

Z10.3 Hull Surveys of Chemical Tankers

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Z10.3 Notes:

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1. This UR Z10.3 is applicable from the first Annual, Intermediate or Special Survey commencing on or after 1 July 1997.
2. Changes introduced in Rev.2 to UR Z10.3 are to be applied by all Member Societies and Associates from 1 September 1999.
3. Changes introduced in Rev.3 to UR Z10.3 are to be applied by all Member Societies and Associates from 1 July 2001.
4. Changes introduced in Rev.4 and Rev.4.1 to UR Z10.3 are to be applied by all Member Societies and Associates from 1 July 2001.
5. Paragraph 4.2.4.3 is newly introduced in Rev.5 in accordance with Res MSC.105(73) and is to be implemented from 1 July 2002.
The other changes introduced in Rev.5 are to be implemented within one year of the adoption by Council.
6. Changes introduced in Rev.7 are to be uniformly implemented from 1 July 2006. The amendments to paragraphs 2.2.3.1 and 4.2.2.2 related to the protective coating condition are to apply to the ballast tanks of which the condition will be assessed at the forthcoming Special Survey and Intermediate Survey on or after 1 July 2006.
7. Changes introduced in Rev.8 (para. 1.4, 5.5.4, 5.5.6 and 7.1.3) are to be uniformly applied by IACS Societies on surveys commenced on or after 1 January 2007.
8. Changes introduced in Rev.9 are to be uniformly applied by IACS Societies for surveys commenced on or after the 1 January 2009.
9. Changes introduced in Rev.10 are to be uniformly applied by IACS Societies for surveys commenced on or after 1 January 2010.
10. Changes introduced in Rev.11 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.

11. Changes introduced in Rev.12 are to be uniformly applied by IACS Societies for surveys commenced on or after 1 July 2012.

Z10.3 1. GENERAL

(cont) 1.1 Application

1.1.1 The requirements apply to all self-propelled Chemical Tankers with integral tanks i.e. vessels with IMO certificate of fitness for the carriage of dangerous chemicals in bulk. If a chemical tanker is constructed with both integral and independent tanks, these requirements are applicable only to that portion of the cargo length containing integral tanks. Combined gas carriers/chemical tankers with independent tanks within the hull, are to be surveyed as gas carriers.

1.1.2 The requirements apply to surveys of hull structure and piping systems in way of cargo tanks, pump rooms, cofferdams, pipe tunnels, void spaces within the cargo area and all Ballast Tanks. The requirements are additional to the classification requirements applicable to the remainder of the ship. The requirements are not applicable for independent tanks on deck.

1.1.3 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 include additional Close-up Survey when necessary.

1.2 Definitions

1.2.1 Chemical Tanker

A Chemical Tanker is a ship constructed or adapted and used for the carriage in bulk of any liquid product listed in Chapter 17 of the International Code For The Construction And Equipment Of Ships Carrying Dangerous Chemicals In Bulk, IBC Code.

1.2.2 Ballast Tank

A Ballast Tank is a tank which is used solely for the carriage of salt water ballast.

1.2.2 bis A Combined Cargo/Ballast Tank is a tank which is used for the carriage of cargo or ballast water as a routine part of the vessel's operation and will be treated as a Ballast Tank. Cargo tanks in which water ballast might be carried only in exceptional cases per MARPOL I/18.3 are to be treated as cargo 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.

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 longitudinal bulkheads. For transversely framed vessels, a transverse section includes adjacent frames and their end connections in way of transverse sections.

1.2.6 Representative Tank

Representative Tanks are those 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 is to be taken of the service and repair history onboard and identifiable Critical Structural Areas and/or Suspect Areas.

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1.2.7 Suspect Area

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

1.2.8 Critical Structural Area

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

1.2.9 Substantial Corrosion

Substantial Corrosion is an extent of corrosion such that assessment of corrosion pattern indicate 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:

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, or hard scale at 10% or more, of areas under consideration.

Reference is made to IACS Recommendation No.87 "Guidelines for Coating Maintenance & Repairs for Ballast Tanks and Combined Tanks on Oil Tankers".

1.2.12 Cargo Area

Cargo Area is that part of the ship which contains cargo tanks, slop tanks and cargo/ballast pump-rooms, cofferdams, ballast tanks and void spaces adjacent to cargo tanks and also deck areas throughout the entire length and breadth of the part of the ship over the above mentioned 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 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 Thorough 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, or recommendation.

Z10.3 1.3 Repairs

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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:

- bottom structure and bottom plating;
- side structure and side plating;
- deck structure and deck plating;
- watertight or oiltight bulkheads;
- hatch covers or hatch coamings, where fitted.

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.

1.4 Thickness measurements and close-up surveys

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

Z10.3 2. SPECIAL SURVEY¹

(cont) 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.

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 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 Survey, examination, tests and checks of sufficient extent to ensure that the hull and related piping, as required in 2.2.1.3, is in a satisfactory condition and is fit for its 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 tanks, Ballast Tanks, including double bottom tanks, pump rooms, pipe tunnels, cofferdams and void spaces bounding cargo tanks, 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.

2.2.1.3 Cargo piping on deck and cargo and ballast piping within the above tanks and spaces are to be examined and operationally tested to working pressure to attending Surveyor's satisfaction to ensure that tightness and condition remain satisfactory. Special attention is to be given to any ballast piping in cargo tanks and cargo piping in ballast tanks and void spaces, and Surveyors are to be advised on all occasions when this piping, including valves and fittings are open during repair periods and can be examined internally.

¹ Some member Societies use the term "Special Periodical Survey" others use the term "Class Renewal Survey" instead of the term "Special Survey".

Z10.3 2.2.2 Dry Dock Survey

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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 tanks and 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 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 the corrosion prevention system of cargo tanks is to be examined.

A Ballast Tank is to be examined at subsequent annual intervals where:

- a. a **hard** protective coating has not been applied from the time of construction, or
- b. a soft or semi-hard coating has been applied, or
- c. substantial corrosion is found within the tank, or
- d. the **hard** protective coating is found to be in less than GOOD condition and the **hard** protective coating is not repaired to the satisfaction of the Surveyor.

Thickness measurements are to be carried out as deemed necessary by the surveyor.

2.3 Extent of Overall and Close-up Survey

2.3.1 An Overall Survey of all tanks and spaces is to be carried out at each Special Survey.

2.3.2 The minimum requirements for Close-up Surveys at Special Survey are given in Table I. The survey of stainless steel tanks may be carried out as an overall survey supplemented by Close-up Survey as deemed necessary by the surveyor.

2.3.3 The 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:

- a) In particular, tanks having structural arrangements or details which have suffered defects in similar tanks or on similar ships according to available information.
- b) In tanks which have structures approved with reduced scantlings due to an approved corrosion control system.

2.3.4 For areas in tanks where hard protective coatings are found to be in a GOOD condition as defined in 1.2.11, the extent of Close-up Surveys according to Table I may be specially considered.

2.4 Extent of Thickness Measurement

2.4.1 The minimum requirements for thickness measurements at Special Survey are given in Table II. Thickness measurement of stainless steel hull structure and piping may be waived, except for clad steel plating.

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2.4.2 Provisions for extended measurements for areas with Substantial Corrosion are given in Table IV, and as may be additionally specified in the Survey Programme as required in 5.1. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous Special Surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

2.4.3 The Surveyor may further extend the thickness measurements as deemed necessary.

2.4.4 For areas in tanks where hard protective coatings are found to be in a GOOD condition as defined in 1.2.11, the extent of thickness measurements according to Table II may be specially considered.

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

2.4.6 In cases where two or three sections are to be measured, at least one is to include a Ballast Tank within 0.5L amidships.

2.5 Extent of Tank Testing

2.5.1 The minimum requirements for tank testing at Special Survey are given in Table III. Pressure testing of cargo tanks may be accepted based on a confirmation from the Master stating that the pressure testing has been carried out according to the requirements with a satisfactory result.

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

2.5.3 Boundaries of ballast tanks are to be tested with a head of liquid to the top of air pipes.

2.5.4 Boundaries of cargo tanks are to be tested to the highest point that liquid will rise under service conditions.

2.5.5 The testing of double bottom tanks and other spaces not designed for the carriage of liquid may be omitted, provided a satisfactory internal examination together with an examination of the tanktop is carried out.

2.6 Chemical Tankers over 10 Years of Age

2.6.1 Selected steel cargo pipes outside cargo tanks and ballast pipes passing through cargo tanks are to be:

- Thickness measured at random or selected pipe lengths to be opened for internal inspection;
- Pressure tested to the maximum working pressure.

Special attention is to be given to cargo/slop discharge piping through Ballast Tanks and void spaces.

Z10.3 3. ANNUAL SURVEY

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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 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

3.2.3.1 Examination of cargo tank openings including gaskets, covers, coamings and flame screens.

3.2.3.2 Examination of cargo tanks pressure/vacuum valves and flame screens.

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

3.2.3.4 Examination of cargo, bunker and vent piping systems, including vent masts and headers.

3.2.4 Examination of Cargo pump rooms and pipe tunnels if fitted

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

3.2.4.2 Examination of the condition of all piping systems.

3.2.5 Examination of Ballast Tanks

3.2.5.1 Examination of Ballast Tanks where required as a consequence of the results of the Special Survey (see 2.2.3) and Intermediate Survey (see 4.2.2.1 and 4.2.2.2) is to be carried out. When considered necessary by the surveyor, or when extensive corrosion exists, thickness measurements are to be carried out and if the results of these thickness measurements indicate that Substantial Corrosion is found, the extent of thickness measurements is to be increased in accordance with Table IV. These extended thickness measurements are to be carried out before the survey is credited as completed. Suspect Areas identified at previous Surveys are to be examined. Areas of substantial corrosion identified at previous surveys are to have thickness measurements taken.

Z10.3 4. INTERMEDIATE SURVEY

(cont) 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 Survey may be surveyed either at or between the 2nd and 3rd Annual Survey.

4.1.3 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.

4.2.1.2 For weather decks, an examination as far as applicable of cargo, bunker, ballast, steam and vent piping systems as well as vent masts and headers is to be carried out. If upon examination there is any doubt as to the condition of the piping, the piping may be required to be pressure tested, thickness measured or both.

4.2.2 Chemical Tankers between 5 and 10 Years of Age

The following is to apply:

4.2.2.1 For ballast tanks, an Overall Survey of Representative Tanks selected by the Surveyor is to be carried out. If such inspections reveal no visible structural defects, the examination may be limited to a verification that the hard protective coating remains in GOOD condition.

4.2.2.2 A Ballast Tank is to be examined at subsequent annual intervals where:

- a. a hard protective coating has not been applied from the time of construction, or
- b. a soft or semi-hard coating has been applied, or
- c. substantial corrosion is found within the tank, or
- d. the hard protective coating is found to be in less than GOOD condition and the hard protective coating is not repaired to the satisfaction of the Surveyor.

4.2.2.3 In addition to the requirements above, suspect areas identified at previous surveys are to be examined.

4.2.3 Chemical Tankers between 10 and 15 years of Age

The following is to apply:

4.2.3.1 The requirements of the Intermediate Survey are to be to the same extent as the previous Special Survey as required in 2 and 5.1. However, pressure testing of cargo and ballast tanks is not required unless deemed necessary by the attending Surveyor.

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4.2.3.2 In application of 4.2.3.1, 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.

4.2.3.3 In application of 4.2.3.1, an under water survey may be considered in lieu of the requirements of 2.2.2.

4.2.4 Chemical Tankers 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 and 5.1. However, pressure testing of cargo and ballast tanks is 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 application of 4.2.4.1, a survey in dry dock is to be part of the intermediate survey. The overall and close-up surveys and thickness measurements, as applicable, of the lower portions of the cargo tanks and water ballast tanks are to be carried out in accordance with the applicable requirements for intermediate surveys, if not already performed.

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

Z10.3 5. PREPARATION FOR SURVEY

(cont) 5.1 Survey Programme

5.1.1 The Owner in co-operation with the Classification Society is to work out a specific Survey Programme prior to the commencement of any part of:

- the Special Survey;
- the Intermediate Survey for chemical tankers over 10 years of age.

The Survey Programme at Intermediate Survey may consist of the Survey Programme at the previous Special Survey supplemented by the Executive Hull Summary of that Special Survey and later relevant survey reports.

The Survey Programme is to be worked out taking into account any amendments to the survey requirements implemented after the last Special Survey carried out.

The Survey Programme is to be in a written format based on the information in annex IIIA.

5.1.1.1 Prior to the development of the survey programme, the survey planning questionnaire is to be completed by the owner based on the information set out in annex IIIB, and forwarded to the Classification Society.

5.1.2 In developing the Survey Programme, the following documentation is to be collected and consulted with a view to selecting tanks, areas, and structural elements to be examined:

- .1 Survey status and basic ship information;
- .2 Documentation on-board, as described in 6.2 and 6.3;
- .3 Main structural plans of cargo and ballast tanks (scantling drawings), including information regarding use of high tensile steels (HTS), clad steel and stainless steel;
- .4 Executive Hull Summary;
- .5 Relevant previous damage and repair history;
- .6 Relevant previous survey and inspection reports from both Classification Society and the owner;
- .7 Information regarding the use of the ship's tanks, typical cargoes and other relevant data;
- .8 details of the inert gas plant and tank cleaning procedures;
- .9 information and other relevant data regarding conversion or modification of the ship's cargo and ballast tanks since the time of construction;
- .10 description and history of the coating and corrosion protection system (previous class notations), if any;
- .11 inspections by the Owner's personnel during the last 3 years with reference to structural deterioration in general, leakages in tank boundaries and piping and condition of the coating and corrosion protection system, if any;

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.12 information regarding the relevant maintenance level during operation including port state control reports of inspection containing hull related deficiencies, Safety Management System non-conformities relating to hull maintenance, including the associated corrective action(s); and

.13 any other information that will help identify suspect areas and critical structural areas.

5.1.3 The submitted Survey Programme is to account for and comply, as a minimum, with the requirements of Tables I, II, 2.5 and 2.6 for close-up survey, thickness measurement, tank testing and pipe testing, respectively, and is to include relevant information including at least:

.1 Basic ship information and particulars;

.2 Main structural plans (scantling drawings), including information regarding use of high tensile steels (HTS), clad steel and stainless steel;

.3 Plan of tanks;

.4 List of tanks with information on use, corrosion prevention and condition of coating;

.5 Conditions for survey (e.g., information regarding tank cleaning, gas freeing, ventilation, lighting, etc.);

.6 Provisions and methods for access to structures;

.7 Equipment for surveys;

.8 Nomination of tanks and areas for close-up survey (per 2.3);

.9 Nomination of sections for thickness measurement (per 2.4);

.10 Nomination of tanks for tank testing (per 2.5); and the pipes that are to undergo pipe testing as per 2.6;

.11 Identification of the thickness measurement company;

.12 Damage experience related to the ship in question;

.13 Critical structural areas and suspect areas, where relevant.

5.1.4 The Classification Society will advise the Owner of the maximum acceptable structural corrosion diminution levels applicable to the vessel.

5.1.5 Use may also be made of the Guidelines for Technical Assessment in Conjunction with Planning for Enhanced Surveys of Chemical Tankers Special Survey - Hull, contained in Annex I. These guidelines are a recommended tool which may be invoked at the discretion of the Classification Society, when considered necessary and appropriate, in conjunction with the preparation of the required Survey Programme.

5.2 Conditions For Survey

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

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5.2.1.1 In order to enable the attending surveyors to carry out the survey, provisions for proper and safe access are to be agreed between the owner and the Classification society.

5.2.1.2 Details of the means of access are to be provided in the survey planning questionnaire.

5.2.1.3 In cases where the provisions of safety and required access are judged by the attending surveyors not to be adequate, the survey of the spaces involved is to not proceed.

5.2.2 Tanks and spaces are to be safe for access. Tanks and spaces are to be gas free and properly ventilated. Prior to entering a tank, void or enclosed space, it is to be verified that the atmosphere in that space is free from hazardous gas and contains sufficient oxygen.

5.2.3 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 as well as the condition of the coating. 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.

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

5.2.5 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.

5.2.6 The surveyor(s) are to always be accompanied by at least one responsible person, assigned by the owner, experienced in tank and enclosed spaces inspection. In addition a back-up team of at least two experienced persons is to be stationed at the hatch opening of the tank or space that is being surveyed. The back-up team is to continuously observe the work in the tank or space and is to keep lifesaving and evacuation equipment ready for use.

5.2.7 A communication system is to be arranged between the survey party in the tank or space being examined, the responsible officer on deck and, as the case may be, the navigation bridge. The communication arrangements are to be maintained throughout the survey.

5.3 Access to Structures

5.3.1 For overall survey, means are to be provided to enable the surveyor to examine the hull structure in a safe and practical way.

5.3.2 For close-up survey, 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 and passages through structures;
- lifts and movable platforms;
- boats or rafts;
- portable ladders;
- other equivalent means.

Z10.3 5.4 Equipment for Survey

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5.4.1 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.

5.4.2 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.

5.4.3 Explosimeter, oxygen-meter, breathing apparatus, lifelines, riding belts with rope and hook and whistles together with instructions and guidance on their use are to be made available during the survey. A safety check-list is to be provided.

5.4.4 Adequate and safe lighting is to be provided for the safe and efficient conduct of the survey.

5.4.5 Adequate protective clothing is to be made available and used during the survey (e.g. safety helmet, gloves, safety shoes, etc.).

5.5 Survey at Sea or at Anchorage

5.5.1 Survey at sea or at anchorage may be accepted provided the Surveyor is given the necessary assistance from the personnel onboard. Necessary precautions and procedures for carrying out the survey are to be in accordance with 5.1, 5.2, 5.3 and 5.4.

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

5.5.3 Surveys of tanks by means of boats or rafts may only be undertaken with the agreement of the Surveyor, who is to take into account the safety arrangements provided, including weather forecasting and ship response under foreseeable conditions and provided the expected rise of water within the tank does not exceed 0.25m.

5.5.4 When rafts or boats are used for close-up surveys, the following conditions are to be observed:

- .1 only rough duty, inflatable rafts or boats, having satisfactory residual buoyancy and stability even if one chamber is ruptured, should be used;
- .2 the boat or raft should be tethered to the access ladder and an additional person should be stationed down the access ladder with a clear view of the boat or raft;
- .3 appropriate lifejackets should be available for all participants;
- .4 the surface of water in the tank should be calm (under all foreseeable conditions the expected rise of water within the tank should not exceed 0.25 m) and the water level stationary. On no account should the level of the water be rising while the boat or raft is in use;

Z10.3

(cont)

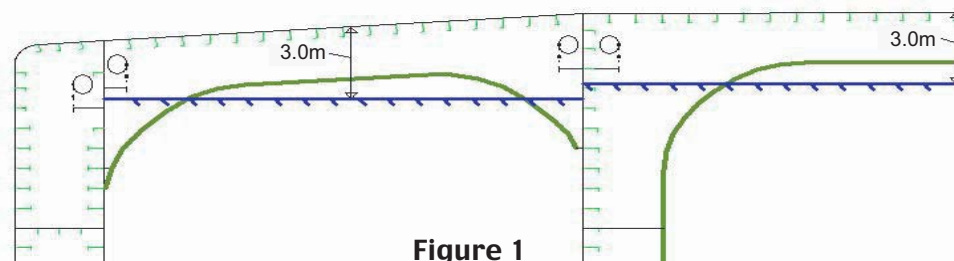
- .5 the tank or space must contain clean ballast water only. Even a thin sheen of cargo on the water is not acceptable;
- .6 at no time should the water level be allowed to be within 1 m of the deepest under deck web face flat so that the survey team is not isolated from a direct escape route to the tank hatch. Filling to levels above the deck transverses should only be contemplated if a deck access manhole is fitted and open in the bay being examined, so that an escape route for the survey party is available at all times. Other effective means of escape to the deck may be considered;
- .7 if the tanks (or spaces) are connected by a common venting system, or inert gas system, the tank in which the boat or raft should be used should be isolated to prevent a transfer of gas from other tanks (or spaces).

5.5.5 Rafts or boats alone may be allowed for inspection of the under deck areas for tanks or spaces, if the depth of the webs is 1.5 m or less.

5.5.6 If the depth of the webs is more than 1.5 m, rafts or boats alone may be allowed only:

- .1 when the coating of the under deck structure is in GOOD condition and there is no evidence of wastage; or
- .2 if a permanent means of access is provided in each bay to allow safe entry and exit. This means:
- i. access direct from the deck via a vertical ladder and a small platform fitted approximately 2 m below the deck in each bay; or
 - ii. access to deck from a longitudinal permanent platform having ladders to deck in each end of the tank. The platform shall, for the full length of the tank, be arranged in level with, or above, the maximum water level needed for rafting of under deck structure. For this purpose, the ullage corresponding to the maximum water level is to be assumed not more than 3 m from the deck plate measured at the midspan of deck transverses and in the middle length of the tank (See Figure 1).

If neither of the above conditions are met, then staging or an "other equivalent means" is to be provided for the survey of the under deck areas.



5.5.7 The use of rafts or boats alone in paragraphs 5.5.5 and 5.5.6 does not preclude the use of boats or rafts to move about within a tank during a survey.

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

Z10.3 5.6 Survey Planning Meeting

(cont)

5.6.1 Proper preparation and close co-operation between the attending surveyor(s) and the owner's representatives onboard prior to and during the survey are an essential part in the safe and efficient conduct of the survey. During the survey on board safety meetings are to be held regularly.

5.6.2 Prior to the commencement of any part of the Special and Intermediate Survey a survey planning meeting is to be held between the attending Surveyor(s), the Owner's Representative in attendance and the TM company representative, where involved, and the master of the ship or an appropriately qualified representative appointed by the master or Company for the purpose of ascertaining that all the arrangements envisaged in the survey programme are in place, so as to ensure the safe and efficient conduct of the survey work to be carried out. See also 7.1.2.

5.6.3 The following is an indicative list of items that are to be addressed in the meeting:

- .1 schedule of the vessel (i.e. the voyage, docking and undocking manoeuvres, periods alongside, cargo and ballast operations etc.);
- .2 provisions and arrangements for thickness measurements (i.e. access, cleaning/de-scaling, illumination, ventilation, personal safety);
- .3 extent of the thickness measurements;
- .4 acceptance criteria (refer to the list of minimum thicknesses);
- .5 extent of close-up survey and thickness measurement considering the coating condition and suspect areas/areas of substantial corrosion;
- .6 execution of thickness measurements;
- .7 taking representative readings in general and where uneven corrosion/pitting is found;
- .8 mapping of areas of substantial corrosion; and
- .9 communication between attending surveyor(s) the thickness measurement company operator(s) and owner representative(s) concerning findings.

Z10.3 6. DOCUMENTATION ON BOARD

(cont)

6.1 General

6.1.1 The owner is to obtain, supply and maintain on board documentation as specified in 6.2 and 6.3, which is to be readily available for the Surveyor.

6.1.2 The documentation is to be kept on board for the lifetime of the ship.

6.2 Survey Report File

6.2.1 A Survey Report File is to be a part of the documentation on board consisting of

- Reports of structural surveys;
- Executive Hull Summary;
- Thickness measurement reports.

6.2.2 The Survey Report File is to be available also in the Owner's and the Classification Society's management offices.

6.3 Supporting Documents

6.3.1 The following additional documentation is to be available onboard:

- Survey Programme as required by 5.1 until such time as the Special Survey or Intermediate Survey, as applicable, has been completed;
- Main structural plans of cargo and ballast tanks;
- Previous repair history;
- Cargo and ballast history;
- Extent of use of inert gas plant and tank cleaning procedures;
- Inspections by ship's personnel with reference to
 - structural deterioration in general
 - leakage in bulkheads and piping
 - condition of corrosion prevention system, if any;
- Any other information that will help identify Critical Structural Areas and/or Suspect Areas requiring inspection.

6.4 Review of Documentation On Board

6.4.1 Prior to survey, the Surveyor is to examine the completeness of the documentation onboard, and its contents as a basis for the survey.

Z10.3 7. PROCEDURES FOR THICKNESS MEASUREMENTS

(cont) 7.1 General

7.1.1 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.

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

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

7.1.4 In all cases the extent of the thickness measurements are to be sufficient as to represent the actual average condition.

7.2 Certification of Thickness Measurement Company

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

7.3 Reporting

7.3.1 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. The thickness measurement report is to follow the principles as specified in the Recommended Procedures for Thickness Measurements of Chemical Tankers, contained in Annex II.

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

Z10.3 8. REPORTING AND EVALUATION OF SURVEY

(cont)

8.1 Evaluation of Survey Report

8.1.1 The data and information on the structural condition of the vessel collected during the survey is to be evaluated for acceptability and continued structural integrity of the vessel.

8.2 Reporting

8.2.1 Principles for survey reporting are shown in Table VIII.

8.2.2 When a survey is split between different survey stations, a report is to be made for each portion of the survey. A list of items examined and / or tested (pressure testing, thickness measurements etc.) and an indication of whether the item has been credited, are to be made available to the next attending Surveyor(s), prior to continuing or completing the survey.

8.2.3 An Executive Hull Summary of the survey and results is to be issued to the Owner as shown in Table IX and placed on board the vessel for reference at future surveys. The Executive Hull Summary is to be endorsed by the Classification Society's head office or regional managerial office.

TABLE I

Z10.3

(cont)

**MINIMUM REQUIREMENTS FOR CLOSE-UP SURVEY AT
SPECIAL SURVEY OF CHEMICAL TANKERS**

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
A/(1) ONE WEB FRAME <u>RING</u> - in a ballast wing tank (for S.H.) or ballast double hull tank (for D.H.) (see Note 4!)	A/(1) ALL WEB FRAMES <u>RINGS</u> - in a ballast wing tank or ballast double hull tank (see Note 4!)	A/(1) ALL WEB FRAMES <u>RINGS</u> - in all ballast tanks	As special survey No.3
B/(2) ONE DECK TRANSVERSE - in a cargo tank or on deck	B ONE DECK TRANSVERSE - in each remaining ballast tank or on deck (for S.H.)	A/(7) ALL WEB FRAMES <u>RINGS</u> - in a cargo wing tank	Additional transverse areas as deemed necessary by the Society
B ONE DECK TRANSVERSE - in a cargo wing tank or on deck (for S.H.)	B(6) THE KNUCKLE AREA AND THE UPPER PART (35 metres approx) of one web frame in each remaining ballast tank (for D.H.)		
D/C/(4) ONE TRANSVERSE BULKHEAD (lower part for S.H. - complete for D.H.) - in a ballast tank	B ONE DECK TRANSVERSE - in a cargo wing tank or on deck (for S.H.)	A/(7) ONE WEB FRAME <u>RING</u> - in each remaining cargo tank	
D/(5) ONE TRANSVERSE BULKHEAD - in a cargo wing tank	B/(2) ONE DECK TRANSVERSE - in two cargo centre tanks or on deck (for S.H.) and one deck transverse in two cargo tanks (for D.H.)	C/(3) ALL TRANSVERSE BULKHEADS - in all cargo and ballast tanks	
D/(5) ONE TRANSVERSE BULKHEAD - in a cargo centre tank (see Note 2!)	C BOTH TRANSVERSE BULKHEADS - in a ballast wing tank (for S.H.)	C/(4) ALL TRANSVERSE BULKHEADS - in all ballast tanks	
	C(4) ONE TRANSVERSE BULKHEAD in each ballast tank (for D.H.) (see Note 4!)		

Z10.3

(cont)

D	ONE TRANSVERSE BULKHEAD - in each remaining ballast tank (for S.H.)
D/(5)	ONE TRANSVERSE BULKHEAD - in two cargo centre tanks (see Note 2II)
D/(5)	ONE TRANSVERSE BULKHEAD - in a cargo wing tank

(1), (2), (3), (4), (5), (6) and (7) are areas to be subjected to close-up surveys and thickness measurements (see Figure 1 and Figure 2 of Table V in UR Z10.4).

(1): Web frame in a ballast tank means vertical web in side tank, hopper web in hopper tank, floor in double bottom tank and deck transverse in double deck tank (where fitted), including adjacent structural members. In fore and aft peak tanks web frame means a complete transverse web frame ring including adjacent structural members.

(2): Deck transverse, including adjacent deck structural members (or external structure on deck in way of the tank, where applicable).

(3): Transverse bulkhead complete in cargo tanks, including girder system, adjacent structural members (such as longitudinal bulkheads) and internal structure of lower and upper stools, where fitted.

(4): Transverse bulkhead complete in ballast tanks, including girder system and adjacent structural members, such as longitudinal bulkheads, girders in double bottom tanks, inner bottom plating, hopper side, connecting brackets.

(5): Transverse bulkhead lower part in cargo tank, including girder system, adjacent structural members (such as longitudinal bulkheads) and internal structure of lower stool, where fitted.

(6): The *knuckle area* and the upper part (5 metres approximately), including adjacent structural members. *Knuckle area* is the area of the web frame around the connections of the slope hopper plating to the inner hull bulkhead and the inner bottom plating, up to 2 metres from the corners both on the bulkhead and the double bottom.

(7): Web frame in a cargo oil tank means deck transverse, longitudinal bulkhead vertical girder and cross ties, where fitted, including adjacent structural members.

~~Note 1: Double hull tank – including double bottom and side tank even though these tanks are separate.~~

Note I: Ballast double hull tank: means double bottom tank plus double side tank plus double deck tank, as applicable, even if these tanks are separate.

Note 2II: Where no centre cargo tanks are fitted (as in the case of centre longitudinal bulkhead), transverse bulkheads in wing tanks are to be surveyed.

A-D: are areas to be subjected to close-up surveys and thickness measurements (see sheet 15 of the Annex II to UR Z10.1).

- A) Complete transverse web frame ring including adjacent structural members.
- B) Deck transverse including adjacent deck structural members.
- C) Transverse bulkhead complete - including girder system and adjacent structural members.
- D) Transverse bulkhead lower part - including girder system and adjacent structural members.

Z10.3

(cont)

TABLE II

**MINIMUM REQUIREMENTS FOR THICKNESS MEASUREMENTS AT
SPECIAL SURVEY OF CHEMICAL TANKERS**

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
1. Suspect areas	1. Suspect areas	1. Suspect areas	1. Suspect areas
2. One section of deck plating for the full beam of the ship within the cargo area (in way of a ballast tank, if any, or a cargo tank used primarily for water ballast)	2. Within the cargo area: .1 Each deck plate .2 One transverse section	2. Within the cargo area: .1 Each deck plate .2 Two transverse sections ⁽¹⁾ .3 All wind and water strakes	2. Within the cargo area: .1 Each deck plate .2 Three transverse sections ⁽¹⁾ .3 Each bottom plate
	3. Selected wind and water strakes outside the cargo area	3. Selected wind and water strakes outside the cargo area	3. All wind and water strakes, full length
4. Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.	4. Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.	4. Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.	4. Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to Table I.
(1): at least one section is to include a ballast tank within 0.5L amidships.			

Z10.3

(cont)

TABLE III

**MINIMUM REQUIREMENTS FOR TANK TESTING
AT SPECIAL SURVEY OF CHEMICAL TANKERS**

Special Survey No.1 age \leq 5	Special Survey No.2 and Subsequent age $>$ 5
All ballast tank boundaries	All ballast tank boundaries
Cargo tank boundaries facing ballast tanks, void spaces, pipe tunnels, pump rooms or cofferdams	All cargo tank bulkheads

Z10.3

(cont)

TABLE IV/Sheet 1

**REQUIREMENTS FOR EXTENT OF THICKNESS
MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION.
SPECIAL SURVEY OF CHEMICAL TANKERS WITHIN
THE CARGO AREA LENGTH.**

BOTTOM, INNER BOTTOM AND HOPPER STRUCTURE		
Structural member	Extent of measurement	Pattern of measurement
Bottom, inner bottom and hopper structure plating	Minimum of three bays across tank, including aft bay Measurements around and under all suction bell mouths	5-point pattern for each panel between longitudinals and floors
Bottom, inner bottom and hopper structure longitudinals	Minimum of three longitudinals in each bay where bottom plating measured	Three measurements in line across the flange and three measurements on vertical web
Bottom girders, including the watertight ones	At fore and aft watertight floors and in centre of tanks	Vertical line of single measurements on girder plating with one measurement between each panel stiffener, or a minimum of three measurements. Two measurements across face flat where fitted.
Bottom floors, including the watertight ones	Three floors in bays where bottom plating measured, with measurements at both ends and middle	5-point pattern over two square metre area
Hopper structure web frame ring	Three floors in bays where bottom plating measured	5-point pattern over one square metre of plating. Single measurements on flange
Hopper structure transverse watertight bulkhead or swash bulkhead	- lower 1/3 of bulkhead	- 5-point pattern over one square metre of plating
	- upper 2/3 of bulkhead	- 5-point pattern over two square metre of plating
	- stiffeners (minimum of three)	- For web, 5-point pattern over span (two measurements across web at each end and one at centre of span). For flange, single measurements at each end and centre of span
Panel stiffening	Where applicable	Single measurements

TABLE IV/Sheet 2

Z10.3

(cont)

**REQUIREMENTS FOR EXTENT OF THICKNESS
MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION.
SPECIAL SURVEY OF CHEMICAL TANKERS WITHIN
THE CARGO AREA LENGTH.**

DECK STRUCTURE		
Structural member	Extent of measurement	Pattern of measurement
Deck plating	Two transverse bands across tank	Minimum of three measurements per plate per band
Deck longitudinals	Every third longitudinal in each of two bands with a minimum of one longitudinal	Three measurements in line vertically on webs and two measurements on flange (if fitted)
Deck girders and brackets	At fore and aft transverse bulkhead, bracket toes and in centre of tanks	Vertical line of single measurements on web plating with one measurement between each panel stiffener, or a minimum of three measurements. Two measurements across flange. 5-point pattern on girder/bulkhead brackets
Deck transverse webs	Minimum of two webs, with measurements at both ends and middle of span	5-point pattern over one square metre area. Single measurements on flange
Vertical web and transverse bulkhead in wing ballast tank for double hull design (two metres from deck)	Minimum of two webs, and both transverse bulkheads	5-point pattern over one square metre area
Panel stiffening	Where applicable	Single measurements

Z10.3

(cont)

TABLE IV/Sheet 3

**REQUIREMENTS FOR EXTENT OF THICKNESS
MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION.
SPECIAL SURVEY OF CHEMICAL TANKERS WITHIN
THE CARGO AREA LENGTH.**

SIDE SHELL AND LONGITUDINAL BULKHEADS		
Structural member	Extent of measurement	Pattern of measurement
Side shell and longitudinal bulkhead plating: <ul style="list-style-type: none"> - Deckhead and bottom strakes, and strakes in way of horizontal girders - All other strakes 	<ul style="list-style-type: none"> - Plating between each pair of longitudinals in a minimum of three bays (along the tank) - Plating between every third pair of longitudinals in same three bays 	Single measurement
Side shell and longitudinal bulkhead longitudinals on: <ul style="list-style-type: none"> - Deckhead and bottom strakes - All other strakes 	<ul style="list-style-type: none"> - Each longitudinal in same three bays - Every third longitudinal in same three bays 	3 measurements across web and 1 measurement on flange
Longitudinals - brackets	Minimum of three at top, middle and bottom of tank in same three bays	5-point pattern over area of bracket
Vertical web and transverse bulkheads of double side tanks (excluding deck area): <ul style="list-style-type: none"> - Strakes in way of horizontal girders - Other strakes 	<ul style="list-style-type: none"> - Minimum of two webs and both transverse bulkheads - Minimum of two webs and both transverse bulkheads 	<ul style="list-style-type: none"> - 5-point pattern over approx. two square metre area - Two measurements between each pair of vertical stiffeners
Web frames and cross ties for other tanks than double side tanks	Three webs with minimum of three locations on each web, including in way of cross tie connections and lower end bracket	5-point pattern over approximately two square metre area of webs, plus single measurements on flanges of web frame and cross ties
Horizontal girders	Plating on each girder in a minimum of three bays	Two measurements between each pair of longitudinal girder stiffeners
Panel stiffening	Where applicable	Single measurements

Z10.3

(cont)

TABLE IV/Sheet 4

**REQUIREMENTS FOR EXTENT OF THICKNESS
MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION.
SPECIAL SURVEY OF CHEMICAL TANKERS WITHIN
THE CARGO AREA LENGTH.**

TRANSVERSE WATERTIGHT AND SWASH BULKHEADS		
Structural member	Extent of measurement	Pattern of measurement
Upper and lower stool, where fitted	<ul style="list-style-type: none"> - Transverse band within 25mm of welded connection to inner bottom/deck plating - Transverse band within 25mm of welded connection to shelf plate 	5-point pattern between stiffeners over one metre length
Deckhead and bottom strakes, and strakes in way of horizontal stringers	Plating between pair of stiffeners at three locations: approximately 1/4, 1/2 and 3/4 width of tank	5-point pattern between stiffeners over one metre length
All other strakes	Plating between pair of stiffeners at middle location	Single measurement
Strakes in corrugated bulkheads	Plating for each change of scantling at centre of panel and at flange of fabricated connection	5-point pattern over about one square metre of plating
Stiffeners	Minimum of three typical stiffeners	For web, 5-point pattern over span between bracket connections (two measurements across web at each bracket connection and one at centre of span). For flange, single measurements at each bracket toe and at centre of span
Brackets	Minimum of three at top, middle and bottom of tank	5-point pattern over area of bracket
Horizontal stringers	All stringers with measurements at both ends and middle.	5-point pattern over one square metre area, plus single measurements near bracket toes and on flanges
Deep webs and girders	Measurements at toe of bracket and at centre of span	For web, 5 point pattern over about 1 square metre. 3 measurements across face flat.

Z10.3

(cont)

TABLE V

Deleted, data now contained in Annex IIIC.

Z10.3

(cont)

TABLE VII**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.

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. organisation and management structure.
- b) Experience of the firms on thickness measurement inter alia of hull structures of the vessels.
- c) Technicians' careers, i.e. experience 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.
- g) Measurement record format in accordance with the Recommended Procedures for Thickness Measurements of Chemical Tankers, contained in Annex II.

(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.

Z10.3
(cont)**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.

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.

Z10.3

(cont)

TABLE VIII**SURVEY REPORTING PRINCIPLES**

As a principle, for chemical tankers subject to ESP, the surveyor is to include the following content in his report for survey of hull structure and piping systems, as relevant for the survey.

The structure of the reporting content may be different, depending on the report system for the respective Societies.

1. General

1.1 A survey report is to be generated in the following cases:

- In connection with commencement, continuation and / or completion of periodical hull surveys, i.e. annual, intermediate and special surveys, as relevant
- When structural damages / defects have been found
- When repairs, renewals or modifications have been carried out
- When condition of class (recommendation) has been imposed or deleted

1.2 The purpose of reporting is to provide:

- Evidence that prescribed surveys have been carried out in accordance with applicable classification rules
- Documentation of surveys carried out with findings, repairs carried out and condition of class (recommendation) imposed or deleted
- Survey records, including actions taken, which shall form an auditable documentary trail. Survey reports are to be kept in the survey report file required to be on board
- Information for planning of future surveys
- Information which may be used as input for maintenance of classification rules and instructions

1.3 When a survey is split between different survey stations, a report is to be made for each portion of the survey. A list of items surveyed, relevant findings and an indication of whether the item has been credited, is to be made available to the next attending surveyor, prior to continuing or completing the survey. Thickness measurement and tank testing carried out is also to be listed for the next surveyor.

2. Extent of the survey

2.1 Identification of compartments where an overall survey has been carried out.

2.2 Identification of locations, in each tank, where a close-up survey has been carried out, together with information of the means of access used.

2.3 Identification of locations, in each tank, where thickness measurement has been carried out.

*Note: As a minimum, the identification of location of close-up survey and thickness measurement is to include a confirmation with description of individual structural members corresponding to the extent of requirements stipulated in Z10.3 based on type of periodical survey and the ship's age.
Where only partial survey is required, i.e. one web frame ring / one deck transverse, the identification is to include location within each tank by reference to frame numbers.*

Z10.3

(cont)

2.4 For areas in tanks where protective coating is found to be in GOOD condition and the extent of close-up survey and / or thickness measurement has been specially considered, structures subject to special consideration are to be identified.

2.5 Identification of tanks subject to tank testing.

2.6 Identification of cargo piping on deck and cargo and ballast piping within cargo and ballast tanks, pump rooms, pipe tunnels and void spaces, where:

- Examination including internal examination of piping with valves and fittings and thickness measurement, as relevant, has been carried out
- Operational test to working pressure has been carried out

3. Result of the survey

3.1 Type, extent and condition of protective coating in each tank, as relevant (rated GOOD, FAIR or POOR).

3.2 Structural condition of each compartment with information on the following, as relevant:

- Identification of findings, such as:
 - Corrosion with description of location, type and extent
 - Areas with substantial corrosion
 - Cracks / fractures with description of location and extent
 - Buckling with description of location and extent
 - Indents with description of location and extent
- Identification of compartments where no structural damages / defects are found

The report may be supplemented by sketches / photos.

3.3 Thickness measurement report is to be verified and signed by the surveyor controlling the measurements on board.

4. Actions taken with respect to findings

4.1 Whenever the attending surveyor is of the opinion that repairs are required, each item to be repaired is to be identified in the survey report ~~a numbered list~~. Whenever repairs are carried out, details of the repairs effected are to be reported by making specific reference to relevant items in the survey report ~~numbered list~~.

4.2 Repairs carried out are to be reported with identification of:

- Compartment
- Structural member
- Repair method (i.e. renewal or modification) including:
 - Steel grades and scantlings (if different from the original),
 - Sketches/photos, as appropriate
- Repair extent
- NDT / Tests

4.3 For repairs not completed at the time of survey, condition of class (recommendation) is to be imposed with a specific time limit for the repairs. In order to provide correct and proper information to the surveyor attending for survey of the repairs, condition of class (recommendation) is to be sufficiently detailed with identification of each item to be repaired. For identification of extensive repairs, reference may be given to the survey report.

Z10.3

(cont)

TABLE IX (i)**IACS UNIFIED REQUIREMENTS FOR ENHANCED SURVEYS****EXECUTIVE HULL SUMMARY**

Issued upon Completion of Special Survey

GENERAL PARTICULARS

SHIP'S NAME:

CLASS IDENTIFY NUMBER:

IMO IDENTIFY NUMBER:

PORT OF REGISTRY:

NATIONAL FLAG:

DEADWEIGHT (M. TONNES):

GROSS TONNAGE:

NATIONAL:

ITC (69):

DATE OF BUILD:

CLASSIFICATION NOTATION:

DATE OF MAJOR CONVERSION:

TYPE OF CONVERSION:

- a) The survey reports and documents listed below have been reviewed by the undersigned and found to be satisfactory
- b) A summary of the survey is attached herewith on sheet 2
- c) The hull special survey has been completed in accordance with the Regulations on [date]

Executive Summary Report completed by:	Name Signature	Title
OFFICE	DATE	
Executive Summary Report verified by:	Name Signature	Title
OFFICE	DATE	

Attached reports and documents:

- 1)
- 2)
- 3)
- 4)
- 5)
- 6)

Z10.3

(cont)

TABLE IX (ii)**EXECUTIVE HULL SUMMARY**

- | | | | |
|----|-------------------------------------|---------------------------|---|
| A) | General Particulars: | - | Ref. Table IX (i) |
| B) | Report Review: | - | Where and how survey was done |
| C) | Close-up Survey: | - | Extent (Which tanks) |
| D) | Cargo & Ballast
Piping System: | - | Examined |
| | | - | Operationally tested |
| E) | Thickness
measurements: | - | Reference to Thickness Measurement report |
| | | - | Summary of where measured |
| | | - | Separate form indicating the tanks/areas with
Substantial Corrosion, and corresponding |
| | | | * Thickness diminution |
| | | | * Corrosion pattern |
| F) | Tank Protection: | Separate form indicating: | |
| | | - | Location of coating |
| | | - | Condition of coating (if applicable) |
| G) | Repairs: | - | Identification of tanks/areas |
| H) | Condition of Class/Recommendations: | | |
| I) | Memoranda: | - | Acceptable defects |
| | | - | Any points of attention for future surveys, e.g. for
Suspect Areas. |
| | | - | Extended Annual/Intermediate survey due to coating
breakdown |
| J) | Conclusion: | - | Statement on evaluation/verification of survey report |

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(cont)

TABLE IX (iii)

EXTRACT OF THICKNESS MEASUREMENTS

Reference is made to the thickness measurements report:

1) Position of substantially corroded Tanks/Areas or Areas with deep pitting	Thickness diminution [%]	2) Corrosion pattern	Remarks: e.g. Ref. attached sketches

Remarks:

- 1) Substantial corrosion, i.e. 75 – 100% of acceptable margins wasted
- 2) P = Pitting
C = Corrosion in General
Any bottom plating with a pitting intensity of 20% or more, with wastage in the substantial corrosion range or having an average depth of pitting of 1/3 or more of actual plate thickness is to be noted.

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(cont)

TABLE IX (iv)
TANK PROTECTION

1) Tank Nos.	2) Tank protection	3) Coating condition	Remarks

Remarks:

1) All segregated ballast tanks and combined cargo/ballast tanks to be listed.

2) C = Coating NP = No Protection

3) Coating condition according to the following standard

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.

If coating condition **less than "GOOD"** is given, extended annual surveys are to be introduced. This is to be noted in part I(H) of the Executive Hull Summary.

End of First Section

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(cont)

ANNEX I**GUIDELINES FOR TECHNICAL ASSESSMENT IN CONJUNCTION WITH
PLANNING FOR ENHANCED SURVEYS OF CHEMICAL TANKERS
SPECIAL SURVEY - HULL****Contents:****1. INTRODUCTION****2. PURPOSE AND PRINCIPLES**

- 2.1 Purpose
- 2.2 Minimum Requirements
- 2.3 Timing
- 2.4 Aspects to be Considered

3. TECHNICAL ASSESSMENT

- 3.1 General
- 3.2 Methods
 - 3.2.1 Design Details
 - 3.2.2 Corrosion
 - 3.2.3 Locations for Close-up Survey and Thickness Measurement

REFERENCES

1. IACS Unified Requirement Z10.3, "Hull Surveys of Chemical Tankers."
2. TSCF, "Guidelines for the Inspection and Maintenance of Double Hull Tanker Structures, 1995."
3. TSCF, "Guidance Manual for Tanker Structures, 1997."

1 INTRODUCTION

These guidelines contain information and suggestions concerning technical assessments which may be of use in conjunction with the planning of enhanced special surveys of chemical tankers. As indicated in section 5.1.5 of IACS Unified Requirement Z10.3, "Hull Surveys of Chemical Tankers," (Ref. 1), the guidelines are a recommended tool which may be invoked at the discretion of an IACS Member Society, when considered necessary and appropriate, in conjunction with the preparation of the required Survey Programme.

2 PURPOSE AND PRINCIPLES**2.1 Purpose**

The purpose of the technical assessments described in these guidelines is to assist in identifying critical structural areas, nominating suspect areas and in focusing attention on structural elements or areas of structural elements which may be particularly susceptible to, or evidence a history of, wastage or damage. This information may be useful in nominating locations, areas and tanks for thickness measurement, close-up survey and tank testing. Critical Structural Areas are locations which have been identified from calculations to require monitoring or from the service history of the subject ship or from similar or sister ships (if

Z10.3 available) to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship.
(cont)

2.2 Minimum Requirements

However, these guidelines may not be used to reduce the requirements pertaining to thickness measurement, close-up survey and tank testing contained in Tables I, II and III, respectively, of Z10.3; which are, in all cases, to be complied with as a minimum.

2.3 Timing

As with other aspects of survey planning, the technical assessments described in these guidelines should be worked out by the Owner or operator in cooperation with the Classification Society well in advance of the commencement of the Special Survey, i.e., prior to commencing the survey and normally at least 12 to 15 months before the survey's completion due date.

2.4 Aspects to be Considered

Technical assessments, which may include quantitative or qualitative evaluation of relative risks of possible deterioration, of the following aspects of a particular ship may be used as a basis for the nomination of tanks and areas for survey:

- Design features such as stress levels on various structural elements, design details and extent of use of high tensile steel.
- Former history with respect to corrosion, cracking, buckling, indents and repairs for the particular ship as well as similar vessels, where available.
- Information with respect to types of cargo carried, use of different tanks for cargo/ballast, protection of tanks and condition of coating, if any.

Technical assessments of the relative risks of susceptibility to damage or deterioration of various structural elements and areas are to be judged and decided on the basis of recognised principles and practices, such as may be found in publications of the Tanker Structure Cooperative Forum (TSCF), (Refs. 2 and 3).

3 TECHNICAL ASSESSMENT

3.1 General

There are three basic types of possible failure which may be the subject of technical assessment in connection with planning of surveys; corrosion, cracks and buckling. Contact damages are not normally covered by the survey plan since indents are usually noted in memoranda and assumed to be dealt with as a normal routine by Surveyors.

Technical assessments performed in conjunction with the survey planning process are, in principle, to be as shown schematically in Figure 1 depicts, schematically, how technical assessments can be carried out in conjunction with the survey planning process.

The approach is basically an evaluation of the risk based on the knowledge and experience related to design and corrosion.

The design is to be considered with respect to structural details which may be susceptible to buckling or cracking as a result of vibration, high stress levels or fatigue.

Corrosion is related to the ageing process, and is closely connected with the quality of corrosion protection at newbuilding, and subsequent maintenance during the service life. Corrosion may also lead to cracking and/or buckling.

Z10.3 3.2 Methods

(cont)

3.2.1 Design Details

Damage experience related to the ship in question and similar ships, where available, is the main source of information to be used in the process of planning. In addition, a selection of structural details from the design drawings are to be included.

Typical damage experience to be considered will consist of:

- Number, extent, location and frequency of cracks;
- Location of buckles.

This information may be found in the survey reports and/or the Owner's files, including the results of the Owner's own inspections. The defects are to be analyzed, noted and marked on sketches.

In addition, general experience is to be utilized. For example, reference is to be made to the two TSCF's publications mentioned in Ref.2 and Ref.3, which contain a catalogue of typical damages and proposed repair methods for various tanker structural details.

Such figures are to be used together with a review of the main drawings, in order to compare with the actual structure and search for similar details which may be susceptible to damage. An example is shown in Figure 2. In particular, Chapter 3 of Ref.2 deals with various aspects specific to double hull tankers, such as stress concentration locations, misalignment during construction, corrosion trends, fatigue considerations and areas requiring special attention, which are to be considered in working out the survey planning.

The review of the main structural drawings, in addition to using the above mentioned figures, is to include checking for typical design details where cracking has been experienced. The factors contributing to damage are to be carefully considered.

The use of high tensile steel (HTS) is an important factor. Details showing good service experience where ordinary, mild steel has been used may be more susceptible to damage when HTS, and its higher associated stresses, are utilized. There is extensive and, in general, good experience, with the use of HTS for longitudinal material in deck and bottom structures. Experience in other locations, where the dynamic stresses may be higher, is less favourable, e.g. side structures.

In this respect, stress calculations of typical and important components and details, in accordance with the latest Rules or other relevant methods, may prove useful and are to be considered. The selected areas of the structure identified during this process are to be recorded and marked on the structural drawings to be included in the Survey Programme.

3.2.2 Corrosion

In order to evaluate relative corrosion risks, the following information is generally to be considered:

- Usage of Tanks and Spaces
- Condition of Coatings
- Cleaning Procedures
- Previous Corrosion Damage
- Ballast use and time for Cargo Tanks
- Corrosion Risk Scheme (See Ref. 3, Table 2.1)
- Location of Heated Tanks

Z10.3 Ref. 3 gives definitive examples which can be used for judging and describing coating condition, using typical pictures of conditions.
(cont)

The evaluation of corrosion risks is to be based on information in Ref. 3, together with relevant information on the anticipated condition of the ship as derived from the information collected in order to prepare the Survey Programme and the age of the ship. The various tanks and spaces are to be listed with the corrosion risks nominated accordingly.

Special attention is to be given to the areas where the double hull tanker is particularly exposed to corrosion. To do this end, the specific aspects addressing corrosion in double hull tankers indicated in 3.4 (Corrosion trends) of Ref.2 are to be taken into account.

3.2.3 Locations for Close-up Survey and Thickness Measurement

On the basis of the table of corrosion risks and the evaluation of design experience, the locations for initial close-up survey and thickness measurement (areas and sections) may be nominated.

The sections subject to thickness measurement are to normally be nominated in tanks and spaces where corrosion risk is judged to be the highest.

The nomination of tanks and spaces for close-up survey is to, initially, be based on highest corrosion risk, and is to always include ballast tanks. The principle for the selection is to be that the extent is increased by age or where information is insufficient or unreliable.

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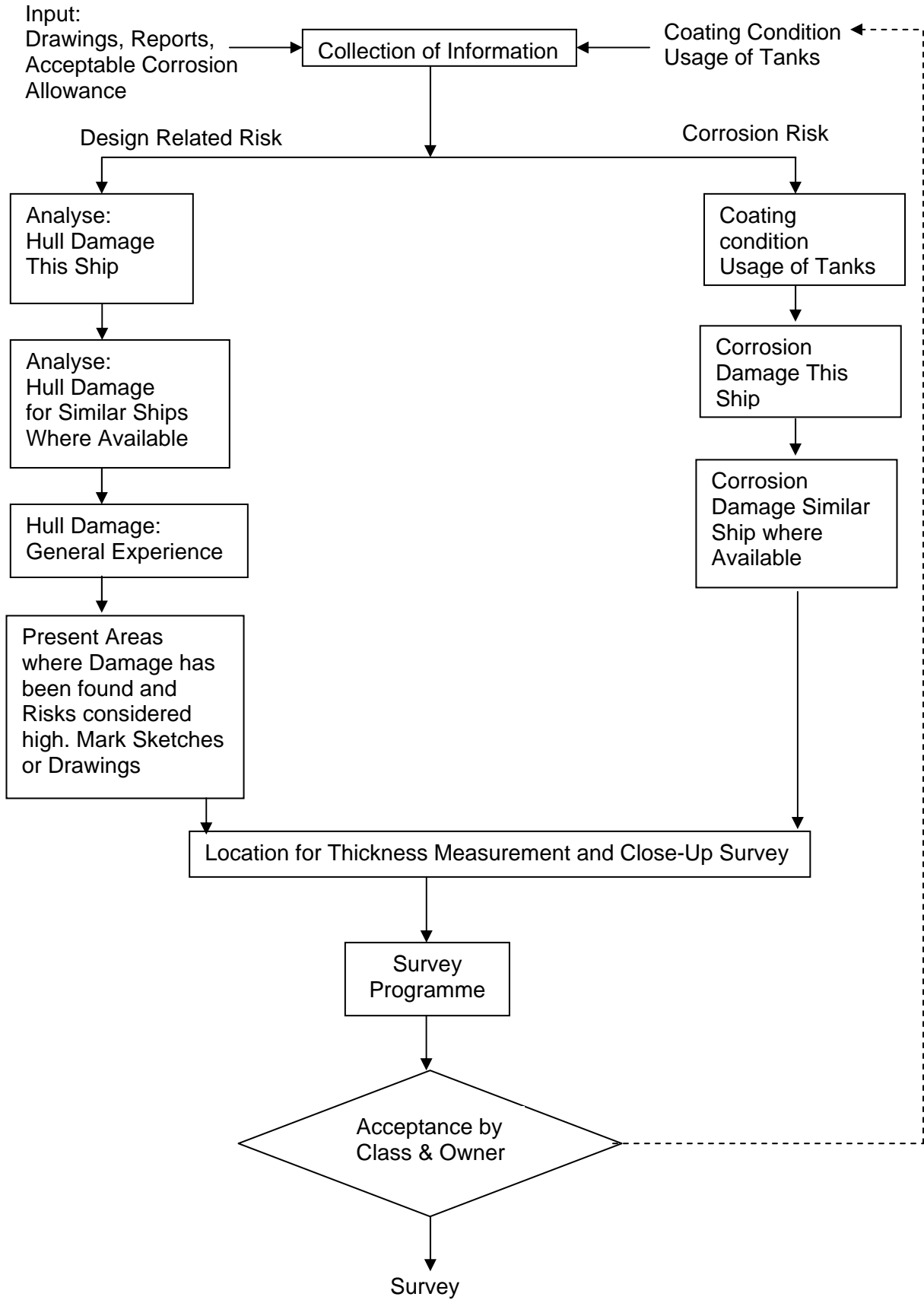


Figure 1: Technical Assessment and the Survey Planning Process

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<p>LOCATION: Connection of longitudinals to transverse webs</p> <p>EXAMPLE No. 1 : Web and flat bar fractures at cut-outs for longitudinal stiffener connections</p>		
TYPICAL DAMAGE		PROPOSED REPAIR
<p>Labels: SHELL PLATING OR LONGITUDINAL BULKHEAD, FLAT BAR STIFFENER, FRACTURED WELD/WEB, FRACTURE, VIEW A - A, SIDE SHELL OR BULKHEAD LONGITUDINAL, WEB PLATING, FRACTURE, WEB FLAT BAR STIFFENER.</p> <p>NOTE ★ONE OR MORE FRACTURES MAY OCCUR</p>		<p>FULL COLLAR IF FRACTURES IN WEB PLATE ARE SMALL AND ARE REPAIRED BY WELDING</p> <p>Labels: LUG, BACKING BRACKET, VIEW A - A.</p> <p>WEB AND FLAT BAR CROPPED AND PART RENEWED OR ALTERNATIVELY WELDED</p>
<p>FACTORS CONTRIBUTING TO DAMAGE</p> <ol style="list-style-type: none"> Asymmetrical connection of flat bar stiffener resulting in high peak stresses at the heel of the stiffener under fatigue loading. Insufficient area of connection of longitudinal to web plate. Defective weld at return around the plate thickness. High localised corrosion at areas of stress concentration such as flat bar stiffener connections, corners of cut-out for the longitudinal and connection of web to shell at cut-outs. High stress in the web of the transverse. Dynamic sea way load/ship motions. 		
FIGURE 1	TANKER STRUCTURE CO-OPERATIVE FORUM SUBJECT: CATALOGUE OF STRUCTURAL DETAILS	FIGURE 1

Figure 2: Typical Damage and Repair Example (Reproduced from Ref. 2)

End of Annex I

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(cont)

ANNEX II

RECOMMENDED PROCEDURES FOR THICKNESS MEASUREMENTS OF CHEMICAL TANKERS*

*

Note 1: Annex II is recommendatory

Note 2: For Single Hull Chemical Tankers, please refer to Annex II of URZ10.1

Note 3: For Double Hull Chemical Tankers, please refer to Annex II of URZ10.4

End of Annex II

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ANNEX III

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Preamble

1.1 Scope

1.1.1 The present survey programme covers the minimum extent of overall surveys, close-up surveys, thickness measurements and pressure testing within the cargo area, cargo tanks, ballast tanks, including fore and aft peak tanks, required by UR Z10.3.

1.1.2 The arrangements and safety aspects of the survey are to be acceptable to the attending surveyor(s).

1.2 Documentation

All documents used in the development of the survey programme are to be available onboard during the survey as required by section 6.

2 Arrangement of tanks and spaces

This section of the survey programme is to provide information (either in the form of plans or text) on the arrangement of tanks and spaces that fall within the scope of the survey.

3 List of tanks and spaces with information on their use, extent of coatings and corrosion protection system

This section of the survey programme is to indicate any changes relating to (and is to update) the information on the use of the tanks of the ship, the extent of coatings and the corrosion protective system provided in the Survey Planning Questionnaire.

4 Conditions for survey

This section of the survey programme is to provide information on the conditions for survey, e.g. information regarding cargo hold and tank cleaning, gas freeing, ventilation, lighting, etc.

5 Provisions and method of access to structures

This section of the survey programme is to indicate any changes relating to (and is to update) the information on the provisions and methods of access to structures provided in the Survey Planning Questionnaire.

6 List of equipment for survey

This section of the survey programme is to identify and list the equipment that will be made available for carrying out the survey and the required thickness measurements.

7 Survey requirements

7.1 Overall survey

This section of the survey programme is to identify and list the spaces that are to undergo an overall survey for the ship in accordance with 2.3.1.

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7.2 Close-up survey

This section of the survey programme is to identify and list the hull structures that are to undergo a close-up survey for the ship in accordance with 2.3.2.

8 Identification of tanks for tank testing and pipes for pipe testing

This section of the survey programme is to identify and list the tanks that are to undergo tank testing for the ship in accordance with 2.5 and the pipes that are to undergo pipe testing in accordance with 2.6.

9 Identification of areas and sections for thickness measurements

This section of the survey programme is to identify and list the areas and sections where thickness measurements are to be taken in accordance with 2.4.1.

10 Minimum thickness of hull structures

This section of the survey programme is to specify the minimum thickness for hull structures of the ship that are subject to UR Z10.3 (indicate either (a) or preferably (b), if such information is available):

- (a) Determined from the attached wastage allowance table and the original thickness to the hull structure plans of the ship;
- (b) Given in the following table(s):

Area or location	Original as-built thickness (mm)	Minimum thickness (mm)	Substantial corrosion thickness (mm)
Deck			
Plating			
Longitudinals			
Longitudinal girders			
Bottom			
Plating			
Longitudinals			
Longitudinal girders			
Ship side			
Plating			
Longitudinals			
Longitudinal girders			
Longitudinal bulkhead			
Plating			
Longitudinals			
Longitudinal girders			
Inner bottom			
Plating			
Longitudinals			
Longitudinal girders			
Transverse bulkheads			
Plating			
Stiffeners			

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Appendices

Appendix 1 - List of plans

Paragraph 5.1.3.2 requires that main structural plans of cargo and ballast tanks (scantling drawings), including information regarding use of high tensile steel (HTS), clad steel and stainless steel to be available. This appendix of the survey programme is to identify and list the main structural plans which form part of the survey programme.

Appendix 2 - Survey Planning Questionnaire

The Survey Planning Questionnaire (annex IIIB), which has been submitted by the owner, is to be appended to the survey programme.

Appendix 3 - Other documentation

This part of the survey programme is to identify and list any other documentation that forms part of the Plan.

Prepared by the owner in co-operation with the Classification Society for compliance with 5.1.3.

Date:..... (name and signature of authorized owner's representative)

Date:..... (name and signature of authorized representative of the Classification Society)

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ANNEX IIIB**SURVEY PLANNING QUESTIONNAIRE**

The following information will enable the owner in co-operation with the Classification Society to develop a survey programme complying with the requirements of UR Z10.3. It is essential that the owner provides, when completing the present questionnaire, up-to-date information. The present questionnaire, when completed, is to provide all information and material required by UR Z10.3.

Particulars

Ship's name:

IMO number:

Flag State:

Port of registry:

Owner:

Classification Society:

Class ID:

Gross tonnage:

Deadweight (metric tonnes):

Date of build:

Information on access provision for close-up surveys and thickness measurement:

The owner is to indicate, in the table below, the means of access to the structures subject to close-up survey and thickness measurement. A close-up survey is an examination where the details of structural components are within the close visual inspection range of the attending surveyor, i.e. normally within reach of hand.

Tank No.	Structure	C(Cargo)/ B(Ballast)	Temporary staging	Rafts	Ladders	Direct access	Other means (please specify)
F.P.	Fore peak						
A.P.	Aft peak						
Wing Tanks	Under deck						
	Side shell						
	Bottom transverse						
	Longitudinal Transverse						
Centre Tanks	Under deck						
	Bottom transverse						
	Transverse						

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History of heated cargo for the last 3 years together with indication as to whether cargo was heated

Owner's inspections

Using a format similar to that of the table below (which is given as an example), the owner is to provide details of the results of their inspections for the last 3 years on all cargo and ballast tanks and void spaces within the cargo area, including peak tanks.

Tank No.	Corrosion protection (1)	Coating extent (2)	Coating condition (3)	Structural deterioration (4)	Tank damage history (5)
Cargo centre tanks					
Cargo wing tanks					

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(cont'd)

Tank No.	Corrosion protection (1)	Coating extent (2)	Coating condition (3)	Structural deterioration (4)	Tank damage history (5)
Ballast tanks					
Fore peak					
Aft peak					
Miscellaneous spaces					

Note: Indicate tanks which are used for cargo/ballast.

- 1) HC=hard coating; SC=soft coating;
SH=semi-hard coating; NP=no protection
- 2) U=upper part; M=middle part;
L=lower part; C=complete
- 3) G=good; F=fair; P=poor;
RC=recoated (during the last 3 years)
- 4) N=no findings recorded; Y=findings recorded,
(Description of findings is to be attached to the questionnaire)
- 5) DR=damage & repair; L=leakages;
CV=conversion
(Description is to be attached to this questionnaire)

Name of owner's representative:

Signature:

Date:

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ANNEX IIIC**OWNER'S INSPECTION REPORT****Structural condition**

Ship's name:

For tank No:

Grade of steel:

deck:

side:

bottom:

longitudinal bulkhead:

Elements	Cracks	Buckles	Corrosion	Coating condition	Pitting	Modification/repair	Other
Deck							
Bottom							
Side							
Longitudinal bulkhead							
Transverse bulkhead							

Repairs carried out due to:

Thickness measurements carried out

(dates):

Results in general:

Overdue surveys:

Outstanding conditions of class:

Comments:

Date of inspection:

Inspected by:

Signature:

End of Annex III End of Document
