5.1.

5.3 Equipment for Survey

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

5.3.2 One or more of the following fracture detection procedures may be required if deemed necessary by PRS Surveyor:
– radiographic,
– ultrasonic,
– magnetic particle,
– dye penetrant.

5.4 Survey at Sea or at Anchorage

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

5.4.2 A communication system shall be arranged between the survey party in the tank and the responsible officer on deck.

6 PROCEDURES FOR THICKNESS MEASUREMENTS

6.1 General

6.1.1 The required thickness measurements, if not performed by PRS itself, shall be witnessed by PRS Surveyor. The Surveyor shall be on board to the extent necessary to control the process.

6.1.2 The thickness measurement company shall 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 performed simultaneously with close-up surveys.

6.2 Certification of Thickness Measurement Company

6.2.1 The thickness measurement shall be performed by a company certified by PRS according to the principles stated in Table IV, except that in respect of measurements of ships less than 500 gross tonnage, the firm need not be so approved.

6.3 Reporting

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

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

Table I

MINIMUM REQUIREMENTS FOR CLOSE-UP SURVEYS AT CLASS RENEWAL SURVEYS OF LIQUEFIED GAS CARRIERS

I class renewal Age ≤ 5 years	II class renewal 5 < Age ≤ 10 years	III and subsequent class renewals Age > 10 years
(1) One web frame in a representative ballast tank of the topside, hopper side and double hull side type.	(1) All web frames in a ballast tank, which shall be a double hull side tank or a topside tank. If such tanks are not fitted, another ballast tank shall be selected	(1) All web frames in all ballast tanks.
	(1) One web frame in each remaining ballast tank.	
	(2) One transverse bulkhead in each ballast tank.	(2) All transverse bulkheads in all ballast tanks.
(3) One transverse bulkhead in a ballast tank		

(1) – Complete transverse web frame including adjacent structural members
(2) – Transverse bulkhead complete, including girder system and adjacent members, and ajacent longitudinal bulkhead structure
(3) – Transverse bulkhead lower part including girder system and adjacent structural members

Note 1: Ballast tanks include topside, double hull side, double bottom, hopper side, or any combined arrangement of the aforementioned, and peak tanks where fitted.

Note 2: For areas in tanks where coatings are found to be in GOOD condition, as defined in Para. 1.2, the extent of close-up surveys may be specially considered by PRS.

Note 3: For ships having independent tanks of type C, with a midship section similar to that of a general cargo ship, the extent of close-up surveys may be specially considered by PRS.

Note 4: PRS Surveyor may extend the close-up survey as deemed necessary, taking into account the maintenance of the tanks under survey, the condition of the corrosion prevention system and also in the following cases:
– in particular, in tanks having structural arrangements or details which have suffered defects in similar tanks, or on similar ships according to available information;
– in tanks having structures approved with reduced scantlings.

Table II

MINIMUM REQUIREMENTS FOR THE THICKNESS MEASUREMENTS AT CLASS RENEWAL SURVEYS OF LIQUEFIED GAS CARRIERS

I class renewal Age ≤ 5 years	II class renewal 5 < Age ≤ 10 years	III class renewal 10 < Age ≤ 15 years	IV and subsequent class renewals Age > 15 years
One section of deck plating for the full beam of the ship within 0.5*L* amidship in way of a ballast tank, if any.	Within the cargo area: – each deck plate, – one transverse section within 0.5*L* amidships in way of a ballast tank, if any.	Within the cargo area: – each deck plate, – two transverse sections (1), – all wind and water strakes.	Within the cargo area: – each deck plate, – three transverse sections (1), – each bottom plate, – duct keel plating and internals.
	Selected wind and water strakes outside the cargo length area.	Selected wind and water strakes outside the cargo length area.	All wind and water strakes, full length.
Measurement, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.	Measurement, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.	Measurement, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.	Measurement, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.
Suspect areas	Suspect areas	Suspect areas	Suspect areas

(1) – At least one section shall include a ballast tank within 0,5*L* amidships, if any.

Note 1: For ships having independent tanks of type C, with a midship section similar to that of a general cargo ship, the extent of thickness measurements may be increased to include the tank top plating at the discretion of PRS Surveyor.

Note 2: For areas in tanks where coatings are found to be in GOOD condition, as defined in Para. 1.2, the extent of thickness measurements may be specially considered by PRS.

Note 3: PRS Surveyor may extend the thickness measurements as deemed necessary. Where substantial corrosion, as defined in Para. 1.2, is found, the extent of thickness measurements shall be increased to the satisfaction of PRS Surveyor.

Table III

MINIMUM REQUIREMENTS FOR CLOSE – UP SURVEYS AT INTERMEDIATE SURVEY OF LIQUEFIED GAS CARRIERS

10 < Age ≤ 15 years	Age > 15 years
Close-up survey of: – all web frames and both transverse bulkheads in a representative ballast tank (1) and (2), – the upper part of one web frame in another representative ballast tank, – one transverse bulkhead in another representative ballast tank (2).	Close-up survey of: – all web frames and both transverse bulkheads in two representative ballast tanks (1) and (2).

(1) – Complete transverse web frame including adjacent structural members.
(2) – Transverse bulkhead complete, including girder system and adjacent members, and adjacent longitudinal bulkhead structure.

Note 1: Ballast tanks include topside, double hull side, double bottom, hopper side, or any combined arrangement of the aforementioned, and peak tanks where fitted.

Note 2: For areas in tanks where protective coatings are found to be in GOOD condition, as defined in 1.2, the extent of close-up surveys may be specially considered by PRS.

Note 3: For ships having independent tanks of type C, with a midship section similar to that of a general cargo ship, the extent of close-up surveys may be specially considered by PRS.

Note 4: PRS Surveyor may extend the close-up survey as deemed necessary, taking into account the maintenance of the tanks under survey, the condition of the corrosion prevention system and also in the following cases:
– in particular, in tanks having structural arrangements or details which have suffered defects in similar tanks, or on similar ships according to available information;
– in tanks having structures approved with reduced scantlings.

Table IV

PROCEDURES FOR CERTIFICATION OF FIRMS ENGAGED IN THICKNESS MEASUREMENTS 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.

2 Procedure for Certification

2.1 Submission of Documents:

The following documents shall be submitted to PRS HO for approval:

.1 Outline of firms, e.g. organisation and management structure.
.2 Experience of the firms in thickness measurement, inter alia of hull structures of the vessels.
.3 Technicians careers, i.e. experiences of technicians as thickness measurement operators, technical knowledge of hull structure, etc. Operators should be qualified according to a recognised industrial NDT Standard.
.4 Equipment used for thickness measurement such as ultrasonic testing machines and its maintenance/calibration procedures.
.5 A guide for thickness measurement operators.
.6 Training programmes of technicians for thickness measurement.

2.2 Auditing of the Firms

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

2.3 Demonstration

Certification is conditional on an onboard demonstration of thickness measurements, as well as satisfactory reporting.

3 Certification

3.1 Upon satisfactory results of both the audit of the firm in 2.2 and the demonstration tests in 2.3 above, PRS will issue a *Certificate of Approval*, as well as notice to the effect that the thickness measurement operation system of the firm has been certified by PRS.

Note: Details concerning approval of firms engaged in thickness measurements are included in *Publication 51/P – Procedural Requirements for Service Suppliers.*

3.2 Renewal/endorsement of the *Certificate* shall be made at intervals not exceeding 3 years by verification that original conditions are maintained.

4 Information on 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 shall be immediately informed to PRS. Re-audit is made where deemed necessary by PRS.

5 Cancellation of Approval

Approval may be cancelled in the following cases:

.1 Where the measurements were improperly performed or the results were improperly reported.
.2 Where PRS Surveyor has found any deficiencies in the approved thickness measurement operation system of the firm.
.3 Where the firm failed to inform PRS on any alteration in 4 above.

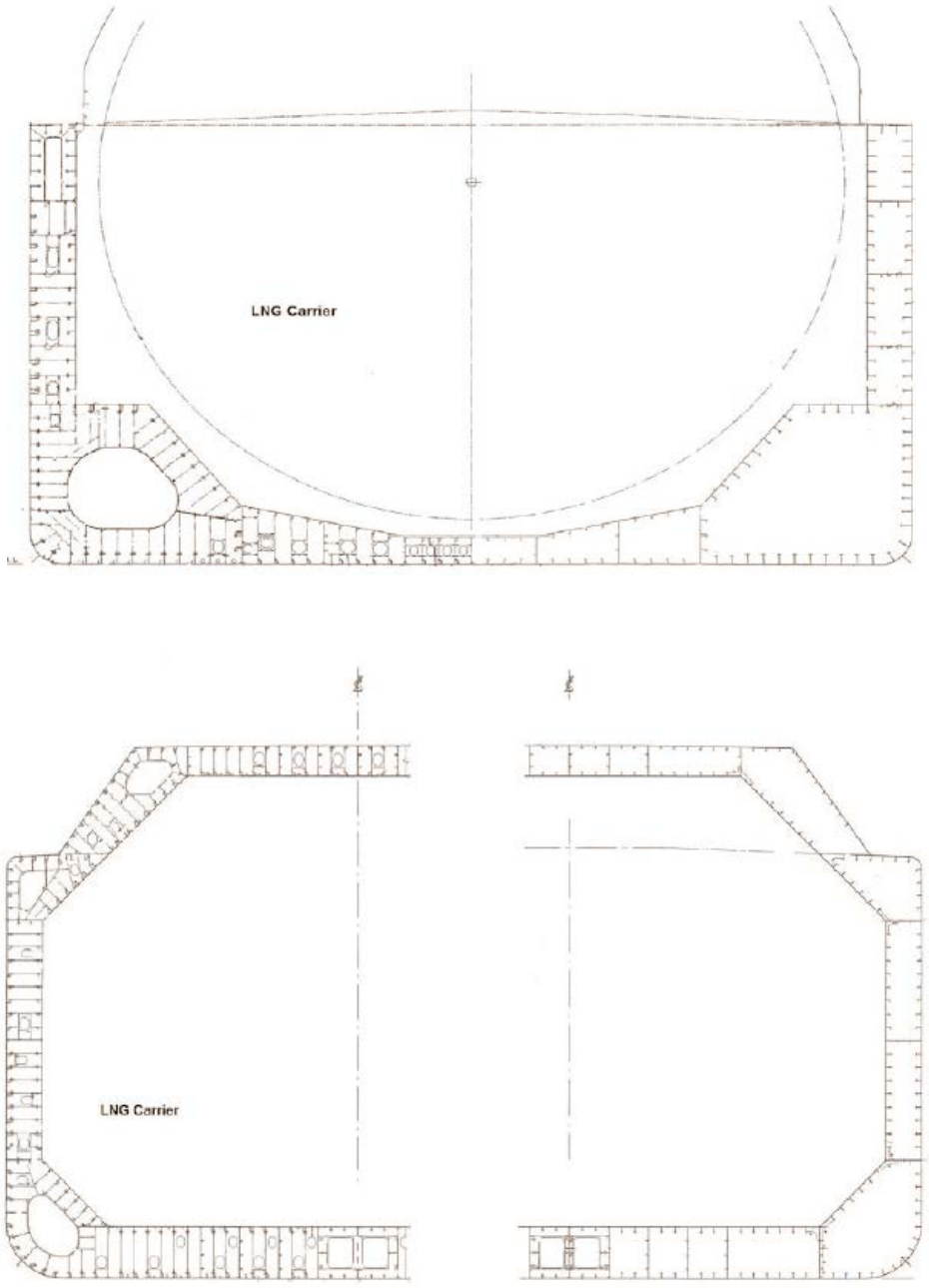
Table V

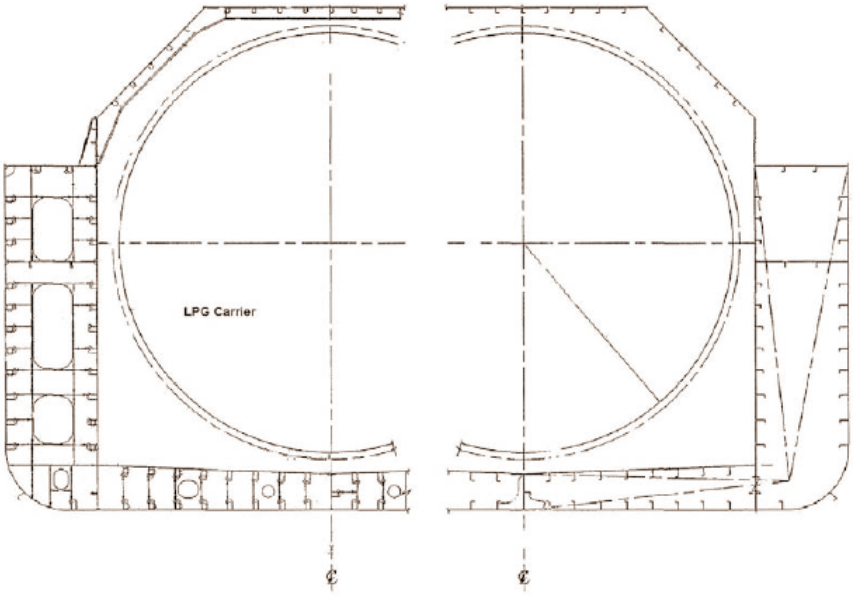
GUIDANCE FOR ADDITIONAL THICKNESS MEASUREMENTS IN WAY OF SUBSTANTIAL CORROSION

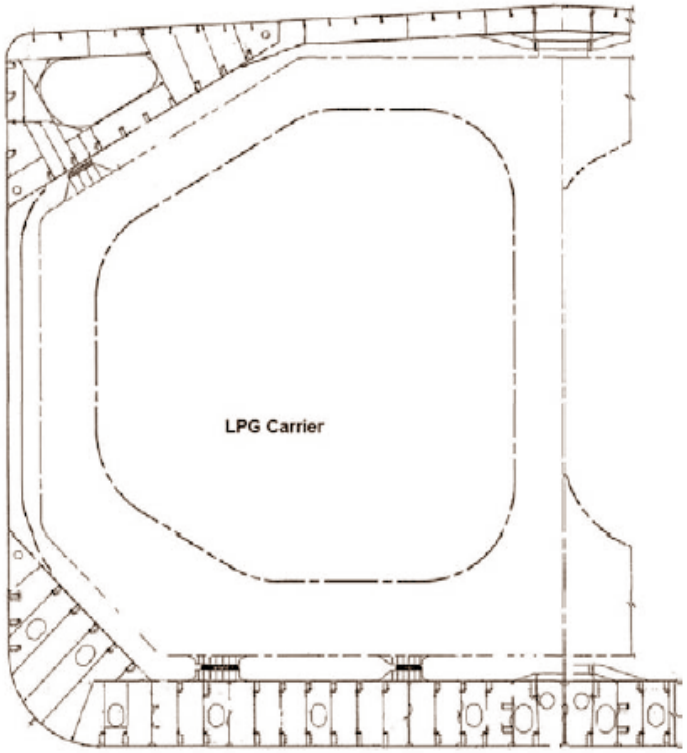
Structural Member	Extent of Measurement	Pattern of Measurement
Plating	Suspect area and adjacent plates	5 point pattern over 1 square meter
Stiffeners	Suspect area	3 measurements in line across web and flange

Figure 1

TYPICAL MIDSHIP SECTIONS OF LIQUEFIED GAS CARRIERS







List of amendments effective as of 1 July 2020

Item	*Title/Subject*	*Source*
various items	Substitution of the term "recommendation" by the term "condition"	IACS decision
1.4.2, 1.5, 5.2.2	Remote Inspection Techniques	IACS UR 7.2