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PORT STATE CONTROL COMMITTEE INSTRUCTION 50/2017/12

GUIDANCE FOR CHECKING THE STRUCTURE OF BULK CARRIERS AND OIL TANKERS

Contents

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1. The 2011 ESP Code supersedes and is based upon the requirements of IMO Resolution A.744(18) and is applicable from the first ESP survey after 1 January 2014. The following guidance is to assist PSCOs in checking the structure of bulk carriers and oil tankers, particularly during an expanded inspection.

Enhanced Survey Programme and Survey Report File

2. PSCOs must include a check of the Survey Report File (SRF), required by the enhanced survey programme (ESP), as part of their initial inspection of documents on these ship types.

   This guidance does not preclude the PSCO from using portable measuring devices provided by his administration in order to gain an approximate impression of plate thicknesses.

3. The SRF is referred to in IMO Resolution A.1049(27) 2011 ESP Code as amended, which applies the requirements of SOLAS XI-1 reg.2 to:

   - Single and double-hull oil tankers of 500 GT and above
   - Single or double-skin bulk carriers of 500GT and above.

   For ships not covered by ESP or Condition Assessment Scheme(CAS), structural requirements in the conventions are limited to:

   Loadline 1966 which requires that a ship has sufficient general structural strength (LL66 Annex I Chapter I Regulation 1). Ships built to the rules of a classification society recognised by the ship's flag may be considered as possessing sufficient strength.

   SOLAS 1974 which requires that a ship is constructed and maintained in compliance with the structural requirements of a classification society recognised by the ship's flag or by equivalent national standards (Chapter II-1 Part A-1 Regulation 3.1 of SOLAS 74 as amended).

4. Documentation on board

   4.1 General

   The owner should obtain, supply and maintain on board Survey Report File (SRF) and supporting documents which should be readily available for the PSCO. Condition evaluation report should be endorsed by the Administration or by the recognized organization on behalf of the Administration. The condition evaluation report (annex VII of the Code) should include a translation into English.

   The thickness measurements should be carried out by a qualified company certified by an organization recognized by the Administration

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

   4.2 Survey Report File (SRF)

   The SRF (bulk carriers only) should include:

   a) reports of structural surveys (annex 6 of the Code); and
   b) condition evaluation report (annex 7 of the Code); and
   c) thickness measurement reports (annex 8 of the Code).

   4.3 Supporting documents (bulk carriers & double hull oil tanker)

   The following additional documentation should be available on board:

d) survey programme until such time as the renewal survey, or intermediate survey, as applicable, has been completed;
e) main structural plans of cargo holds and ballast tanks;
f) previous repair history;
g) cargo and ballast history;
h) inspections by ship's personnel with reference to:
   i. structural deterioration in general;
   ii. leakages in bulkheads and piping;
   iii. condition of coating or corrosion prevention system, if any;
   iv. any other information that would help to identify critical structural areas and/or suspect areas requiring inspection.

Additionally for bulk carriers:

v. within the cargo area
   - shell plating bottom and side shell plating /longitudinals
   - transverse bulkheads in cargo holds
   - lower stool
   - transverse bulkheads

vi. Deck structure including cross strips, main cargo hatchways, hatch covers, coamings and topside tanks

   - cross-deck strip plating
   - under-deck stiffeners
   - hatch covers/coamings
   - topside water ballast tanks
   - main deck plating/ longitudinals
   - web frames/ transverses
   - double bottom and hopper structure
   - inner/double-bottom plating/ longitudinals
   - longitudinal girders or transverse floors
   - watertight bulkheads (WT floors)
   - web frames
   - bottom/side shell longitudinals

vii. Cargo holds

   - side shell frames including their upper and lower end attachments,
   - adjacent shell plating and transverse bulkheads in forward cargo hold
   - areas found to be suspect areas at previous surveys
   - no.1 hold side shells framing and top and bottom connections (panting and pounding region)

5. Further guidance on the requirements for the SRF are in PSCC Instruction "Guidelines for PSCOs on checking hull structure condition on the basis of residual thickness measurements' reports". Guidance on single-hull tankers covered by the Condition Assessment Scheme (CAS) can be found in Port State Control Committee Instruction "Guidelines for PSCO's on CAS".

6. During an expanded or more detailed inspection a closer check of the SRF may identify possible suspect areas requiring a physical inspection. Points to consider from the last Condition Evaluation Reports are:

   a) tank coating condition
   b) suspect areas and areas of substantial corrosion
   c) extent of repairs
   d) extent of use of inert gas plant an tank cleaning procedures

e) "memoranda" – recommendations for further survey action based on thickness measurements and the resulting strength calculations
f) completeness of information e.g. not all tanks recorded
g) class conditions, if any
h) period of time between whatever type of surveys (either dry- dock or special one)

Where provided, the condition of the corrosion prevention system of cargo tanks should be examined. A ballast tank should be examined at subsequent annual intervals where:

a) a hard protective coating has not been applied from the time of construction; or
a) a soft or semi-hard coating has been applied; or
b) substantial corrosion is found within the tank*; or
c) the hard protective coating is found to be in less than GOOD condition

**Extensive corrosion is an extent of corrosion consisting of hard and/or loose scale, including pitting, over 70% or more of the area under consideration, accompanied by evidence of thickness diminution.*

Overall Condition

7. In addition to the SRF, the impression of hull maintenance and general state on deck, the condition of such items as ladders, hatches, air pipes, guard-rails, bulkhead and tank top penetrations, visible evidence of previous repairs, and the condition of deck machinery should influence the PSCO's decision on the extent of the examination of the hull.

8. Special attention should be given to critical structural areas of high stress and bending moments such as;

a) immediately forward of the engine room bulkhead
b) over the midships half-length
c) In bulk carriers the no.1 hold side shells framing and top and bottom connections (panting and pounding region)

9. Particular attention should be given to areas where fracturing, cracks, distortion or excessive wastage can occur. For bulk carriers these areas are shown at Appendix 1 & 2 - the weather tight integrity of hatches and closures is particularly important on ore carriers with no reserve buoyancy. For double hull tankers typical locations of high sensitivity fatigue failure and other suspect areas are shown at Appendix 3.

10. Common defects in bulk carriers are:

a) cracking at hatch corners.
b) plate panel buckling of cross deck strips and stiffening structure.
c) cracking of hatch coamings.
d) cracking at intersection of the inner bottom plating and the hopper plating.
e) grab and bulldozer damage to the main frames lower brackets.
f) grab damage to the inner bottom plating, hopper and lower stool plating.
g) cracking at main frame bracket toes.
h) both general and localised corrosion of main frames and brackets.
i) cracking at fore and aft extremities of topside tank structures.
j) corrosion within topside tanks.
k) general corrosion and cracking of transverse bulkheads.
l) structural and weathertight condition of hatchcovers and coamings
   - stowage and securing in open condition
   - proper fit and efficiency of sealing
m) necking at lower and upper bracket frames
n) necking at side, bottom and deck longitudinals

o) indents

11. Common defects in double skin bulk carriers are:

a) connection of inner hull longitudinal bulkheads.
b) inner hull longitudinal bracket toe
c) area in way of cut outs in hopper plate
d) cut-outs around transverse web frame
e) area at connection of inner hull longitudinal bulkhead upper hopper plate and horizontal girder in the wing ballast tank
f) area at connections of inner hull longitudinal bulkhead upper hopper plate and horizontal girder
g) area in way of longitudinal bulkhead web frame bracket connection to inner bottom.
h) connection on vertical girder between inner bottom and bottom shell
i) connections between longitudinal bulkhead web frame and upper deck.

12. Common defects in oil tankers are:

a) plate panel buckling of cross deck strips and stiffening structure.
b) cracking at fore and aft extremities of tank structures
c) corrosion within ballast tanks.
d) cracking of pipe foundations
e) clamps and nuts at cargo piping supports
f) leakage from expansion (“dresser”) couplings (especially in midship area)
g) signs of cargo or gas leakage into ballast tanks through bulkhead damage or pipe failure or ballast pipe bulkhead penetration
h) deterioration of cargo- and IG piping on deck
i) acidic corrosion in tanks (cargo or ballast) which are kept under inert gas
j) pitting below ballast suction well
k) corrosion, buckling, cracks of longitudinal material, transverse web frames, transverse bulkheads and swash bulkheads
l) necking at bottom, side (wing and hopper tanks) and deck longitudinals
m) deck buckling
n) deck welding seams loss of thickness
o) longitudinals passing through frames at side, shear strakes and stringer plates in ballast tanks
p) welded seams between longitudinals and transverse bulkhead in ballast tanks
q) deformation or cracking at intersection of the inner bottom plating/inner shell plating and hopper plating
r) deformation or cracking at intersection of the inner shell plating and deck plating

13. Common defects in double hull oil tankers ballast spaces are:

a) main deck deckhead: corrosion and fractures
b) inner hull plate and stiffener: coating breakdown
c) buckling of the web plate in the upper and lower part of the web frame
d) fractures at the side shell longitudinal connection to web frames due to fatigue
e) corrosion and fractures at knuckle joints in inner hull at forward and after parts of ship
f) corrosion and fractures at the junction of the sloped inner hull with the inner bottom
g) fractures at side and inner hull longitudinal connections to transverse bulkheads due to fatigue and/or high relative deflections
h) inner bottom deckhead corrosion at inner bottom
i) bottom corrosion wastage
j) cracks at inner bottom longitudinal connection to double bottom floor web plating

k) fractures at inner bottom and bottom longitudinal; connection to transverse watertight floor due to high relative defections.

14. Additional common defects in combination carriers (OBO)

a) defects in welded seams between corrugated transverse bulkheads and the upper hopper tanks
b) cracks in the connections with bulkhead stool in hold no. 1 aft and side hopper tank
c) In double hulls, cracks in the upper welded seams of the longitudinal bulkheads between ballast tank and cargo tank
d) hatch covers not oil and gas tight

15. Where a fracture, which has not been caused by contact damage, is found in the main hull structure on one side of a ship, the corresponding structure on the opposite side is to be examined to see if a similar failure has occurred. Fractures of this nature are of concern especially where corrosion is associated with the failure and may have been a contributing factor.

16. Where portable covers, wooden or steel pontoons are fitted, the PSCO should consider the following:

a) wooden covers and portable beams, carriers or sockets for the portable beam, and their securing devices;
b) steel pontoons, including close-up survey of hatch cover plating;
c) tarpaulins;
d) cleats, battens and wedges;
e) hatch securing bars and their securing devices;
f) loading pads/bars and the side plate edge;
g) guide plates and chocks; and
h) compression bars, drainage channels and drain pipes (if any).

17. Where mechanically operated hatch covers are fitted, the PSCO should consider the following:

a) stowage and securing in open condition;
b) proper fit and efficiency of sealing in closed condition; and
c) wires, chains and link drives

18. Where securing devices are fitted, the PSCO should consider the that the strength of the securing devices should comply with the following requirements:

a) 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.
b) where rod cleats are fitted, resilient washers or cushions should be incorporated.
c) 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.

Ballast Tanks

19. If an expanded inspection is being carried out on a bulk carrier or an oil tanker, at least one ballast tank within the cargo area must be examined. In selecting a tank to examine the PSCO should consider:

a) the items mentioned in paragraph 6 above
b) recent inspections of tanks by PSC (see the verification report)
c) even distribution of tank inspections as recorded in the SRF or omission thereof

The selection of the tank should include fore / aft peak tanks and other tanks, as appropriate, taking into account the total number and type of ballast tanks. If such overall survey reveals no visible structural defects, the examination may be limited to verification that the corrosion prevention system remains efficient.

20. There may be constraints on the selection of a tank due to the safety of persons or the ship or the port, particularly with regard to stability, stress and gas free aspects of cargo/ballasting operations.

21. During an expanded inspection the examination of the tank may be made from the tank manhole cover (a mirror can help). The PSCO should look for cracks, buckling, indents, deformations and corrosion on all visible surfaces. As far as possible the following could be examined;

    a) internals and plates
    b) welds
    c) condition of the coating (compared with approved programme)
    d) air pipes and sounding pipes
    e) ladders.

22. If the examination from the manhole or the scrutiny of the SRF reveals clear grounds for doubting the condition of the tank the PSCO should, where it is safe to do so, make an internal examination of the tank.

23. The examination of a tank is not a survey and therefore does not confirm that the condition of the tank complies with the conventions. Rather, the examination should confirm that there are no visible signs that the condition of the tank does not match the condition reported in the SRF. In case of doubt the visual inspection can be supplemented with random tests using ultra sonic equipment, if available to the PSCO, inside the selected tank(s). Any deeper investigation of thicknesses would need to take account of the guidance.

24. If tanks (or holds) are to be inspected internally the PSCO must ensure it is safe to enter. The requirements of the Code of Safe Practice for Solid Bulk Cargoes, Appendix F apply. For tankers the International Safety Guide for Oil Tankers & Terminals (ISGOTT) provides recommendations (Chapter 11). The PSCO must receive proof that the selected tank is in a gas free condition and oxygenated even if the examination is from manhole/deck access only

25. Before a tank is entered the PSCO must inform the master. If tanks (or holds) are to be inspected internally the PSCO must ensure it is safe to enter. Before entering PSCO should consult Guidance related to CIC on familiarisation and enclosed space entry. The PSCO must receive proof that the selected tank is in a gas free condition and oxygenated even if the examination is from manhole/deck access only

26. The PSCO should follow local and national regulations and guidelines before entry to an enclosed space.

27. The master will take responsibility for the arrangements for the inspection of the tank, including the items listed below:

    a) to inform the terminal
    b) an agreement with the PSCO, the harbour master of the port/terminal on further action
    c) gas free condition in selected tank confirmed
    d) closed space entry permit issued (procedures under the SMS)

e) continuous ventilation in tank during inspection
f) communication between PSCO and persons at entrance (gas/explosion proof walkie-talkies designed for tank use or similar equipment) and a life line
g) guard at tank entry - at least two persons with breathing apparatuses ready in case of emergency
h) safe and adequate lighting
i) adjacent areas are safe during the entry – gas free and not inert
j) tank to be clean – free from mud and other particles
k) PSCO should be assisted by a responsible officer inside the tank

28. The PSCO should consider the following as a minimum of personal safety equipment;

a) protective helmet
b) protective shoes (chemical approved)
c) boiler suit and gloves (chemical approved)
d) torch (explosion-proof and with shoulder straps)
e) oxygen and gas meter (explosion-proof)
f) EEBD (Emergency Escape Breathing Device)

This list is not to be considered exhaustive and further requirements may be necessary. Special insurance cover may be applicable for the PSCO depending on national legislation.

29. Some ports/terminals have limitations on inspections of tanks before/during/after cargo operation. Liaison with terminals in advance may enable the PSCO to agree procedures/arrangements under which tank inspection can be carried out (if the necessity arises). PSCOs should always know and follow the applicable terminal rules for the control.

30. At an internal examination of a ballast tank the PSCO should consider the following aspect;

a) the paint condition in coated ballast tanks and the condition of anodes if fitted. In ballast tanks rates of corrosion of the order of 1mm per year may be encountered, depending on whether they are coated, or protected by anodes. In some ships only the ullage space is coated with the remainder protected by anodes. This can result in corrosion during empty periods on uncoated structures which remain wet.
b) in tanks used for ballast which may be subject to variable depths of seawater, for example forepeak tanks, it is often the case that there is little wastage top and bottom, but significant wastage over central regions. Attention should be paid to longitudinal stiffeners and brackets at the collision bulkhead to shell junction.
c) longitudinal shell stiffeners in dedicated ballast tanks, particularly in areas adjacent to bulkheads and web frames.
d) underdeck longitudinals in ballast tanks. Wastage is usually most severe close to the deckhead. This may result in the fillet welds attaching longitudinals to the deck being wasted leading to detachment of the longitudinals and consequent buckling of deck plates.
e) the relevant items mentioned in paragraphs 10 to 14.
f) defects around lightening holes and manholes

Cargo operations in relation to structure

31. If relevant, the PSCO may check that the necessary calculations have been made to ensure bending and shear stresses are maintained within maximum limits both during loading/discharge and the next voyage. This is especially important in bulk carriers where high density cargoes are carried or the loading/ballasting arrangement is of a different configuration to that described in the vessel's loading manual. Calculations should also include damage stability conditions integrating loading data and flooded compartment characteristic. Stress calculations are also part of operations for oil tankers and dictate the loading sequence and final sailing conditions/cargo distribution.

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Further Action

32. If the condition of the hull structure in general gives rise to concern the flag state/recognized organization should be consulted to consider the need for a more detailed survey.

33. In reaching any decision regarding detention, the PSCO should consider the seaworthiness and not the age of the ship, making allowance for fair wear and tear over the minimum acceptable scantlings. Where there is doubt the recognized organization should advise the accepted diminution rates of structural members. Damage not affecting seaworthiness will not constitute grounds for judging that a ship should be detained, nor will damage temporarily but effectively repaired for a voyage to a port for permanent repairs. However, in his assessment of the effect of damage the PSCO should have regard to the location of crew accommodation and whether the damage substantially affects its habitability.

34. Any proposals from the flag state or recognized organization are to be considered carefully. Specification of repairs is for the recognized organization surveyor to propose and need only be agreed by the PSCO. In the event the proposals are acceptable, care is to be taken to ensure the flag state and the RO oversee the repairs and clear the ship before a request to lift the detention is made.

35. Any proposal by the flag state to allow the vessel to make a single voyage to a repair yard should be considered in accordance with PSC procedures.

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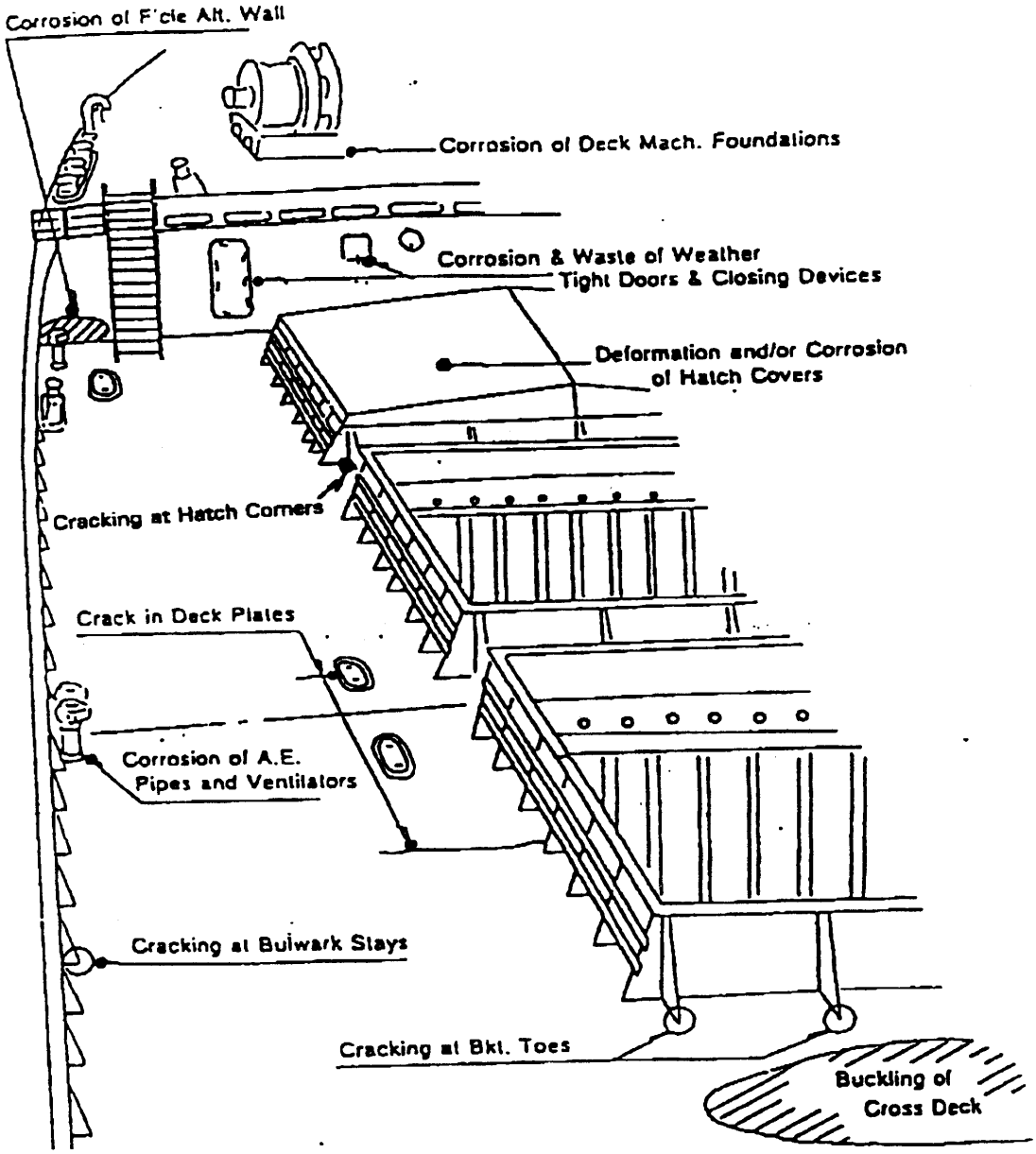
APPENDIX 1 – BULK CARRIERS - WHAT TO LOOK FOR ON DECK



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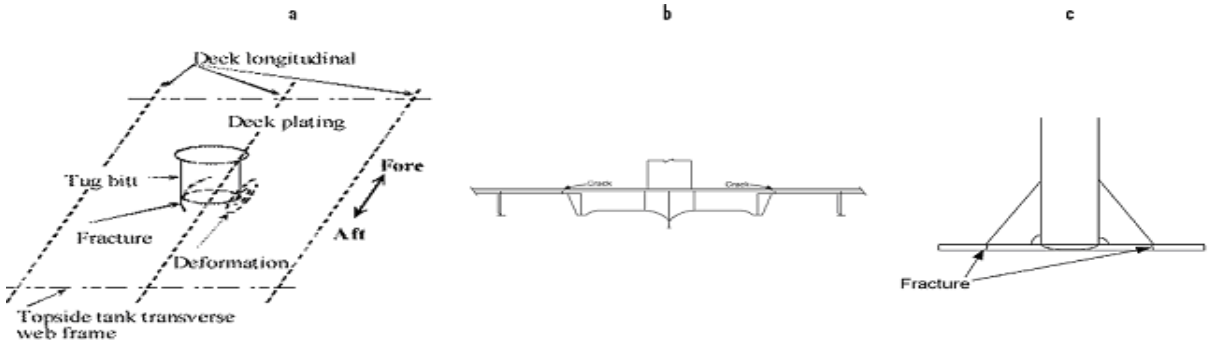
DECK STRUCTURE - Suspect Areas



a. Plating around tug bitts

b. In way of crane support

c. In way of deck pipe

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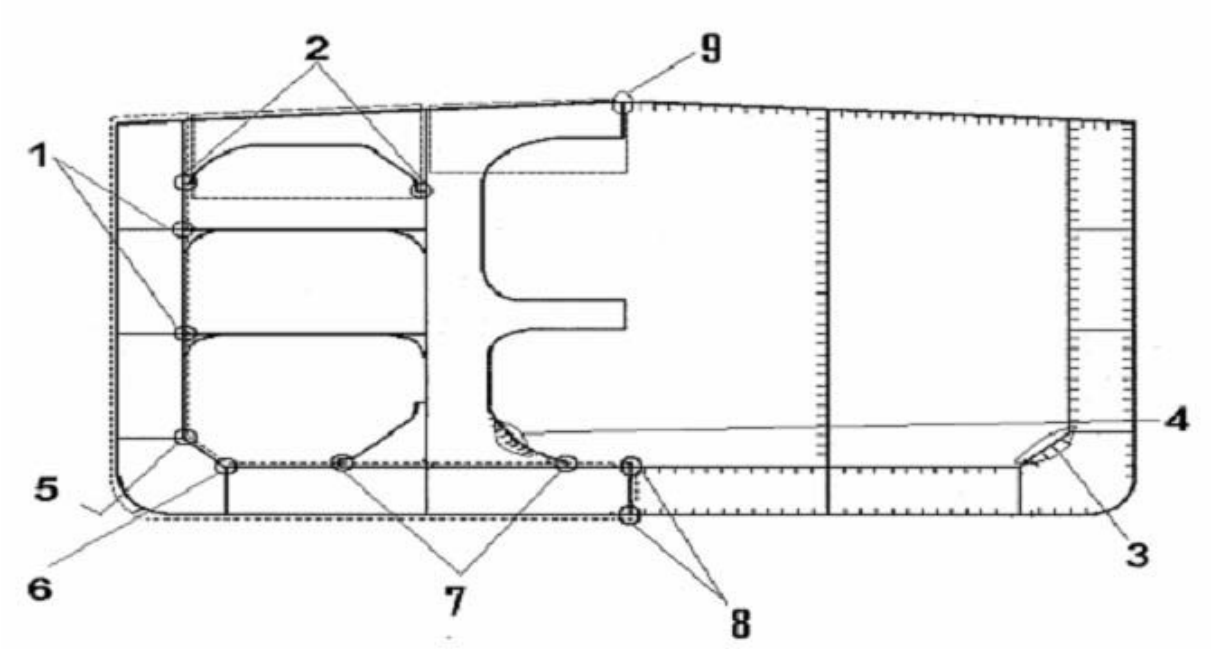
APPENDIX 2 – DOUBLE HULL OIL TANKERS - TYPICAL LOCATIONS OF FATIGUE FAILURE



1. Connection of inner hull longitudinal bulkheads.	6. Area at connection of hopper plate inner bottom and vertical double bottom girder
2. Inner hull longitudinal bracket toe	7. Area in way of longitudinal bulkhead web frame bracket connection to inner bottom.
3. Area in way of cut outs in hopper plate	8. Connection on vertical girder between inner bottom and bottom shell
4. Cut-outs around transverse web frame	9. Connections between longitudinal bulkhead web frame and upper deck.
5. Area at connections of inner hull longitudinal bulkhead upper hopper plate and horizontal girder in the wing ballast tank	

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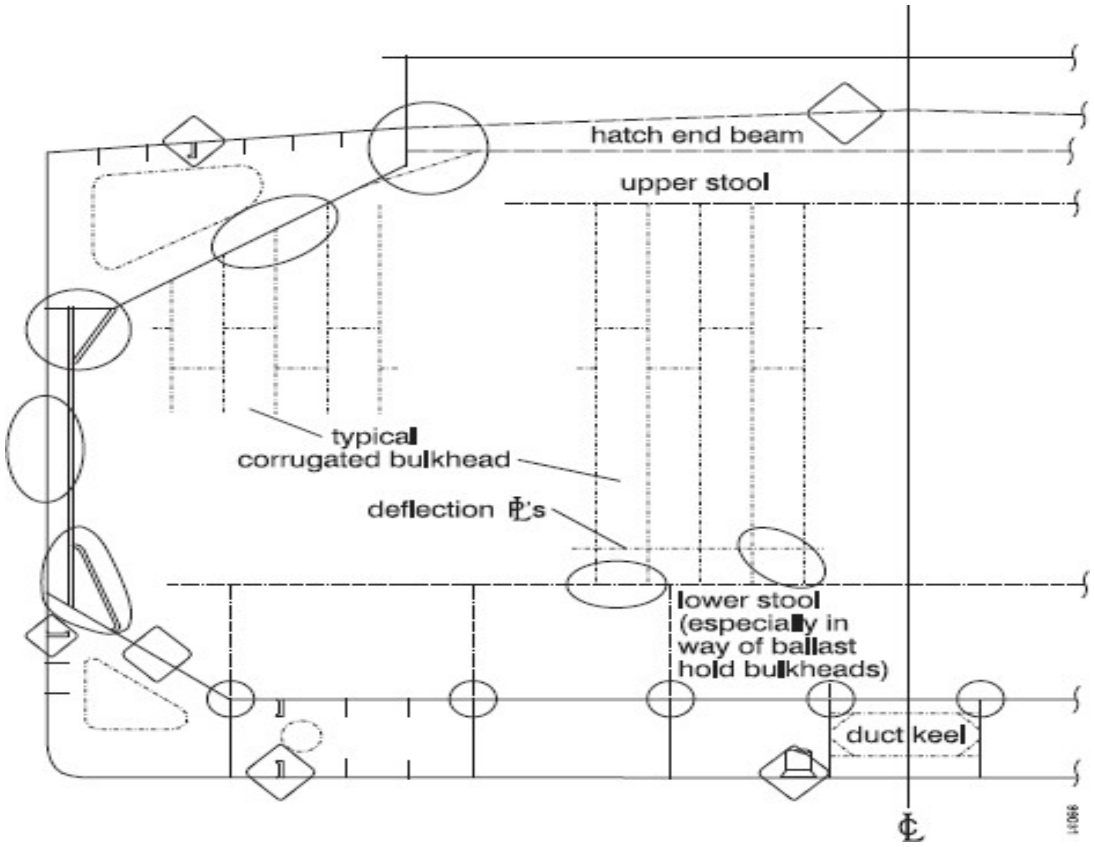
APPENDIX 3 – TYPICAL LOCATIONS SUSCEPTIBLE TO STRUCTURAL DAMAGE OR CORROSION ON HOLDS IN SINGLE HULL BULK CARRIER



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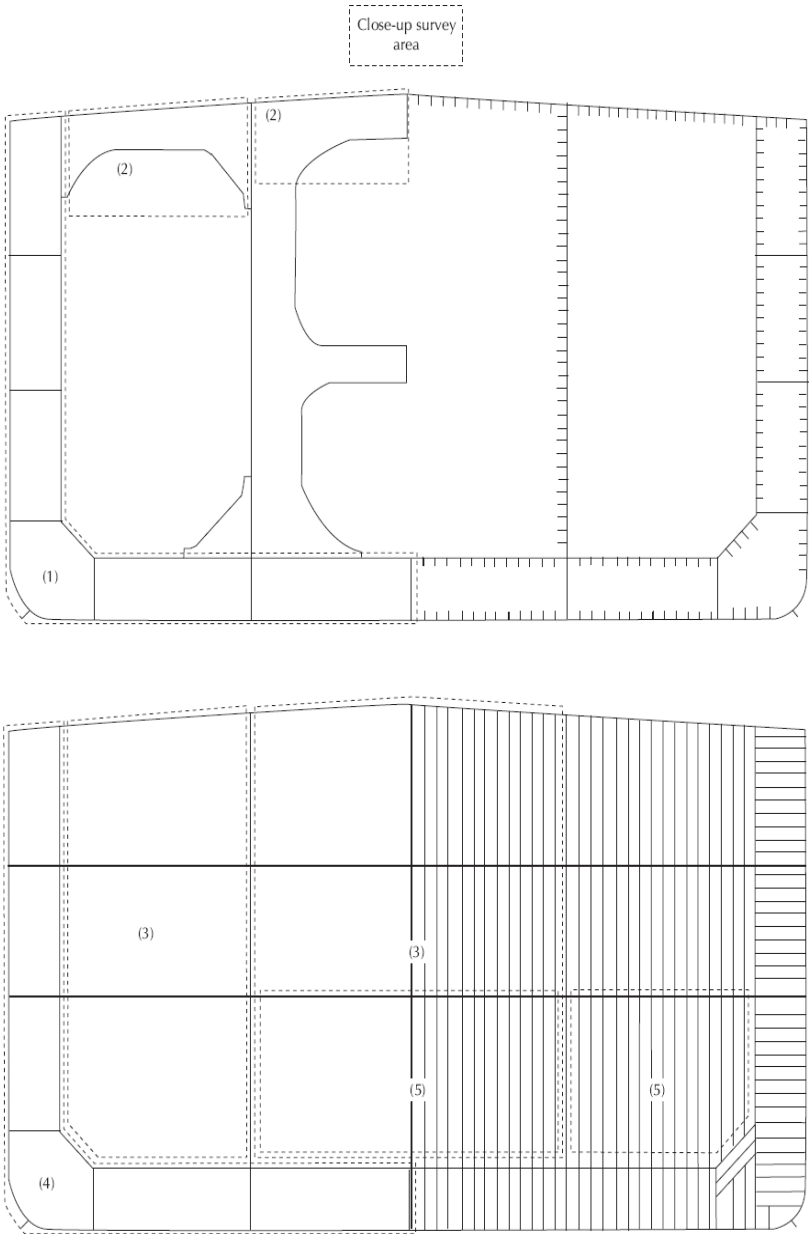
APPENDIX 4 – THICKNESS MEASUREMENT – DOUBLE-HULL OIL TANKERS SUSPECT AREAS – AREAS (1) TO (5)



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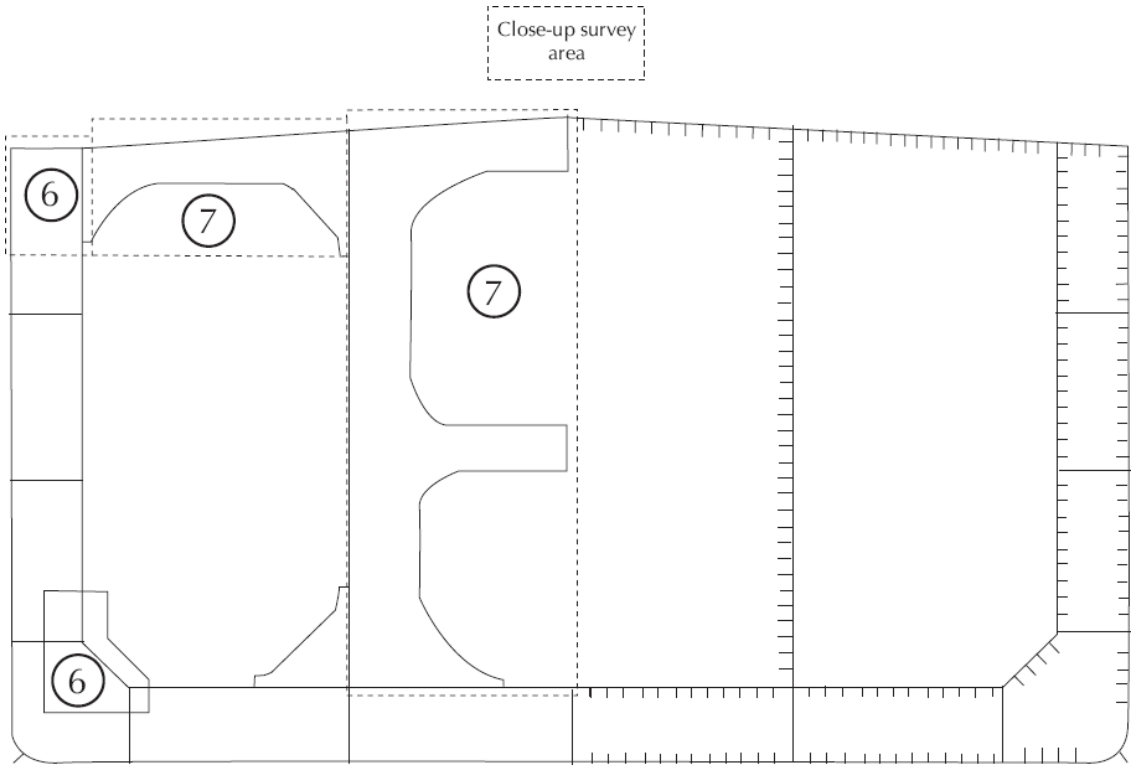
APPENDIX 5 – THICKNESS MEASUREMENT – DOUBLE-HULL OIL TANKERS

Suspect areas – areas: (6) to inner hull longitudinal/transferal brackets (7)



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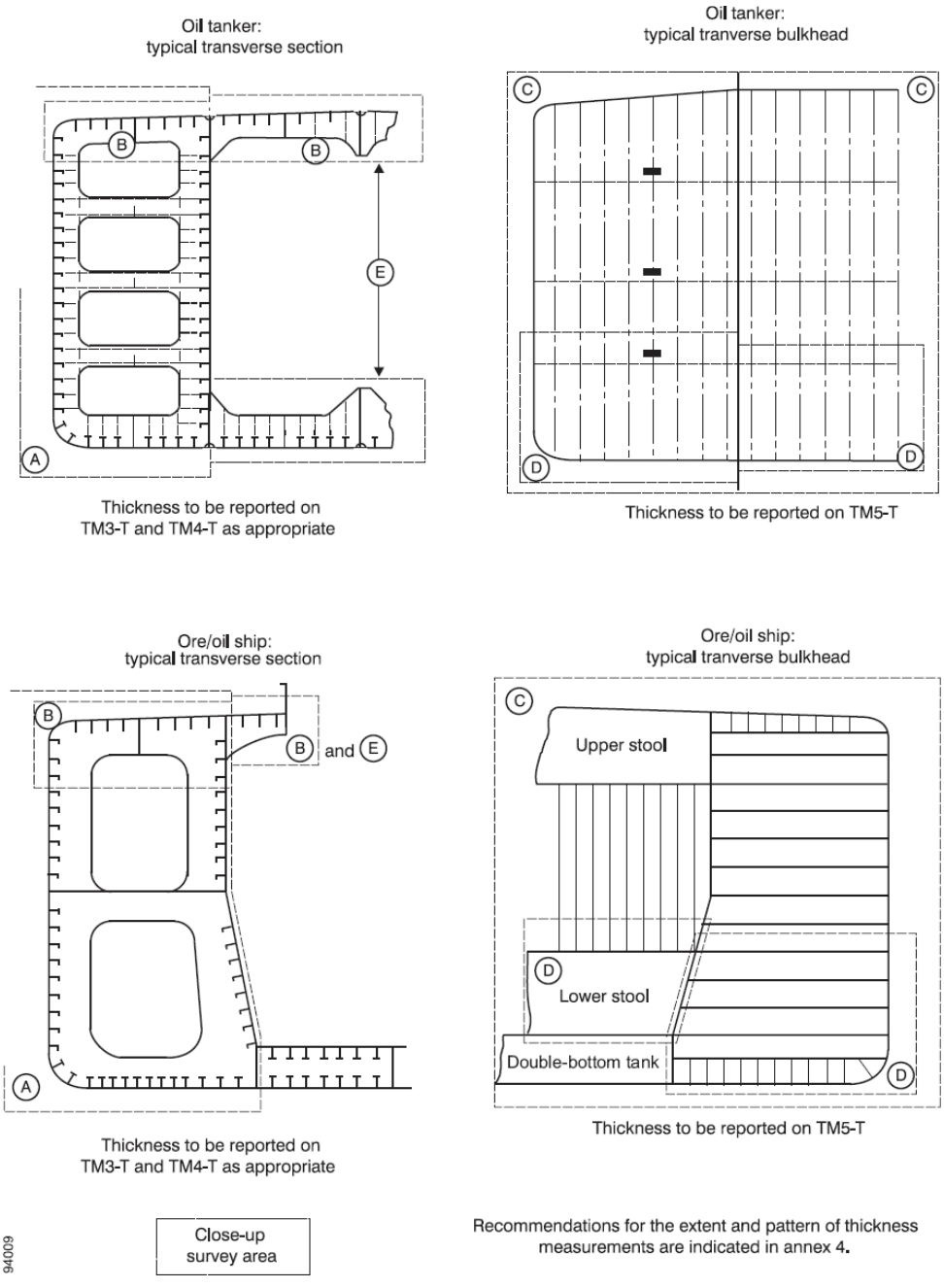
APPENDIX 6 – TRANSVERSE SECTIONS OF OIL TANKERS AND ORE/OIL SHIPS SHOWING TYPICAL AREAS FOR THICKNESS MEASUREMENT



(A) Complete transverse web frame ring including adjacent structural members
(B) Deck transverse including adjacent deck structural members
(C) Transverse bulkheads complete – including girder system and adjacent members
(D) Transverse bulkhead lower part – including girder system and adjacent structural members
(E) Deck and bottom transverse including adjacent structural members