

Deck structure including cross strips, main cargo hatchways, hatch covers, coamings and topside tanks (cont'd)

Structural member	Extent of measurement	Pattern of measurement
5 Topside water ballast tanks (continued)	c Three representative bays of slope plating i lower third of tank ii upper two-thirds of tank	i five-point pattern over 1 m ² of plating ii five-point pattern over 1 m ² of plating
	d Longitudinals, suspect and adjacent	d Five-point pattern both web and flange over 1 m length
6 Main deck plating	Suspect plates and adjacent (4)	Five-point pattern over 1 m ² of plating
7 Main deck longitudinals	Minimum of three longitudinals where plating measured	Five-point pattern on both web and flange over 1 m length
8 Web frames/transverses	Suspect plates	Five-point pattern over 1 m ²

Double-bottom and hopper structure

Structural member	Extent of measurement	Pattern of measurement
1 Inner/double-bottom plating	Suspect plate plus all adjacent plates	Five-point pattern for each panel between longitudinals over 1 m length
2 Inner/double-bottom longitudinals	Three longitudinals where plates measured	Three measurements in line across web, and three measurements on flange
3 Longitudinal girders or transverse floors	Suspect plates	Five-point pattern over about 1 m ²
4 Watertight bulkheads (WT floors)	a Lower third of tank	a Five-point pattern over 1 m ² of plating
	b Upper two-thirds of tank	b Five-point pattern alternate plates over 1 m ² of plating

Double-bottom and hopper structure (cont'd)

Structural member	Extent of measurement	Pattern of measurement
5 Web frames	Suspect plate	Five-point pattern over 1 m ² of plating
6 Bottom/side shell longitudinals	Minimum of three longitudinals in way of suspect areas	Three measurements in line across web, and three measurements on flange

Cargo holds

Structural member	Extent of measurement	Pattern of measurement
1 Side shell frames	Suspect frame and each adjacent	a At each end and mid span: five-point pattern of both web and flange
		b Five-point pattern within 25 mm of welded attachment to both shell and lower slope plate

Annex 11

Guidelines for the gauging of the vertically corrugated transverse watertight bulkhead between holds Nos. 1 and 2

1 Gauging is necessary to determine the general condition of the structure and to define the extent of possible repairs and/or reinforcements of the vertically corrugated transverse watertight bulkhead for verification of the compliance with the Bulk carrier bulkhead and double-bottom strength standards, defined in regulation XII/1.5 of the Convention.

2 Taking into account the buckling model specified in the Bulk carrier bulkhead and double-bottom strength standards, defined in regulation XII/1.5 of the Convention, in the evaluation of strength of the bulkhead, it is essential to determine the thickness diminution at the critical levels shown in figures 1 and 2 of this annex.

3 The gauging should be carried out at the levels as described below. To adequately assess the scantlings of each individual vertical corrugation, each corrugation flange, web, shedder plate and gusset plate within each of the levels given below should be gauged.

Level (a) Ships without lower stool (see figure 1):

Locations:

- The mid-breadth of the corrugation flanges at approximately 200 mm above the line of shedder plates;
- The middle of gusset plates between corrugation flanges, where fitted;
- The middle of the shedder plates;
- The mid-breadth of the corrugation webs at approximately 200 mm above the line of shedder plates.

Level (b) Ships with lower stool (see figure 2):

Locations:

- The mid-breadth of the corrugation flanges at approximately 200 mm above the line of shedder plates;
- The middle of gusset plates between corrugation flanges, where fitted;
- The middle of the shedder plates;
- The mid-breadth of the corrugation webs at approximately 200 mm above the line of shedder plates.

Level (c) Ships with or without lower stool (see figures 1 and 2):

Locations:

- The mid-breadth of the corrugation flanges and webs at about the mid-height of the corrugation.

4 Where the thickness changes within the horizontal levels, the thinner plate should be gauged.

5 Steel renewal and/or reinforcement should comply with the Bulk carrier bulkhead and double-bottom strength standards, defined in regulation XII/1.5 of the Convention.

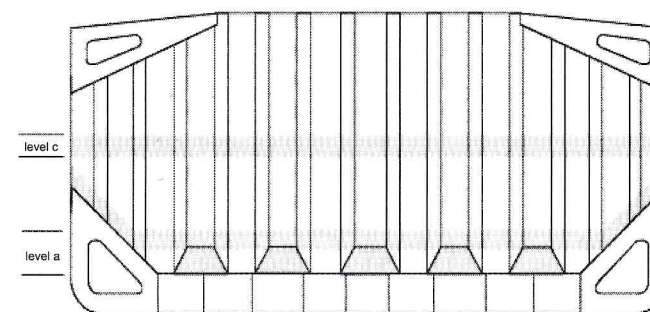


Figure 1 – Ships without lower stool

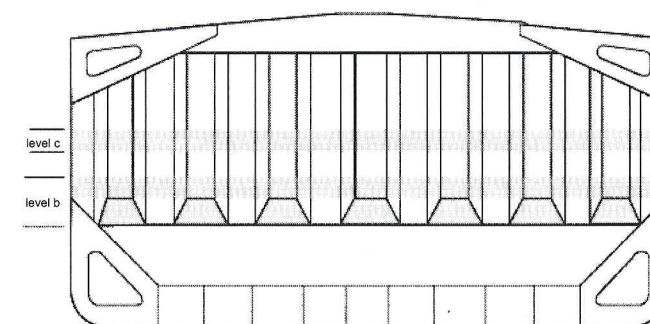


Figure 2 – Ships with lower stool

Annex 12

Additional annual survey requirements for the foremost cargo hold of ships subject to SOLAS Regulation XII/9.1

1 General

In the case of bulk carriers over 5 years of age, the annual survey should include, in addition to the requirements of the annual surveys prescribed in chapter 3 of the present Guidelines, an examination of the following items.

2 Extent of survey

2.1 *For bulk carriers of 5 to 15 years of age*

2.1.1 An overall survey of the foremost cargo hold, including close-up survey of sufficient extent, minimum 25% of frames, should be carried out to establish the condition of:

- .1 shell frames including their upper and lower end attachments, adjacent shell plating, and transverse bulkheads; and
- .2 areas found to be suspect areas at the previous renewal survey.

2.1.2 Where considered necessary by the surveyor as a result of the overall and close-up survey as described in 2.1.1 above, the survey should be extended to include a close-up survey of all of the shell frames and adjacent shell plating of the cargo hold.

2.2 *For bulk carriers exceeding 15 years of age*

An overall survey of the foremost cargo hold, including close-up survey should be carried out to establish the condition of:

- .1 all shell frames including their upper and lower end attachments, adjacent shell plating, and transverse bulkheads; and
- .2 areas found to be suspect areas at the previous renewal survey.

3 Extent of thickness measurement

3.1 Thickness measurement should be carried out to an extent sufficient to determine both general and local corrosion levels at areas subject to close-up survey, as described in 2.1 and 2.2. The minimum requirement for thickness measurements are areas found to be suspect areas at the previous

renewal survey. Where substantial corrosion is found, the extent of thickness measurements should be increased with the requirements of annex 10.

3.2 The thickness measurement may be dispensed with provided the surveyor is satisfied by the close-up survey, there is no structural diminution and the protective coating, where applied, remains effective.

4 Special consideration

Where the protective coating, as referred to in the explanatory note below, in the foremost cargo hold is found to be in GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered.

Explanatory note:

At the time of new construction, all internal and external surfaces of hatch coamings and hatch covers, and all internal surfaces of the cargo holds, excluding the flat tank top areas and the hopper tanks sloping plating approximately 300 mm below the side shell frame and brackets, should have an efficient protective coating (epoxy coating or equivalent) applied in accordance with the manufacturer's recommendation. In the selection of coating due consideration should be given by the owner to intended cargo conditions expected in service.

For existing bulk carriers, where owners may elect to coat or recoat cargo holds as noted above, consideration may be given to the extent of the close-up and thickness measurement surveys. Prior to the coating of cargo holds of existing ships, scantlings should be ascertained in the presence of a surveyor.

Annex 13

Strength of cargo hatch cover securing arrangements for bulk carriers

1 Securing devices

The strength of securing devices should comply with the following requirements:

- .1 Panel hatch covers should be secured by appropriate devices (bolts, wedges or similar) suitably spaced alongside the coamings and between cover elements. Arrangement and spacing should be determined with due attention to the effectiveness for weathertightness, depending upon the type and the size of the hatch cover, as well as on the stiffness of the cover edges between the securing devices.

- .2 The net sectional area of each securing device is not to be less than:

$$A = 1.4 a / f \text{ (cm}^2\text{)}$$

where:

a = spacing between securing devices not to be taken less than 2 m

$$f = (\sigma_Y / 235)^e$$

σ_Y = specified minimum upper yield stress in N/mm² of the steel used for fabrication, not to be taken greater than 70% of the ultimate tensile strength

$$e = 0.75 \text{ for } \sigma_Y > 235 \\ = 1.0 \text{ for } \sigma_Y \leq 235$$

Rods or bolts should have a net diameter not less than 19 mm for hatchways exceeding 5 m² in area.

- .3 Between cover and coaming and at cross-joints, a packing line pressure sufficient to obtain weathertightness should be maintained by the securing devices. For packing line pressures exceeding 5 N/mm, the cross section area should be increased in direct proportion. The packing line pressure should be specified.

- .4 The cover edge stiffness should be sufficient to maintain adequate sealing pressure between securing devices. The moment of inertia, I , of edge elements should be less than:

$$I = 6 p a^4 \text{ (cm}^4\text{)}$$

where:

p = packing line pressure in N/mm, minimum 5 N/mm

a = spacing in metres of securing devices

- .5 Securing devices should be of reliable construction and securely attached to the hatchway coamings, decks or covers. Individual securing devices on each cover are to have approximately the same stiffness characteristics.
- .6 Where rod cleats are fitted, resilient washers or cushions should be incorporated.
- .7 Where hydraulic cleating is adopted, a positive means should be provided to ensure that it remains mechanically locked in the closed position in the event of failure of the hydraulic system.

2 Stoppers

2.1 No.1 and 2 hatch covers should be effectively secured, by means of stoppers, against the transverse forces arising from a pressure of 175 kN/m²

2.2 No.2 hatch covers should be effectively secured, by means of stoppers, against the longitudinal forces acting on the forward end arising from a pressure of 175 kN/m².

2.3 No.1 hatch cover should be effectively secured, by means of stoppers, against the longitudinal forces acting on the forward end arising from a pressure of 230 kN/m². This pressure may be reduced to 175 kN/m² if a forecandle is fitted.

2.4 The equivalent stress in stoppers and their supporting structures and calculated in the throat of the stopper welds is not to exceed the allowable value of 0.8 σ_Y .

3 Materials and welding

Where stoppers or securing devices are fitted to comply with this annex, they should be manufactured of materials, including welding electrodes, to the satisfaction of the Administration.

Part B

Guidelines on the enhanced programme of inspections during surveys of bulk carriers having double-side skin construction

1 General

1.1 Application*

1.1.1 The Guidelines should apply to all self-propelled bulk carriers of 500 gross tonnage and above having double-side skin construction. Where a bulk carrier has a combination of single- and double-side skin construction, the relevant requirements of parts A and B should apply to that construction, as applicable.

1.1.2 The Guidelines should apply to surveys of hull structure and piping systems in way of cargo holds, cofferdams, pipe tunnels, void spaces within the cargo length area and all ballast tanks. The surveys should be carried out during the surveys prescribed by regulation I/10 of the Convention.

1.1.3 The Guidelines contain the extent of examination, thickness measurements and tank testing. The survey should 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 *Bulk carrier* is a ship which is constructed generally with single deck, topside tanks and hopper side tanks in cargo spaces, and is intended primarily to carry dry cargo in bulk and includes such types as ore carriers and combination carriers.[†]

1.2.2 *Ballast tank* is a tank which is used for water ballast and includes side ballast tanks, ballast double-bottom spaces, topside tanks, hopper side tanks

* The intention of these Guidelines is to ensure that an appropriate level of review of plans and documents is conducted and consistency in application is attained. Such evaluation of survey reports, survey programmes, planning documents, etc., should be carried out at the managerial level of the Administration or organization recognized by the Administration.

[†] For combination carriers, additional requirements are specified in the Guidelines on the enhanced programme of inspections during surveys for oil tankers, set out in annex B.

and peak tanks. A double-side tank should be considered, for survey purposes, as a separate tank even if it is in connection to either the topside tank or the hopper side tank.

1.2.3 *Spaces* are separate compartments including holds and tanks.

1.2.4 *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.

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

1.2.6 *Transverse section* includes all longitudinal members such as plating, longitudinals and girders at the deck, sides, bottom, inner bottom, hopper sides, inner sides, top wing inner sides and longitudinal bulkheads.

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

1.2.8 *Suspect areas* are locations showing substantial corrosion and/or are considered by the surveyor to be prone to rapid wastage.

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

1.2.10 A *corrosion prevention system* is normally considered a full hard coating.

Protective coating should usually be epoxy coating or equivalent. Other coating systems may be considered acceptable as alternatives provided that they are applied and maintained in compliance with the manufacturer's specifications.

Where soft coatings have been applied, safe access should 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 coating should be removed.

1.2.11 *Coating condition* is defined as follows:

GOOD	condition with only minor spot rusting;
FAIR	condition with local breakdown of coating 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.

1.2.12 *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 to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship.

1.2.13 *Cargo length area* is that part of the ship which includes all cargo holds and adjacent areas including fuel tanks, cofferdams, ballast tanks and void spaces.

1.2.14 *Intermediate survey* is a survey carried out either at the second or third annual survey or between these surveys.

1.2.15 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.

1.2.16 *Convention* means the International Convention for the Safety of Life at Sea, 1974, as amended.

1.2.17 *Specially considered* means sufficient close-up inspection and thickness measurements are taken to confirm the actual average condition of the structure under coating.

1.3 *Repairs*

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

- .1 side shell frames, their end attachments or adjacent shell plating;
- .2 deck structure and deck plating;

- .3 bottom structure and bottom plating;
- .4 watertight or oiltight bulkheads; and
- .5 hatch covers or hatch coamings.

Where adequate repair facilities are not available, the Administration may 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 corrosion or structural defects, either of which, in the opinion of the Administration, will impair the ship's fitness for continued service, remedial measures should be implemented before the ship continues in service.

1.4 *Surveyors*

For bulk carriers of 20,000 tons deadweight and above, two surveyors should jointly carry out the first scheduled renewal survey after the bulk carrier passes 10 years of age, and all subsequent renewal surveys and intermediate surveys. If the surveys are carried out by a recognized organization, the surveyors should be exclusively employed by such recognized organizations.

2 *Renewal survey***2.1** *General*

2.1.1 The renewal survey may be commenced at the fourth annual survey and be progressed during the succeeding year with a view to completion by the fifth anniversary date.

2.1.2 As part of the preparation for the renewal survey, the survey programme should be dealt with in advance of the survey. The thickness measurement should not be held before the fourth annual survey.

2.1.3 The survey should 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 is in a satisfactory condition and is fit for its intended purpose for the new period of validity of the Cargo Ship Safety Construction Certificate, subject to proper maintenance and operation and to renewal surveys being carried out.

2.1.4 All cargo holds, ballast tanks, including double-bottom and double-side tanks, pipe tunnels, cofferdams and void spaces bounding cargo holds, decks and outer hull should be examined, and this examination should be supplemented by thickness measurement and testing, as required by 2.6

and 2.7, to ensure that the structural integrity remains effective. The examination should be sufficient to discover substantial corrosion, significant deformation, fractures, damages or other structural deterioration.

2.1.5 All piping systems within the above spaces should be examined and operationally tested under working conditions to ensure that the condition remains satisfactory.

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

2.2 *Dry-dock survey*

2.2.1 A survey in dry dock should be a part of the renewal survey. There should be a minimum of two inspections of the outside of the ship's bottom during the five-year period of the certificate. In all cases, the maximum interval between bottom inspections should not exceed 36 months.

2.2.2 For ships of 15 years of age and over, inspection of the outside of the ship's bottom should be carried out with the ship in dry dock. For ships of less than 15 years of age, alternate inspections of the ship's bottom not conducted in conjunction with the renewal survey may be carried out with the ship afloat. Inspection of the ship afloat should only be carried out when the conditions are satisfactory and the proper equipment and suitably qualified staff are available.

2.2.3 If a survey in dry-dock is not completed in conjunction with the enhanced survey during renewal survey or if the 36 month maximum interval referred to in 2.2.1 is not complied with, the Cargo Ship Safety Construction Certificate should cease to be valid until a survey in dry-dock is completed.

2.3 *Space protection*

Where provided, the condition of the corrosion prevention system of ballast tanks should be examined. For ballast tanks, excluding double-bottom tanks, where a coating is found in POOR condition as defined in 1.2.11, and it is not renewed, or where a soft coating has been applied, or where a coating has not been applied, the tanks in question should be examined at annual intervals. When such breakdown of coating is found in ballast double-bottom tanks, or where a soft coating has been applied or where a coating has not been applied, the tanks in question may be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurement should be carried out. Where a protective coating is provided in cargo holds and is found in good condition, the extent of close-up surveys and thickness measurements may be specially considered.

2.4 *Hatch covers and coamings*

2.4.1 A thorough inspection of the items listed in 3.3 should be carried out.

2.4.2 Checking of the satisfactory operation of all mechanically operated hatch covers should be made, including:

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

2.4.3 The effectiveness of sealing arrangements of all hatch covers by hose testing or equivalent should be checked.

2.4.4 Thickness measurement of the hatch cover and coaming plating and stiffeners should be carried out as given in annex 2.

2.5 *Extent of overall and close-up surveys*

2.5.1 An overall survey of all spaces excluding fuel oil tanks should be carried out at the renewal survey. Fuel oil tanks in way of cargo holds should be sufficiently examined to ensure that their condition is satisfactory.

2.5.2 Each renewal survey should include a close-up examination of sufficient extent to establish the condition of the cargo holds and ballast tanks as indicated in annex 1.

2.6 *Extent of thickness measurements*

2.6.1 The requirements for thickness measurements at the renewal survey are given in annex 2.

2.6.2 Representative thickness measurements to determine both general and local levels of corrosion in the transverse web frames in all water ballast tanks should be carried out. Thickness measurements should also be carried out to determine the corrosion levels on the transverse bulkhead plating. The thickness measurements may be dispensed with provided the surveyor is satisfied by the close-up examination that there is no structural diminution, and the coating where applied remains efficient.

2.6.3 The surveyor may extend the thickness measurements as deemed necessary. Provisions for extended measurements for areas with substantial corrosion as defined in 1.2.9 are given in annex 10.

2.6.4 For areas in spaces where coatings are found to be in GOOD condition as defined in 1.2.11, the extent of thickness measurements according to annex 2 may be specially considered by the Administration. Where a protective coating is provided in cargo holds and is found in good condition, the extent of close-up surveys and thickness measurements may be specially considered.

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

2.7 *Extent of tank pressure testing*

2.7.1 All boundaries of ballast tanks, deep tanks and cargo holds used for ballast within the cargo hold length should be pressure tested. Representative tanks for fresh water, fuel oil and lubrication oil should also be pressure tested.

2.7.2 Generally, the hydrostatic pressure should correspond to a water level to the top of hatches for ballast/cargo holds, or top of air pipes for ballast tanks or fuel tanks.

3 **Annual survey**

3.1 *General*

The annual survey should consist of an examination for the purpose of ensuring, as far as practicable, that the hull hatch covers, coamings and piping are maintained in a satisfactory condition and should take into account the service history, condition and extent of the corrosion prevention system of ballast tanks and areas identified in the survey report file.

3.2 *Examination of the hull*

3.2.1 Examination of the hull plating and its closing appliances should be carried out as far as can be seen.

3.2.2 Examination of watertight penetrations should be carried out as far as practicable.

3.3 *Examination of hatch covers and coamings*

3.3.1 It should be confirmed that no unapproved changes have been made to the hatch covers, hatch coamings and their securing and sealing devices since the last survey.

3.3.2 A thorough survey of cargo hatch covers and coamings is only possible by examination in the open as well as closed positions and should include verification of proper opening and closing operation. As a result, at least the hatch covers sets within the forward 25% of the ship's length and at least one additional set, such that all the sets on the ship are assessed at least once in every five-year period, should be surveyed open, closed and in operation to the full extent in each direction at each annual survey, including:

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

The closing of the covers should include the fastening of all peripheral, and cross joint cleats or other securing devices. Particular attention should be paid to the condition of hatch covers in the forward 25% of the ship's length, where sea loads are normally greatest.

3.3.3 If there are indications of difficulty in operating and securing hatch covers, additional sets above those required by 3.3.2, at the discretion of the surveyor, should be tested in operation.

3.3.4 Where the cargo hatch securing system does not function properly, repairs should be carried out under the supervision of the Administration. Where hatch covers or coamings undergo substantial repairs, the strength of securing devices should be upgraded to comply with annex 11.

3.3.5 For each cargo hatch cover set, at each annual survey, the following items should be surveyed:

- .1 cover panels, including side plates, and stiffener attachments that may be accessible in the open position by close-up survey (for corrosion, cracks, deformation);
- .2 sealing arrangements of perimeter and cross joints (gaskets for condition and permanent deformation, flexible seals on combination carriers, gasket lips, compression bars, drainage channels and non-return valves);
- .3 clamping devices, retaining bars, cleating (for wastage, adjustment, and condition of rubber components);
- .4 closed cover locating devices (for distortion and attachment);
- .5 chain or rope pulleys;
- .6 guides;

- .7 guiderails and track wheels;
- .8 stoppers;
- .9 wires, chains, tensioners and gypsies;
- .10 hydraulic system, electrical safety devices and interlocks; and
- .11 end and interpanel hinges, pins and stools where fitted.

3.3.6 At each hatchway, at each annual survey, the coamings, with plating, stiffeners and brackets should be checked for corrosion, cracks and deformation, especially of the coaming tops.

3.3.7 Where considered necessary, the effectiveness of sealing arrangements may be proved by hose or chalk testing supplemented by dimensional measurements of seal compressing components.

3.3.8 Where portable covers, wooden or steel pontoons are fitted, the satisfactory condition of the following should be confirmed:

- .1 wooden covers and portable beams, carriers or sockets for the portable beam, and their securing devices;
- .2 steel pontoons, including close-up survey of hatch cover plating;
- .3 tarpaulins;
- .4 cleats, battens and wedges;
- .5 hatch securing bars and their securing devices;
- .6 loading pads/bars and the side plate edge;
- .7 guide plates and chocks;
- .8 compression bars, drainage channels and drain pipes (if any).

3.4 Examination of cargo holds

3.4.1 For bulk carriers over 10 years of age, the following should be carried out:

- .1 overall survey of two selected cargo holds. Where a protective coating is provided in cargo holds and is found in GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered; and
- .2 when considered necessary by the surveyor, thickness measurement should be carried out. If the results of these thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements should be increased in accordance with annex 10.

3.4.2 For bulk carriers over 15 years of age, the following should be carried out:

- .1 overall survey of all cargo holds. Where a protective coating is provided in cargo holds and is found in GOOD condition, the extent of close-up surveys and thickness measurements may be specially considered; and
- .2 when considered necessary by the surveyor, thickness measurement should be carried out. If the results of these thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements should be increased in accordance with annex 10.

3.4.3 All piping and penetrations in cargo holds, including overboard piping, should be examined for bulk carriers over 10 years of age.

3.5 Examination of ballast tanks

Examination of ballast tanks should be carried out when required as a consequence of the results of the renewal survey and intermediate survey. When considered necessary by the surveyor, thickness measurement should be carried out. If the results of these thickness measurements indicate that substantial corrosion is found, the extent of thickness measurements should be increased in accordance with annex 10.

4 Intermediate survey

4.1 General

4.1.1 Notwithstanding the provisions of 1.1.2, items that are additional to the requirements of the annual survey may be surveyed either at the second or third annual survey or between these surveys.

4.1.2 The extent of survey is dependent upon the age of the ship as specified in 4.2, 4.3 and 4.4.

4.2 Bulk carriers 5 to 10 years of age

4.2.1 Ballast tanks

4.2.1.1 For spaces used for salt water ballast, an overall survey of representative spaces selected by the surveyor should be carried out. If such inspections reveal no visible structural defects, the examination may be limited to a verification that the protective coating remains efficient.

4.2.1.2 Where POOR coating condition, corrosion or other defects are found in salt water ballast spaces or where protective coating was not applied from the time of construction, the examination should be extended to other ballast spaces of the same type.

4.2.1.3 In salt water ballast spaces other than double-bottom tanks, where a protective coating is found in POOR condition and it is not renewed, or where soft coating has been applied, or where a protective coating was not applied from the time of construction, the tanks in question should be examined and thickness measurements carried out as considered necessary at annual intervals. When such breakdown of coating is found in salt water ballast double-bottom tanks, where a soft coating has been applied, or where a coating has not been applied, the tanks in question should be examined at annual intervals. When considered necessary by the surveyor, or where extensive corrosion exists, thickness measurements should be carried out.

4.2.1.4 In addition to the above requirements, areas found to be suspect areas at the previous renewal survey should be overall and close-up surveyed.

4.2.2 Cargo holds

4.2.2.1 An overall survey of all cargo holds should be carried out.

4.2.2.2 Where considered necessary by the surveyor as a result of the overall survey of any one cargo hold as described in 4.2.2.1, the survey should be extended to include a close-up survey of that cargo hold as well as a close-up survey of sufficient extent of those areas of the structure as deemed necessary.

4.2.3 Extent of thickness measurement

4.2.3.1 Thickness measurement should be carried out to an extent sufficient to determine both general and local corrosion levels at areas subject to close-up survey as described in 4.2.2.1. The minimum requirement for thickness measurements at the intermediate survey are areas found to be suspect areas at the previous renewal survey.

4.2.3.2 Where substantial corrosion is found, the extent of thickness measurements should be increased in accordance with the requirements of annex 10.

4.2.3.3 The thickness measurement may be dispensed with provided the surveyor is satisfied by the close-up survey, that there is no structural diminution and the protective coating, where applied, remains effective.

4.3 Bulk carriers 10 to 15 years of age

4.3.1 Ballast tanks

4.3.1.1 For bulk carriers:

All salt water ballast tanks should be examined. If such inspections reveal no visible structural defects, the examination may be limited to a verification that the protective coating remains efficient.

4.3.1.2 For ore carriers:

- .1** all web frame rings – in one ballast wing tank;
- .2** one deck transverse – in each of the remaining ballast wing tanks;
- .3** both transverse bulkheads – in one ballast wing tank; and
- .4** one transverse bulkhead – in each remaining ballast wing tank.

4.3.1.3 In addition, the requirements described in 4.2.1.2 to 4.2.1.4 apply.

4.3.2 Cargo holds

4.3.2.1 An overall survey of all cargo holds should be carried out.

4.3.2.2 Where considered necessary by the surveyor as a result of the overall survey of any one cargo hold as described in 4.3.2.1, the survey should be extended to include a close-up survey of that cargo hold as well as a close-up survey of sufficient extent of those areas of the structure as deemed necessary.

4.3.3 Extent of thickness measurement

4.3.3.1 Thickness measurement should be carried out to an extent sufficient to determine both general and local corrosion levels at areas subject to close-up survey as described in 4.3.2.1. The minimum requirement for thickness measurements at the intermediate survey are areas found to be suspect areas at the previous renewal survey.

4.3.3.2 In addition, the requirements described in 4.2.3.2 and 4.2.3.3 apply.

4.4 Bulk carriers exceeding 15 years of age

4.4.1 The requirements of the intermediate survey should be to the same extent as the previous renewal survey required in 2 and 5.1. However, pressure testing of tanks and cargo holds used for ballast is not required unless deemed necessary by the attending surveyor.

4.4.2 In application of 4.4.1, 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 2.1.1.

5 Preparations for survey

5.1 Survey programme

5.1.1 A specific survey programme should be worked out in advance of the renewal survey by the owner in co-operation with the Administration. The survey programme should be in a written format based on the information in annex 4A. The survey should not commence until the survey programme has been agreed.

5.1.2 Prior to the development of the survey programme, the survey planning questionnaire should be completed by the owner based on the information set out in annex 4B, and forwarded to the Administration.

5.1.3 In developing the survey programme, the following documentation should be collected and consulted with a view to selecting tanks, holds, areas and structural elements to be examined:

- .1 survey status and basic ship information;
- .2 documentation on board, as described in 7.2 and 7.3;
- .3 main structural plans (scantlings drawings), including information regarding use of high-tensile steels (HTS);
- .4 relevant previous survey and inspection reports from both the classification society and the owner;
- .5 information regarding the use of ship's holds and tanks, typical cargoes and other relevant data;
- .6 information regarding corrosion protection level on the new building; and
- .7 information regarding the relevant maintenance level during operation.

5.1.4 The submitted survey programme should account for, and comply, as a minimum, with the provisions of annexes 1 and 2 and paragraph 2.7 for close-up survey, thickness measurement and tank testing, respectively, and should 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);

- .3 plan of holds and tanks;
- .4 list of holds and tanks with information on use, protection 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 holds and tanks and areas for close-up survey (per annex 1);
- .9 nomination of sections for thickness measurement (per annex 2);
- .10 nomination of tanks for testing (per 2.7); and
- .11 damage experience related to ship in question.

5.1.5 The Administration should advise the owner of the maximum acceptable structural corrosion diminution levels applicable to the ship.

5.1.6 Use may also be made of the Guidelines for technical assessment in conjunction with the planning of enhanced surveys for bulk carriers, contained in annex 9. These Guidelines are a recommended tool which may be invoked at the discretion of the Administration, 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 should provide the necessary facilities for a safe execution of the survey.

5.2.2 In order to enable the attending surveyors to carry out the survey, provisions for proper and safe access, should be agreed between the owner and the Administration.

5.2.3 Details of the means of access should be provided in the survey planning questionnaire.

5.2.4 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 should not proceed.

5.2.5 Cargo holds, tanks and spaces should be safe for access. Cargo holds, tanks and spaces should be gas free and properly ventilated. Prior to

entering a tank, void or enclosed space, it should be verified that the atmosphere in the tank is free from hazardous gas and contains sufficient oxygen.

5.2.6 Cargo holds, tanks and spaces should be sufficiently clean and free from water, scale, dirt, oil residues, sediments, etc., to reveal corrosion, deformation, fractures, damages or other structural deterioration as well as the condition of the coating. In particular, this applies to areas which are subject to thickness measurement.

5.2.7 Sufficient illumination should be provided to reveal corrosion, deformation, fractures, damages or other structural deterioration as well as the condition of the coating.

5.2.8 The surveyor(s) should 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 should be stationed at the hatch opening of the tank or space that is being surveyed. The back-up team should continuously observe the work in the tank or space and should keep life-saving and evacuation equipment ready for use.

5.2.9 A communication system should be arranged between the survey party in the cargo hold, tank or space being examined, the responsible officer on deck and, as the case may be, the navigation bridge. The communication arrangements should be maintained throughout the survey.

5.3 Access to structures*

5.3.1 For overall survey, means should be provided to enable the surveyor to examine the 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, should be provided:

- .1 permanent staging and passages through structures;
- .2 temporary staging and passages through structures;
- .3 lifts and moveable platforms;
- .4 portable ladders;
- .5 other equivalent means.

* Refer to the Guidelines on the means of access to structures for inspection and maintenance of oil tankers and bulk carriers (MSC/Circ.686).

5.4 Equipment for survey

5.4.1 Thickness measurements should normally be carried out by means of ultrasonic test equipment. The accuracy of the equipment should 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:

- .1 radiographic equipment;
- .2 ultrasonic equipment;
- .3 magnetic particle equipment;
- .4 dye penetrant;
- .5 other equivalent means.

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 should be made available during the survey. A safety checklist should be provided.

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

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

5.5 Surveys at sea or at anchorage

5.5.1 Surveys at sea or at anchorage may be accepted provided the surveyor is given the necessary assistance from the personnel on board. Necessary precautions and procedures for carrying out the survey should be in accordance with 5.1, 5.2, 5.3 and 5.4.

5.5.2 A communication system should be arranged between the survey party in the spaces and the responsible officer on deck.

5.5.3 When rafts or boats will be used for close-up survey, the following conditions should 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 or hold 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 either stationary or falling. On no account should the level of the water be rising while the boat or raft is in use;
- .5 the tank, hold or space should contain clean ballast water only. Even a thin sheen of oil on the water is not acceptable; and
- .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.

5.5.4 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.

5.5.5 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 of access should be direct from the deck via a vertical ladder with a small platform fitted approximately 2 m below the deck. Other effective means of escape to the deck may be considered.

If neither of the above conditions are met, then staging or other equivalent means should be provided for the survey of the under-deck areas.

5.5.6 The use of rafts or boats alone in 5.5.4 and 5.5.5 does not preclude the use of boats or rafts to move about within a tank during a survey.

5.6 Survey planning meeting

5.6.1 The establishment of proper preparation and the close co-operation between the attending surveyor(s) and the owner's representatives on board 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 should be held regularly.

5.6.2 Prior to commencement of any part of the renewal and intermediate survey, a survey planning meeting should be held between the attending surveyor(s), the owner's representative in attendance, the thickness measurement Company operator (as applicable) and the master of the ship or an appropriately qualified representative appointed by the master or Company for the purpose to ascertain 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.

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

- .1 schedule of the ship (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/descaling, 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's representative(s) concerning findings.

6 Documentation on board

6.1 General

6.1.1 The owner should obtain, supply and maintain on board the ship documentation as specified in 6.2 and 6.3, which should be readily available for the surveyor. The condition evaluation report referred to in 6.2 should include a translation into English.

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

6.2 *Survey report file*

6.2.1 A survey report file should be a part of the documentation on board consisting of:

- .1 reports of structural surveys (annex 6);
- .2 condition evaluation report (annex 7); and
- .3 thickness measurement reports (annex 8).

6.2.2 The survey report file should be available also in the owner's and the Administration offices.

6.3 *Supporting documents*

6.3.1 The following additional documentation should be available on board:

- .1 main structural plans of holds and ballast tanks;
- .2 previous repair history;
- .3 cargo and ballast history;
- .4 inspections by ship's personnel with reference to:
 - .4.1 structural deterioration in general;
 - .4.2 leakages in bulkheads and piping;
 - .4.3 condition of coating or corrosion prevention system, if any. A guidance for reporting is shown in annex 3;
- .5 survey programme as required by 5.1 until such time as the renewal survey has been completed,

and any other information that would help to identify critical structural areas and/or suspect areas requiring inspection.

6.4 *Review of documentation on board*

Prior to survey, the surveyor should examine the completeness of the documentation on board, and its contents as a basis for the survey.

7 **Procedures for thickness measurements****7.1** *General*

7.1.1 The required thickness measurements, if not carried out by the recognized organization acting on behalf of the Administration, should be witnessed by a surveyor of the recognized organization. The surveyor should be on board to the extent necessary to control the process.

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

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

7.1.4 Procedural requirements for thickness measurements are set out in annex 12.

7.2 *Certification of thickness measurement company*

The thickness measurements should be carried out by a qualified company certified by an organization recognized by the Administration according to principles stated in annex 5.

7.3 *Reporting*

7.3.1 A thickness measurement report should be prepared and submitted to the Administration. The report should give the location of measurements, the thickness measured as well as corresponding original thickness. Furthermore, the report should give the date when the measurements were carried out, type of measuring equipment, names of personnel and their qualifications and be signed by the operator. The thickness measurement report should follow the principles as specified in the recommended procedures for thickness measurements set out in annex 8.

7.3.2 The surveyor should verify and countersign the thickness measurement reports.

8 **Reporting and evaluation of survey****8.1** *Evaluation of survey report*

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

8.1.2 The analysis of data should be carried out and endorsed by the Administration and the conclusions of the analysis should form a part of the condition evaluation report.

8.2 *Reporting*

8.2.1 Principles for survey reporting are shown in annex 6.

8.2.2 When a survey is split between different survey stations, a report should 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, should be made available to the next attending surveyor(s), prior to continuing or completing the survey.

8.2.3 A condition evaluation report of the survey and results should be issued to the owner as shown in annex 7 and placed on board the ship for reference at future surveys. The condition evaluation report should be endorsed by the Administration.

Annex 1
Requirements for close-up survey at renewal surveys

Age ≤ 5 years	5 < Age ≤ 10 years	10 < Age ≤ 15 years	Age > 15 years
1	2	3	4
<p>One transverse web with associated plating and longitudinals in two representative water ballast tanks of each type. This is to include the foremost topside and double-side water ballast tanks on either side. (A)</p> <p>Two selected cargo hold transverse bulkheads, including internal structure of upper and lower stools, where fitted. (C)</p> <p>All cargo hold hatch covers and coaming. (D)</p>	<p>One transverse web with associated plating and longitudinals as applicable in each water ballast tank. (A)</p> <p>Forward and aft transverse bulkhead including stiffening system in a transverse section including topside, hopper side and double-side ballast tanks. (A)</p> <p>25% of ordinary transverse frames in the foremost double-side tanks. (B)</p> <p>One transverse bulkhead in each cargo hold, including internal structure of upper and lower stools, where fitted. (C)</p> <p>All cargo hold hatch covers and coamings. (D)</p> <p>All deck plating and under-deck structures inside line of hatch openings between cargo hold hatches. (E)</p>	<p>All transverse webs with associated plating and longitudinals as applicable in each water ballast tank. (A)</p> <p>All transverse bulkheads including stiffening system in each water ballast tank. (A)</p> <p>25% of ordinary transverse frames in the foremost double-side tanks. (B)</p> <p>All cargo hold transverse bulkheads including internal structure of upper and lower stools, where fitted. (C)</p> <p>All cargo hold hatch covers and coamings. (D)</p> <p>All deck plating and under-deck structures inside line of hatch openings between cargo hold hatches. (E)</p>	<p>All transverse webs with associated plating and longitudinals as applicable in each water ballast tank. (A)</p> <p>All transverse bulkheads including stiffening system in each water ballast tank. (A)</p> <p>All ordinary transverse frames in all double-side tanks. (B)</p> <p>Areas (C)-(E) as for column 3</p>

- (A) Transverse web or watertight transverse bulkhead in topside, hopper side and double-side ballast tanks. In fore and aft peak tanks transverse web means a complete transverse web frame ring including adjacent structural members.
- (B) Ordinary transverse frame in double-side tanks.
- (C) Cargo hold transverse bulkheads, platings, stiffeners and girders.
- (D) Cargo hold hatch covers and coamings.
- (E) Deck plating and under-deck structure inside line of hatch openings between cargo hold hatches.

Note : Close-up survey of transverse bulkheads to be carried out at four levels:

- Level (a) Immediately above the inner bottom and immediately above the line of gussets (if fitted) and shedders for ships without lower stool.
- Level (b) Immediately above and below the lower stool shelf plate (for those ships fitted with lower stools), and immediately above the line of the shedder plates.
- Level (c) About mid-height of the bulkhead.
- Level (d) Immediately below the upper deck plating and immediately adjacent to the upper wing tank, and immediately below the upper stool shelf plate for those ships fitted with upper stools, or immediately below the topside tanks.

Annex 2
Requirements for thickness measurements at renewal surveys

Age ≤ 5 years	5 < Age ≤ 10 years	10 < Age ≤ 15 years	Age > 15 years
1	2	3	4
<p>1 Suspect areas</p>	<p>1 Suspect areas</p> <p>2 Within the cargo length area: two transverse sections of deck plating outside line of cargo hatch openings</p> <p>3 Measurement, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to annex 1</p> <p>4 All cargo holds hatch covers and coamings (plating and stiffeners)</p> <p>5 All deck plating inside line of openings between cargo hold hatches</p> <p>6 Wind and water strakes in way of transverse sections considered under point 2 above</p>	<p>1 Suspect areas</p> <p>2 Within the cargo length area: .1 each deck plate outside line of cargo hatch openings</p> <p>.2 two transverse sections, one of which should be in the amidship area, outside line of cargo hatch openings</p> <p>3 Measurement, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to annex 1</p> <p>4 All cargo hold hatch covers and coamings (plating and stiffeners)</p> <p>5 All deck plating inside line of openings between cargo hold hatches</p>	<p>1 Suspect areas</p> <p>2 Within the cargo length area: .1 each deck plate outside line of cargo hatch openings</p> <p>.2 three transverse sections, one of which should be in the amidship area, outside line of cargo hatch openings</p> <p>.3 each bottom plate</p> <p>3 Points 3 to 7 referred to in column 3</p>

Age ≤ 5 years 1	5 < Age ≤ 10 years 2	10 < Age ≤ 15 years 3	Age > 15 years 4
		6 All wind and water strakes within the cargo length area 7 Selected wind and water strakes outside the cargo length area	

Annex 3
Owner's inspection report
Structural condition

Ship's name: Owners's inspection report – Structural condition For tank/hold no: Grade of steel: deck: side: bottom: longitudinal bulkhead:							
Elements	Cracks	Buckles	Corrosion	Coating condition	Pitting	Modification/repair	Other
Deck:							
Bottom:							
Side:							
Side framing:							
Longitudinal bulkheads:							
Transverse bulkheads:	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:							

Annex 4A

Survey programme

Basic information and particulars

Name of ship:
IMO number:
Flag State:
Port of registry:
Gross tonnage:
Deadweight (metric tonnes):
Length between perpendiculars (m):
Shipbuilder:
Hull number:
Recognized Organization (RO):
RO ship identity:
Date of delivery of the ship:
Owner:
Thickness measurement company:

1 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 length area, cargo holds, ballast tanks, including fore and aft peak tanks, required by the Guidelines.

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

1.2 Documentation

All documents used in the development of the survey programme should be available on board during the survey as required by section 6.

2 Arrangement of cargo holds, tanks and spaces

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

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

This section of the survey programme should indicate any changes relating to (and should update) the information on the use of the holds and 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 should 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 should indicate any changes relating to (and should 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 should 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 should identify and list the spaces that should undergo an overall survey for this ship in accordance with 2.4.1 and 2.5.1.

7.2 Close-up survey

This section of the survey programme should identify and list the hull structures that should undergo a close-up survey for this ship in accordance with 2.5.2.

8 Identification of tanks for tank testing

This section of the survey programme should identify and list the cargo holds and tanks that should undergo tank testing for this ship in accordance with 2.7.

9 Identification of areas and sections for thickness measurements

This section of the survey programme should identify and list the areas and sections where thickness measurements should be taken in accordance with 2.6.1.

10 Minimum thickness of hull structures

This section of the survey programme should specify the minimum thickness for hull structures of this ship that are subject to survey, according to .1 or .2:

- .1 Determined from the attached wastage allowance table and the original thickness to the hull structure plans of the ship;
- .2 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			
Cross deck plating			
Cross deck stiffeners			

Area or location	Original as-built thickness (mm)	Minimum thickness (mm)	Substantial corrosion thickness (mm)
Bottom			
Plating			
Longitudinals			
Longitudinal girders			
Inner bottom			
Plating			
Longitudinals			
Longitudinal girders			
Floors			
Ship side in way of topside tanks			
Plating			
Longitudinals			
Ship side in way of hopper side tanks			
Plating			
Longitudinals			
Ship side in way of double-side tanks (if applicable)			
Plating			
Longitudinals or ordinary transverse frames			
Longitudinal stringers			
Longitudinal bulkhead (if applicable)			
Plating			
Longitudinals (if applicable)			
Longitudinal girders (if applicable)			

Area or location	Original as-built thickness (mm)	Minimum thickness (mm)	Substantial corrosion thickness (mm)
Transverse bulkheads			
Plating			
Stiffeners (if applicable)			
Upper stool plating			
Upper stool stiffeners			
Lower stool plating			
Lower stool stiffeners			
Transverse web in topside tanks			
Plating			
Flanges			
Stiffeners			
Transverse web in hopper tanks			
Plating			
Flanges			
Stiffeners			
Transverse web in double-side tanks			
Plating			
Flanges			
Stiffeners			
Hatch covers			
Plating			
Stiffeners			
Hatch coamings			
Plating			
Stiffeners			

Note: The wastage allowance tables should be attached to the survey programme.

11 Thickness measurement company

This section of the survey programme should identify changes, if any, relating to the information on the thickness measurement company provided in the survey planning questionnaire.

12 Damage experience related to the ship

This section of the survey programme should, using the tables provided below, provide details of the hull damages for at least the last three years in way of the cargo holds, ballast tanks and void spaces within the cargo length area. These damages are subject to survey.

Hull damages sorted by location for this ship

Cargo hold, tank or space number or area	Possible cause, if known	Description of the damages	Location	Repair	Date of repair

Hull damages for sister or similar ships (if available) in the case of design related damage

Cargo hold, tank or space number or area	Possible cause, if known	Description of the damages	Location	Repair	Date of repair

13 Areas identified with substantial corrosion from previous surveys

This section of the survey programme should identify and list the areas of substantial corrosion from previous surveys.

14 Critical structural areas and suspect areas

This section of the survey programme should identify and list the critical structural areas and the suspect areas, when such information is available.

15 Other relevant comments and information

This section of the survey programme should provide any other comments and information relevant to the survey.

Appendices

Appendix 1 – List of plans

The provisions of 5.1.4.2 require that the main structural plans of cargo holds and ballast tanks (scantling drawings), including information regarding the use of high-tensile steel (HTS), should be available. This appendix of the survey programme should identify and list the main structural plans which form part of the survey programme.

Appendix 2 – Survey planning questionnaire

The survey planning questionnaire (annex 4B), which has been submitted by the owner, should be appended to the survey programme.

Appendix 3 – Other documentation

This part of the survey programme should identify and list any other documentation that forms part of the plan.

Prepared by the owner in co-operation with the Administration for compliance with 5.1.4.

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

Date:
(name and signature of authorized representative of the Administration)

Annex 4B
Survey planning questionnaire

1 The following information will enable the owner, in co-operation with the Administration, to develop a survey plan complying with the requirements of the Guidelines. It is essential that the owner provides, when completing the present questionnaire, up-to-date information. The present questionnaire, when completed, should provide all information and material required by the Guidelines.

Particulars

Ship's name:

IMO number:

Flag State:

Port of registry:

Owner:

Recognized Organization:

Gross tonnage:

Deadweight (metric tonnes):

Date of delivery:

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

2 The owner should 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., preferably within reach of hand.

Hold/Tank No.	Structure	Temporary staging	Rafts	Ladders	Direct access	Other means (please specify)
F.P.	Fore peak					
A.P.	Aft peak					
Cargo holds	Hatch side coamings					
	Topside sloping plate					
	Upper stool plating					
	Cross deck					
	Double-side tank plating					
	Transverse bulkhead					
	Hopper tank plating					
	Lower stool					
	Tank top					
	Under-deck structure					
Topside tanks	Side shell and structure					
	Sloping plate & structure					
	Webs and bulkheads					

Hold/Tank No.	Structure	Temporary staging	Rafts	Ladders	Direct access	Other means (please specify)
Hopper tanks	Hopper sloping plate and structure					
	Side shell and structure					
	Bottom structure					
	Webs and bulkheads					
Double-side tanks	Side shell and structure					
	Inner skin and structure					
	Webs and bulkheads					
	Double-bottom structure					
	Upper stool internal structure					
	Lower stool internal structure					
Wing tanks of double ore carriers	Underdeck and structure					
	Side shell and structure					
	Side shell vertical web and structure					
	Longitudinal bulkhead and structure					

Hold/Tank No.	Structure	Temporary staging	Rafis	Ladders	Direct access	Other means (please specify)
Wing tanks of double ore carriers (continued)	Longitudinal bulkhead web and structure					
	Bottom plating & structure					
	Cross ties/stringers					

History of bulk cargoes of a corrosive nature (e.g., high sulphur content)

Owner's inspections

3 Using a format similar to that of the table below (which is given as an example), the owner should provide details of the results of their inspections, for the last three years in accordance with the Guidelines on all CARGO holds and BALLAST tanks and VOID spaces within the cargo area.

Tank/Hold No.	Corrosion protection (1)	Coating extent (2)	Coating condition (3)	Structural deterioration (4)	Hold and tank history (5)
Cargo holds					
Topside tanks					
Hopper tanks					
Double-side skin tanks					
Double-bottom tanks					
Upper stools					
Lower stools					
Wing tanks (ore tankers)					
Fore peak					
Aft peak					
Miscellaneous other spaces:					

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

- 1) HC = hard coating; SC = soft coating;
A = anodes; 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
three years)
- 4) N = no findings recorded; Y = findings
recorded, description of findings
should be attached to this questionnaire
- 5) DR = damage & repair; L = leakages;
CV = conversion (description to be
attached to this questionnaire)

Name of owner's representative:
Signature:.....
Date:

Reports of port State control inspections

List the reports of port State control inspections containing hull structural related deficiencies, relevant information on rectification of the deficiencies:

Safety management system

List non-conformities related to hull maintenance, including the associated corrective actions:

Name and address of the approved thickness measurement company:

Annex 5

Procedures for certification of a company engaged in thickness measurement of hull structures

1 Application

This guidance applies for certification of the company which intends to engage in the thickness measurement of hull structures of ships.

2 Procedures for certification

Submission of documents

2.1 The following documents should be submitted to an organization recognized by the Administration for approval:

- .1 outline of the company, e.g., organization and management structure;
- .2 experience of the company on thickness measurement of hull structures of ships;
- .3 technicians' careers, i.e., experience of technicians as thickness measurement operators, technical knowledge and experience of hull structure, etc. Operators should be qualified according to a recognized industrial NDT Standard;
- .4 equipment used for thickness measurement such as ultrasonic testing machines and their maintenance/calibration procedures;
- .5 a guide for thickness measurement operators;
- .6 training programmes for technicians for thickness measurement;
- .7 measurement record format in accordance with recommended procedures for thickness measurements (see annex 8).

Auditing of the company

2.2 Upon reviewing the documents submitted with satisfactory results, the company should be audited in order to ascertain that the company is duly organized and managed in accordance with the documents submitted, and eventually is capable of conducting thickness measurement of the hull structure of ships.

2.3 Certification is conditional upon an on board demonstration of thickness measurement as well as satisfactory reporting.

3 Certification

3.1 Upon satisfactory results of both the audit of the company referred to in 2.2 and the demonstration tests referred to in 2.3, the Administration or organization recognized by the Administration should issue a certificate of approval as well as a notice to the effect that the thickness measurement operation system of the company has been certified.

3.2 Renewal/endorsement of the certificate should be made at intervals not exceeding three years by verification that original conditions are maintained.

4 Report of any alteration to the certified thickness measurement operation system

In cases where any alteration to the certified thickness measurement operation system of the company is made, such an alteration should be immediately reported to the organization recognized by the Administration. Re-audit should be made where deemed necessary by the organization recognized by the Administration.

5 Withdrawal of the certification

The certification may be withdrawn in the following cases:

- .1 where the measurements were improperly carried out or the results were improperly reported;
- .2 where the surveyor found any deficiencies in the approved thickness measurement operation systems of the company; and
- .3 where the company failed to report any alteration referred to in 4 to the organization recognized by the Administration as required.

Annex 6

Survey reporting principles

As a principle, for bulk carriers subject to the Guidelines, the surveyor should include the following contents in his report for survey of hull structure and piping systems, as relevant for the survey.

1 General

1.1 A survey report should be generated in the following cases:

- .1 in connection with commencement, continuation and/or completion of periodical hull surveys, i.e., annual, intermediate and renewal surveys, as relevant;
- .2 when structural damages/defects have been found;
- .3 when repairs, renewals or modifications have been carried out; and
- .4 when condition of class (recommendation) has been imposed or has been deleted.

1.2 The reporting should provide:

- .1 evidence that prescribed surveys have been carried out in accordance with applicable requirements;
- .2 documentation of surveys carried out with findings, repairs carried out and condition of class (recommendation) imposed or deleted;
- .3 survey records, including actions taken, which should form an auditable documentary trail. Survey reports should be kept in the survey report file required to be on board;
- .4 information for planning of future surveys; and
- .5 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 should 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, are 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 ballast tank and cargo hold including hatch covers and coamings, where a close-up survey has been carried out, together with information on the means of access used.

2.3 Identification of locations, in each ballast tank and cargo hold including hatch covers and coamings, where thickness measurement has been carried out.

Note: As a minimum, the identification of location of close-up survey and thickness measurement should include a confirmation with description of individual structural members corresponding to the extent of requirements stipulated in annex A based on type of periodical survey and the ship's age.

Where only partial survey is required, e.g., one transverse web, two selected cargo hold transverse bulkheads, the identification should include location within each ballast tank and cargo hold by reference to frame numbers.

2.4 For areas in ballast tanks and cargo holds 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 should be identified.

2.5 Identification of tanks subject to tank testing.

2.6 Identification of piping systems on deck and within cargo holds, ballast tanks, pipe tunnels, cofferdams and void spaces where:

- .1 examination including internal examination of piping with valves and fittings and thickness measurement, as relevant, has been carried out; and
- .2 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) including identification of tanks fitted with anodes.

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

- .1 identification of findings, such as:
 - .1.1 corrosion with description of location, type and extent;
 - .1.2 areas with substantial corrosion;
 - .1.3 cracks/fractures with description of location and extent;
 - .1.4 buckling with description of location and extent; and
 - .1.5 indents with description of location and extent;
- .2 identification of compartments where no structural damages/defects are found. The report may be supplemented by sketches/photos; and
- .3 thickness measurement report should 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 should be identified in a numbered list. Whenever repairs are carried out, details of the repairs effected should be reported by making specific reference to relevant items in the numbered list.

4.2 Repairs carried out should be reported with identification of:

- .1 compartment;
- .2 structural member;
- .3 repair method (i.e., renewal or modification), including:
 - .3.1 steel grades and scantlings (if different from the original); and
 - .3.2 sketches/photos, as appropriate;
- .4 repair extent; and
- .5 non-destructive test (NDT)/tests.

4.3 For repairs not completed at the time of survey, condition of class/recommendation should 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 should be sufficiently detailed with identification of each item to be repaired. For identification of extensive repairs, reference may be made to the survey report.

Annex 7
Condition Evaluation Report
Issued upon completion of renewal survey

General particulars

Ship's name:	Class/Administration identity number: Previous class/Administration identity number(s): IMO number:
Port of registry:	National flag: Previous national flag(s):
Deadweight (metric tonnes):	Gross tonnage: National: ITC (1969):
Date of build:	Classification notation:
Date of major conversion:	
Type of conversion:	Owner: Previous owner(s):

1 The survey reports and documents listed below have been reviewed by the undersigned and found to be satisfactory.

2 The renewal survey has been completed in accordance with the present Guidelines on (date)

Condition evaluation report completed by	Name Signature	Title
Office	Date	
Condition evaluation report verified by	Name Signature	Title
Office	Date	

Attached reports and documents:

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

Contents of condition evaluation report

- Part 1 – General particulars: – See front page
- Part 2 – Report review: – Where and how survey was done
- Part 3 – Close-up survey: – Extent (which tanks/holds)
- Part 4 – Thickness measurements: – Reference to thickness measurement report
- Summary of where measured
- Separate form indicating the spaces with substantial corrosion, and corresponding:
- thickness diminution
- corrosion pattern
- Part 5 – Tank corrosion prevention system: – Separate form indicating:
- location of coating/anodes
- condition of coating (if applicable)
- Part 6 – Repairs: – Identification of spaces/areas
- Part 7 – Condition of class/flag State requirements:
- Part 8 – Memoranda: – Acceptable defects
- Any points of attention for future surveys, e.g., for suspect areas
- Extended annual/intermediate survey due to coating breakdown
- Part 9 – Conclusion: – Statement on evaluation/ verification of survey report

Extract of thickness measurements

Reference is made to the thickness measurement report:

Position of substantially corroded tanks/areas ¹ or areas with deep pitting ³	Thickness diminution [%]	Corrosion pattern ²	Remarks: (e.g., ref. attached sketches)

Notes:

- ¹ Substantial corrosion, i.e., 75%–100% of acceptable margins wasted.
- ² P = Pitting
C = Corrosion in general
- ³ 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 $\frac{1}{3}$ or more of actual plate thickness should be noted.

Tank/hold corrosion prevention system

Tank/hold nos. ¹	Tank/hold corrosion prevention system ²	Coating condition ³	Remarks

Notes:

- 1 All ballast tanks and cargo holds should be listed.
- 2 C = Coating A = Anodes NP = No protection
- 3 Coating condition according to the following standard:
 - GOOD condition with only minor spot rusting.
 - FAIR condition with local breakdown of coating 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 POOR is given, extended annual surveys should be introduced. This should be noted in part 7 of the contents of condition evaluation report.

Annex 8*Recommended procedures for thickness measurements*

- 1 This annex should be used for recording thickness measurements as required by part B of annex A.
- 2 Thickness measurement sheet forms TM1-DSBC, TM2-DSBC, TM3-DSBC, TM4-DSBC, TM5-DSBC and TM6-DSBC (appendices 2 to 5) should be used, as appropriate, for recording thickness measurements and these sheets should be bound with the cover sheet of the report of GENERAL PARTICULARS in appendix 1. The maximum allowable diminution should be stated. The maximum allowable diminution could be stated in an attached document.
- 3 Appendices 3 to 5 are guidance diagrams and notes relating to the reporting forms and the procedure for the thickness measurements.

**Appendix 1
THICKNESS MEASUREMENT REPORT
GENERAL PARTICULARS**

Ship's name:

IMO number:

Administration identity number:

Port of registry:

Gross tonnage:

Deadweight:

Date of build:

Classification society:

Name of company performing thickness measurement:

.....

Thickness measurement company certified by:

Certificate number:

Certificate valid from: to

Place of measurement:

First date of measurement:

Last date of measurement:

Renewal survey/intermediate survey* due:

Details of measurement equipment:

Qualification of operator:

Report number: consisting of forms

Name of operator: Name of surveyor:

Signature of operator: Signature of surveyor:

Company official stamp: Administration:

Official stamp

* Delete as appropriate.

Appendix 2

Report on thickness measurement of all deck plating, all bottom shell plating or side shell plating* (TM1-DSBC)

Ship's name Class identity no. Report no. IMO number.....

STRAKE POSITION	No. or letter	Org. thk. mm	Forward reading		Aft reading		Mean diminution %	
			Gauged P	Diminution P mm %	Gauged S	Diminution S mm %	P	S
12th forward								
11th								
10th								
9th								
8th								
7th								
6th								
5th								
4th								
3rd								
2nd								
1st								
Amidships								
1st aft								
2nd								
3rd								
4th								
5th								
6th								
7th								
8th								
9th								
10th								
11th								
12th								

Operator's signature Notes - see following page

(* - delete as appropriate)

Notes to report TM1-DSBC

- 1 This report should be used for recording the thickness measurement of:
 - .1 all strength deck plating within cargo length area;
 - .2 all keel, bottom shell plating and bilge plating within the cargo length area;
 - .3 side shell plating including selected wind and water strakes outside cargo length area; and
 - .4 all wind and water strakes within cargo length area.
- 2 The strake position should be cleared as follows:
 - .1 for strength deck indicate the number of the strake of plating inboard from the stringer plate;
 - .2 for bottom plating indicate the number of the strake of plating outboard from the keel plate; and
 - .3 for side shell plating give number of the strake of plating sheerstrake and letter as shown on shell expansion.
- 3 Only the deck plating strakes outside line of openings are to be recorded.
- 4 Measurements should be taken at the forward and aft areas of all plates and where plates cross ballast/cargo tank boundaries separate measurements for the area of plating in way of each type of tank should be recorded.
- 5 The single measurements recorded are to represent the average of multiple measurements.
- 6 The maximum allowable diminution could be stated in an attached document.

Report on thickness measurement of shell and deck plating at transverse sections (one, two or three transverse sections) (TM2-DSBC(ii))

Ship's name Class identity no. Report no. IMO number

STRAKE POSITION	FIRST TRANSVERSE SECTION AT FRAME NUMBER				SECOND TRANSVERSE SECTION AT FRAME NUMBER				THIRD TRANSVERSE SECTION AT FRAME NUMBER									
	No. or letter	Org. thk. mm	Max. allow. dimin. mm	Diminution P mm	No. or letter	Org. thk. mm	Max. allow. dimin. mm	Diminution P mm	No. or letter	Org. thk. mm	Max. allow. dimin. mm	Diminution P mm	No. or letter	Org. thk. mm	Max. allow. dimin. mm	Diminution S %	Diminution P mm	Diminution S %
Stringer plate																		
1st strake inboard																		
2nd																		
3rd																		
4th																		
5th																		
6th																		
7th																		
8th																		
9th																		
10th																		
11th																		
12th																		
13th																		
14th																		
centre strake																		
sheer-strake																		
TOPSIDE TOTAL																		

Operator's signature Notes - see following page

Notes to report TM2-DSBC(i)

- 1 This report should be used for recording the thickness measurement of:
Strength deck plating and sheerstrake plating transverse sections:
One, two or three sections within the cargo length area, comprising structural items (0), (1) and (2) as shown on the diagrams of typical transverse sections (appendices 3 and 4).
- 2 Only the deck plating strakes outside line of hatch openings should be recorded.
- 3 The top side area comprises deck plating, stringer plate and sheerstrake (including rounded gunwales).
- 4 The exact frame station of measurement should be stated.
- 5 The single measurements recorded should represent the average of multiple measurements.
- 6 The maximum allowable diminution could be stated in an attached document.

Report on thickness measurement of shell and deck plating at transverse sections (one, two or three transverse sections) (TM2-DSBC(ii))

Ship's name Class identity no. Report no. IMO number

STRAKE POSITION	FIRST TRANSVERSE SECTION AT FRAME NUMBER						SECOND TRANSVERSE SECTION AT FRAME NUMBER						THIRD TRANSVERSE SECTION AT FRAME NUMBER													
	No. or letter	Org. thk. mm	Max. allow. dimin. mm	Gauged P	S	Diminution P mm	Diminution S mm	%	No. or letter	Org. thk. mm	Max. allow. dimin. mm	Gauged P	S	Diminution P mm	Diminution S mm	%	No. or letter	Org. thk. mm	Max. allow. dimin. mm	Gauged P	S	Diminution P mm	Diminution S mm	%		
1st below sheerstrake																										
2nd																										
3rd																										
4th																										
5th																										
6th																										
7th																										
8th																										
9th																										
10th																										
11th																										
12th																										
13th																										
14th																										
15th																										
16th																										
17th																										
18th																										
19th																										
20th																										
keel strake																										
BOTTOM TOTAL																										

Operator's signature

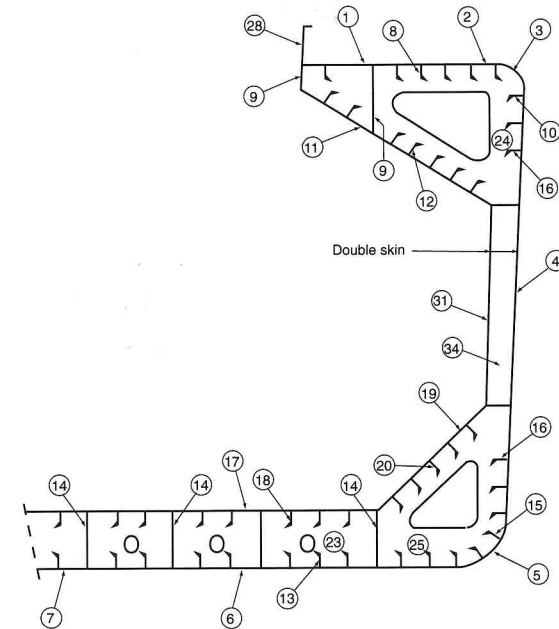
Notes - see following page

Notes to report TM6-DSBC

- 1 This report should be used for recording the thickness measurement of:
Miscellaneous structural members including structural items (40), (41) and (42) as shown on diagrams of typical transverse sections illustrated in appendix 3.
- 2 Guidance for areas of measurements is indicated in appendix 5.
- 3 The single measurements recorded should represent the average of multiple measurements.
- 4 The maximum allowable diminution could be stated in an attached document.

Appendix 3**THICKNESS MEASUREMENT – DOUBLE-SIDE SKIN CONSTRUCTION**

Typical transverse section of a double skin bulk carrier with indication of longitudinal and transverse members.



REPORT ON TM2-DSBC(i) and (ii)	
①	Strength deck plating
②	Stringer plate
③	Sheerstrake
④	Side shell plating
⑤	Bilge plating
⑥	Bottom shell plating
⑦	Keel plate

REPORT ON TM3-DSBC			
⑧	Deck longitudinals	⑮	Side shell longitudinals, if any
⑨	Deck girders	⑰	Inner bottom plating
⑩	Sheerstrake longitudinals	⑱	Inner bottom longitudinals
⑪	Topside tank sloping plating	⑲	Hopper plating
⑫	Topside tank sloping plating longitudinals	⑳	Hopper longitudinals
⑬	Bottom longitudinals	㉓	Inner side plating – Inner side longitudinals, if any – Horizontal girders in wing ballast tanks
⑭	Bottom girders		
⑮	Bilge longitudinals		

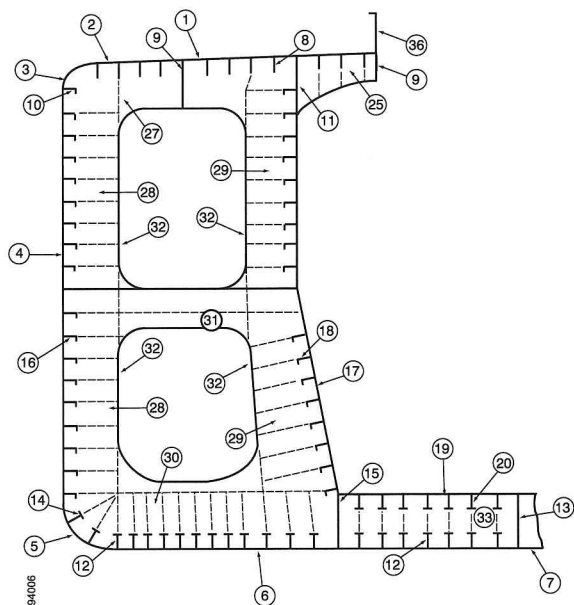
REPORT ON TM4-DSBC	
㉓	Double-bottom tank floors
㉕	Hopper side tank transverses
㉗	Transverse web frame – Topside tank transverses

REPORT ON TM6-DSBC	
㉘	Hatch coamings – Deck plating between hatches – Hatch covers

Appendix 4

THICKNESS MEASUREMENT – ORE CARRIERS

Typical transverse section of an ore carrier with indication of longitudinal and transverse members.



REPORT ON TM2-DSBC (i) and (ii)
1 Strength deck plating
2 Stringer plate
3 Sheerstrake
4 Side shell plating
5 Bilge plating
6 Bottom shell plating
7 Keel plate

REPORT ON TM6-DSBC
36 Hatch coamings
37 Deck plating between hatches
38 Hatch covers
39
40

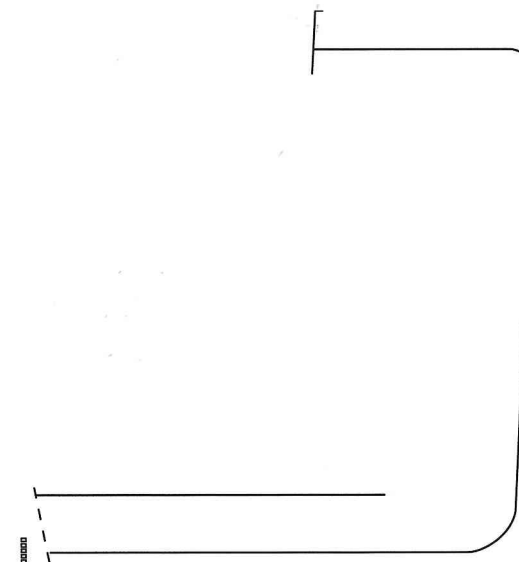
REPORT ON TM3-DSBC
8 Deck longitudinals
9 Deck girders
10 Sheerstrake longitudinals
11 Longitudinal bulkhead top strake
12 Bottom longitudinals
13 Bottom girders
14 Bilge longitudinals
15 Longitudinal bulkhead lower strake
16 Side shell longitudinals
17 Longitudinal bulkhead plating (remainder)
18 Longitudinal bulkhead longitudinals
19 Inner bottom plating
20 Inner bottom longitudinals
21
22
23
24

REPORT ON TM4-DSBC
25 Deck transverse centre tank
26 Bottom transverse centre tank
27 Deck transverse wing tank
28 Side shell vertical web
29 Longitudinal bulkhead vertical web
30 Bottom transverse wing tank
31 Struts
32 Transverse web face plate
33 Double bottom floors
34
35

Appendix 5

THICKNESS MEASUREMENT – DOUBLE-SIDE SKIN CONSTRUCTION

Transverse section outline: the diagram may be used for those ships where the diagrams given in appendices 3 and 4 are not suitable.



REPORT ON TM2-DSBC(i) and (ii)
1 Strength deck plating
2 Stringer plate
3 Sheerstrake
4 Side shell plating
5 Bilge plating
6 Bottom shell plating
7 Keel plate

REPORT ON TM4-DSBC
23 Double-bottom tank floors
25 Hopper side tank transverses
34 Transverse web frame
- Topside tank transverses

REPORT ON TM3-DSBC
8 Deck longitudinals
9 Deck girders
10 Sheerstrake longitudinals
11 Topside tank sloping plating
12 Topside tank sloping plating longitudinals
13 Bottom longitudinals
14 Bottom girders
15 Bilge longitudinals
16 Side shell longitudinals, if any
17 Inner bottom plating
18 Inner bottom longitudinals
19 Hopper plating
20 Hopper longitudinals
31 Inner side plating
- Inner side longitudinals, if any
- Horizontal girders in wing ballast tanks

REPORT ON TM6-DSBC
28 Hatch coamings
- Deck plating between hatches
- Hatch covers

Annex 9

Guidelines for technical assessment in conjunction with planning for enhanced surveys of bulk carriers

1 Introduction

These guidelines contain information and suggestions concerning technical assessments, which may be of use in conjunction with the planning of enhanced surveys of double-skin bulk carriers. As indicated in 5.1.6, the guidelines are a recommended tool which may be invoked at the discretion of the Administration, when considered necessary and appropriate, in conjunction with the preparation of the required survey programme.

2 Purpose and principles

2.1 Purpose

2.1.1 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 holds and tanks for thickness measurement, close-up survey and tank testing.

2.1.2 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.

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 annexes 1 and 2 of part B and in paragraph 2.7, respectively, which, in all cases, should 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 co-operation with the Administration well in advance of the commencement of

the renewal 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

2.4.1 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 holds, tanks and areas for survey:

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

2.4.2 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 recognized principles and practices, such as may be found in references 2, 3 and 4.

3 Technical assessment

3.1 General

3.1.1 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 planning since indents are usually noted in memoranda and assumed to be dealt with as a normal routine by surveyors.

3.1.2 Technical assessments performed in conjunction with the survey planning process should, in principle, be as shown schematically in figure 1. The approach is basically an evaluation of the risk in the following aspects based on the knowledge and experience related to:

- .1 design; and
- .2 corrosion.

3.1.3 The design should 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.

3.1.4 Corrosion is related to the ageing process, and is closely connected with the quality of corrosion prevention systems fitted at new building, and subsequent maintenance during the service life. Corrosion may also lead to cracking and/or buckling.

3.2 *Methods*

3.2.1 Design details

3.2.1.1 Damage experience related to the ship in question and sister and/or 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 is to be included.

3.2.1.2 Typical damage experience to be considered will consist of:

- .1 number, extent, location and frequency of cracks; and
- .2 location of buckles.

3.2.1.3 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 should be analysed, noted and marked on sketches.

3.2.1.4 In addition, general experience should be utilized. Also, reference should be made to reference 2, which contains a catalogue of typical damages and proposed repair methods for various structural details on single skin bulk carriers. Reference should also be made to reference 3, which contains catalogues of typical damages and proposed repair methods for double-hull oil tanker structural details which may to some extent be similar to structural details in double skin bulk carriers. Such figures should be used together with a review of the main drawings, in order to compare with the actual structure and search for similar details that may be susceptible to damage. In particular, chapter 3 of reference 3 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, while chapter 4 of reference 3 addresses experience gained on structural defects in double-hulls (chemical tankers, OBO carriers, ore/oil carriers, gas carriers), which should also be considered in working out the survey planning.

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

3.2.1.6 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.

3.2.1.7 In this respect, stress calculations of typical and important components and details, in accordance with relevant methods, may prove useful and should be considered.

3.2.1.8 The selected areas of the structure identified during this process should be recorded and marked on the structural drawings to be included in the survey programme.

3.2.2 Corrosion

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

- .1 usage of tanks, holds and spaces;
- .2 condition of coatings;
- .3 cleaning procedures;
- .4 previous corrosion damage;
- .5 ballast use and time for cargo holds;
- .6 risk of corrosion in cargo holds and ballast tanks; and
- .7 location of ballast tanks adjacent to heated fuel oil tanks.

3.2.2.2 Reference 4 gives definitive examples which can be used for judging and describing coating condition, using typical pictures of conditions.

3.2.2.3 The evaluation of corrosion risks should be based on information in both reference 2 and reference 4, as far as applicable to double-side skin construction, 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 holds, tanks and spaces should be listed with the corrosion risks nominated accordingly.

3.2.3 Locations for close-up survey and thickness measurement

3.2.3.1 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.

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

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

References

- 1 IACS, Unified Requirement Z10.5, *Hull Surveys of Double Skin Bulk Carriers*
- 2 IACS, *Bulk Carriers: Guidelines for Surveys, Assessment and Repair of Hull Structures*, January 2002
- 3 TSCF, *Guidelines for the Inspection and Maintenance of Double Hull Tanker Structures*, 1995
- 4 TSCF, *Guidance Manual for Tanker Structures*, 1997

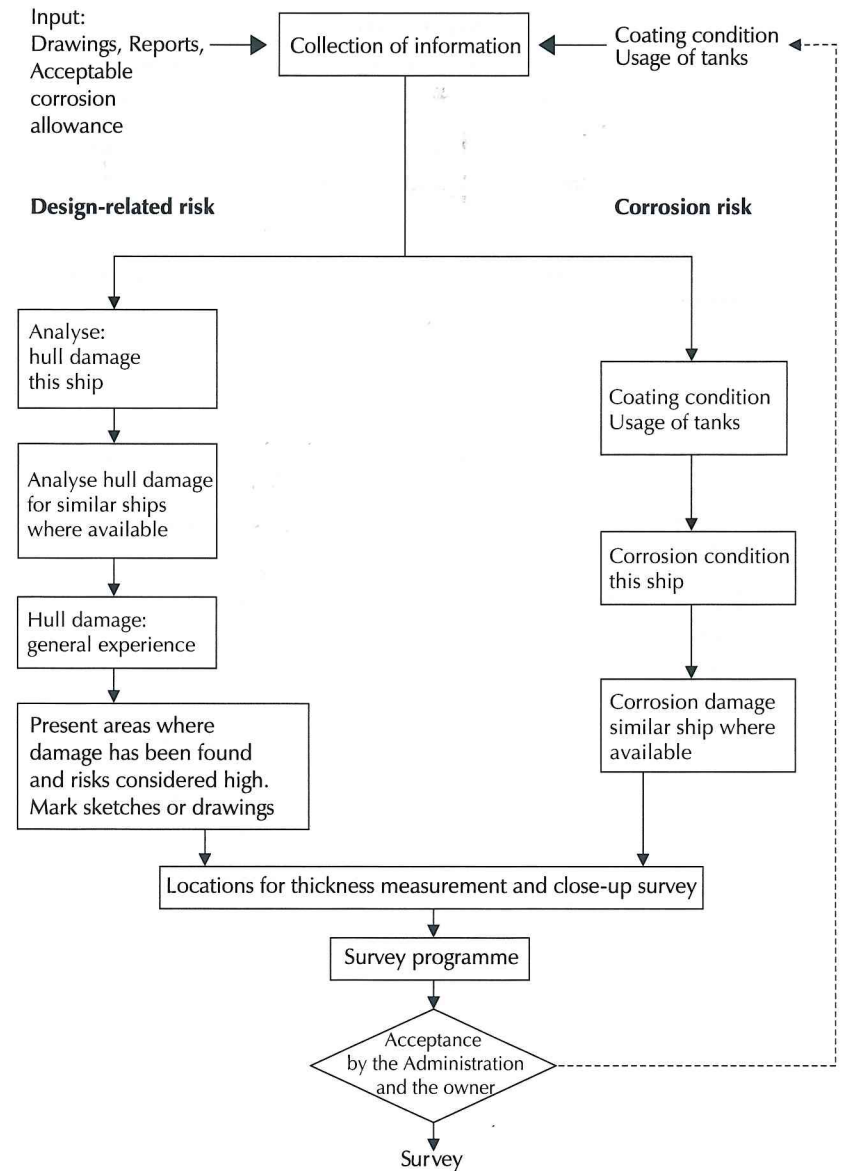


Figure 1 – Technical assessment and the survey planning process

Annex 10

Requirements for extent of thickness measurements at those areas of substantial corrosion of bulk carriers with double-side skin construction within the cargo length area

Table 1 – 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 double-bottom tank, including aft bay Measurements around and under all suction bell mouths	Five-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 flange and three measurements on the 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
Bottom floors, including the watertight ones	Three floors in the bays where bottom plating measured, with measurements at both ends and middle	Five-point pattern over 2 m ² area
Hopper structure web frame ring	Three floors in bays where bottom plating measured	Five-point pattern over 1 m ² of plating Single measurements on flange

Structural member	Extent of measurement	Pattern of measurement
Hopper structure transverse watertight bulkhead or swash bulkhead	– lower $\frac{1}{3}$ of bulkhead	five-point pattern over 1 m ² of plating
	– upper $\frac{2}{3}$ of bulkhead	five-point pattern over 2 m ² of plating
	– stiffeners (minimum of three)	For web, five-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 2 – Deck structure including cross strips, main cargo hatchways, hatch covers, coamings and topside tanks

Structural member	Extent of measurement	Pattern of measurement
Cross deck strip plating	Suspect cross deck strip plating	Five-point pattern between under deck stiffeners over 1 m length
Under deck stiffeners	Transverse members Longitudinal member	Five-point pattern at each end and mid span Five-point pattern on both web and flange
Hatch covers	Side and end skirts, each three locations Three longitudinal bands, outboard strakes (2) and centreline strake (1)	Five-point pattern at each location Five-point measurement each band
Hatch coamings	Each side and end of coaming, one band lower $\frac{1}{3}$, one band upper $\frac{2}{3}$ of coaming	Five-point measurement each band i.e., end or side coaming

Structural member	Extent of measurement	Pattern of measurement
Topside ballast tanks	a) watertight transverse bulkheads: - Lower $\frac{1}{3}$ of bulkhead - Upper $\frac{2}{3}$ of bulkhead - Stiffeners	Five-point pattern over 1 m ² of plating
		Five-point pattern over 1 m ² of plating
		Five-point pattern over 1 m length
Topside ballast tanks	b) two representative swash transverse bulkheads: - Lower $\frac{1}{3}$ of bulkhead - Upper $\frac{2}{3}$ of bulkhead - Stiffeners	Five-point pattern over 1 m ² of plating
		Five-point pattern over 1 m ² of plating
		Five-point pattern over 1 m length
Topside ballast tanks	c) three representative bays of slope plating: - Lower $\frac{1}{3}$ of tank - Upper $\frac{2}{3}$ of tank	Five-point pattern over 1 m ² of plating
		Five point pattern over 1 m ² of plating
Topside ballast tanks	d) Longitudinals, suspect and adjacent	Five point pattern on both web and flange over 1 m length
Main deck plating	Suspect plates and adjacent (4)	Five-point pattern over 1 m ² of plating
Main deck longitudinals	Suspect plates	Five point pattern on both web and flange over 1 m length
Web frames/transverses	Suspect plates	Five-point pattern over 1 m ² of plating

Table 3 – Structure in double-side ballast tanks

Structural member	Extent of measurement	Pattern of measurement
Side shell and inner plating: - Upper strake and strakes in way of horizontal girders - All other strakes	- Plating between each pair of transverse frames/longitudinals in a minimum of three bays (along the tank) - Plating between every third pair of longitudinals in same three bays	- Single measurement - Single measurement
Side shell and inner side transverse frames/longitudinals on: - upper strake - all other strakes	- Each transverse frame/longitudinal in same three bays - Every third transverse frame/longitudinal in same three bays	- Three measurements across web and one measurement on flange - Three measurements across web and one measurement on flange
Transverse frames/longitudinals: - brackets	Minimum of three at top, middle and bottom of tank in same three bays	Five-point pattern over area of bracket
Vertical web and transverse bulkheads: - strakes in a way of horizontal girders - other strakes	- Minimum of two webs and both transverse bulkheads - Minimum of two webs and both transverse bulkheads	- Five-point pattern over approximately 2 m ² area - Two measurements between each pair of vertical stiffeners
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

Table 4 – Transverse bulkheads in cargo holds

Structural member	Extent of measurement	Pattern of measurement
Lower stool, where fitted	<ul style="list-style-type: none"> - Transverse band within 25 mm of welded connection to inner bottom - Transverse bands within 25 mm of welded connection to shelf plate 	<ul style="list-style-type: none"> - Five-point pattern between stiffeners over 1 m length - Five-point pattern between stiffeners over 1 m length
Transverse bulkheads	<ul style="list-style-type: none"> - Transverse band at approximately mid height - Transverse band at part of bulkhead adjacent to upper deck or below upper stool shelf plate (for those ships fitted with upper stools) 	<ul style="list-style-type: none"> - Five-point pattern over 1 m² of plating - Five-point pattern over 1 m² of plating

Annex 11

Strength of cargo hatch cover securing arrangements for bulk carriers

1 Securing devices

The strength of securing devices should comply with the following requirements:

- .1 Panel hatch covers should be secured by appropriate devices (bolts, wedges or similar) suitably spaced alongside the coamings and between cover elements. Arrangement and spacing should be determined with due attention to the effectiveness for weathertightness, depending upon the type and the size of the hatch cover, as well as on the stiffness of the cover edges between the securing devices.

- .2 The net sectional area of each securing device is not to be less than:

$$A = 1.4 a/f \text{ (cm}^2\text{)}$$

where:

a = spacing between securing devices not to be taken less than 2 m

$$f = (\sigma_Y/235)^e$$

σ_Y = specified minimum upper yield stress in N/mm² of the steel used for fabrication, not to be taken greater than 70% of the ultimate tensile strength

$$e = 0.75 \text{ for } \sigma_Y > 235$$

$$e = 1.0 \text{ for } \sigma_Y \leq 235$$

Rods or bolts should have a net diameter not less than 19 mm for hatchways exceeding 5 m² in area.

- .3 Between cover and coaming and at cross-joints, a packing line pressure sufficient to obtain weathertightness should be maintained by the securing devices. For packing line pressures exceeding 5 N/mm, the cross section area should be increased in direct proportion. The packing line pressure should be specified.

- 4** The cover edge stiffness should be sufficient to maintain adequate sealing pressure between securing devices. The moment of inertia, I , of edge elements be less than:

$$I = 6 p a^4 \text{ (cm}^4\text{)}$$

where:

p = packing line pressure in N/mm, minimum 5 N/mm

a = spacing in metres of securing devices

- 5** Securing devices should be of reliable construction and securely attached to the hatchway coamings, decks or covers. Individual securing devices on each cover are to have approximately the same stiffness characteristics.
- 6** Where rod cleats are fitted, resilient washers or cushions should be incorporated.
- 7** Where hydraulic cleating is adopted, a positive means should be provided to ensure that it remains mechanically locked in the closed position in the event of failure of the hydraulic system.

2 Stoppers

2.1 Nos. 1 and 2 hatch covers should be effectively secured, by means of stoppers, against the transverse forces arising from a pressure of 175 kN/m².

2.2 No. 2 hatch covers should be effectively secured, by means of stoppers, against the longitudinal forces acting on the forward end arising from a pressure of 175 kN/m².

2.3 No. 1 hatch cover should be effectively secured, by means of stoppers, against the longitudinal forces acting on the forward end arising from a pressure of 230 kN/m². This pressure may be reduced to 175 kN/m² if a forecastle is fitted.

2.4 The equivalent stress in stoppers and their supporting structures and calculated in the throat of the stopper welds is not to exceed the allowable value of 0.8 σ_y .

3 Materials and welding

Where stoppers or securing devices are fitted to comply with this annex, they should be manufactured of materials, including welding electrodes, to the satisfaction of the Administration.

Annex 12

Procedural requirements for thickness measurements

1 General

Thickness measurements required in the context of hull structural surveys, if not carried out by the society itself should be witnessed by a surveyor. The attendance of the surveyor should be recorded. This also applies to thickness measurements taken during voyages.

2 Survey meeting

2.1 Prior to commencement of the renewal or intermediate survey, a meeting should be held between the attending surveyor(s), the owner's representative(s) in attendance and the thickness measurement firm's representative(s) so as to ensure the safe and efficient execution of the surveys and thickness measurements to be carried out on board.

2.2 Communication with the thickness measurement operator(s) and owner's representative(s) should be agreed during the meeting, with respect to the following:

- .1** reporting of thickness measurements on a regular basis;
- .2** prompt notification to the surveyor in case of findings such as:
 - .2.1** excessive and/or extensive corrosion or pitting/grooving of any significance;
 - .2.2** structural defects like buckling, fractures and deformed structures;
 - .2.3** detached and/or holed structure; and
 - .2.4** corrosion of welds.

2.3 The survey report should indicate where and when the meeting took place and who attended (the name of the surveyor(s), the owner's representative(s) and the thickness measurement firm's representative(s)).

3 Monitoring of the thickness measurement process on board

3.1 The surveyor should decide final extent and location of thickness measurements after overall survey of representative spaces on board.

3.2 In case the owner prefers to commence the thickness measurements prior to the overall survey, then the surveyor should advise that the planned extent and locations of thickness measurements are subject to confirmation during the overall survey. Based on findings, the surveyor may require additional thickness measurements to be taken.

3.3 The surveyor should direct the gauging operation by selecting locations such that readings taken represent, on average, the condition of the structure for that area.

3.4 Thickness measurements taken mainly to evaluate the extent of corrosion, which may affect the hull girder strength, should be carried out in a systematic manner such that all longitudinal structural members are gauged, as required.

3.5 Where thickness measurements indicate substantial corrosion or wastage in excess of allowable diminution, the surveyor should direct locations for additional thickness measurements in order to delineate areas of substantial corrosion and to identify structural members for repairs/renewals.

3.6 Thickness measurements of structures in areas where close-up surveys are required should be carried out simultaneously with close-up survey.

4 Review and verification

4.1 Upon completion of the thickness measurements, the surveyor should confirm that no further gaugings are needed, or specify additional gaugings.

4.2 Where these guidelines allow the extent of thickness measurements to be reduced after special considerations by the surveyor, these special considerations should be reported, where appropriate.

4.3 In case thickness measurements are partly carried out, the extent of remaining thickness measurements should be reported for the use of the next surveyor.

ANNEX B

Guidelines on the enhanced programme of inspections during surveys of oil tankers

Part A

Guidelines on the enhanced programme of inspections during surveys of double-hull oil tankers

1 General

1.1 Application

1.1.1 The Guidelines should apply to all self-propelled double-hull oil tankers of 500 gross tonnage and above.

1.1.2 The Guidelines should 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 surveys should be carried out during the surveys prescribed by regulation 1/10 of the 1974 SOLAS Convention, as amended.

1.1.3 The Guidelines contain the extent of examination, thickness measurements and tank testing. The survey should 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 *Double-hull oil tanker* is a ship which is constructed primarily for the carriage of oil in bulk, which has the cargo tanks protected by a double-hull which extends for the entire length of the cargo area, consisting of double sides and double-bottom spaces for the carriage of water ballast or void spaces.

1.2.2 A *ballast tank* is a tank which is used solely for water ballast.

1.2.3 *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* is a survey where the details of structural components are within the close visual inspection range of the surveyor, i.e., preferably within reach of hand.

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

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

1.2.7 *Suspect areas* are locations showing substantial corrosion and/or are considered by the surveyor to be prone to rapid wastage.

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

1.2.9 *Corrosion prevention system* is normally considered either:

- .1 a full hard coating, or
- .2 a full hard coating supplemented by anodes.

Protective coating should usually be epoxy coating or equivalent. Other coating systems may be considered acceptable as alternatives provided that they are applied and maintained in compliance with the manufacturer's specification.

Where soft coatings have been applied, safe access should be provided for the surveyor to verify the effectiveness of the coating and to carry out an assessment of the condition of internal structures which may include spot removal of the coating. When safe access cannot be provided, the soft coating should be removed.

1.2.10 *Coating condition* is defined as follows:

GOOD	condition with only minor spot rusting,
FAIR	condition with local breakdown of coating 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.

1.2.11 *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 to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship.

1.2.12 *Cargo area* is an area as defined in regulation II-2/3.6 of the 1974 SOLAS Convention, as amended.

1.2.13 *Intermediate survey* is a survey carried out either at the second or the third annual survey or between these surveys.

1.2.14 *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.

1.2.15 *Specially considered* means sufficient close-up inspection and thickness measurements are taken to confirm the actual average condition of the structure under coating.

1.3 Repairs

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

- .1 bottom structure and bottom plating;
- .2 side structure and side plating;
- .3 deck structure and deck plating;
- .4 inner bottom structure and inner bottom plating;
- .5 inner side structure and inner side plating;
- .6 longitudinal bulkhead(s) structure and longitudinal bulkhead(s) plating, where fitted;
- .7 transverse watertight or oiltight bulkheads structure and transverse watertight or oiltight bulkheads plating;
- .8 hatch covers or hatch coamings, where fitted; and
- .9 items in 3.3.

Where adequate repair facilities are not available, the Administration may 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 corrosion or structural defects, either of which, in the opinion of the Administration, will impair the ship's fitness for continued service, remedial measures should be implemented before the ship continues in service.

1.4 Surveyors

For tankers of 20,000 tons deadweight and above, two surveyors should jointly carry out the first scheduled renewal survey after the tanker passes 10 years of age, and all subsequent renewal surveys and intermediate surveys. If the surveys are carried out by a recognized organization, the surveyors should be exclusively employed by such recognized organizations.

2 Renewal survey

2.1 General

2.1.1 The renewal survey may be commenced at the fourth annual survey and be progressed during the succeeding year with a view to completion by the fifth anniversary date.

2.1.2 As part of the preparation for the renewal survey the survey programme should be dealt with in advance of the renewal survey. The thickness measurement should not be carried out before the fourth annual survey.

2.1.3 The survey should 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 2.1.5 is in a satisfactory condition and is fit for its intended purpose for the new period of validity of the Cargo Ship Safety Construction Certificate, subject to proper maintenance and operation and to renewal surveys being carried out.

2.1.4 All cargo tanks, ballast tanks, pump-rooms, pipe tunnels, cofferdams and void spaces bounding cargo tanks, decks and outer hull should be examined, and this examination should be supplemented by thickness measurement and testing as deemed necessary, to ensure that the structural integrity remains effective. The examination should be sufficient to discover substantial corrosion, significant deformation, fractures, damages or other structural deterioration.

2.1.5 Cargo piping on deck, including crude oil washing (COW) piping, and cargo and ballast piping within the above tanks and spaces should be examined and operationally tested to working pressure to attending

surveyor's satisfaction to ensure that tightness and condition remain satisfactory. Special attention should be given to any ballast piping in cargo tanks and cargo piping in ballast tanks and void spaces, and surveyors should be advised on all occasions when this piping, including valves and fittings, are open during repair periods and can be examined internally.

2.2 Dry dock survey

2.2.1 A survey in dry dock should be a part of the renewal survey. There should be a minimum of two inspections of the outside of the ship's bottom during the five-year period of the Safety Construction Certificate. In all cases, the maximum interval between bottom inspections should not exceed 36 months.

2.2.2 For ships of 15 years of age and over, inspection of the outside of the ship's bottom should be carried out with the ship in dry dock. For ships of less than 15 years of age, alternate inspections of the ship's bottom not conducted in conjunction with the renewal survey may be carried out with the ship afloat. Inspection of the ship afloat should only be carried out when the conditions are satisfactory and the proper equipment and suitably qualified staff are available.

2.2.3 If a survey in dry dock is not completed in conjunction with the renewal survey or if the 36 month maximum interval referred to in 2.2.1 is not complied with, the Cargo Ship Safety Construction Certificate should cease to be valid until a survey in dry dock is completed.

2.3 Tank corrosion prevention system

Where provided, the condition of the corrosion prevention system of cargo tanks should be examined. A ballast tank where a protective coating is found in POOR condition and it is not renewed, or where soft coating has been applied, or where a protective coating has not been applied from the time of construction, the tank in question should be examined at annual intervals. Thickness measurement should be carried out as deemed necessary by the surveyor.

2.4 Extent of overall and close-up surveys

2.4.1 An overall survey of all integral tanks and spaces should be carried out at the renewal survey.

2.4.2 The requirements for close-up surveys at the renewal survey are given in annex 1.

2.4.3 The surveyor may extend the scope of 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:

- .1 in particular, tanks having structural arrangements or details which have suffered defects in similar tanks or on similar ships according to available information;
- .2 in tanks which have structures with reduced scantlings in association with a corrosion prevention system approved by the Administration.

2.4.4 For areas in tanks where coatings are found to be in GOOD condition as defined in 1.2.10, the extent of close-up surveys according to annex 1 may be specially considered by the Administration.

2.5 *Extent of thickness measurements*

2.5.1 The requirements for thickness measurements at the renewal survey are given in annex 2.

2.5.2 Where substantial corrosion as defined in 1.2.8 is found, the extent of thickness measurements should be increased in accordance with the requirements of annex 4.

2.5.3 The surveyor may extend the thickness measurements as deemed necessary.

2.5.4 For areas in tanks where coatings are found to be in GOOD condition as defined in 1.2.10, the extent of thickness measurements according to annex 2 may be specially considered by the Administration.

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

2.5.6 In cases where two or three sections are to be measured, at least one should include a ballast tank within 0.5L amidships.

2.6 *Extent of tank pressure testing*

2.6.1 The requirements for tank pressure testing at the renewal survey are given in annex 3.

2.6.2 The surveyor may extend the tank pressure testing as deemed necessary.

2.6.3 Generally, the pressure should correspond to a water level to the top of access hatches for cargo tanks, or top of air pipes for ballast tanks.

3 **Annual survey**

3.1 *General*

The annual survey should consist of an examination for the purpose of ensuring, as far as practicable, that the hull and piping are maintained in a satisfactory condition and should take into account the service history, condition and extent of the corrosion prevention system of ballast tanks and areas identified in the survey report file.

3.2 *Examination of the hull*

3.2.1 Examination of the hull plating and its closing appliances should be carried out as far as can be seen.

3.2.2 Examination of watertight penetrations should be carried out as far as practicable.

3.3 *Examination of weather decks*

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

3.3.2 Examination of cargo tank pressure/vacuum valves and flame screens.

3.3.3 Examination of flame screens on vents to all bunker and oily slop tanks.

3.3.4 Examination of cargo, crude oil washing, bunker and vent piping systems, including vent masts and headers.

3.4 *Examination of cargo pump-rooms and pipe tunnels*

3.4.1 Examination of all bulkheads for signs of oil leakage or fractures and, in particular, the sealing arrangements of all penetrations of bulkheads.

3.4.2 Examination of the condition of all piping systems and pipe tunnels.

3.5 *Examination of ballast tanks*

3.5.1 Examination of ballast tanks should be carried out when required as a consequence of the results of the renewal survey and intermediate survey. When extensive corrosion is found, thickness measurements should be carried out.