

澳門特別行政區**REGIÃO ADMINISTRATIVA ESPECIAL
DE MACAU****行政長官辦公室****GABINETE DO CHEFE DO EXECUTIVO****第 42/2016 號行政長官公告****Aviso do Chefe do Executivo n.º 42/2016**

中華人民共和國於一九九九年十二月十三日以照會通知聯合國秘書長，經修訂的《1974年國際海上人命安全公約》自一九九九年十二月二十日起適用於澳門特別行政區；

Considerando que a República Popular da China, por nota datada de 13 de Dezembro de 1999, notificou o Secretário-Geral das Nações Unidas sobre a aplicação da Convenção Internacional para a Salvaguarda da Vida Humana no Mar de 1974, tal como emendada, na Região Administrativa Especial de Macau, a partir de 20 de Dezembro de 1999;

國際海事組織海上安全委員會於二零零五年五月二十日透過第MSC.197(80)號決議通過了《散貨船和油輪檢驗期間的強化檢查方案指南》修正案（經修正的第A.744(18)號決議），該修正案自二零零七年一月一日起適用於澳門特別行政區；

Considerando igualmente que, em 20 de Maio de 2005, o Comité de Segurança Marítima da Organização Marítima Internacional, através da resolução MSC.197(80), adoptou emendas às Directrizes relativas ao Programa Reforçado de Inspeções no âmbito das Vistorias a Graneleiros e Petroleiros (resolução A.744(18), tal como emendada), e que tais emendas são aplicáveis na Região Administrativa Especial de Macau desde 1 de Janeiro de 2007;

基於此，行政長官根據第3/1999號法律《法規的公佈與格式》第六條第一款的規定，命令公佈包含上指修正案的MSC.197(80)號決議的中文及英文文本。

O Chefe do Executivo manda publicar, nos termos do n.º 1 do artigo 6.º da Lei n.º 3/1999 (Publicação e formulário dos diplomas), a resolução MSC.197(80), que contém as referidas emendas, nos seus textos em línguas chinesa e inglesa.

二零一六年五月三十日發佈。

Promulgado em 30 de Maio de 2016.

行政長官 崔世安

O Chefe do Executivo, *Chui Sai On*.

第 MSC.197 (80) 號決議

(2005 年 5 月 20 日通過)

《散貨船和油輪檢驗期間的強化檢查方案指南》修正案 (經修正的第 A.744 (18) 號決議)

海上安全委員會，

憶及國際海事組織公約第 28 (b) 條關於本委員會的職能，

還憶及大會第 A.744 (18) 號決議，通過該決議，大會通過了有關在散貨船和油船檢驗期間的加強檢驗計劃導則 (簡稱導則)，

進一步憶及 1974 年國際海上人命安全公約 (以下簡稱公約) 第 VIII (b) 條和第 XI-1/2 條關於對導則的修正程序，

注意到大會在通過第 A.744 (18) 號決議時，要求海上安全委員會和海上環境保護委員會保持導則處於複審之中並在必要時根據他們在運用中所取得的經驗予以修改，

還注意到按照公約第 VIII (b) 條和第 XI-1/2 條的規定，海上安全委員會以第 MSC.49 (66) 號、MSC.105 (73) 號、MSC.125 (75) 號、MSC.144 (77) 號決議和 1997 年安全公約締約國政府會議的第 2 號決議通過了對大會第 A.744 (18) 號決議的修正案，

在其第八十屆會議上，經審議按照第 VIII (b) (i) 條提出並散發的公約修正案，

1. 按照公約第 VIII (b) (iv) 條，通過了公約的修正案，修正案的文本列於本決議的附件；
2. 按照公約第 VIII (b) (vi) (2) (bb) 條確定，該修正案將於 2006 年 7 月 1 日視為已被接受；除非在該日期之前有超過三分之一的締約國政府或其合計商船噸位不小於世界商船總噸位 50% 的締約國政府書面通知反對該修正案；
3. 請安全公約締約國政府注意，按照公約第 VIII (b) (vii) (2) 條，該修正案將於 2007 年 1 月 1 日生效，取決於上述第 2 段的接受情況；
4. 要求秘書長，按照公約第 VIII (b) (v) 條，將本決議核證無誤的副本和附件中所含修正案的文本轉交本公約所有締約國政府；
5. 還要求秘書長將本決議及其附件轉交非本公約締約國政府的本組織所有成員國。

附件

《散貨船和油輪檢驗期間的加強檢查方案指南》

(經修正的第 A.744 (18) 號決議) 修正案

散貨船和油輪檢驗期間的加強檢查方案指南

1 “目錄”部分由以下內容代替，並相應對導則正文中的相關標題進行修改：

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散貨船檢驗期間的加強檢查計劃導則

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 - 1.2 定義
 - 1.3 修理
 - 1.4 驗船師
- 2 換證檢驗**
 - 2.1 綜述

- 2.2 乾塢檢驗
- 2.3 處所保護
- 2.4 艙蓋和艙口圍板
- 2.5 總體和近觀檢驗的範圍
- 2.6 厚度測量的範圍
- 2.7 液貨艙壓力測試的範圍

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- 3.2 船體檢查
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- 3.5 壓載水艙的檢查
- 3.6 需符合《SOLAS 公約》第 XII/9.1 條要求的船舶根據附件 12 的要求對艙部第一貨艙的附加年度檢驗要求

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5.2 檢驗條件

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5.5 在海上或錨泊時的檢驗

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- 附件 3 所有人的檢查報告
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- 附件 5 船體結構厚度測量公司發證的程序
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- 附件 9 與規劃散貨船加強檢驗同時進行的技術評估導則
- 附件 10 發生嚴重鏽蝕區域的厚度測量範圍要求。散貨船貨物區域的定期檢驗
- 附件 11 第 1 和第 2 貨艙間水密橫向波紋艙壁垂直測量導則
- 附件 12 需符合《SOLAS 公約》第 XII/9.1 條要求的船舶艙部第一貨艙的附加年度檢驗要求
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附件 B

A 部分

雙殼油輪檢驗期間的加強檢查計劃導則

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1.3 修理

1.4 驗船師

2 換證檢驗

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4.3 船齡 10 年至 15 年的油輪

4.4 船齡超過 15 年的油輪

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6 船上的文件

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7 厚度測量程序

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附件 4 雙殼油輪嚴重鏽蝕區域厚度測量的範圍要求

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附件 6A 檢驗計劃

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附件 9 狀況評估報告

附件 10 雙殼油輪厚度測量的建議程序

附件 11 與計劃油輪加強檢驗同時進行的技術評估導則

附件 12 油輪船體桁材縱向強度衡準

B 部分

雙殼油輪以外的油輪檢驗期間的加強檢查計劃導則

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1.2 定義

1.3 修理

1.4 驗船師

2 換證檢驗

2.1 綜述

2.2 乾塢檢驗

2.3 液貨艙防腐蝕系統

2.4 總體和近觀檢驗的範圍

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- 3.2 船體檢查
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- 3.4 貨泵艙和管隧檢查
- 3.5 壓載水艙檢查
- 4 中期檢驗**
- 4.1 綜述
- 4.2 船齡 5 年至 10 年的油輪
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- 5 檢驗的準備**
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附件 8 檢驗報告原則

附件 9 狀況評估報告

附件 10 厚度測量的建議程序

附件 11 與計劃油輪加強檢驗同時進行的技術評估導則

附件 12 油輪船體桁樑縱向強度衡準”

2 整個導則：

- .1 “定期檢驗期間加強檢驗”、“定期檢驗”和“加強檢驗”一詞改為“更新檢驗”；
- .2 “期間加強檢驗”一詞改為“期間檢驗”；
- .3 “期間加強檢驗”一詞改為“期間檢驗”；和
- .4 “is to be”和“are to be”一詞改為“應是”。

附件 A

散貨船檢驗期間的加強檢查計劃導則

- 3 新增第 1.1.1 段如下：

“1.1.1 本導則適用於所有 500 總噸及以上的自推進式散貨船。
”

將現有第 1.1.1 段和第 1.1.2 段重新編號為第 1.1.2 段和第 1.1.3 段。

- 4 在新第 1.1.2 段（原第 1.1.1 段）的第 2 句話中，“《1974 年 SOLAS 公約》”後插入“第 I/10 條”的字樣。

- 5 在第 1.2.14 段中，將“中期強化檢驗為一次……的強化檢驗”改為“中期強化檢驗為一次……的檢驗”。

- 6 在現有第 1.2.15 段中，將“入級條件”一詞改為：“入級條件或建議”。

- 7 新增加 1.2.17 段如下：

“1.2.17 特殊考慮係指進行充分的近觀檢驗和厚度測量以確認塗層下結構的實際平均狀況。”

- 8 刪去第 1.3.2 段中的“重大”一詞。

- 9 新增第 1.4 段如下：

“1.4 驗船師

對於 20,000 載重噸或以上的散貨船，應由兩名驗船師聯合開展

散貨船船齡超過 10 年後的第一次定期換證檢驗，以及所有後續換證檢驗和中期檢驗。如果檢驗有認可組織進行，驗船師應只受僱於該認可組織。”

- 10 刪去第 2.1.2 段中的“厚度測量和”字樣。
- 11 刪去第 2.2.4 段。
- 12 刪去第 2.3.1、2.6.4、3.4.1.1 和 3.4.2.1 段關於“特殊考慮”的腳註的參考。
- 13 在第 3.1 節中，在“檢驗”一詞前插入“年度”一詞。
- 14 刪去現有第 3.3.2、3.3.4、3.3.5 和 3.3.6 段。
- 15 在現有第 3.3.1 段後新增第 3.3.2 至 3.3.7 段如下：

“3.3.2 只有在開敞以及關閉的位置才可能對貨艙蓋和艙口圍作出全面檢驗，並且該檢驗應包括驗證正常的開啟和關閉操作。因此，在每個年度檢驗時，應對船舶前部佔 25%船長以內的艙蓋組件和額外至少一套艙蓋組件（在每 5 年的間隔內船上的每一組艙蓋都至少被檢驗一次）在開啟、關閉和在每個方向上最大限度操作進行檢驗，包括：

- .1 在開啟狀態時的存放和固定；
- .2 關閉狀態時的適當吻合和密封有效性；以及
- .3 對液壓和電器元件、線路、鉸鏈及鏈驅動的運行測試。

艙蓋的關閉應包括所有周界、和十字搭接卡具或其他穩固裝置的緊固。應特別注意船前部 25%船長以內艙蓋的狀況，通

常該處甲板上浪荷載最大。

3.3.3 如果存在艙蓋難於操作和緊固的跡象，應由驗船師決定，對上述第 3.3.2 段要求之外的額外艙蓋組件進行操作試驗。

3.3.4 如果貨艙口穩固系統不能正常工作，應在主管機關的監督下進行維修。如果艙蓋或艙口圍經過實質性維修，應提高穩固裝置的強度以符合附件 13。

3.3.5 在每次年度檢驗時，對於每套貨艙蓋組件，應檢驗以下項目：

- .1 在開啟位置可進行近觀檢驗的艙蓋板，包括側板和加強附件（檢查其腐蝕、裂縫、變形情況）；
- .2 周邊和十字搭接密封裝置（密封墊的條件性和永久性變形、混裝船的彈性密封、密封墊邊緣、壓條、排水槽和止回閥）；
- .3 固定裝置、定位條、卡具（磨損、移位、和橡膠元件的狀況）；
- .4 艙蓋關閉定位裝置（變形和附着）；
- .5 鏈條或繩索滑輪；
- .6 導向裝置；
- .7 導軌和軌道輪；
- .8 制動器；
- .9 線路、鏈條、張力器和絞筒；

.10 液壓系統、電器安全裝置和內部鎖定；以及

.11 端部和板間鉸鏈、鉸軸和支座。

3.3.6 對於每個艙口，在每次年度檢驗時均應對包括圍板、加強構件和托架在內的艙口圍作腐蝕、裂縫和變形方面的檢查，特別是對於艙口圍的頂部。

3.3.7 在認為必要時，密封裝置的有效性可通過水龍或粉筆測試，並輔以對密封壓縮構件的尺度測量來驗證。”

16 將現有第 3.3.3 段重新編號為 3.3.8。

17 將現有第 5.1.1 段用以下內容代替：

“5.1.1 應由船東與主管機關合作在換證檢驗之前制訂一個專門的檢驗方案。該檢驗方案應為書面方案，以附件 4A 中的信息為基礎。在檢驗方案獲得同意以前不得開始檢驗。

5.1.1.1 在制訂檢驗方案以前，應由船東在附件 4B 中的信息基礎上填寫檢驗計劃問卷，並提交給主管機關。”

18 將第 5.1.2 段中的 7 個分項編號為：“.1”至“.7”，將第 5.1.3 段中的 11 個分項編號為“.1”至“.11”。

19 刪去第 5.1.4 段，並將第 5.1.5 和 5.1.6 段重新編號為第 5.1.4 和 5.1.5 段。

20 新增第 5.2.1.1 至 5.2.1.3 段如下：

“5.2.1.1 為了使主管驗船師能夠開展檢驗，船東和主管機關應就提供妥善和安全的出入通道達成一致。

5.2.1.2 在檢驗計劃問卷中應規定出入通道的細節。

5.2.1.3 如果主管驗船師斷定安全設備和所要求的通道不充分，對有關場所的檢驗不得進行。”

21 將現有第 5.2.2、5.2.3 和 5.2.4 段用以下內容代替：

“5.2.2 貨艙、液艙和處所應進出安全。貨艙、液艙和處所應不存在氣體並適當通風。在進入液艙、留空或封閉處所之前，應驗證液艙內的空氣中沒有有害氣體並且含有充足的氧氣。

5.2.3 貨艙、液艙和處所應足夠清潔且不存在水、水垢、塵土、殘油、沉積物等，以展現腐蝕、變形、裂縫、損壞或其他構造型退化以及塗層的狀況。這一點特別適用於需要進行厚度測量的區域。

5.2.4 應提供充分的照明以展現腐蝕、變形、裂縫、損壞或其他構造型退化以及塗層的狀況。”

22 新增第 5.2.5 和 5.2.6 段如下：

“5.2.5 驗船師應一直由至少一名船東指派的在檢查液艙和封閉處所方面有經驗的負責人員陪同。另外還應有至少兩名經驗豐富人員的後備組守在被檢驗的液艙或處所開口處。後備組應持續觀察液艙或處所內的工作，並應做好準備立即使用救生和撤離設備。

5.2.6 在將檢查的貨艙、液艙或處所內的人員、甲板上的負責高級船員以及駕駛室人員（視情而定）之間應安排通信系統。在整個檢驗期間均應維持該通信安排。”

23 在現有第 5.3.2 段中，在第 3 和第 4 分項間插入“便攜梯”分項。

24 將第 5.3.2 段中的 5 個分項編號為：“.1”至“.5”，將第 5.4.2 段中的 5 個分項編號為“.1”至“.5”。

25 新增第 5.4.3 至 5.4.5 段如下：

“5.4.3 在檢驗期間應備好爆度計、氧氣表、呼吸器、救生繩、配有繩索和掛鈎的安全帶和哨笛及其使用說明和指南。應提供安全核查清單。

5.4.4 應提供安全和有效開展檢驗用的充足和安全照明。

5.4.5 在檢驗期間應備有和使用充足的防護服（例如安全帽、手套、安全鞋等）。”

26 現有第 5.5.3 段用以下內容代替：

“5.5.3 如果在近觀檢驗中使用筏或小船，應符合以下條件：

- .1 只能使用堅固的充氣筏或小船，在其中一個浮力艙被劃破後仍具備滿意的儲備浮力和穩性；
- .2 小船或筏應拴在出入梯上，並應另有一人守在出入梯的下端能清楚看到小船或筏；
- .3 所有參與人員應有適當的救生衣；
- .4 液艙或艙室內的水面應平靜（在所有可預見的情況下艙內水上升不得超過 0.25m），水位或者保持穩定或者下降。無論如何在小船或筏使用期間水

位不得上升；

- .5 液艙、貨艙或處所內只能有潔淨的壓載水。水面上即使有很薄的油膜也是不可接受的；以及
- .6 在任何時候水位都不允許位於甲板下最深肋板平面 1m 以內，從而不致使檢驗人員與通往液艙口的逃生通道隔斷。只有在設有甲板進出人孔並且隔間上的開口經過檢查後，才可考慮充水至甲板橫樑以上。”

27 新增第 5.5.4 至 5.5.6 段如下：

“5.5.4 如果肋板深度為 1.5m 或以下，可允許只使用筏或小船檢查液艙或處所的甲板下區域。

5.5.5 如果肋板深度超過 1.5m，只有在以下情況下才允許只使用筏或小船：

- .1 若甲板下結構的塗層處於良好狀態，且沒有損耗的跡象；或
- .2 如果在每個隔間都提供了永久性通道允許安全進出。該通道應經由在甲板以下約 2m 裝有小平台的垂直梯通向甲板。也可考慮其他通向甲板的逃生通道。

如果上述兩個條件均不滿足，則在檢驗甲板下區域時應提供腳手架或其他等效方式。

5.5.6 第 5.5.4 和 5.5.5 段中的只使用筏或小船並不排除在

檢驗期間使用筏或小船在一個液艙內移動。”

28 新增第 5.6 節如下：

“5.6 檢驗計劃會議

5.6.1 在檢驗之前或檢驗期間作出妥善的準備和主管驗船師與船東的船上代表之間的密切合作是安全和高效完成檢驗的重要組成部分。在檢驗期間應定期召開船上安全會議。

5.6.2 在換證和中期檢驗的任何部分開始以前，應在主管驗船師、船東的參與代表、厚度測量公司的操作員（如適用）和船舶的船長之間召開檢驗規劃會議，以便確定檢驗方案中的所有預期安排均已到位，從而確保檢驗工作的安全和高效開展。

5.6.3 以下是會議中應該處理的項目的示意性清單：

- .1 船期安排（即航次、進塢和出塢操縱、靠塢期間、貨物和壓載操作等）；
- .2 厚度測量的提供和安排（即進入、清潔/除垢、照明、通風、人身安全）；
- .3 厚度測量的範圍；
- .4 接受衡準（參見最小厚度清單）；
- .5 考慮到塗層狀況和可疑區域/嚴重鏽蝕區域，近觀檢驗和厚度測量的範圍；
- .6 進行厚度測量；
- .7 記錄總體以及所發現的非均勻腐蝕或點蝕處的代表

性讀數；

.8 勘測嚴重鏽蝕區域；以及

.9 在主管驗船師、厚度測量公司操作員和船東代表之間
溝通結果。”

29 第 6.1.1 段中的“提供並在船上保存”字樣替換為“取得、提供
和在船上保存”。

30 刪去第 6.2.1.4 段。

31 將第 6.4 段中的“檢查”一詞替換為“檢驗”。

32 將第 7.1.3 段中的“擴展”一詞替換為“範圍”。

33 在現有第 8.2.1 段後新增第 8.2.2 段如下：

“8.2.2 如果一次檢驗在不同的檢驗站分開進行，應對檢驗的
每個部分作出報告。一份檢驗和（或）試驗（壓力試驗、厚度測
量等）項目的清單和關於該項目是否曾被認證的說明應在繼續
或完成檢驗前提供給下一個主管驗船師。”

34 將現有的第 8.2.2 段重新編號為第 8.2.3 段。

35 刪去現有附件 4。

36 在現有附件 3 後新增附件 4A 如下：

“附件 4A

檢驗方案

基本信息和細節

船名：
IMO 編號：
船旗國：
船籍港：
總噸位：
載重噸（米制噸）：
首尾柱間長度（m）：
造船廠：
船體編號：
認可組織（RO）：
RO 船舶識別號：
交船日期：
所有人：
厚度測量公司：

1 序言

1.1 範圍

1.1.1 本檢驗方案包括導則所要求的在貨物長度區域、貨艙、壓載艙（包括首尖艙和尾尖艙）內最低程度的總體檢驗、近觀檢驗、厚度測量和壓力試驗。

1.1.2 檢驗的安全方面的安排應能被主管驗船師接受。

1.2 文件

制定檢驗方案所使用的所有第 6 節要求的文件在檢驗期間應能從船上得到。

2 貨艙、液艙和處所的佈置

檢驗方案的本節應提供檢驗範圍內的貨艙、液艙和處所的佈置方面的信息（可以用圖的形式，也可用文字形式）。

3 貨艙、液艙和處所連同關於其用途、塗層範圍和防腐蝕系統的信息的清單

檢驗方案的本節應指出與“檢驗計劃問卷”所提供的船舶貨艙或液艙用途、塗層的範圍和防腐蝕系統方面的信息有關的任何變化（並應更新）。

4 檢驗條件

檢驗方案的本節應提供關於檢驗條件方面的信息，例如關於貨艙或液艙的清洗、除氣、通風、照明等。

5 進入結構的裝置和方法

檢驗方案的本節應指出與“檢驗計劃問卷”所提供的關於進入結構的裝置和方法方面的信息有關的任何變化（並應更新）。

6 檢驗用設備的清單

檢驗方案的本節應確定開展檢驗及厚度測量所需準備的設備清單。

7 檢驗要求

7.1 總體檢驗

檢驗方案的本節應確定並列出本船舶根據第 2.4.1 和 2.5.1 段應接受總體檢驗的處所。

7.2 近觀檢驗

檢驗方案的本節應確定並列出本船舶根據第 2.5.2 段應接受近觀檢驗的船體。

8 確定需進行液艙試驗的液艙

檢驗方案的本節應確定並列出本船舶根據第 2.7 段應接受液艙試驗的貨艙和液艙。

9 確定需進行厚度測量的區域和截面

檢驗方案的本節應確定並列出根據第 2.6.1 段應接受厚度測量的區域和截面。

10 船體結構最低厚度

檢驗計劃的本節應明確本船根據 (a) 或 (b) 需接受檢驗的船體結構的最低厚度：

(a) 根據所附的消耗餘量表和船舶船體結構圖原始厚度來確定；

(b) 在下表中給出：

區域或位置	原始建造厚度 (mm)	最低厚度 (mm)	嚴重鏽蝕厚度 (mm)
甲板			
板材			
縱材			
縱桁			
橫向甲板板材			
橫向甲板加強板材			
船底			
板材			

縱材			
縱桁			
內底			
板材			
縱材			
縱桁			
肋板			
船側，沿着頂邊艙			
板材			
縱材			
船側，沿着底邊艙			
板材			
縱材			
船側，沿着液貨艙（如適用）			
板材			
縱材			
縱桁			
船側，沿着貨艙			
板材			
側肋腹板			
側肋翼緣			
上支架腹板			
上支架翼緣			
下支架腹板			
下支架翼緣			
縱艙壁（如適用）			
板材			
縱材（如適用）			
縱桁（如適用）			
橫艙壁			
板材			
加強肋（如適用）			
上板材支座			
上加強肋支座			
下板材支座			

下加強肋支座			
頂邊艙橫腹板骨架			
板材			
翼緣			
加強肋			
底邊艙橫腹板骨架			
板材			
翼緣			
加強肋			
艙蓋			
板材			
加強肋			
艙口圍			
板材			
加強肋			

註： 損耗餘度表應附在檢驗方案之後。

11 厚度測量公司

檢驗方案的本節應指出與“檢驗計劃問卷”所提供的關於厚度測量公司的信息有關的任何變化。

12 與該船舶有關的破損經歷

檢驗方案的本節應使用下文提供的表格提供貨物長度區域內沿貨艙、壓載艙和空艙至少前三年的船體破損細節。對這些破損應進行檢驗。

按位置劃分的本船船體破損情況

貨艙、液艙或處 所的編號或區域	可能的原 因，如果知 道	對破損 的描述	位置	維修	維修日期

姊妹船或類似船舶（如果有）的船體破損（若破損與設計有
關）

貨艙、液艙或處 所的編號或區域	可能的原 因，如果知 道	對破損 的描述	位置	維修	維修日期

13 以前的檢驗所確定的嚴重鏽蝕區域

檢驗計劃的本節應確定並列出以前檢驗所確定的嚴重鏽蝕區域。

14 關鍵結構區域和可疑區域

檢驗計劃的本節應確定並列出關鍵結構區域和可疑區域（如果有這些信息的話）。

15 其他相關評論和信息

檢驗計劃的本節應提供與檢驗相關的其他評論和信息。

附錄

附錄 1 – 圖紙清單

第 5.1.3.2 段要求提供關於貨艙和壓載艙的主要結構圖（船材尺寸圖），包括關於使用高強度鋼（HTS）的信息。檢驗方案的本附錄應確定並列出作為檢驗方案組成部分的主要結構圖。

附錄 2 – 檢驗計劃問卷

由船東所提交的檢驗計劃問卷（附件 4B）應附在檢驗方案後。

附錄 3 – 其他文件

檢驗方案的本部分應確定並列出作為檢驗方案組成部分的其他文件。

根據第 5.1.3 段由船東與主管機關合作準備：

日期：.....（經授權的船東代表的姓名和簽字）

日期：.....（主管機關授權代表的姓名和簽字）

37 在現有附件 4A 後新增附件 4B 如下：

“附件 4B

檢驗計劃問卷

1 以下信息將能夠使船東與主管機關合作制訂符合導則要求檢驗方案。在填寫本問卷時，船東提供最新信息非常關鍵。本問卷在完成後，應提供導則所要求的所有信息和材料。

細節

船名：

IMO 編號：

船旗國：

船籍港：

船東：

認可組織：

總噸位：

載重噸（米制噸）：

交船日期：

關於近觀檢驗和厚度測量通道的信息

2 船東應在下表中說明進入需開展近觀檢驗和厚度測量的結構的通道。近觀檢驗係指結構構件的細節均位於主管驗船師的仔細目視檢查範圍之內（即手能接觸到）的檢查。

艙號	結構	臨時腳手架	船筏	梯子	直接進入	其他方式 (請寫明)
F.P.	首尖艙					
A.P.	尾尖艙					
貨 艙	艙口側圍					
	頂邊艙斜板					
	上板材支座					
	橫甲板					
	側殼、框架和托架					
	橫艙壁					
	底邊艙板材					
	下支座					
	液艙頂					
頂 邊 艙	甲板下結構					
	側殼及結構					
	斜板及結構					
	腹板和艙壁					
底 邊 艙	底斜板及結構					
	側殼及結構					
	底結構					
	腹板和艙壁					
	雙層底結構					
	上支座內結構					
	下支座內結構					
雙 層 礦 石 船 翼 艙	甲板下結構					
	側殼及結構					
	側殼垂直腹板及結構					
	縱向艙壁及結構					
	縱向艙壁腹板及結構					
	底板及結構					
	橫拉杆／承樑材					

裝載腐蝕性（如含硫量高）散貨的歷史

船東的檢查

3 船東應使用類似於下表的格式（作為一個範例），提供其前 3 年內根據導則對所有貨艙和壓載艙和貨物區域內的留空處所進行檢驗的詳細結果。

艙櫃編號	防腐蝕 (1)	塗層範圍 (2)	塗層狀況 (3)	結構消耗 (4)	艙櫃歷史 (5)
貨艙					
頂邊艙					
底邊艙					
雙舷側艙					
雙層底艙					
上支座					
下支座					
翼艙（礦沙船）					
首尖艙					
尾尖艙					
其他處所：					

註：指明用於裝油/壓載的艙。

- 1) HC = 硬塗層；SC = 軟塗層；
A = 陽極；NP = 沒有保護
- 2) U = 上部；M = 中部；L = 下部；
C = 全部
- 3) G = 良好；F = 一般；P = 差；
RC = 重塗過（在過去 3 年內）

船東代表的姓名：

.....

- 4) N= 沒有結果記錄；Y= 有結果記錄，對結果的描述應附在本問卷之後
- 5) DR= 破損和維修；L= 滴漏；CV= 改裝（描述應附在本問卷之後）

簽字：

日期：

港口國監督檢查報告

列出港口國監督檢查報告中與船體結構有關的缺陷和關於糾正這些缺陷的信息：

安全管理系統

列出關於船體維護的不符合項，包括相關的改正措施：

經認可的厚度測量公司的名稱和地址：

”

“附件 6

檢驗報告原則

作為一項原則，針對受導則約束的散貨船，驗船師應在其船體結構和管系的報告中收錄以下與該檢驗有關的內容。

1 綜述

1.1 在以下情況時應編寫檢驗報告：

- .1 關於定期船體檢驗（即相關的年度、中期和換證檢驗）的開始、繼續和（或）完成；
- .2 如果發現結構破損和（或）缺陷；
- .3 如果進行了修理、換新或改裝；以及
- .4 如果附加了入級條件（建議）或條件被刪除。

1.2 報告應提供：

- .1 關於已按適用的要求開展了所規定的檢驗的證據；
- .2 關於已開展檢驗及其結果、所進行的維修以及附加或刪除的入級條件（建議）的文字材料；
- .3 檢驗記錄，包括所採取的措施，它們將構成可審核的文件依據。檢驗報告應保留在要求保存在船上的檢驗報告卷宗內；
- .4 關於計劃未來檢驗的信息；以及

.5 可用來調整入級規定和指令的信息。

1.3 如果一項檢驗是在不同的檢驗站分開進行的，應為檢驗的每個部分作出報告。一份關於所檢驗項目的清單、相關的結果和關於該項目是否曾被認證的說明應在繼續或完成檢驗前提供給下一位主管驗船師。還應為下一位驗船師列出所開展的厚度測量和液艙測試。

2 檢驗範圍

2.1 指明進行了總體檢驗的艙室。

2.2 指明各個液艙內進行了近觀檢驗的位置，以及關於使用的出入通道的信息。

2.3 指明各個液艙內進行了厚度測量的位置。

註：作為最低要求，指明近觀檢驗和厚度測量的位置時應包括對符合附件 A 中基於定期檢驗的類型和船齡所規定的範圍要求的各個結構構件的描述的確認。

如果只要求部分檢驗，即 25%的殼框架 / 一個寬板肋骨環 / 兩個甲板橫材，該位置說明應包括使用框架編號來指明在各壓載艙和貨艙中的位置。

2.4 對於液艙中發現保護塗層處於良好狀態，且專門考慮了近觀檢驗和（或）厚度測量範圍的區域，應指明受到了專門考慮的結構。

2.5 指明進行了液艙測試的液艙。

2.6 指明經過了下述檢驗的甲板上以及貨艙、壓載艙、管隧、隔離艙和留空處所內的管系：

- .1 進行了包括對帶有閘門和附件的管系內部檢查的檢驗和相關的厚度測量；以及
- .2 對工作壓力進行了操作性測試。

3 檢驗結果

3.1 各艙內保護塗層的有關類型、範圍和狀況（按良好、一般或不良來分等），包括指明裝有陽極的液艙。

3.2 每個艙室的結構狀況，包括以下相關信息：

- .1 指明發現的情況，例如：
 - .1.1 腐蝕，連同對位置、類型和範圍的描述；
 - .1.2 發生嚴重鏽蝕的區域；
 - .1.3 裂縫/斷裂，連同位置和範圍的描述；
 - .1.4 彎曲，連同位置和範圍的描述；以及
 - .1.5 錯位，連同位置和範圍的描述；
- .2 指明沒有發現結構破壞/缺陷的艙室。報告可以附有草圖/照片。
- .3 厚度測量報告應由船上控制測量的驗船師進行驗證和簽字。

4 針對發現的情況採取的行動

4.1 如果主管驗船師認為需要維修，應在一份編號的清單中指明每個將要維修的項目。一旦進行過修理，應通過具體提及編號清單中的相關項目來報告所進行修理的細節。

4.2 應通過指明下述情況來報告修理的細節：

- .1 艙室；
- .2 結構構件；
- .3 維修方法（即更新或改動），包括：
 - .3.1 鋼種和尺度（如果與原來不同）；
 - .3.2 草圖/照片，視情況；
- .4 維修範圍；以及
- .5 非破壞性測試（NDT）/測試。

4.3 對於在檢驗時未能完成的維修，應對維修規定具有特定時間限制的人級條件/建議。為了向負責對維修進行檢驗的驗船師提供正確和適當的信息，人級條件/建議應足夠詳細，指明需要維修的每一項目。為了明確大量修理的情況，可參照檢驗報告。

”

- 39 刪除附件 8 附錄 3 中的表 1 和表 2 並將表 3 重新編號為表 1。
- 40 在附件 9 的第 1 段中，“附件 A 的 5.1.6 段”的字樣替換為“5.1.5 段”。
- 41 增加下列新的附件 13：

“附件 13

散貨船艙口蓋固定裝置的強度

1 固定裝置

固定裝置的強度應該符合下列要求：

- .1 艙蓋面板應該由適當的裝置（螺栓、楔子或相似的）加以固定，適合於填補艙口圍板與艙蓋組件之間的縫隙。佈置和間隔的確定應該適當注意風雨密的有效性，取決於艙口蓋的類型和尺寸以及與繫固裝置之間艙口蓋邊沿的硬度。
- .2 每一繫固裝置的淨截面面積不應小於：

$$A = 1.4a/f \text{ (厘米}^2\text{)}$$

式中：

a = 每一固定裝置之間的不小於 2 米

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

σ_Y = 對於裝配所使用的鋼材，規定的最小應力在 N/mm^2 以上，不得取大於最後抗拉強度的 70%。

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

$$= 1.0 \text{ 對於 } \sigma_Y = 235$$

對於面積超過 5m^2 的艙口，螺桿或螺栓的直徑至少為

19 毫米。

.3 在艙蓋和艙口圍板之間和在交叉接頭處，有一根足以取得風雨密壓力的包紮繩應由繫固裝置加以保持。對於壓力超過 5N/毫米的包紮繩，橫截面積應該按比例增加。包紮繩壓力應予規定。

.4 艙蓋邊沿撓度應足以保持繫固裝置之間的適當密封壓力。組件邊沿的慣性力矩 I 應小於：

$$I = 6pa^4 \text{ (厘米}^4\text{)}$$

式中：

p = 包裝線壓按 N/毫米，最小為 5N/毫米

a = 固定裝置的間距（米）

.5 繫固裝置應有可靠的結構並緊緊地附着在艙口圍板、甲板貨艙蓋上。每一艙蓋上的單個繫固裝置具有大約相同的撓性特徵。

.6 如果安裝螺杆楔子，應與有彈性的墊圈或墊子一併使用。

.7 如果採用液壓楔子，應備有正確的方法以確保一旦液壓系統失靈，能在關閉位置保持機械鎖住。

2 制動器

2.1 第 1 和 2 號艙蓋應該通過制動器進行有效繫固，承受 175kN/m^2 壓力引起的橫向力量。

2.2 No.2 艙蓋應該通過制動器進行有效繫固，承受 175kN/m^2 壓力引起的首部末端的縱向力量。

2.3 No.1 艙蓋應該通過制動器進行有效繫固，承受 230kN/m^2 壓力引起的首部末端的縱向力量，如果安裝有前桅，則該壓力可以減少到 175kN/m^2 。

2.4 在制動器及其支撐構件的等同應力和在制動器咽喉的焊接處計算的應力不超過允許值的 $0.8\sigma_Y$ 。

3 材料和焊接

如為符合本附則要求裝有制動或繫固裝置，則製作的材料包括電焊條應是主管機關滿意。”

附件 B

有關雙殼油船檢驗期間加強檢驗計劃導則

42 原有的附件 B 修改為第 A 節，標題為：

“第 A 節

有關雙殼油船的檢驗期間加強檢驗計劃導則”

並增加第 B 節標題為：

“第 B 節

有關雙殼油船以外的油船檢驗期間加強檢驗計劃導則”

43 新的第 A 節文本如下：

“第 A 節

有關雙殼油船的檢驗期間加強檢驗計劃導則

1 綜述

1.1 適用範圍

1.1.1 本導則應適用於 500 總噸及以上的所有自推式雙殼油船。

1.1.2 本導則應適用於船體結構和貨艙、隔離艙、管隧、貨物區域內的空處所及所有壓載艙管路系統的檢驗。該檢驗應按照經修正的 1974 年國際海上人命安全公約第 I/10 條規定的檢驗期間進行。

1.1.3 本導則包括厚度測量和液艙測試的範圍。當發現有嚴重腐蝕和/或結構性缺陷，應擴大檢驗並在必要時進行附加的近觀檢驗。

1.2 定義

1.2.1 雙殼油船係指主要為運載散裝貨油而建造的船舶，其貨艙通過延伸到整個貨物區域，包括運載壓載水的雙層側和雙層底或空處所的雙層殼加以保護。

1.2.2 壓載艙係指僅用於裝壓載水的液艙。

1.2.3 全面檢驗係指旨在對船體結構的全面情況做出報告並

對確定附加的近觀檢驗範圍做出報告的檢驗。

1.2.4 近觀檢驗係指在驗船師在近距離，即最好在手能觸及的範圍內對構件進行目測檢查的檢驗。

1.2.5 橫切面包括甲板、船側、船底內底和縱向艙壁上的全部縱向構件，諸如板材、縱桁和樑。

1.2.6 代表性液艙係指能夠反映具有同樣類型和功能並有相同防腐蝕系統的其他液艙狀況的液艙。在選擇代表性液艙時，應考慮到船舶的運營和修理歷史，並可視為相同的危險區域和/或可疑區域。

1.2.7 可疑區域係指表明嚴重腐蝕和/或驗船師認為易被迅速腐蝕的區域。

1.2.8 嚴重腐蝕係指估計腐蝕的範圍超過允許界限的 75%，但還在可接受的極限內。

1.2.9 防腐蝕系統通常係指可考慮的下面兩種之一：

- .1 全面的硬塗層；或
- .2 由陽極補充的全面的硬塗層。

保護性塗層通常為環氧塗層或等效物。其他的塗層系統可考慮作為替代品加以接受，但要按照廠家的規範進行施塗和保養。

在已經施塗軟塗層的地方，應為驗船師提供安全通道以嚴明塗層的有效性並對內部構件的狀況進行評估，包括塗層起斑點脫落。如果不能提供安全通道，則應清除軟塗層。

1.2.10 塗層狀況規定如下：

良好 僅有少量點狀鏽斑；

尚可 在加強筋和焊接處邊緣的塗層有局部開裂的狀況和/或在被考慮區域中輕度鏽蝕為 20%或更多的狀況，但小於不良狀況規定的範圍；

不良 在考慮區域中 20%以上區域的塗層普遍破裂或 10%以上區域有硬的鏽皮。

1.2.11 關鍵性結構區域係指根據計算被確定為需要作出監測的區域或根據標的船舶或其他類似船舶或姊妹船舶的維修史，被確定為龜裂、起皺、鏽蝕會影響船舶結構完整性的敏感區域。

1.2.12 貨物區域係指按經修正的 1974 年 SOLAS 公約第 II-2/3.6 條定義的區域。

1.2.13 期間檢驗係指在第二次或第三次年度檢驗時，或在這兩次檢驗之間進行的強化檢驗。

1.2.14 適當和徹底修理係指在檢驗時完成得使驗船師滿意的一種永久性修理，清除入級或建議的任何相關狀況的必要性。

1.2.15 特殊考慮係指採取足夠的近觀檢查和厚度測量的措施來確定塗層下構件的實際平均狀況。

1.3 修理

1.3.1 超過允許範圍的鏽蝕引起的任何損害(包括翹稜、開槽、分離或折斷)，或超過允許極限影響或主管機關認為將影響船舶結構、水密或風雨密完整性的大面積鏽蝕，應予以及時徹底的

修理（參見 1.2.14）。應考慮區域包括：

- .1 船殼邊板肋骨、邊緣附件或周邊船殼板；
- .2 甲板結構和甲板底板；
- .3 船底結構和船底板；
- .4 水密或油密艙壁，和
- .5 艙口蓋或艙口圍欄。
- .6 縱向艙壁（s）構架和縱向艙壁（s）板，如有；
- .7 橫向水密或油密艙壁構架和橫向水密或油密艙壁板；
- .8 艙口蓋和艙口圍板，如有；和
- .9 第 3.3 段的項目。

如無充足修理設備，則主管機關可允許船舶直接駛入修理場地。這可能要求從預定的航程卸貨並/或進行臨時修理。

1.3.2 此外，如果檢驗結果發現有嚴重腐蝕或結構缺陷，無論上述何種情況，主管機關認為將影響船舶是否適宜繼續營運，則應在船舶繼續營運前實施補救措施。

1.4 驗船師

對於 20,000 載重噸及以上的散貨船，應由兩名驗船師參加 10 年後的首次更新檢驗以及以後所有的更新檢驗和期間檢驗。如果檢驗是由一個認可組織完成，該驗船師應是由該認可組織專門僱用的驗船師。

2 更新檢驗

2.1 總則

2.1.1 更新檢驗可在第四個年度檢驗時開始並於下一年期間進行，以便在第五個周年日期完成。

2.1.2 作為更新檢驗準備工作的一部分，應在更新檢驗前事先制訂檢驗方案。厚度測量不應在第四個年度檢驗之前完成。

2.1.3 除了年度檢驗的要求外，檢驗應該包括檢查、測試和足夠程度的核查，以確保按 2.1.5 段要求對船體和相關管系處於合格狀態並適合於貨船構造安全證書新的有效期內的預定用途，但還要進行適當維修保養和操作並進行定期檢驗。

2.1.4 所有的貨艙、壓載艙、泵房、管隧、隔離空艙和與貨艙、甲板及船外殼相連的空處所都要進行檢查，而這種檢查如認為有必要應通過厚度測量和測試加以補充，以確保結構完整性仍然有效。檢查應足以發現嚴重鏽蝕、嚴重變形、裂縫、損壞或其他結構的損壞。

2.1.5 甲板上貨物管道，包括原油清洗管道和在上述液艙和處所的貨物和壓載水管道應予以檢查並在操作上做工作壓強測試滿足在場驗船師要求從而確保密閉性和狀況令人滿意。應特別關注貨艙的壓載水管道及壓載水艙和真空處所的貨物管道，並在任何場合下應告知驗船師在船舶修理期間何時該管道包括閘門和裝置是打開的可以進行內部檢查。

2.2 乾塢檢驗

2.2.1 乾塢檢驗應該是更新檢驗的部分。在構造安全證書的 5 年期限內應至少對船底的外部進行兩次檢驗。在所有情況下，船底檢查的最大間隔期限應該不超過 36 個月。

2.2.2 對於船齡在 15 年及以上的船舶，船底外部的檢查應在乾船塢裏進行。對於船齡小於 15 年的船舶，不可結合船舶浮起時的更新檢驗進行船底的選擇性檢查。只有在狀況令人滿意並有合適的設備和適當的合格人員時才能對飄浮船舶進行檢查。

2.2.3 如果乾塢檢驗不是與更新檢驗一起進行或如果 2.2.1 段中提到的 36 個月最大間隔期不符合，則在乾塢檢驗完成之前，貨船構造安全證書應該失效。

2.3 液艙防腐蝕系統

當裝有防腐蝕系統時，應對液貨艙防腐系統的狀況進行檢查。如果發現壓載艙的保護層的狀況差而且沒有更換，或者施塗的軟塗層，或在建造時就沒有塗保護層，則該液艙應在年度檢驗時檢查。厚度測量應在驗船師認為必要時進行。

2.4 全面檢驗和近觀檢驗的程度

2.4.1 所有完整液艙和處所應在更新檢驗時進行全面檢驗。

2.4.2 在更新檢驗時的近觀檢驗要求見附件 1。

2.4.3 驗船師在考慮到所檢驗液艙的維護保養狀況、防腐蝕系統的狀況、以及在下列情況下，如認為有必要，可以擴大近觀檢驗的範圍：

- .1 特別是對於根據得到的信息類似液艙或類似船舶

上存在結構性佈置或具體缺陷的液艙；

.2 由於主管機關批准的防腐蝕系統減小了相關結構尺寸的液艙。

2.4.4 對於發現艙口圍板處於 1.2.10 定義的良好狀況的液艙，主管機關可以特別考慮按照附件 1 的近觀檢驗的範圍。

2.5 厚度測量的範圍

2.5.1 附件 2 規定了更新檢驗時厚度測量的要求。

2.5.2 如果發現 1.2.8 定義的嚴重腐蝕，則應按照附件 4 的要求擴大厚度測量的範圍。

2.5.3 驗船師如認為必要，可擴大厚度測量的範圍。

2.5.4 對於各處所中塗層處於 1.2.10 定義的良好狀況的區域，主管機關可以特別考慮按照附件 2 規定的厚度測量的範圍。

2.5.5 應該選擇懷疑最大減薄或在甲板板材測量中發現有最大減薄的橫切面。

2.5.6 如有兩個或三個截面需要測量，至少應該包括一個在 0.5L 船中內的壓載艙。

2.6 液艙壓力測試的範圍

2.6.1 在附件 3 中規定了更新檢驗時液艙壓力測試的要求。

2.6.2 驗船師如認為必要，可擴大液艙壓力測試的範圍。

2.6.3 一般來說，壓力應相當於貨艙艙口頂部的水位或壓載艙空氣管頂部的水位。

3 年度檢驗

3.1 綜述

年度檢驗應包括目的在於儘可能確保船體和管路保持在令人滿意的狀況的檢查，並應考慮營運歷史、檢驗報告卷宗中確定的壓載艙和區域防腐蝕系統的狀況和範圍。

3.2 船體的檢查

3.2.1 船殼板及其關閉裝置，凡可見之處均應檢查。

3.2.2 應儘可能檢查水密滲透情況。

3.3 露天甲板檢查

3.3.1 對液貨艙開口的檢查，包括墊圈、艙蓋、圍板和火焰屏蔽裝置。

3.3.2 對液貨艙壓力/真空閥和火焰屏蔽裝置的檢查。

3.3.3 對通向燃油艙和污油櫃所有透氣管上火焰屏蔽裝置的檢查。

3.3.4 對貨物管路系統、原油洗艙管系、燃油管系和透氣管管系，包括透氣管桅和通風集管的檢查。

3.4 貨泵房和管隧的檢查

3.4.1 檢查所有艙壁有無漏油或裂縫，特別是檢查所有艙壁貫穿裝置的密封情況。

3.4.2 檢查所有管路系統和管隧的狀況。

3.5 壓載艙的檢查

3.5.1 如更新檢驗和期間檢驗的結果表明需要時，應對壓載艙進行檢查。如發現大面積腐蝕時，應進行厚度測量。

3.5.2 如發現 1.2.8 段定義的嚴重腐蝕時，應按照附件 4 中的要求，擴大厚度測量的範圍。

3.5.3 船齡超過 15 年的雙殼油船

3.5.3.1 帶有任何加熱裝置的貨艙或燃油艙臨近（即有共同的平面邊界）的所有壓載艙應作內部檢查。如驗船師認為有必要，應進行厚度測量，而如發現嚴重腐蝕，則應根據附件 4 的要求，擴大厚度測量的範圍。

3.5.3.2 對於在以往的期間檢驗或更新檢驗時發現沒有實質性腐蝕並發現符合下列條件之一的壓載艙，主管機關可以給予特別考慮：

- .1 塗層處於良好狀態；或
- .2 共同邊界，包括鄰近結構的塗層處於良好狀態，而且液艙的其餘部分的塗層處於較好狀態。

4 中期加強檢驗

4.1 總則

4.1.1 年度檢驗要求以外的附加項目可以在第二次或第三次年度檢驗或在這些檢驗期間進行檢驗。

4.1.2 檢驗的程度取決於下面 4.2、4.3 和 4.4 段規定和附件 5

所示的船齡。

4.1.3 對於露天甲板，儘可能對貨物、原油洗滌，燃料油、壓載物，蒸汽管和通風管系統以及通風筒和罩進行檢查，如經檢查對管系的狀況有任何懷疑，則該管系需要作壓力測試、厚度測量或兩者同時進行。

4.2 5 至 10 年船齡的油船

4.2.1 適用於 4.1.3 的要求。

4.2.2 對於載運鹹水壓載的液貨艙而言，應對驗船師挑選的具有代表性的液貨艙進行全面的檢驗。如果上述檢查未發現明顯的結構缺陷，則檢驗可僅局限於驗證保護塗層仍然有效。

4.2.3 如在鹹水壓載處所發現塗層狀況較差、腐蝕或其他缺陷或從建造之日起未刷保護塗層，則應擴大查驗，對同類的其他壓載水處所也應查驗。

4.2.4 如發現保護塗層狀況較差且未進行刷新，或已刷了軟塗層，或從建造之日起未刷保護塗層，則必要的話應在年度檢驗期間對這些艙進行查驗和厚度測量。

4.3 10 年至 15 年船齡的油船

4.3.1 適用 4.2 段的要求。

4.3.2 至少應對兩個典型貨艙進行一次全面檢驗。

4.3.3 就鹹水壓載的液艙包括貨物、壓載水兩用艙而言，應對所有這些液艙進行一次全面檢驗。如這些檢驗未發現明顯的結構缺陷，則檢驗可僅限於驗證保護塗層是否有效。

4.3.4 近觀檢驗的程度

壓載艙：與上次更新檢驗的程度相同；

貨艙：檢驗的程度應根據上次更新檢驗的記錄和液艙以往的修理情況並應對第二次更新檢驗後的兩個貨艙進行。

近觀檢驗的最低要求列於附件 5。可以根據 2.4.3 段提高近觀檢驗的程度。對液艙中塗層處於良好狀態的區域，則主管機關可以對附件 5 規定的近觀檢驗的程度予以特殊考慮。

4.3.5 厚度測量的程度

厚度測量的程度列於附件 5。期間檢驗厚度測量的最低要求須按照 1.2.7 段的規定，對上次期間檢驗時認為可疑的區域進行測量。如發現 1.2.8 段定義的嚴重腐蝕，則應根據附件 4 的要求提高附件 5 中要求的厚度測量程度。

4.4 15 年以上船齡的油船

中期檢驗的要求應與第 2 章和 5.1 章要求的上次定期檢驗的程度相同。但並不要求對貨艙和壓載水艙進行壓強測試，除非在場的驗船師認為有必要。

5 檢驗的準備工作

5.1 檢驗方案

5.1.1 特殊檢驗方案應由船東與主管機關合作在更新檢驗之前提出。檢驗方案應以書面格式提供附件 6A 中的信息。該檢驗不應在檢驗方案達成一致之前開始。

5.1.1.1 在制訂檢驗方案之前，應基於附件 6B 規定的信息，由船東填寫檢驗計劃問卷，並交到主管機關。

5.1.2 在制定檢驗方案時，應收集下列文件並商定選擇將要檢查的液艙、區域和構件：

- .1 檢驗現狀和基本的船舶信息；
- .2 在 6.2 和 6.3 段中所述的船上文件；
- .3 貨艙和壓載艙的主結構平面圖（草圖），包括關於使用的高強度鋼（HTS）的信息；
- .4 按照附件 9 的狀況評估報告；
- .5 以往破損的相關情況和修復歷史；
- .6 來自認可組織和船東的以往的檢驗和檢查的相關報告；
- .7 最近 3 年的載貨和壓載史，包括在加熱的條件下載貨史；
- .8 惰性氣體站和液艙清洗程序的詳細資料；
- .9 自建造以來船舶貨艙和壓載艙的改裝或改建的信息及相關數據；
- .10 對塗層和防腐蝕系統的敘述和歷史（包括陽極和以前的分類符號），如有的話；
- .11 在最近 3 年期間船東人員對結構一般性變壞的檢查，液艙和管系邊界洩漏以及塗層和防腐蝕系統

(包括陽極)的狀況，如有的話。報告指南列於附件 6C 中；

- .12 有關營運期間維護保養水平的資料，包括港口國監督檢查報告中與船體缺陷有關的信息，安全管理系統不符合船體維護保養的要求，包括相關的糾正的行動(s)；和
- .13 幫助識別可疑區域和關鍵構件的任何其他信息。

5.1.3 提交的檢驗方案應分別考慮附件 1、2 和 3 和 2.6 段近觀檢驗、厚度測量和液艙試驗的要求，並應至少包括下列相關信息：

- .1 基本的船舶信息和細節；
- .2 貨艙和壓載艙的主結構平面圖(草圖)，包括關於使用的高強度鋼(HTS)的信息；
- .3 液艙的佈置；
- .4 有關塗層和防腐蝕系統使用範圍的信息的液艙清單；
- .5 檢驗的條件(例如有關液艙清潔、除氣、通風、照明，等等)；
- .6 接近構件的措施和方法；
- .7 檢驗設備；
- .8 近觀檢驗的液艙和區域的識別(看 2.4)；

- .9 厚度測量的區域和截面的識別（看 2.5）；
- .10 為液艙測試的液艙識別（看 2.6）；
- .11 厚度測量公司的辨認；
- .12 與所述船舶有關的破損經歷；和
- .13 關鍵的結構區域和可疑區域，如果相關的話。

5.1.4 主管機關應告訴船東適用到該船可接受的結構腐蝕減少的最大限度。

5.1.5 還應使用附件 11 所含的技術評估和液貨船加強檢驗計劃導則。該導則為推薦性工具，主管機關在準備檢驗方案時如認為必要和合適可以採納。

5.2 檢驗的條件

5.2.1 船東應為安全進行檢驗提供必要的便利。

5.2.1.1 為了使到場的驗船師能夠完成檢驗，應提供經船東和主管機關同意的適當的和安全通道。

5.2.1.2 應在檢驗計劃問卷中提供檢查通道的具體情況。

5.2.1.3 當參加檢驗的驗船師斷定提供的和所需的安全通道不合適時，則不應對涉及的處所進行檢驗。

5.2.2 貨艙、液貨艙和處所應能安全出入。貨艙、液貨艙和處所應沒有有害氣體並適當通風。在進入液貨艙、空艙或封閉處所之前，應先驗明液貨艙內沒有有害氣體並含有足夠的氧氣。

5.2.3 液艙和處所應足夠乾淨和沒有水、鏽皮、灰塵、殘油等，

以能顯示嚴重腐蝕、變形、裂縫、損壞或其他結構性惡化和塗層的狀況。特別是在厚度測量時適用。

5.2.4 還提供充足的照明以能顯示嚴重腐蝕、變形、裂縫、損壞或其他結構性惡化和塗層的狀況。

5.2.5 驗船師應該至少有一個由船東指定的經歷過液艙和封閉處所檢查的負責人陪伴。此外，應至少二位有經驗的人組成的後援隊守候在正在檢驗的液艙或處所的開口處。後援隊應該不斷地觀察進入液艙或處所人員的工作情況，並應保持救生和撤離設備隨即可用。

5.2.6 正在檢查的液艙或處所的檢驗方和甲板上負責駕駛員以及可能在航行駕駛台之間應安排通信系統。通信裝置應保持在整個檢驗過程中。

5.3 出入構件的通道

5.3.1 對於全面檢驗，應提供能使驗船師以安全可行的方法檢查構件的裝置。

5.3.2 對於近觀檢驗，應提供驗船師能接受的下述一種或多種出入方法：

- .1 穿過結構的永久性階梯和過道；
- .2 穿過結構的暫時性階梯和過道；
- .3 升降和移動的平台；
- .4 艇或筏；

- .5 輕便的梯子；
- .6 其他等效的裝置。

5.4 檢驗用的設備

5.4.1 厚度測量通常用超聲波測試儀來完成。應按要求向驗船師證明設備的精確度。

5.4.2 如果驗船師認為需要，可要求下列一種或多種裂縫探測程序：

- .1 X 光線儀；
- .2 超聲波設備；
- .3 磁粉設備；
- .4 染色體滲透；和
- .5 其他等效的方法。

5.4.3 濃度測驗儀，氧氣瓶、呼吸器、救生索、帶有繩和鈎的腰帶和口哨以及使用說明和指南應在檢驗期間提供。應提供安全檢驗清單。

5.4.4 應為安全和有效進行檢驗提供充足和安全的照明。

5.4.5 應提供適當的保護服並在檢驗時使用（例如：安全帽、手套、安全鞋，等等。）。

5.5 在海上或錨地檢驗

5.5.1 只要驗船師能得到船上人員的必要幫助，可接受在海上

或錨地的檢驗。進行檢驗的必要預防措施和程序應符合 5.1、5.2、5.3 和 5.4 的要求。

5.5.2 在液艙中的檢驗方和甲板上的負責駕駛員之間應安排通信系統。如果使用艇和筏，該系統還應包括負責操作壓載泵的人員。

5.5.3 使用艇和筏對液艙進行的檢驗，只能在驗船師同意的情況下才能進行，驗船師應考慮到安全裝置，包括天氣預報和合理的海況對船舶的反應。

5.5.4 如果使用筏或艇進行近觀檢驗，應符合下列條件：

- .1 只有在執行粗糙的任務時，才應使用即使有一個氣室破損仍有令人滿意的剩餘浮力和穩性的氣脹筏或小船；
- .2 小船或筏應該栓在進入的梯子上而且另有一人站在梯子口清楚地看得見小船和筏；
- .3 所有參加者應有一件合適的救生衣；
- .4 艙內的水表面應該是平靜的（在所有可預知的海況之下預計艙中的水上升不應該超過 0.25 米），而水位要麼不動，要麼下降。在使用小船或筏的同時水位決不應該上升；
- .5 艙或處所應只裝載清潔的壓載水。甚至水中一層薄的油光都是不能接受的；
- .6 任何時候允許的水位應控制在最深甲板腹板表面

下 1 米以內，以便檢驗隊不會與通向艙口的直接逃生路線隔開。填補物僅用來將橫向甲板上方弄平，如果安裝有出入人孔並在被檢查的港灣打開的話，以便檢驗隊隨時有逃生路線可走。其他有效的逃生通道可以考慮；

- .7 如果艙（或處所）與共同的通風系統或惰氣系統相連，則使用小船或筏的艙應與其他艙（或處所）隔開，以防止氣體的轉移。

5.5.5 如果腹板的深度為 1.5 米或小於 1.5 米，可以允許單獨使用筏或小船對液艙或處所下甲板區域的檢查。

5.5.6 如果腹板的深度大於 1.5 米，僅在下列情況下可以允許單獨使用筏或小船：

- .1 在甲板構件下的塗層處於良好狀態而且沒有明顯的垃圾時；或
- .2 如果在每一港灣備有允許安全進出的永久性通道。這些通道應直接從甲板經安裝在甲板下大約 2 米的小平台上的垂直進入。可以考慮通向甲板的其他有效的逃生通道。

如果達不到上述兩個條件，則應為甲板下區域的檢驗提供階梯式或其他等效的裝置。

5.5.7 在 5.5.5 和 5.5.6 段中單獨使用的筏或小船，檢驗期間不排除在一個液艙內使用小船或筏。

5.6 檢驗計劃會議

5.6.1 在檢驗前和檢驗期間現場驗船師和船東代表之間的適當準備和密切合作對安全進行檢驗至關重要。檢驗期間應召開船上安全會議。

5.6.2 在開始對更新的任何部分和期間檢驗之前，應召開現場驗船師、船東代表、厚度測量公司操作員（如果適用）和船長的檢驗計劃會議，目的是確定檢驗方案中的所有安排均就緒，以確保安全有效地進行檢驗工作。

5.6.3 下列項目應在檢驗會議上討論：

- .1 船舶的調度計劃（即：航海，入塢和出塢時間，靠泊、貨物和壓載操作期限，等等）；
- .2 厚度測量的器械和安排（即：通道，清洗/除垢，照明，通風，個人的安全）；
- .3 厚度測量的範圍；
- .4 可接受的標準（查閱最小厚度的表）；
- .5 近觀檢驗和厚度測量考慮塗層狀況和可疑區域/嚴重腐蝕的區域的；
- .6 厚度測量的執行；
- .7 一般情況是抽查並在發現不規則的腐蝕/深坑的地方取代表性讀數；
- .8 嚴重腐蝕區域的映射範圍；和

- .9 關於裁決在現場驗船師、厚度測量公司測量員和船東代表之間溝通。

6 船上的文件

6.1 綜述

6.1.1 船東應該獲得、提供 6.2 和 6.3 款規定的船舶文件並保持在船上，這些文件應即刻提供給驗船師。6.2 款中所述狀況評估報告應包括英文翻譯本。

6.1.2 文件應該在船舶的整個壽命期間保存在船上。

6.2 檢驗報告文檔

6.2.1 檢驗報告文檔應該是船上文件的一部分，包括：

- .1 結構檢驗的報告（附件 8）；
- .2 狀況評估報告（附件 9）；和
- .3 厚度測量報告（附件 10）。

6.2.2 船東和主管機關的辦公室也應有檢驗測量報告文檔。

6.3 支持性文件

船上應有下列附加文件：

- .1 5.1.2 段所要求的所有文件；
- .2 5.1 段所要求的檢驗方案，直至完成更新檢驗；和
- .3 對識別關鍵性結構區域與/需要檢查的可疑區域有幫助的任何其他信息。

6.4 複審船上的文件

在檢驗之前，驗船師應檢查作為檢驗依據的船上文件的完整性及其內容。

7 厚度測量的程序

7.1 通則

7.1.1 如要求的厚度測量不是由代表主管機關的認可組織進行的，則厚度測量應有認可組織的一名驗船師在場。驗船師應在船上對過程進行控制。

7.1.2 厚度測量公司應參加檢驗開始前召開的檢驗計劃會議。

7.1.3 在任何情況下厚度測量的程度應足以代表實際平均狀況。

7.2 對厚度測量公司的認證

厚度測量應該按照附件 7 所述原則，由持有經主管機關認可的組織簽發證書的合格公司進行。

7.3 報告

7.3.1 應該是擬定厚度測量報告並提交主管機關。該報告應該提供測量位置、所測得的厚度以及相應的原始厚度。此外，該報告應該提供完成測量的日期、測量設備的類型、人員姓名及其資格並由操作員簽字。厚度測量報告應該遵循附件 10 中所載厚度測量建議程序規定的原則。

7.3.2 驗船師應該驗證並和簽註厚度測量報告。

8 報告和檢驗評估

8.1 檢驗報告的評估

8.1.1 應對在檢驗期間收集的船舶結構狀況的數據和資料做出評估，以確定船舶的可接受性和連續結果完整性。

8.1.2 對於長度為 130 米及以上的油船（按生效的《國際載重線公約》的規定），船舶的縱向強度應在船齡達到 10 年以後所進行的構造安全換新檢驗期間，通過視情使用經測量、更新和加強的結構構件的厚度，根據附件 12 規定的油船船體桁材的縱向強度標準來評估。

8.1.3 主管機關應對數據做出分析和簽註，分析的結論應構成狀況評估報告的一部分。

8.1.4 在因初步評估而對結構構件作了更新或加強後，第 8.1.2 段所要求的船舶縱向強度評估的最後結果，應作為狀態評估報告的一部分予以報告。

8.2 報告

8.2.1 檢驗報告的原則載於附件 8。

8.2.2 當檢驗分開在不同的檢驗站進行時，應對檢驗的每一部分做出報告。檢查過和/或測試過的（壓測試，厚度測量法等等）項目清單並指出是否有未驗的項目，應在繼續或完成檢驗之前提供給下一個現場驗船師。

8.2.3 如附件 9 所示，檢驗的狀況評估報告和結果應抄送船東並存放在船上供將來檢驗時參考。狀況評估報告應有主管機關簽註。

附件 1

雙殼油輪換證檢驗時的最低近觀檢驗要求

船齡 ≤ 5 年	5 < 船齡 ≤ 10 年	10 < 船齡 ≤ 15 年	船齡 > 15 年
1	2	3	4
一個完整壓載水艙中的一個寬板肋骨 (1) (見註 1)	一個完整壓載水艙中的所有寬板肋骨 (1) (見註 1) 其餘每個壓載水艙中的寬板肋骨的折角部分和上部 (約 5 m) (6)	所有壓載水艙中的所有寬板肋骨 (1)	與第 3 欄中所述的船舶相同 主管當局認為必要的附加橫截面
一個貨油艙中的一個甲板橫材 (2)	兩個貨油艙中各一個甲板橫材 (2)	一個貨油艙中的所有寬板橫材 (7)·包括甲板橫材和橫撐材 (如有) 其他各貨油艙中的一個寬板橫材 (7)·包括甲板橫材和橫撐材 (如有)	
一個完整壓載水艙中的一個橫向艙壁 (4) (見註 1)	各完整壓載水艙中的一個橫向艙壁 (4) (見註 1)	所有貨油艙 (3) 和壓載水艙 (4) 中的所有橫向艙壁	
一個中央貨油艙中的一個橫向艙壁 (5) 一個貨油翼艙中的一個橫向艙壁 (5) (見註 2)	兩個中央貨油艙中的一個橫向艙壁 (5) 一個貨油翼艙中的一個橫向艙壁 (5) (見註 2)		

註釋：

(1)、(2)、(3)、(4)、(5)、(6) 和 (7) 是將進行近觀檢驗和厚度測量的區域（參見附件 10 的附錄 3）。

- (1) 一個壓載水艙中的寬板肋骨係指：邊艙中的垂直桁材，底邊艙中的漏斗腹板，雙底艙中的肋板和雙甲板艙中的甲板橫材（如果有的話），包括鄰接的結構性構件。首尖艙和尾尖艙中的寬板肋骨指一個完整的橫材寬板肋骨環，包括鄰接的結構性構件。
- (2) 甲板橫材，包括鄰接的結構性構件（或者液艙甲板上的外部結構，如適用）。
- (3) 貨艙中的完整橫向艙壁，包括桁系統、鄰接的結構性構件（例如縱向艙壁）和上下支座的內部構件，如果安裝了的話。
- (4) 壓載水艙中的完整橫向艙壁，包括桁系統和鄰接的結構性構件，例如縱向艙壁、雙層底艙的桁材、內底板、底邊艙側板和連接肘板。
- (5) 貨艙中的橫向艙壁下部，包括桁系統、鄰接的結構性構件（例如縱向艙壁）和下支座的內部構件，如果安裝了的話。
- (6) 折角區域及上部（約 5m），包括鄰接的結構性構件。折角區域是傾斜漏斗狀板材與內殼艙壁及內底板材連接部分周圍的寬板肋骨區域，從艙壁和雙層底的角部 2m 以上。
- (7) 貨油艙中的寬板肋骨指甲板桁材、縱向艙壁豎桁和橫撐材（如有），包括鄰接的結構性構件。

註 1 完整壓載水艙：指雙層底艙加雙層邊艙加雙甲板艙，如果適用，即使這些艙櫃是分開的。

註 2 如果沒有中央貨艙（如中央縱向艙壁的情況），應檢驗翼艙中的橫向艙壁。

附件 2

雙殼油輪換證檢驗時厚度測量的最低要求

船齡 ≤ 5 年	5 < 船齡 ≤ 10 年	10 < 船齡 ≤ 15 年	船齡 > 15 年
1	2	3	4
貨物區域內船舶全部橫樑的甲板板材一個截面	在貨物區域內： – 每塊甲板板材 – 一個橫截面	在貨物區域內： – 每塊甲板板材 – 兩個橫截面 (1) – 所有風水列板	在貨物區域內： – 每塊甲板板材 – 三個橫截面 (1) – 每塊船底列板 – 所有風水列板
	在貨物區域外，有選擇的風水列板	在貨物區域外，有選擇的風水列板	在貨物區域外，有選擇的風水列板
根據附件 1 需進行近觀檢驗的結構性構件的測量，供對鏽蝕分佈作總體評估和記錄使用	根據附件 1 需進行近觀檢驗的結構性構件的測量，供對鏽蝕分佈作總體評估和記錄使用	根據附件 1 需進行近觀檢驗的結構性構件的測量，供對鏽蝕分佈作總體評估和記錄使用	根據附件 1 需進行近觀檢驗的結構性構件的測量，供對鏽蝕分佈作總體評估和記錄使用
可疑區域	可疑區域	可疑區域	可疑區域
(1)：至少一個截面應位於船中 0.5L 內。			

附件 3

雙殼油輪換證檢驗時液貨艙測試的最低要求

船齡 ≤ 5 年	5 < 船齡 ≤ 10 年	船齡 > 10 年
1	2	3
所有壓載水艙邊界	所有壓載水艙邊界	所有壓載水艙邊界
面對壓載水艙、留空處所、管隧、有代表性的燃油艙、泵艙或隔離艙的液艙邊界	面對壓載水艙、留空處所、管隧、有代表性的燃油艙、泵艙或隔離艙的液艙邊界	面對壓載水艙、留空處所、管隧、有代表性的燃油艙、泵艙或隔離艙的液艙邊界
	構成隔離貨物邊界的所有液艙艙壁	所有其他液艙艙壁

附件 4/表 1

雙殼油輪換證檢驗嚴重鏽蝕區域

厚度測量的範圍要求

船底、內底和漏斗結構		
結構性構件	測量範圍	測量方式
船底、內底和漏斗結構列板	至少橫越雙底液艙的三個分段，包括船艙部分在所有喇叭口周圍和下方測量	在縱材和肋板間每塊板 5 點型
船底、內底和漏斗結構縱材	在測量船底板材處每個分段上至少三個縱材	在橫越法蘭線上測量 3 處和在垂直桁材上測量 3 處
船底桁材，包括水密類	在前和後水密肋板和液艙中央	在每塊面板的加強材之間測量 1 處，或至少測量 3 處
船底肋板，包括水密類	測量過船底列板的分段處的 3 個肋板，在兩端和中間測量	在 2 平方米區域上的 5 點型
漏斗結構寬板肋骨環	測量過船底列板的分段處的 3 個肋板	在板材 1 平方米區域上的 5 點型。 在法蘭線測量 1 處
漏斗結構水密橫艙壁或緩衝艙壁	— 下部 1/3 艙壁	在板材 1 平方米區域上的 5 點型
	— 上部 2/3 艙壁	在板材 2 平方米區域上的 5 點型
	— 加強材（至少三個）	對於腹板，在跨上的 5 點型（橫跨腹板兩端各測 2 處，跨中測量 1 處）。對於法蘭，在每端和中央測量 1 處
面板加強材	如果適用	單次測量

附件 4/表 2

雙殼油輪換證檢驗貨物區域長度內嚴重鏽蝕區域

厚度測量的範圍要求

甲板結構		
結構性構件	測量範圍	測量方式
甲板板材	跨越液艙的兩條帶狀	每條帶上每塊板材至少測量 3 處
甲板縱材	在每兩個條帶上每第三個縱材，至少要一個縱材	在垂直於桁材的線上測量 3 處並在法蘭（如果有的話）上測量 2 處
甲板桁材和肘板 （通常只在貨艙內）	在前後橫向艙壁、肘板和 在液艙中央	在每塊面板的加強材之間 測量 1 處，在桁材板材上 的垂直線上測量 1 處，或 至少測量 3 處。 通過法蘭測量 2 處。在桁 /艙壁肘板上的 5 點型
甲板橫向桁材	在橫跨的中央和兩端測 量，至少二個桁材	在 1 平方米區域上的 5 點 型。 在法蘭上測量一處
壓載邊艙（距甲板 2 米）內的垂直桁材和 橫艙壁	至少二個桁材，及兩個橫 艙壁	在 1 平方米區域上的 5 點 型
面板加強材	如果適用	單次測量

附件 4/表 3

雙殼油輪換證檢驗貨物區域長度內的嚴重鏽蝕區域

厚度測量的範圍要求

壓載邊艙結構		
結構性構件	測量範圍	測量方式
側殼和縱向艙壁板材：		
— 上層列板和水平桁上的列板	至少三個分段中的每對縱材之間的板材（沿液艙）	測量 1 處
— 所有其他列板	在同樣三個分段上每第三對縱材之間的板材	測量 1 處
側殼和縱向艙壁縱材：	在同樣三個分段上的每個縱材	跨越腹板測量 3 處及在法蘭上測量 1 處
— 上層列板	在同樣三個分段上的每第三個縱材	跨越腹板三次測量及在法蘭上測量 1 處
— 所有其他列板		
縱材－肘板	在同樣三個分段上，在液艙頂部、中間和底部至少三處	在肘板區域上 5 點型
垂直桁材和橫艙壁（頂甲板區域除外）：	至少兩塊腹板和兩個橫艙壁	約 2 平方米區域上 5 點型
— 水平桁上的上層列板	至少兩塊腹板和兩個橫艙壁	在每對垂直加強材間測量 2 處
— 所有其他列板		
水平桁	至少三個分段上的每個桁材上的板材	在每對縱向加強桁間測量 2 處
面板加強材	如果適用	單次測量

附件 4/表 4

雙殼油輪換證檢驗貨物區域長度內嚴重鏽蝕區域

厚度測量的範圍要求

液貨艙的縱向艙壁		
結構性構件	測量範圍	測量方式
艙頂甲板和船底列板，以及橫向艙壁的水平縱桁上的列板	至少三個分段上的每對縱材之間的板材	測量 1 處
所有其他列板	在同樣三個分段上每第三對縱材之間的板材	測量 1 處
艙頂甲板和船底列板上的縱材	在同樣三個分段上的每個縱材	跨越腹板測量 3 處及在法蘭上測量 1 處
所有其他縱材	在同樣三個分段上的每第三個縱材	跨越腹板測量 3 處及在法蘭上測量 1 處
縱材－肘板	在同樣三個分段上，在液艙頂部、中間和底部至少三個	在肘板區域上 5 點型
寬板肋骨和橫撐材	三個桁材，每個桁材上至少三個位置，包括在橫撐材接頭處的桁材	在腹板上約 2 平方米區域上 5 點型，加上在寬板肋骨法蘭上和橫撐材上測量 1 處
下邊的端肘板（寬板肋骨的另一側）	至少三個肘板	在肘板上約 2 平方米區域上 5 點型，加上在肘板法蘭上測量 1 處

附件 4/表 5

雙殼油輪換證檢驗貨物區域長度內嚴重鏽蝕區域

厚度測量的範圍要求

液貨艙內的橫向水密和緩衝艙壁		
結構性構件	測量範圍	測量方式
上部和下部的支座 (如果有的話)	在內底/甲板板材焊接合 25 毫米內的橫向扁條 在隔板板材焊接合 25 毫 米內的橫向扁條	在一米長度上加強材間 5 點型
船頂甲板和船底列板 和在水平縱桁上的列 板	每對加強筋間的板材的三 個位置：液艙寬度約 1/4、 1/2 和 3/4 處	在一米長度上加強材間 5 點型
所有其他列板	在中間位置的一對加強筋 間的板材	測量 1 處
在波型艙壁中的板材	在面板中央和在法蘭預制 接頭處尺寸變化的板材	在板材 1 平方米上 5 點 型
加強材	至少三個典型加強材	對桁材，在肘板連接間 間隔 5 點型（在每個肘 板連接處跨桁材測量 2 處，跨中測量 1 處）。 對法蘭，在每個肘板趾 和跨中各測量 1 處
肘板	在液艙頂部、中間和底部 至少三個	在肘板區域上 5 點型
水平縱桁	所有縱桁均在兩端和中間 測量	在 1 平方米區域上 5 點 型，加上在鄰近肘板趾 和法蘭上測量 1 處

附件 5

雙殼油輪中期檢驗時的總體和近觀檢驗及厚度測量最低

要求

5 < 船齡 ≤ 10 年	10 < 船齡 ≤ 15 年	船齡 > 15 年
1	2	3
有代表性海水壓載艙的總體檢驗，由主管驗船師選擇（選擇應包括首尖艙、尾尖艙及三個其他液艙）（參見 4.2）	所有海水壓載艙的總體檢驗，包括兼用的貨物/壓載艙（如果有的話）（參見 4.3）	如同附件 1 中規定的換證檢驗
	至少兩個有代表性液貨艙的總體檢驗	如同附件 1 中規定的換證檢驗
	海水壓載艙的近觀檢驗： — 一個完整液艙中的所有寬板肋骨（1）（見註 1） — 其他各壓載艙（6）中一個寬板肋骨的折角區域及上部（約 5 米） — 在完整液艙中的橫艙壁（4）（見註 1）（見 4.2.3）	如同附件 1 中規定的換證檢驗
	兩個液貨艙的近觀檢驗（或兩個兼用的貨物/壓載艙，如果有的話）：檢驗範圍應基於以前的換證檢驗記錄和該艙的修理史（參見 4.3）	如同附件 1 中規定的換證檢驗
對以前的換證檢驗中發現的第 1.2.7 段定義的可疑區域進行厚度測量（參見 4.3.5）	對以前的換證檢驗中發現的第 1.2.7 段定義的可疑區域進行厚度測量（參見 4.3.5）	如同附件 2 中規定的換證檢驗

註釋：

(1)、(4) 和 (6) 是將進行近觀檢驗和厚度測量的區域（參見附件 3 的附錄 3）。

(1) 寬板肋骨係指：邊艙中的垂直桁材，底邊艙中的漏斗腹板，雙底艙中的肋板和雙甲板艙中的甲板橫材（如果有的話），包括鄰接的結構性構件。首尖艙和尾尖艙中的寬板肋骨指一個完整的橫材寬板肋骨環，包括鄰接的結構性構件。

(4) 壓載水艙中的完整橫向艙壁，包括桁系統和鄰接的結構性構件，例如縱向艙壁、雙層底艙的桁材、內底板、底邊艙側板和連接肘板。

(6) 折角區域及上部（約 5 米），包括鄰接的結構性構件。折角區域是傾斜漏斗狀板材與內殼艙壁及內底板材連接部分周圍的寬板肋骨區域，從艙壁和雙層底的角部 2 米以上。

註 1 完整壓載水艙：指雙層底艙加雙層邊艙加雙甲板艙，如果適用，即使這些艙櫃是分開的。

附件 6A

檢驗方案

基本信息和細節

船名：
IMO 編號：
船旗國：
船籍港：
總噸位：
載重噸（米制噸）：
首尾柱間長度（m）：
造船廠：
船體編號：
認可組織（RO）：
RO 船舶識別號：
交船日期：
所有人：
厚度測量公司：

1 序言

1.1 範圍

1.1.1 本檢驗方案包括導則所要求的在貨物區域、壓載艙，包括首尖艙和尾尖艙內最低程度的總體檢驗、近觀檢驗、厚度測量和壓力試驗。

1.1.2 檢驗的安全方面的安排應能被主管驗船師接受。

1.2 文件

制定檢驗方案所使用的所有第 6 節要求的文件在檢驗期間應能從船上得到。

2 貨艙、液艙和處所的佈置

檢驗方案的本節應提供檢驗範圍內的液艙和處所的佈置方面的信息（可以用圖的形式，也可用文字形式）。

3 貨艙、液艙和處所連同關於其用途、塗層範圍和防腐蝕系統的信息的清單

檢驗方案的本節應指出與“檢驗計劃問卷”所提供的船舶貨艙或液艙用途、塗層的範圍和防腐蝕系統方面的信息有關的任何變化（並應更新）。

4 檢驗條件

檢驗方案的本節應提供關於檢驗條件方面的信息，例如關於貨艙或液艙的清洗、除氣、通風、照明等。

5 進入結構的裝置和方法

檢驗方案的本節應指出與“檢驗計劃問卷”所提供的關於進入結構的裝置和方法方面的信息有關的任何變化（並應更新）。

6 檢驗用設備的清單

檢驗方案的本節應確定開展檢驗及厚度測量所需準備的設備清單。

7 檢驗要求

7.1 總體檢驗

檢驗方案的本節應確定並列出本船舶根據第 2.4.1 段應接受總體檢驗的處所。

7.2 近觀檢驗

檢驗方案的本節應確定並列出本船舶根據第 2.4.2 段應接受近觀檢驗的船體。

8 確定需進行液艙試驗的液艙

檢驗方案的本節應確定並列出本船舶根據第 2.6 段應接受液艙試驗的貨艙和液艙。

9 確定需進行厚度測量的區域和截面

檢驗方案的本節應確定並列出根據第 2.5.1 段應接受厚度測量的區域和截面。

10 船體結構最低厚度

檢驗計劃的本節應明確本船根據導則需接受檢驗的船體結構的最低厚度（如果能夠得到相關信息，指明（a）或（b））：

（a） 根據所附的消耗餘量表和船舶船體結構圖原始厚度來確定；

（b） 在下表中給出：

區域或位置	原始建造厚度 (mm)	最低厚度 (mm)	嚴重鏽蝕厚度 (mm)
甲板			
板材			
縱材			
縱桁			
船底			
板材			
縱材			
縱桁			
船側			
板材			
縱材			
縱桁			
縱向艙壁			
板材			
縱材			
縱桁			
內底			
板材			
縱材			
縱桁			
橫向艙壁			
板材			
加強材			
橫向寬板肋骨、肋板和縱桁			
板材			
法蘭			
加強材			
橫撐材			
法蘭			
腹板			

註： 損耗餘度表應附在檢驗方案之後。

11 厚度測量公司

13 以前的檢驗所確定的嚴重鏽蝕區域

檢驗計劃的本節應確定並列出以前檢驗所確定的嚴重鏽蝕區域。

14 關鍵結構區域和可疑區域

檢驗計劃的本節應確定並列出關鍵結構區域和可疑區域（如果有這些信息的話）。

15 其他相關評論和信息

檢驗計劃的本節應提供與檢驗相關的其他評論和信息。

附錄

附錄 1—圖紙清單

第 5.1.3.2 段要求提供關於貨艙和壓載艙的主要結構圖（船材尺寸圖），包括關於使用高強度鋼（HTS）的信息。檢驗方案的本附錄應確定並列出作為檢驗方案組成部分的主要結構圖。

附錄 2—檢驗計劃問卷

由船東所提交的檢驗計劃問卷（附件 6B）應附在檢驗方案後。

附錄 3—其他文件

檢驗方案的本部分應確定並列出作為檢驗方案組成部分的其他文件。

由船東與主管機關根據第 5.1.3 段合作編寫。

日期：.....（經授權的船東代表的姓名和簽字）

日期：.....（主管機關授權代表的姓名和簽字）

附件 6B

檢驗計劃問卷

以下信息將能夠使船東與主管機關合作制訂符合導則要求檢驗方案。在填寫本問卷時，船東提供最新信息非常關鍵。本問卷在完成後，應提供決議所要求的所有信息和材料。

細節

船名：

IMO 編號：

船旗國：

船籍港：

船東：

認可組織（RO）：

總噸位：

載重噸（米制噸）：

交船日期：

關於近觀檢驗和厚度測量通道的信息

船東應在下表中說明進入需開展近觀檢驗和厚度測量的結構的通道。近觀檢驗係指結構構件的細節均位於主管驗船師的仔細目視檢查範圍之內（即手能接觸到）的檢查。

艙號	結構	C (貨物) /B (壓載)	臨時腳手架	船筏	梯子	直接進入	其他方式 (請寫明)
F.P.	首尖艙						
A.P.	尾尖艙						
翼艙	甲板下						
	側殼						
	底部橫材						
	縱桁						
	橫材						
中央液艙	甲板下						
	底部橫材						
	橫材						

前 3 年載運含有 H ₂ S 的貨物或加熱的貨物的歷史並說明貨物是否曾被加熱以及《海上安全數據單 (MSDS)》(如果有的話)

船東的檢查

船東應使用類似於下表的格式 (作為一個範例), 提供其前 3 年內根據導則對所有貨艙和壓載艙和貨物區域內的留空處所, 包括頂邊艙進行檢驗的詳細結果。

艙櫃編號	防腐蝕 (1)	塗層範圍 (2)	塗層狀況 (3)	結構消耗 (4)	液艙損壞歷史 (5)
中央貨艙					
翼貨艙					
污水					

艙櫃編號	防腐蝕 (1)	塗層範圍 (2)	塗層狀況 (3)	結構消耗 (4)	液艙損壞歷史 (5)
壓載艙					
尾尖艙					
首尖艙					
其他處所					

註： 指明用於裝油/壓載的艙。

- 1) HC = 硬塗層；SC = 軟塗層；A = 陽極；NP = 沒有保護
- 2) U = 上部；M = 中部；L = 下部；C = 全部
- 3) G = 良好；F = 一般；P = 差；RC = 重塗過（在過去 3 年內）
- 4) N = 沒有結果記錄；Y = 有結果記錄，對結果的描述應附在本問卷之後
- 5) DR = 破損和維修；L = 滴漏；CV = 改裝（描述應附在本問卷之後）

船東代表的姓名：
.....

簽字：.....

日期：.....

港口國監督檢查報告

列出港口國監督檢查報告中與船體機構有關的缺陷和關於糾正這些缺陷的信息：

安全管理系統

列出關於船體維護的不符合項，包括相關的改正措施：

經認可的厚度測量公司的名稱和地址：

附件 6C

所有人的檢查報告

結構狀況

船名：

對第...號液艙：

鋼材等級： 甲板： 舷側：

底部： 縱向艙壁：

構件	裂縫	彎曲	鏽蝕	塗層狀 況	點狀腐 蝕	改裝/ 維修	其他
甲板							
船底部							
舷側							
縱向艙壁							
橫向艙壁							

修理原因：

進行厚度測量（日期）：

總體結果：

過期檢驗：

入級的未完成條件：

評語：

檢查日期：

檢查人：

簽字：

附件 7

向船體結構厚度測量的公司發證的程序

1 適用範圍

本指南適用於向擬從事船舶船體結構厚度測量的公司的發證工作。

2 發證程序

提交文件

2.1 應向主管機關認可的組織提交下述文件供批准：

- .1 公司概況，例如組織和管理結構；
- .2 公司在船舶船體結構物的厚度測量方面的經驗；
- .3 技術人員的履歷，即作為厚度測量操作人員的技術人員的經歷、船體結構的技術知識和經驗等等。操作人員的資格應符合經認可的工業無損試驗(NDT)標準；
- .4 用於厚度測量的設備，例如超聲波測試機及其保養/校準程序；
- .5 厚度測量操作人員的指南；
- .6 厚度測量技術人員培訓方案；
- .7 符合推薦厚度測量程序(參見附件 10)的測量記錄格式。對於雙殼油輪厚度測量的推薦程序包括在附件 2 中。

對公司的審查

2.2 在對提交的文件進行了審查並感到滿意後，應審查該公司以確定該公司是根據提交的文件進行的妥善組織和管理，因此有能力進行船舶船體結構厚度測量。

2.3 在上船進行厚度測量展示並提交令人滿意的報告以前，發證是有條件的。

3 發證

3.1 在第 2.2 段所述的對公司的審查和第 2.3 段所述的展示性試驗均感到滿意時，主管機關或主管機關認可的組織應頒發認可證書和已經對該公司的厚度測量操作系統發證的通知。

3.2 應在每隔不超過三年的間隔，通過驗證原有狀況得到了保持，對證書進行更新/簽註。

4 對經認證的厚度測量操作系統任何改動的報告

在對經認證的厚度測量操作系統作出任何改動時，應將這種改動立即報告經主管機關認可的組織。如果主管機關認可的組織認為必要，應作出重新審查。

5 證書的撤銷

在下述情況下可撤銷證書：

- .1 未能妥善開展測量或未能妥善報告結果；
- .2 驗船師發現該公司經批准的厚度測量操作系統中有任何缺陷；
- .3 該公司未按要求將第 4 節中所述的任何改動報告給經主管機關認可的組織。

附件 8

檢驗報告原則

作為一項原則，針對受 ESP 約束的油輪，驗船師應在其船體結構和管系的報告中收錄以下與該檢驗有關的內容。

1 綜述

1.1 在以下情況時應編寫檢驗報告：

- .1 關於定期船體檢驗(即相關的年度、中期和換證檢驗)的開始、繼續和(或)完成；
- .2 如果發現結構破損和(或)缺陷；
- .3 如果進行了修理、換新或改裝；以及
- .4 如果附加了入級條件(建議)或條件被刪除。

1.2 報告應提供：

- .1 關於已按適用的要求開展了所規定的檢驗的證據；
- .2 關於已開展檢驗及其結果、所進行的維修以及附加或刪除的入級條件(建議)的文字材料；
- .3 檢驗記錄，包括所採取的措施，它們將構成可審核的文件依據。檢驗報告應保留在要求保存在船上的檢驗報告卷宗內；
- .4 關於計劃未來檢驗的信息；以及

.5 可用來調整入級規定和指令的信息。

1.3 如果一項檢驗是在不同的檢驗站分開進行的，應為檢驗的每個部分作出報告。一份關於所檢驗項目的清單、相關的結果和關於該項目是否曾被認證的說明應在繼續或完成檢驗前提供給下一位主管驗船師。還應為下一位驗船師列出所開展的厚度測量和液艙測試。

2 檢驗範圍

2.1 指明進行了總體檢驗的艙室。

2.2 指明各個液艙內進行了近觀檢驗的位置，以及關於使用的出入通道的信息。

2.3 指明各個液艙內進行了厚度測量的位置。

註： 作為最低要求，指明近觀檢驗和厚度測量的位置時應包括對符合附件 B 中基於定期檢驗的類型和船齡所規定的範圍要求的各個結構構件的描述的確認。

如果只要求部分檢驗，即一個寬板肋骨環/一個甲板橫材，該位置說明應包括使用框架編號來指明在各壓載艙和貨艙中的位置。

2.4 對於液艙中發現保護塗層處於良好狀態，且專門考慮了近觀檢驗和(或)厚度測量範圍的區域，應指明受到了專門考慮的結構。

2.5 指明進行了液艙測試的液艙。

2.6 指明經過了下述檢驗的甲板上以及原油洗艙 (COW)、壓載艙、管隧、隔離艙和留空處所內的管系：

- .1 進行了包括對帶有閘門和附件的管系內部檢查的檢驗和相關的厚度測量；以及
- .2 對工作壓力進行了操作性測試。

3 檢驗結果

3.1 各艙內保護塗層的有關類型、範圍和狀況（按良好、一般或不良來分等），包括指明裝有陽極的液艙。

3.2 每個艙室的結構狀況，包括以下相關信息：

- .1 指明發現的情況，例如：
 - .1.1 腐蝕，連同對位置、類型和範圍的描述；
 - .1.2 發生嚴重鏽蝕的區域；
 - .1.3 裂縫/斷裂，連同位置和範圍的描述；
 - .1.4 彎曲，連同位置和範圍的描述；以及
 - .1.5 錯位，連同位置和範圍的描述；
- .2 指明沒有發現結構破壞/缺陷的艙室。報告可以附有草圖/照片。
- .3 厚度測量報告應由船上控制測量的驗船師進行驗證和簽字。
- .4 船齡 10 年以上、長度 130m 及以上的油輪船體桁材的縱向強度評估結果。應包括以下相關數據：
 - .4.1 甲板和底板法蘭橫截面的測量值和建造值；

.4.2 甲板和底板法蘭橫截面的減少；以及

.4.3 相關的更換或加強的細節（見第 4.2 段）。

4 針對發現的情況採取的行動

4.1 如果主管驗船師認為需要維修，應在一份編號的清單中指明每個將要維修的項目。一旦進行過修理，應通過具體提及編號清單中的相關項目來報告所進行修理的細節。

4.2 應通過指明下述情況來報告修理的細節：

.1 艙室；

.2 結構構件；

.3 維修方法（即更新或改動），包括：

.3.1 鋼種和尺度（如果與原來不同）；

.3.2 草圖/照片，視情況；

.4 維修範圍；以及

.5 非破壞性測試（NDT）

4.3 對於在檢驗時未能完成的維修，應對維修規定具有特定時間限制的入級條件/建議。為了向負責對維修進行檢驗的驗船師提供正確和適當的信息，入級條件/建議應足夠詳細，指明需要維修的每一項目。為了明確大量修理的情況，可參照檢驗報告。

附件 9

狀況評估報告

在完成換證檢驗時頒發

一般參數

船名： 船級/主管機關識別號：
 原船級/主管機關識別號：
 國際海事組織編號：

船籍港： 國旗：
 原國旗：

載重噸 總噸位：
 (米制噸)： 國家：
 ITC (1969)：

建造日期： 船級符號：

重大改建日期：

改建類型： 所有人：
 原所有人：

- 1 下列檢驗報告和文件已經簽署者審核並發現令人滿意。
- 2 在(日期).....已按照本指南完成了換證檢驗。

狀況評估報告填寫人	姓名 簽名	職務
辦公室	日期	
狀況評估報告審核人	姓名 簽名	職務
辦公室	日期	

所附報告和文件：

狀況評估報告的內容

第 1 部分	— 一般細節：	— 參見標題頁
第 2 部分	— 報告審查：	— 檢驗地點和方法
第 3 部分	— 近觀檢驗：	— 範圍（哪個液艙）
第 4 部分	— 貨物和壓載管系：	— 檢查 — 操作試驗
第 5 部分	— 厚度測量：	— 參閱厚度測量報告 — 測量位置概況 — 另表，註明嚴重鏽蝕液艙和相應的： — 厚度減小 — 鏽蝕類型
第 6 部分	— 液艙防鏽系統：	— 另表，註明： — 塗層/陽極的位置 — 塗層狀況（如適用）
第 7 部分	— 維修：	— 指明液艙/區域
第 8 部分	— 入級條件/船旗國要求：	
第 9 部分	— 備忘：	— 可接受缺陷 — 今後檢驗的任何注意點， 例如可疑區域 — 由於塗層破壞而擴大的 年度/中期檢驗
第 10 部分	— 結論：	— 對檢驗報告的評估/驗證 說明

厚度測量摘要

參閱厚度測量報告：

嚴重鏽蝕的液艙 ¹ /區域 的或深點蝕 ³ 區域的位置	厚度減薄 (%)	鏽蝕類型 ²	備註： (例如：參 照所附草 圖)

註釋：

- 1 嚴重鏽蝕，即損耗了可接受損耗餘量的 75%–100%。
- 2 P = 點蝕
C = 總體鏽蝕
- 3 點蝕密度為 20%或更多的任何船底板材，損耗在嚴重鏽蝕的範圍內，或平均點蝕深度為板材實際厚度的 1/3 或以上的情況應予記錄。

液艙防鏽蝕系統

液艙號 ¹	液艙防鏽系統 ²	塗層狀況 ³	備註

註釋：

- 1 應列出所有專用壓載艙和貨/壓載水兼用艙。
- 2 C = 塗層
A = 陽極

NP = 無保護

3 塗層的狀況依照下述標準：

良好 僅有少量點狀鏽斑。

尚可 加強材和焊縫連接邊緣塗層局部開裂和/或輕度鏽蝕佔考慮區域的 20%或以上，但小於對“不良”狀況所規定者。

不良 普遍開裂的塗層佔考慮區域的 20%或以上或硬質鏽皮佔考慮區域於的 10%或以上。

如果塗層狀況被定為“不良”，則應進行擴大年度檢驗。這一點應在狀況評估報告內容第 8 部分中作出說明。

船齡 10 年以上的長度為 130m 及以上的油輪的船體桁材縱向強度評估結果

（以下第 1、2 和 3 部分，只應填寫適用的一部分）

1 本節所適用的船舶（無論建造日期為何）：在船齡到達 10 年後最近進行的《貨船構造安全證書》或《貨船安全證書》換證檢驗（SC 換證檢驗）期間，船底行材的甲板法蘭（甲板板和甲板縱材）和船底板縱材法蘭（船底殼板和船底縱材）橫截面利用測量、更換和加強的厚度（視情況）計算出，發現橫截面的減少不超過建造時面積的 10%，如下表所示：

		測量	建造時	減少
橫截面1	甲板法蘭	cm ²	cm ²	cm ² (%)
	船底法蘭	cm ²	cm ²	cm ² (%)
橫截面2	甲板法蘭	cm ²	cm ²	cm ² (%)
	船底法蘭	cm ²	cm ²	cm ² (%)
橫截面3	甲板法蘭	cm ²	cm ²	cm ² (%)
	船底法蘭	cm ²	cm ²	cm ² (%)

2 本節適用於 2002 年 7 月 1 日或以後建造的船舶：船體桁材的橫截面模數在船齡到達 10 年後最近進行的 SC 換證檢驗期間，利用測量、更換和加強的厚度（視情況）根據附件 12 第 2.1.1 段的規定計算出，考慮到本組織通過的建議，發現其減少量在主管機關決定的減少限制範圍之內，如下表所示：

		Z _{act} (cm ³) ¹	Z _{req} (cm ³) ²	備註
橫截面 1	甲板上部			
	底部			
橫截面 2	甲板上部			
	底部			
橫截面 3	甲板上部			
	底部			

註釋：

- 1 Z_{act} 係指在 SC 換證檢驗期間根據附件 12 第 2.1.1 段的規定利用測量、更新或加強結構構件的厚度計算出的船體桁材橫截面的實際截面模數。
- 2 Z_{req} 係指根據附件 12 第 2.1.1 段的規定計算出的船舶的縱向彎曲強度減少限制。

Z_{act} 的計算表應附於本報告後。

3 本節適用於 2002 年 7 月 1 日以前建造的船舶：船體桁材的橫截面模數在船齡到達 10 年後最近進行的 SC 換證檢驗期間，利用測量、更換和加強的厚度（視情況）根據附件 12 第 2.2.1.2 段的規定計算出，發現其滿足主管機關或認可的船級社要求的衡準，並且 Z_{act} 不小於附件 12 的附錄 2 中規定的 Z_{mc} （下文註 2 的定義），如下表所示：

描述主管機關或認可的船級社要求的服役船舶的可接受的船體桁材的最小橫截面模數衡準。

		Z_{act} (cm ³) ¹	Z_{mc} (cm ³) ²	備註
橫截面 1	上部甲板			
	底部			
橫截面 2	上部甲板			
	底部			
橫截面 3	上部甲板			
	底部			

註釋：

- 1 如表 2 中的 1 所定義
- 2 Z_{mc} 係指根據附件 12 第 2.1.2 段的規定計算出的最小截面模數減少限制。

附件 10

雙殼油輪厚度測量的建議程序

綜述

- 1 這些程序應用於記錄附件 2 和 4 所要求的厚度測量。
- 2 附錄 2 所載報告格式 TM1-DHT、TM2-DHT(i)、TM2-DHT(ii)、TM3-DHT、TM4-DHT、TM5-DHT 和 TM6-DHT 應用於記錄厚度測量值，應說明最大允許減小值。
- 3 附錄 3 載有有關報告格式和厚度測量要求的圖解和說明。
- 4 在適當時，報告表格應由在結構草圖上標明的數據來補充。

附錄 1

船名：

國際海事組織編號：

船級/主管機關識別號：

船籍港：

總噸位：

載重量：

建造日期：

船級社：

進行厚度測量的公司名稱：

向厚度測量公司發證者：

證書號碼：

證書有效期自： 至

測量地點：

首次測量日：

最後測量日：

換證檢驗/中期檢驗*到期日：

測量設備詳情：

操作者的資格：

報告編號： 共 頁。

操作者姓名： 驗船師姓名：

操作者簽字： 驗船師簽字：

公司正式印章： 主管機關：

正式印章：

* 不適用者刪除。

附錄 2

TM1-DHT 關於所有甲板板材、所有船底外殼板材或舷側船殼板材 的厚度測量報告*

船名：..... 船級識別號：.....

報告號：.....

列板位置	號碼或 字符	原厚度 mm	前讀數						後讀數						%	
			測量		左舷減少		右舷減少		測量		左舷減少		右舷減少			
			左	右	mm	%	mm	%	左	右	mm	%	mm	%	左	右
			mm	mm	mm	%	mm	%	mm	mm	mm	%	mm	%	mm	mm
前第 11																
第 10																
第 9																
第 8																
第 7																
第 6																
第 5																
第 4																
第 3																
第 2																
第 1																
船中																
後第 1																
第 2																
第 3																
第 4																
第 5																
第 6																
第 7																
第 8																
第 9																
第 10																
第 11																

操作人簽字：..... 驗船師簽字：..... 備註—參見反面

* 不適用者刪除。

報告 TM1-DHT 備註：

- 1 本報告應用於記錄以下厚度測量：
 - .1 貨物區域內的所有強力甲板板材。
 - .2 貨物區域內的龍骨、船底殼板和舳板。
 - .3 舷側船殼板，包括貨物區域以外選擇的風、水列板。
 - .4 貨物區域內的所有風、水列板。
- 2 列板的位置應清楚標註如下：
 - .1 對強力甲板，標明縱桁板內側的列板號碼。
 - .2 對船底列板，標明龍骨板外側的列板號碼。
 - .3 對舷側船殼板，給出剪力列板下列板的編號和船殼外展上顯示的字符。
- 3 應在所有板材的前部和後部區域和板材通過壓載水艙/貨艙邊界區域進行測量，應記錄各種類型液艙板材的分次測量。
- 4 記錄的單一測量數據將代表多次測量的平均數。
- 5 允許減少的最大值進而在所附的文件中說明。

TM2-DHT (i) (一、二或三橫截面的) 船殼和甲板板材的厚度測量報告

船名：..... 船級識別號..... 報告號.....

強力甲板和舷側厚板板材																			
列板位置	第一橫截面所處肋骨號碼						第二橫截面所處肋骨號碼						第三橫截面所處肋骨號碼						
	號碼或字符	原厚度	最大允許減少	測量	左舷減少	右舷減少	號碼或字符	原厚度	最大允許減少	測量	左舷減少	右舷減少	號碼或字符	原厚度	最大允許減少	測量	左舷減少	右舷減少	
	mm	mm	mm	左	右	%	mm	mm	mm	左	右	%	mm	mm	mm	左	右	%	
縱桁板																			
舷內側第 1 列板																			
第 2																			
第 3																			
第 4																			
第 5																			
第 6																			
第 7																			
第 8																			
第 9																			
第 10																			
第 11																			
第 12																			
第 13																			
第 14																			
中央列板																			
剪力列板																			
頂面合計																			

操作人簽名..... 驗船師簽名..... 備註—見反面

報告 TM2-DHT (i) 的備註：

- 1 本報告格式應用於記錄強力甲板板材和剪力列板橫截面的厚度測量：

在貨物區域內一、二或三個橫截面，由附件 10 的附錄 3 中圖示的典型橫截面圖所示的結構項目 (0)、(1) 和 (2) 組成。
- 2 頂面區域由甲板板材、縱桁材和剪力列板(包括圓弧船舷) 組成。
- 3 應註明測量的準確肋骨位置。
- 4 記錄的單次測量數據應代表多次測量的平均值。
- 5 最大允許減少值應在所附的文件中說明。

TM2-DHT (ii) (一、二或三橫截面的) 船殼和甲板板材的厚度測量報告

船名：..... 船級識別號..... 報告號.....

船殼板材																				
列板位置	第一橫截面所處肋骨號碼						第二橫截面所處肋骨號碼						第三橫截面所處肋骨號碼							
	號碼或字符	原厚度	最大允許減少	測量	左舷減少	右舷減少	號碼或字符	原厚度	最大允許減少	測量	左舷減少	右舷減少	號碼或字符	原厚度	最大允許減少	測量	左舷減少	右舷減少		
	mm	mm	mm	左	右	mm	%	mm	%	mm	%	mm	%	mm	mm	左	右	mm	%	
剪力列板																				
下第 1																				
第 2																				
第 3																				
第 4																				
第 5																				
第 6																				
第 7																				
第 8																				
第 9																				
第 10																				
.....																				
第 17																				
第 18																				
第 19																				
第 20																				
龍骨列板																				
船底合計																				

操作人簽名..... 驗船師簽名..... 備註一見反面

報告 TM2-DHT (ii) 的備註：

- 1 本報告格式應用於記錄船殼板材橫截面的厚度測量：
貨物長度區域內一、二或三個截面，由附件 10 中的附錄 3 圖示的典型橫截面所示的結構項目 (3)、(4) 和 (5) 及 (6) 組成。
- 2 底部區域由龍骨板、船底板和舳板組成。
- 3 應註明測量的準確肋骨位置。
- 4 記錄的單一測量數據應代表多次測量的平均值。
- 5 最大允許減少值應在所附的文件中說明。

TM3-DHT (一、二或三橫截面的) 縱向構件的厚度測量報告

船名 : 船級識別號 報告號

結構性構件	第一橫截面所處肋骨號碼					第二橫截面所處肋骨號碼					第三橫截面所處肋骨號碼					
	項目號碼	原厚度 mm	最大允許減少		項目號碼	原厚度 mm	最大允許減少		項目號碼	原厚度 mm	最大允許減少		項目號碼	原厚度 mm	最大允許減少	
			mm	%			mm	%			mm	%			mm	%
			左	右			左	右			左	右			左	右

操作人簽名 驗船師簽名 備註一見反面

報告 TM3-DHT 的備註：

- 1 本報告格式應用於記錄縱桁部件的橫截面的厚度測量：
貨物長度區域內一、二或三個截面，由附件 10 中的附錄 3 圖示的典型橫截面所示結構項目（10）至（29）組成。
- 2 應註明測量的準確肋骨位置。
- 3 記錄的單一測量數據應代表多次測量的平均值。
- 4 最大允許減少值應在所附的文件中說明。

TM4-DHT 橫向結構構件厚度測量報告
液貨艙長度內貨油艙和壓載水艙

船名： 船級識別號 報告號

液艙說明									
結構位置									
結構構件	項目	原厚度 (mm)	最大允許減少 (mm)	測量		左舷減少		右舷減少	
				左	右	mm	%	mm	%

操作人簽名 驗船師簽名 備註 — 見反面

報告 TM4-DHT 的備註：

- 1 本報告格式應用於附件 10 的附錄 3 中圖示的典型橫截面所示的適當結構項目（30）至（36）組成的橫向結構構件的厚度測量。
- 2 附件 10 的附錄 3 給出了測量區域的指南。記錄的單一測量數據應代表多次測量平均值。
- 3 最大允許減少值應在所附的文件中說明。

TMS5-DHT W.T./O.T.橫向艙壁厚度測量報告
貨艙或貨物處所內

船名： 船級識別號 報告號

液艙/艙描述		肋骨號碼						
結構構件 (板材，加強材)	原厚度 (mm)	最大允許減少 (mm)	測量		左舷減少		右舷減少	
			左舷	右舷	mm	%	mm	%

操作人簽名 驗船師簽名 備註—見反面

報告 TM5-DHT 的備註：

- 1 本報告應用於記錄 W.T./O.T.橫向艙壁的厚度測量。
- 2 附件 10 的附錄 3 給出了測量區域的指南。
- 3 記錄的單一測量應代表多次測量的平均值。
- 4 最大允許減少值應在所附的文件中說明。

TM6-DHT 其他結構構件的厚度測量報告

船名：..... 船級識別號..... 報告號.....

結構構件						草圖
結構位置						
描述	原厚度 (mm)	最大允許減少 (mm)	測量		右舷減少	
			左舷	右舷	mm	%

操作人簽名..... 驗船師簽名..... 備註—見反面

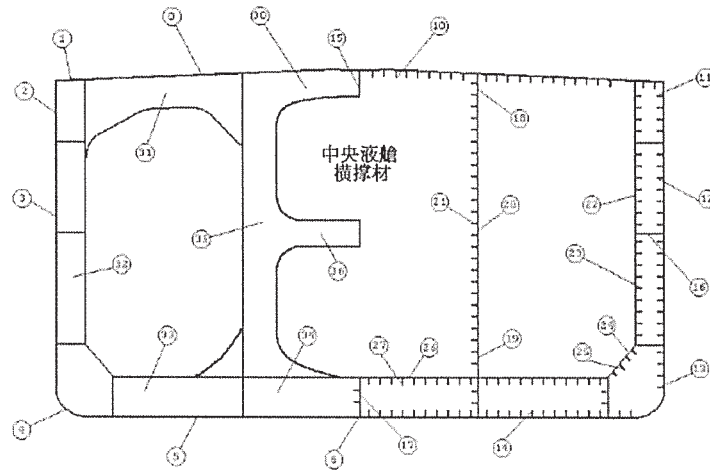
報告 TM6-DHT 的備註

- 1 本報告格式應用於記錄各種結構構件的厚度測量。
- 2 記錄的單一測量應代表多次測量的平均值。
- 3 最大允許減少值應在所附的文件中說明。

附錄 3

厚度測量－雙殼油輪

標明縱向和橫向構件的 150,000 載重噸以上的雙殼油輪的典型橫截面



報告 TM2-DHT (i) 和 (ii)
0. 強力甲板板材
1. 縱桁板
2. 剪力列板
3. 舷側殼板
4. 舭板
5. 船底外殼板材
6. 龍骨板

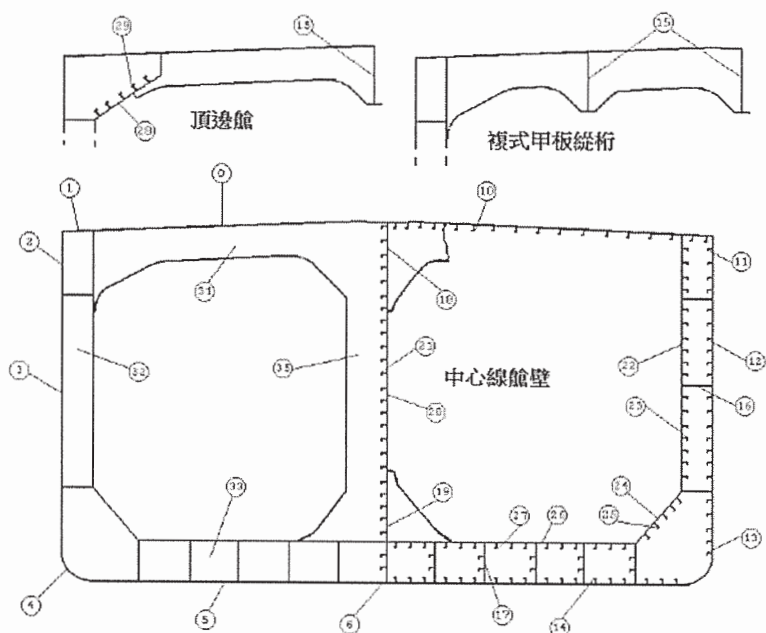
報告 TM3-DHT	
10. 甲板縱桁	20. 縱艙壁板材 (剩餘的)
11. 剪力列板縱桁	21. 縱艙壁縱桁
12. 舷側殼縱桁	22. 內側板材
13. 舭部縱桁	23. 內側縱桁
14. 船底縱桁	24. 底邊艙板材
15. 甲板縱桁	25. 底邊艙縱桁
16. 壓載翼艙的水平桁	26. 內底板材
17. 船底縱桁	27. 內底桁材
18. 縱艙壁頂列板	28. 頂邊艙板材
19. 縱艙壁底列板	29. 頂邊艙縱桁

報告 TM4-DHT
30. 甲板橫向－中央液艙
31. 甲板橫向－翼艙
32. 壓載翼艙垂直桁材
33. 翼艙雙層底肋板
34. 中央液艙雙層底肋板
35. 縱艙壁垂直桁材
36. 橫撐材

厚度測量－雙殼油輪

標明縱向和橫向構件的 150,000 載重噸以上的雙殼油輪的典型橫截面

面



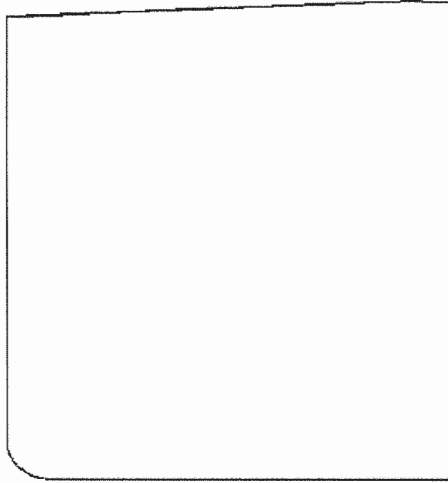
報告 TM2-DHT (i) 和 (ii)
0. 強力甲板板材
1. 縱桁板
2. 剪力列板
3. 舷側殼板
4. 舳板
5. 船底外殼板材
6. 龍骨板

報告 TM3-DHT	
10. 甲板縱桁	20. 縱艙壁板材 (剩餘的)
11. 剪力列板縱桁	21. 縱艙壁縱桁
12. 舷側殼縱桁	22. 內側板材
13. 舳部縱桁	23. 內側縱桁
14. 船底縱桁	24. 底邊艙板材
15. 甲板縱桁	25. 底邊艙縱桁
16. 壓載翼艙的水平桁	26. 內底板材
17. 船底縱桁	27. 內底桁材
18. 縱艙壁頂列板	28. 頂邊艙板材
19. 縱艙壁底列板	29. 頂邊艙縱桁

報告 TM4-DHT
30. 甲板橫向－中央液艙
31. 甲板橫向－翼艙
32. 壓載翼艙垂直桁材
33. 翼艙雙層底肋板
34. 中央液艙雙層底肋板
35. 縱艙壁垂直桁材
36. 橫撐材

厚度測量－雙殼油輪

橫截面輪廓。此圖可用於典型截面不適用的船舶



報告 TM2-DHT (i) 和 (ii)
0. 強力甲板板材
1. 縱桁板
2. 剪力列板
3. 舷側殼板
4. 舳板
5. 船底外殼板材
6. 龍骨板

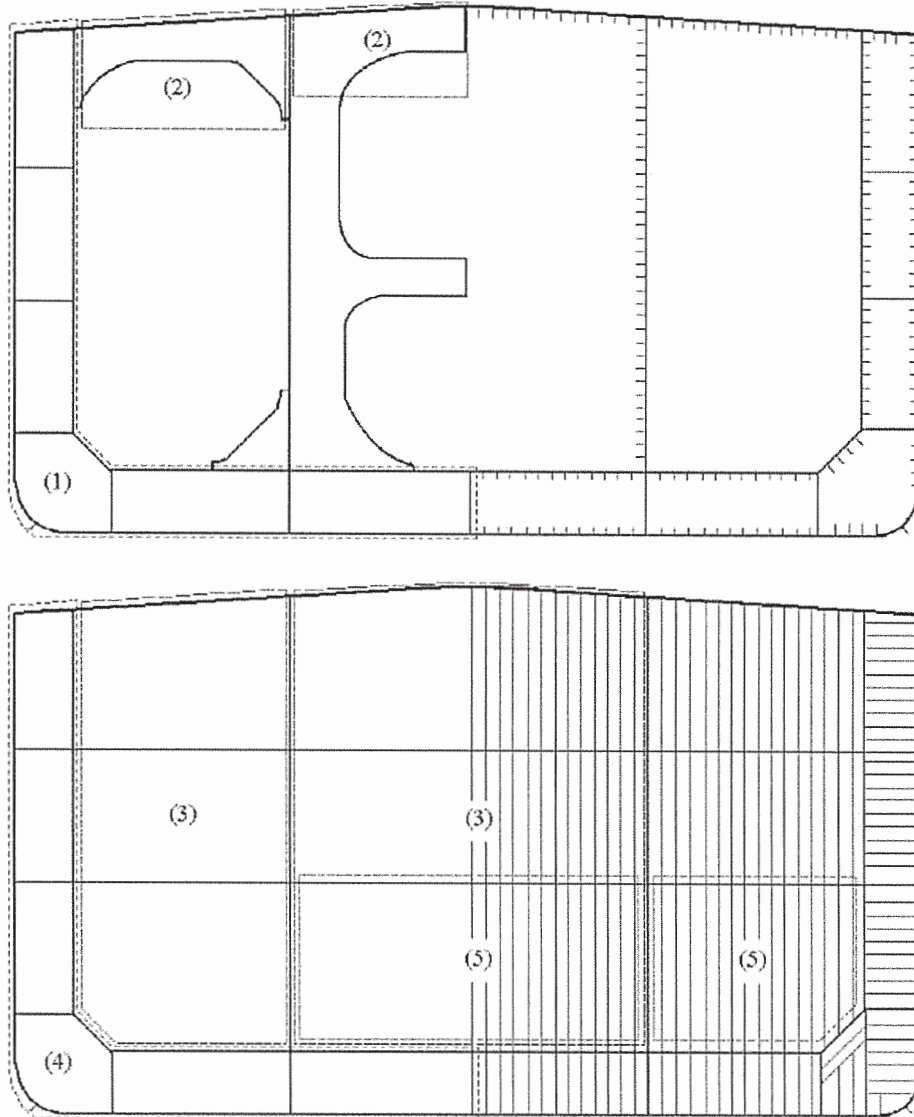
報告 TM3-DHT	
10. 甲板縱桁	20. 縱艙壁板材 (剩餘的)
11. 剪力列板縱桁	21. 縱艙壁縱桁
12. 舷側殼縱桁	22. 內側板材
13. 舳部縱桁	23. 內側縱桁
14. 船底縱桁	24. 底邊艙板材
15. 甲板縱桁	25. 底邊艙縱桁
16. 壓載翼艙的水平桁	26. 內底板材
17. 船底縱桁	27. 內底桁材
18. 縱艙壁頂列板	28. 頂邊艙板材
19. 縱艙壁底列板	29. 頂邊艙縱桁

報告 TM4-DHT
30. 甲板橫向－中央液艙
31. 甲板橫向－翼艙
32. 壓載翼艙垂直桁材
33. 翼艙雙層底肋板
34. 中央液艙雙層底肋板
35. 縱艙壁垂直桁材
36. 橫撐材

厚度測量－雙殼油輪

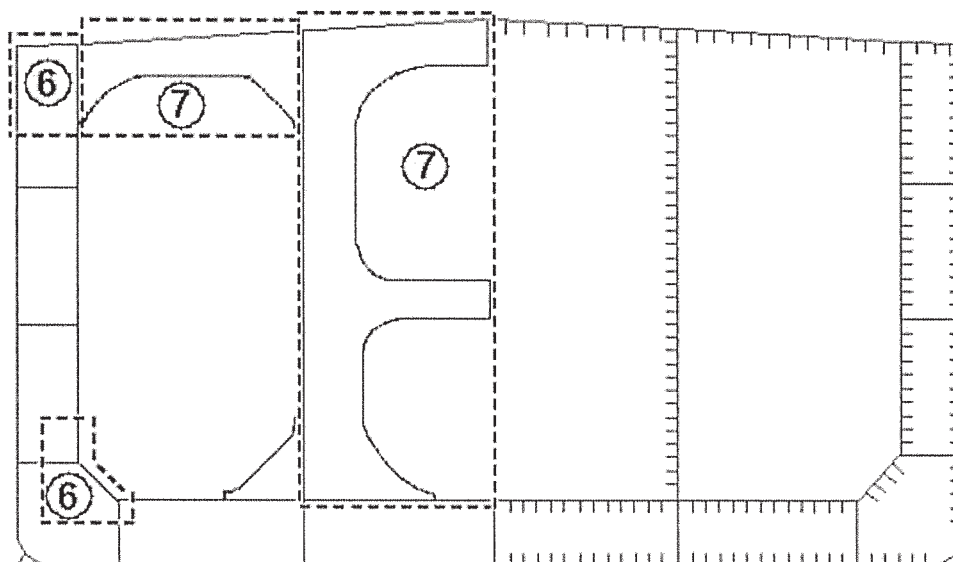
需進行近觀檢驗和厚度測量的區域－區域(1)至(5)按附件1定義－厚度視情按 TM3-DHT、TM4-DHT 和 TM5-DHT 報告

近觀檢驗
區域



需進行近觀檢驗和厚度測量的區域—區域(6)至(7)按附件 1 定義—厚度視情按 TM3-DHT 和 TM4-DHT 報告

近觀檢驗
區域



附件 11

結合計劃雙殼油輪加強檢驗的技術評估導則

換證檢驗

1 引言

本導則包括了關於可與計劃油輪換證檢驗結合使用的技術評估的信息和建議。如第 5.1.5 所述，這些導則為一些建議性的工具，在主管機關認為必要且合適時，結合所要求檢驗方案的準備工作自主採用。

2 目的和原則

2.1 目的

這些導則中所述的技術評估應幫助確定危險結構區域，指明可疑區域並將注意力集中到那些特別可疑或歷史證據表明易於發生損耗或破壞的結構構件上。這些信息可用於確定厚度測量、近觀檢驗和液艙測試的位置、區域和液艙。

2.2 最低要求

本導則不得用於減低附件 1、2 和 3 分別關於近觀檢驗、厚度測量和液艙測試的要求，這些要求，在各種情況下作為最低要求，必須符合。

2.3 時限

如同檢驗規劃的其他方面，本導則所述的技術評估應由船舶所有人或經營人在換證檢驗開始之前與主管機關合作完成，即在檢驗開始

前並通常在檢驗完成日期前 12 到 15 個月前完成。

2.4 需要考慮的方面

對具體船舶的以下方面的技術評估（可包括對可能惡化的有關風險的量和質的評估）可用作指定進行檢驗的液艙和區域的基礎：

- .1 設計特徵，例如各結構構件上的應力水平、設計細節和高強度鋼（HTS）的使用範圍；
- .2 關於具體船舶以及類似船舶以前鏽蝕、裂縫、彎曲、內陷和修理的歷史，如果有；以及
- .3 關於所載運貨物種類、不同液艙/壓載艙的使用、液艙的保護以及塗層狀況，如果有。

對各種結構構件和區域易於發生損壞或惡化的有關風險的技術評估應以認可的原則和實踐（例如可在參考 1 和 2 中見到的）為基礎進行判斷和決定。

3 技術評估

3.1 綜述

3.1.1 有三種可能的失效可成為結合計劃檢驗的技術評估的目標：鏽蝕、裂縫和彎曲。檢驗計劃通常不包括碰撞破損，因為事故通常記錄在案，並假定已由驗船師按常規處理。

3.1.2 與檢驗計劃過程結合進行的技術評估原則上應按圖 1 的流程所示。該圖描繪了如何在有關設計和鏽蝕的知識和經驗的基礎上，結合計劃檢驗過程開展技術評估。

3.1.3 對於可能懷疑因震動、高應力水平或疲勞而發生彎曲或裂縫的構造細節，應考慮其設計。

3.1.4 鏽蝕與老化進程相關，並直接關係到新建造時的防鏽和後來服役期間的保養的質量。鏽蝕還可能導致裂縫和（或）彎曲。

3.2 方法

3.2.1 設計細節

3.2.1.1 如果存在與該船或類似船舶有關的破損經歷，將是用於計劃過程的主要信息來源。此外，一些有選擇的來自設計圖紙的構造細節也應包括在內。需考慮的典型破損經歷將包括：

.1.1 裂縫的數量、範圍、位置和密度；以及

.1.2 彎曲的位置。

3.2.1.2 此信息可在檢驗報告和（或）船舶所有人的卷宗內找到，包括船舶所有人自行檢查的結果。對缺陷應加以分析、記錄並標註在草圖上。

3.2.1.3 此外，應利用一般經驗。例如，應參照收錄了油輪各種結構細節的典型破損和建議維修方法目錄的參考 1。

3.2.1.4 這些圖應與對主圖紙的審核一起使用，以便與實際結構相對比並找出可能易於破損的類似細節。圖 2 給出了一個範例。特別地，參考 1 的第 3 章專門涉及到雙殼油輪的各個方面，例如應力集中的位置、建造期間的偏差、鏽蝕趨勢、疲勞考慮和需特別注意的區域，這些應在制訂檢驗計劃時給予考慮。

3.2.1.5 除使用上述圖以外，對主要結構圖紙的審核還應包括核查

發生過裂縫的典型的設計細節。應仔細審視引發破損的因素。

3.2.1.6 HTS 的使用是一個重要因素。使用普通中等強度鋼曾表現了良好的服役經歷的細節，當使用了 HTS 及其更高的相關應力時可能更易於破壞。使用 HTS 作為甲板和底部結構縱材已較為廣泛且總體效果良好。在其他動態應力較高的位置，經驗表明效果不佳，例如舷側結構。

3.2.1.7 在這方面，根據相關方法進行的典型和重要組件和細節的應力計算可能有用並應予考慮。

3.2.1.8 所選擇的此過程中確定的結構上的區域應予記錄並標註在結構圖上，納入檢驗方案。

3.2.2 鏽蝕

3.2.2.1 為了評估相關的鏽蝕風險，通常應考慮以下信息：

- .1.1 液艙和處所的使用；
- .1.2 塗層狀況；
- .1.3 陽極狀況；
- .1.4 洗艙程序；
- .1.5 以前的鏽蝕破壞；
- .1.6 液貨艙用於壓載及時間；
- .1.7 鏽蝕風險計劃（見參考 2，表 2.1）；以及
- .1.8 加熱艙的位置。

3.2.2.2 參考 2 通過使用典型的狀況圖給出了可用於判斷和描述塗層狀況的最終範例。

3.2.2.3 參考 2 中的信息，連同船舶的船齡和從準備檢驗方案而收集的信息中得出的預期狀況的相關信息應構成鏽蝕風險評估的基礎。

3.2.2.4 應列出各種液艙和處所並指出相應的鏽蝕風險。對於雙殼油輪上特別容易受到鏽蝕的區域應給予特別的注意。為此，應考慮到參考 1 的第 3.4 段(鏽蝕趨勢)所述的處理雙殼油輪鏽蝕的具體方面。

3.2.3 近觀檢驗和厚度測量的位置

3.2.3.1 在鏽蝕風險表和設計經驗評估的基礎上，可以確定初始近觀檢驗和厚度測量（截面）的位置。

3.2.3.2 需進行厚度測量的截面應在經判定鏽蝕風險最大的液艙和處所內。

3.2.3.3 對近觀檢驗和厚度測量的液艙和處所的確定在開始時應基於最高的鏽蝕風險，並應總是將壓載艙包括在內。選擇的原則應為船齡越大或者信息不足或不可靠時，範圍越大。

參考

- 1 油輪結構合作論壇（TSCF）：1995 年《雙殼油輪結構檢查和保養指南》。
- 2 油輪結構合作論壇（TSCF）：1997 年《油輪結構指南手冊》。

輸入：

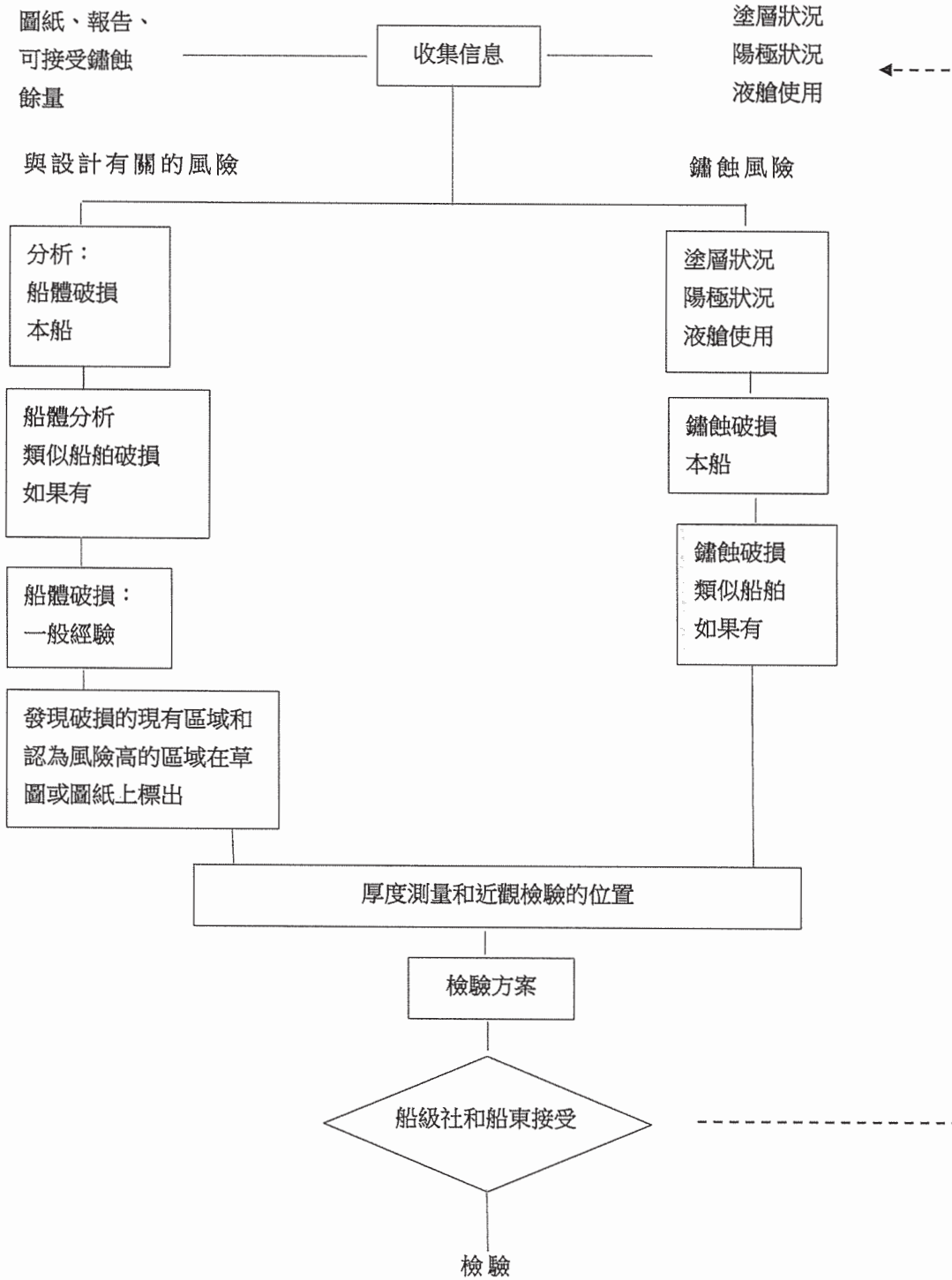


圖 1：技術評估和檢驗計劃過程

位置：縱材與腹板的連接		
例一：縱向加強材連接鏤空上的腹板和平條裂縫		
典型破壞	建議修理	
<p>VIEW A - A</p> <p>註 * 可能出現一個或多個裂縫</p>	<p>如果腹板上的裂縫小且已通過焊接修理，全環板</p> <p>VIEW A - A</p> <p>腹板和平條切割，部分更換或焊接</p>	
<p>導致破損的因素</p> <ol style="list-style-type: none"> 1. 平條加強材的不對稱連接導致其在疲勞裝載下跟部的高峰值壓力。 2. 縱材與腹板連接面積不足。 3. 板厚周圍回焊不良。 4. 壓力集中區域例如平條加強材連接、縱材鏤空角和腹板與船殼在鏤空出的連接出現過度局部鏽蝕。 5. 橫材腹板上的高應力。 6. 動態海浪荷載/船舶運動。 		
圖 1	油輪結構合作論壇 主題：機構細節目錄	圖 1

圖 2：典型破損和修理範例

(複製於參考 2)

附件 12

油輪船體桁材縱向強度衡準

1 綜述

1.1 這些衡準應用於評估第 8.1.2 段要求的船體桁材的縱向強度。

1.2 為了使將評估的船舶縱向強度的有效性得到認可，縱向內部構件與船體外板之間的圓角焊縫應處於堅實狀態，從而保持縱向內部構件與船體外板之間的完整性。

2 縱向強度的評估

對於 10 年以上船齡的 130m 及以上的油輪，船體桁材的縱向強度應根據本附件的要求，基於《貨船構造安全證書》和《貨船安全證書》的換證檢驗（SC 換證檢驗）期間所測量、更換或加強的厚度（視情況）來評估。進行縱向強度評估的船體桁材的狀況應根據附錄 3 規定的方法來確定。

2.1 船體桁材的甲板和船底法蘭橫截面積計算

2.1.1 船體桁材的甲板法蘭（甲板板和甲板縱材）和船底法蘭（底殼板和船底縱材）的橫截面積應利用 SC 換證檢驗期間所測量、更換或加強的厚度（視情況）來計算。

2.1.2 如果甲板法蘭或船底法蘭的橫截面積減少超過了其各自建造時面積（即當船舶建造時的原始截面積）的 10%，應採取以下措施之一：

- .1 更換或加強甲板法蘭或船底法蘭從而實際截面積不小於建造時面積的 90%；或
- .2 利用 SC 換證檢驗期間所測量、更換或加強的厚度（視情況），通過應用附錄 1 中規定的計算方法計算船體桁材橫截面的實際截面模數（ Z_{act} ）。

2.2 船體桁材橫截面模數的要求

2.2.1 根據第 2.1.2.2 段計算出的船體桁材的實際橫截面模數應視情況滿足以下規定之一：

- .1 對於 2002 年 7 月 1 日或以後建造的船舶，根據第 2.1.2.2 段的要求計算出的船體桁材的實際橫截面模數（ Z_{act} ）應不小於主管機關確定的減少限制，並考慮到本組織通過的建議；或
- .2 對於 2002 年 7 月 1 日以前建造的船舶，根據第 2.1.2.2 段的要求計算出的船體桁材的實際橫截面模數（ Z_{act} ）應滿足主管機關或認可的船級社要求的服役船舶的最小截面模數衡準，並且無論在任何情況下 Z_{act} 都不小於附錄 2 中規定的最小截面模數（ Z_{mc} ）減少的限值。

附錄 1

船體桁材船中截面的截面模數計算衡準

- 1 在計算船體桁材的橫截面模數時，所有連續縱向強度構件的橫截面積均應考慮在內。
- 2 大的開口（即長度超過 2.5m 或寬度超過 1.2m 的開口）和扇形口（使用扇形焊接處）應總是從計算截面模數用的橫截面積中扣除。
- 3 小的開口（人孔、照明孔、接縫處的單扇形口）不必扣除，條件是它們在一個橫截面中寬度的總和或投影面積寬度的總和對甲板或船底截面模數的減少不超過 3%，而且縱材或縱桁中照明孔、排水孔和單扇形孔的高度不超過腹板高度的 25%，對於扇形孔最大為 75mm。
- 4 船底或甲板區域的一個橫截面中小開口寬度的無扣減總和 $0.06(B - \Sigma b)$ （其中 B = 船寬， Σb = 大開口的總寬度）可被視為等效於上述截面模數扣減。
- 5 投影面積將通過畫出兩條開口角為 30° 的正切線來取得。
- 6 甲板模數與舷側的型甲板線相關。
- 7 船底模數與船基線相關。
- 8 連續艙圍和縱向艙口圍應包括在縱向截面積中，條件是它們得到縱向艙壁和深桁材的支持。甲板模數則通過用慣性力矩除以以下距離計算得出，條件是該值大於到舷側甲板線的距離：

$$y_t = y \left(0.9 + 0.2 \frac{x}{B} \right)$$

其中：

y = 從中軸線到連續強度構件頂部的距離；

x = 連續強度構件頂部到船舶中心線的距離；

x 和 y 應測量至得到最大 y_t 值的點。

- 9 多艙口間的縱向桁材應通過專門計算考慮。

附錄 2

服役船舶最小縱向強度的減少限值

- 1 服役油輪的最小截面模數 (Z_{mc}) 減少限值通過下式得出：

$$Z_{mc} = cL^2B (C_b + 0.7) k \text{ (cm}^3\text{)}$$

其中：

L = 船舶長度。 L 為夏季載重線上從艏柱的前側到舵杆的後側之間的距離，或者如果沒有舵杆，到舵柱中心的距離，以米計。 L 不得小於夏季載重水線最長值的 96%，但不必大於 97%。對於非常規船艙和船艙佈置的船舶，長度 L 可給予特別考慮。

B = 最大型寬，以米計。

C_b = 在對應於夏季載重水線的吃水 d 時的型方形系數，取決於 L 和 B 。 C_b 值不得小於 0.6。

$$C_b = \frac{\text{吃水為 } d \text{ 時的型排水量 (m}^3\text{)}}{LBd}$$

$$C = 0.9c_n$$

$$\text{對於 } 130\text{m} \leq L \leq 300\text{m}, \quad c_n = 10.75 - \left(\frac{300-L}{100}\right)^{1.5}$$

$$\text{對於 } 300\text{m} < L < 350\text{m}, \quad c_n = 10.75$$

$$\text{對於 } 350\text{m} \leq L \leq 500\text{m}, \quad c_n = 10.75 - \left(\frac{L-350}{150}\right)^{1.5}$$

k = 材料系數，例如

對於屈服應力在 235N/mm^2 及以上的低碳鋼， $k = 1.0$

對於屈服應力在 315N/mm^2 及以上的高強度鋼， $k = 0.78$

對於屈服應力在 355N/mm^2 及以上的高強度鋼， $k = 0.72$

2 應在船中 $0.4L$ 的長度內保持基於上述 1 中的截面模數要求的船體桁材的所有連續縱向構件的尺寸。但是，在特殊情況下，基於對船型、船體形狀和裝載條件的考慮，處於希望不妨礙船舶裝載靈活性的考慮，在朝向 $0.4L$ 結束之處，尺寸可逐漸減小。

3 但是，上述標準可能不適用於非常規型式或設計的船舶，例如主要比例和（或）重量分佈不同於一般的船舶。

附錄 3

縱向強度評估的厚度測量取樣方法和修理方法

1 縱向強度評估的範圍

對於其中含有液艙的船體桁材長度範圍內，應在船中 0.4L 內評估縱向強度，對於可能超出船中 0.4L 的鄰接液艙，在船中 0.5L 內評估。其中液艙指壓載水艙和液貨艙。

2 厚度測量取樣方法

2.1 依照第 2.5 節的要求，橫截面的選取應使厚度測量能夠在儘可能多的處於鏽蝕環境的不同液艙進行。例如與裝有加熱盤管的液貨艙使用共同的水平限界面的壓載艙、其他壓載艙、允許充裝海水的液貨艙和其他液貨艙。如果與裝有加熱盤管的液貨艙使用共同的水平限界面的壓載艙和允許充裝海水的液貨艙存在，則應選中。

2.2 橫截面取樣的最小數目應符合附件 2。橫截面應位於懷疑發生或從第 2.3 所述的甲板和船底厚度測量中發現的最大厚度減少的位置，並應離開已被局部更換或加強的區域。

2.3 根據附件 2 的要求，液貨艙區域內要求測量的每個甲板板和(或)船底殼板上應至少測量兩點。

2.4 在根據附件 2 的要求需要測量的每個橫截面處的甲板和船底 0.1D (其中 D 為船舶的型深) 內，各個縱材和桁材都應在腹板和面板上測量，各板材應在縱材之間上的一點測量。

2.5 對於根據附件 2 的要求需要測量的每個橫截面處的第 2.4 段所

述之外的縱向構件，各個縱材和桁材都應在腹板和面板上測量，各板材應至少在每個列板上的一點測量。

2.6 各構件的厚度應取所有各構件的橫截面所測量數據的平均值。

3 縱向強度不足時的附加測量

3.1 如果發現一個或多個橫截面不滿足本附件中的縱向強度要求，應增加厚度測量的橫截面數量，從而每個液艙的船中 0.5L 區域均被取樣。只有部分位於 0.5L 區域內但超出了 0.5L 的液艙處所，也應取樣。

3.2 還應視必要在每個經修理區域的前後各一個橫截面上進行附加厚度測量，以確保圍繞經修理的區域也符合本導則的要求。

4 有效維修方法

4.1 按本附件所進行的更新和加強的範圍應符合第 4.2 段。

4.2 更新或加強的結構構件的最小連續長度應不超過該方向上的初始構件間距的兩倍。此外，替換件（板，加強筋，樑腹和法蘭等）前部和尾部的每個連接件的對接的厚度減小應不在嚴重腐蝕範圍內（75%的允許減小與每個特定件有關）。如果對接的厚度差大於較低厚度的 15%，應提供轉換錐。

4.3 包括安裝帶或構件改變的可供選擇的修理方法應經過特別考慮。在考慮安裝帶時，應限於下列狀況：

- .1 恢復和/或增加總縱強度；
- .2 應加強的甲板或船底板的厚度減小應不在嚴重腐蝕範圍

內（75%的允許減小與甲板板有關）；

- .3 校中和佈置，包括條帶的終止，應按照主管機關認可的標準；
- .4 條帶在船中整個 0.5L 長度上延續；
- .5 在對接焊時使用連續角焊和完全穿透焊，並根據帶的長度，使用切口焊縫。採用的焊接程序應經主管機關批准。

4.4 鄰近於替換區域且與安裝的條帶相連的現有結構等，應能經受考慮到抗皺折力和縱材和外板之間的焊接狀況的適用載荷。”

B 部分

雙殼油輪以外的油輪檢驗期間的加強檢查計劃導則

- 44 新增 B 部分的内容為經過以下修正的現有附件 B。
- 45 將現有的第 1.1.1 段用以下文字代替：

“1.1.1 本導則適用於附件 B 的 A 部分第 1.2.1 段定義的所有 500 總噸及以上的自推進式雙層殼油輪以外的油輪。”
- 46 刪去第 1.1.2 段並將第 1.1.3 段和第 1.1.4 段重新編號為第 1.1.2 段和第 1.1.3 段。
- 47 在新第 1.1.2 段（現第 1.1.3 段）的結尾，增加以下句子：

“檢驗應在經修正的《1974 年 SOLAS 公約》第 I/10 條所規定的檢驗期間進行。”
- 48 在第 1.2.11 段，以“II-2/3.6”代替提到的“II-2/3.32”。

- 49 在第 1.2.12 段，以“中期檢驗係指一次檢驗”代替“中期強化檢驗是一次強化檢驗”字樣。
- 50 在第 1.2.13 段，以“入級條件或建議”代替“入級條件”。
- 51 新增第 1.2.14 段如下：
- “1.2.14 特殊考慮係指採取充分的近觀檢驗和厚度測量以確認塗層下的平均結構狀況。”
- 52 在第 1.3.1 段中增加一個新的分項“.6 第 3.3 段中的項目”。
- 53 刪去第 1.3.2 段中的“重大”一詞。
- 54 新增第 1.4 段如下：
- “1.4 驗船師
- 對於 20,000 載重噸及以上的油輪，應有兩名驗船師聯合開展油輪船齡超過 10 年的第 1 次定期換證檢驗，以及所有以後的換證檢驗和中期檢驗。如果檢驗由任何組織進行，驗船師應僅受僱於該認可組織。”
- 55 刪去第 2.1.2 段中的“厚度測量及”字樣。
- 56 在第 2.1.3 段和第 2.2.1 段中，在“證書”之前插入“貨船構造安全”字樣。
- 57 刪去第 2.2.3 段中的“按第 1.1.1 段所述簽發給油輪的……和（或）按第 1.1.2 段所述簽發給油輪的《國際防止油污染證書》（如果適用）”字樣。
- 58 刪去第 2.2.4 段。

- 59 刪去第 2.4.4 和 2.5.4 段關於“特殊考慮”的腳註的參考。
- 60 刪去第 2.5.2 段“或如附件 6 所述的計劃文件規定的”字樣。
- 61 在第 3.1 段中，在“檢驗”一詞前插入“年度”一詞。
- 62 刪去第 3.3.3 段中“，含油壓載水”字樣。
- 63 在第 3.5.3 段中，以“一個液貨艙或燃油艙”代替“一個液貨艙”一詞。
- 64 在第 4.3.3 段以“對於壓載水艙”代替“對於使用海水壓載的液艙，包括貨艙/壓載水兼用艙”字樣。
- 65 將現有第 5.1.1 段用以下內容代替：
- “5.1.1 應由船東與主管機關合作在換證檢驗之前制訂一個專門的檢驗方案。該檢驗方案應為書面方案，以附件 6A 中的信息為基礎。在檢驗方案獲得同意以前不得開始檢驗。
- 5.1.1.1 在制訂檢驗方案以前，應由船東在附件 6B 中的信息基礎上填寫檢驗計劃問卷，並提交給主管機關。”
- 66 將現有第 5.1.2 段用以下內容代替：
- “5.1.2 在制訂檢驗方案時，應收集並參考以下文件，以選擇需要檢查的液艙、區域和結構元素：
- .1 檢驗狀況和船舶的基本信息；
 - .2 船上的文件，如第 6.2 和 6.3 段所述；
 - .3 液貨艙和壓載水艙的主要結構平面圖（船材尺寸圖紙），包括關於使用高強度鋼（HTS）的信息；

- .4 根據附件 9 的狀況評估報告；
- .5 相關的以前破損和修理史；
- .6 相關的認可組織和船舶所有人以前的檢驗和檢查報告；
- .7 最近 3 年的裝貨和壓載史，包括在加熱條件下載運貨物；
- .8 惰性氣體機的細節和液艙清洗程序；
- .9 關於自建造以來船舶液貨艙和壓載艙改裝和改造的信息和其他相關數據；
- .10 塗層和防鏽蝕系統的描述和歷史（包括陽極和以前的船級備註），如果有的話；
- .11 船舶所有人的人員在前 3 年間就總體結構惡化、液艙限界面和管線洩漏以及塗層和防鏽蝕系統（包括陽極）的狀況進行的檢查，如果有的話。關於報告的指南見附件 5；
- .12 關於在運營期間的相關保養水平的信息，包括含有關於船體缺陷、與船體維護有關的安全管理系統的不符合項（包括相關的糾正措施）的港口國監督檢查報告中的信息；以及
- .13 能夠幫助確定可疑區域和危險結構區域的任何其他信息。”

67 將現有第 5.1.3 段用以下內容代替：

“5.1.3 提交的檢驗方案應至少分別涉及並符合附件 1、2 和 3 以及第 2.6 段關於近觀檢驗、厚度測量和液艙測試的要求，並應包括相關信息，至少包括以下內容：

- .1 船舶的基本信息和細節；
- .2 液貨艙和壓載水艙的主要結構平面圖（船材尺寸圖紙），包括關於使用高強度鋼（HTS）的信息；
- .3 液艙的佈置；
- .4 液艙清單，包括其用途、塗層範圍和防鏽蝕系統；
- .5 檢驗條件（例如關於液艙清洗、除氣、通風、照明等的信息）；
- .6 進入結構的設備和方法；
- .7 檢驗設備；
- .8 確定近觀檢驗的液艙和區域（見第 2.4 段）；
- .9 確定厚度測量的區域和截面（見第 2.5 段）；
- .10 確定將進行液艙測試的液艙（見第 2.6 段）；
- .11 確定厚度測量公司；
- .12 與目標船舶有關的破損經歷；以及
- .13 危險結構區域和可疑區域，如果相關的話。”

68 刪去第 5.1.4 段，並將第 5.1.5 和 5.1.6 段重新編號為第 5.1.4 和 5.1.5 段。

69 在現有第 5.2.1 段後新增第 5.2.1.1 至 5.2.1.3 段如下：

“5.2.1.1 為了使主管驗船師能夠開展檢驗，船東和主管機關應就提供妥善和安全的出入通道達成一致。

5.2.1.2 在檢驗計劃問卷中應規定出入通道的細節。

5.2.1.3 如果主管驗船師斷定安全設備和所要求的通道不充分，對有關場所的檢驗不得進行。”

70 將現有第 5.2.2 至 5.2.4 段用以下內容代替：

“5.2.2 液艙和處所應進出安全。貨艙、液艙和處所應不存在氣體並適當通風。在進入液艙、留空或封閉處所之前，應驗證液艙內的空氣中沒有有害氣體並且含有充足的氧氣。

5.2.3 液艙和處所應足夠清潔且不存在水、水垢、塵土、殘油、沉積物等，以展現腐蝕、變形、裂縫、損壞或其他構造型退化以及塗層的狀況。這一點特別適用於需要進行厚度測量的區域。

5.2.4 應提供充分的照明以展現腐蝕、變形、裂縫、損壞或其他構造型退化以及塗層的狀況。”

71 新增第 5.2.5 和 5.2.6 段如下：

“5.2.5 驗船師應一直由至少一名船東指派的在檢查液艙和封閉處所方面有經驗的負責人員陪同。另外還應有至少兩名經驗豐富人員的後備組守在被檢驗的液艙或處所開口處。後備組應持續觀察液艙或處所內的工作，並應做好準備立即使用救生和撤離設備。

5.2.6 在將檢查的貨艙、液艙或處所內的人員、甲板上的負責高級船員以及駕駛室人員(視情而定)之間應安排通信系統。在整個檢驗期間均應維持該通信安排。”

72 在現有第 5.3.2 段中，在第 4 和第 5 分項間插入一個新的“便攜梯”分項。

73 將第 5.3.2 段中的 6 個分項編號為“.1”至“.6”，將第 5.4.2 段中的 5 個分項編號為“.1”至“.5”。

74 新增第 5.4.3 至 5.4.5 段如下：

“5.4.3 在檢驗期間應備好爆度計、氧氣表、呼吸器、救生繩、配有繩索和掛鈎的安全帶和哨笛及其使用說明和指南。應提供安全核查清單。

5.4.4 應提供安全和有效開展檢驗用的充足和安全照明。

5.4.5 在檢驗期間應備有和使用充足的防護服(例如安全帽、手套、安全鞋等)。”

75 將現有第 5.5.3 段刪除並將現有第 5.5.4 段重新編號為第 5.5.3 段。

76 增加以下第 5.5.4 段至 5.5.7 段：

“5.5.4 如果在近觀檢驗中使用筏或小船，應符合以下條件：

- .1 只能使用堅固的充氣筏或小船，在其中一個浮力艙被劃破後仍具備滿意的儲備浮力和穩性；
- .2 小船或筏應拴在出入梯上，並應另有一人守在出

入梯的下端能清楚看到小船或筏；

- .3 所有參與人員應有適當的救生衣；
- .4 液艙或艙室內的水面應平靜（在所有可預見的情況下艙內水上升不得超過 0.25m），水位或者保持穩定或者下降。無論如何在小船或筏使用期間水位不得上升；
- .5 液艙、貨艙或處所內只能有潔淨的壓載水。水面上即使有很薄的油膜也是不可接受的；
- .6 在任何時候水位都不允許位於甲板下最深肋板平面 1m 以內，從而不致使檢驗人員與通往液艙口的逃生通道隔斷。只有在設有甲板進出人孔並且隔間上的開口經過檢查後，才可考慮充水至甲板橫樑以上，從而在任何時候檢驗人員都有逃生通道。還可以考慮其他通往甲板的有效逃生方式；和
- .7 如果液艙（或處所）之間由一個共用的透氣系統或惰性氣體系統相連接，將使用小船或筏子的液艙應予以隔離，以防氣體從其他液艙（或處所）進入該艙。

5.5.5 如果肋板深度為 1.5m 或以下，可允許只使用筏或小船檢查液艙或處所的甲板下區域。

5.5.6 如果肋板深度超過 1.5m，只有在以下情況下才允許只使用筏或小船：

- .1 若甲板下結構的塗層處於良好狀態，且沒有損耗的跡象；或
- .2 如果在每個隔間都提供了永久性通道允許安全進出。該出入通道應經由在甲板以下約 2m 裝有小平台的垂直梯通向甲板。也可考慮其他通向甲板的逃生通道。

如果上述兩個條件均不滿足，則在檢驗甲板下區域時應提供腳手架或其他等效方式。

5.5.7 第 5.5.5 和 5.5.6 段中只使用筏或小船的情況並不排除在檢驗期間使用筏或小船在一個液艙內移動。”

77 新增第 5.6 節如下：

“5.6 檢驗計劃會議

5.6.1 在檢驗之前或檢驗期間作出妥善的準備和主管驗船師與船東的船上代表之間的密切合作是安全和高效完成檢驗的重要組成部分。在檢驗期間應定期召開船上安全會議。

5.6.2 在換證和中期檢驗的任何部分開始以前，應在主管驗船師、船東的參與代表、厚度測量公司的操作員（如適用）和船舶的船長之間召開檢驗計劃會議，以便確定檢驗方案中的所有預期安排均已到位，從而確保檢驗工作的安全和高效開展。

5.6.3 以下是會議中應該處理的項目的示意性清單：

- .1 船期安排（即航次、進塢和出塢操縱、靠塢期間、貨物和壓載操作等）；

- .2 厚度測量的提供和安排（即進入、清潔/除垢、照明、通風、人身安全）；
- .3 厚度測量的範圍；
- .4 接受標準（參見最小厚度清單）；
- .5 考慮到塗層狀況和可疑區域/嚴重鏽蝕區域，近觀檢驗和厚度測量的範圍；
- .6 進行厚度測量；
- .7 記錄總體以及所發現的非均勻腐蝕或點蝕處的代表性讀數；
- .8 勘測嚴重鏽蝕區域；以及
- .9 在主管驗船師、厚度測量公司操作員和船東代表之間溝通結果。”

78 將第 6.1.1 段中的“提供並保存在船上”字樣替換為“取得、提供和保存在船上”。

79 刪去第 6.2.1.4 段。

80 將第 6.4 段中的“檢查”一詞替換為“檢驗”。

81 將第 7.1.3 段中的“擴展”一詞替換為“範圍”。

82 在現有第 8.2.1 段後新增第 8.2.2 段如下：

“8.2.2 如果一次檢驗在不同的檢驗站分開進行，應對檢驗的每個部分作出報告。一份檢驗和（或）試驗（壓力試驗、厚度測量等）項目的清單和關於該項目是否曾被認證的說明應在繼續

或完成檢驗前提供給下一個主管驗船師。”

- 83 將現有的第 8.2.2 段重新編號為第 8.2.3 段。
- 84 在附件 1 第 3 欄，將“每個其他各翼艙的一個寬板肋骨環”字樣替換為“每個其他貨翼艙所有寬板肋骨環的至少 30%（見註釋 1）”及將“每個中央貨艙的一個甲板和底部橫材”字樣替換為“每個中央貨艙的甲板和底部橫材的至少 30%（見註釋 1）”。在附件下面增加註釋 1 如下：
- “註釋 1：30%應取整到下一個整數。”
- 85 在現有附件 5 後增加一個新的附件 6A “檢驗方案”。附件內容與 A 部分的附件 6A 相同（見修正案第 43）。
- 86 在新的附件 6A 後面增加一個新的附件 6B。附件內容與 A 部分的附件 6B 相同（見修正案第 43）。
- 87 刪去現有附件 6。
- 88 將現有附件 8 的內容替換為題目為“檢驗報告原則”新內容。附件內容與 A 部分的附件 8 相同（見修正案第 43）。
- 89 刪去附件 10 中附錄 3 的表 1 和表 2 並將表 3 重新編號為表 1。
- 90 在附件 11 的第 1 段中，用“第 5.1.5 段”代替“附件 B 的第 5.1.6 段”一詞。

RESOLUTION MSC.197(80)
(adopted on 20 May 2005)

**AMENDMENTS TO THE GUIDELINES ON THE ENHANCED
PROGRAMME OF INSPECTIONS DURING SURVEYS OF BULK CARRIERS
AND OIL TANKERS (RESOLUTION A.744(18), AS AMENDED)**

THE MARITIME SAFETY COMMITTEE,

RECALLING Article 28(b) of the Convention on the International Maritime Organization concerning the functions of the Committee,

RECALLING ALSO resolution A.744(18) by which the Assembly adopted the Guidelines on the enhanced programme of inspections during surveys of bulk carriers and oil tankers (the Guidelines),

RECALLING FURTHER article VIII(b) and regulation XI-1/2 of the International Convention for the Safety of Life at Sea (SOLAS), 1974 (hereinafter referred to as “the Convention”) concerning the procedure for amending the Guidelines,

NOTING that the Assembly, when adopting resolution A.744(18), requested the Maritime Safety Committee and the Marine Environment Protection Committee to keep the Guidelines under review and update them as necessary, in the light of experience gained in their application,

NOTING ALSO resolutions MSC.49(66), MSC.105(73), MSC.125(75), MSC.144(77) and resolution 2 of the 1997 Conference of Contracting Governments to the Convention, by which amendments to resolution A.744(18) were adopted by the Maritime Safety Committee and the Conference of Contracting Governments to the Convention, in accordance with article VIII(b) and regulation XI-1/2 of the Convention,

HAVING CONSIDERED, at its eightieth session, amendments to the Guidelines proposed and circulated in accordance with article VIII(b)(i) of the Convention,

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the Guidelines on the enhanced programme of inspections during surveys of bulk carriers and oil tankers, the text of which is set out in the Annex to the present resolution;
2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the amendments shall be deemed to have been accepted on 1 July 2006, unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world’s merchant fleet, have notified their objections to the amendments;
3. INVITES Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention, the amendments shall enter into force on 1 January 2007 upon their acceptance in accordance with paragraph 2 above;

4. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Governments to the Convention;

5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annex to Members of the Organization, which are not Contracting Governments to the Convention.

ANNEX**AMENDMENTS TO THE GUIDELINES ON THE ENHANCED PROGRAMME OF
INSPECTIONS DURING SURVEYS OF BULK CARRIERS AND OIL TANKERS
(RESOLUTION A.744(18), AS AMENDED)****GUIDELINES ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING
SURVEYS OF BULK CARRIERS AND OIL TANKERS**

1 The section “Contents” is replaced with the following and the relevant headings in the text of the Guidelines are amended accordingly:

“Contents**ANNEX A****GUIDELINES ON THE ENHANCED PROGRAMME OF INSPECTIONS
DURING SURVEYS OF BULK CARRIERS****1 General**

- 1.1 Application
- 1.2 Definitions
- 1.3 Repairs
- 1.4 Surveyors

2 Renewal survey

- 2.1 General
- 2.2 Dry-dock survey
- 2.3 Space protection
- 2.4 Hatch covers and coamings
- 2.5 Extent of overall and close-up surveys
- 2.6 Extent of thickness measurements
- 2.7 Extent of tank pressure testing

3 Annual survey

- 3.1 General
- 3.2 Examination of the hull
- 3.3 Examination of hatch covers and coamings
- 3.4 Examination of cargo holds
- 3.5 Examination of ballast tanks
- 3.6 Additional annual survey requirements for the foremost cargo hold of ships subject to regulation XII/9.1 of the Convention in accordance with the requirements of annex 12

4 Intermediate survey

- 4.1 General
- 4.2 Bulk carriers 5 to 10 years of age
- 4.3 Bulk carriers 10 to 15 years of age
- 4.4 Bulk carriers exceeding 15 years of age

5 Preparations for survey

- 5.1 Survey programme
- 5.2 Conditions for survey
- 5.3 Access to structures
- 5.4 Equipment for survey
- 5.5 Survey at sea or at anchorage
- 5.6 Survey planning meeting

6 Documentation on board

- 6.1 General
- 6.2 Survey report file
- 6.3 Supporting documents
- 6.4 Review of documentation on board

7 Procedures for thickness measurements

- 7.1 General
- 7.2 Certification of thickness measurement company
- 7.3 Reporting

8 Reporting and evaluation of survey

- 8.1 Evaluation of survey report
- 8.2 Reporting

Annex 1 Requirements for close-up survey at renewal surveys

Annex 2 Requirements for thickness measurements at renewal surveys

Annex 3 Owner's inspection report

Annex 4A Survey programme

Annex 4B Survey planning questionnaire

Annex 5 Procedures for certification of a company engaged in thickness measurement of hull structures

Annex 6 Survey reporting principles

Annex 7 Condition evaluation report

Annex 8 Recommended procedures for thickness measurements

Annex 9 Guidelines for technical assessment in conjunction with the planning of enhanced surveys for bulk carriers

Annex 10 Requirements for extent of thickness measurement at areas of substantial corrosion. Periodical survey of bulk carriers within the cargo area

- Annex 11 Guidelines for the gauging of the vertically corrugated transverse watertight bulkhead between holds Nos.1 and 2
- Annex 12 Additional annual survey requirements for the foremost cargo hold of ships subject to SOLAS regulation XII/9.1
- Annex 13 Strength of cargo hatch cover securing arrangements for bulk carriers

ANNEX B

Part A

GUIDELINES ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF DOUBLE HULL OIL TANKERS

1 General

- 1.1 Application
- 1.2 Definitions
- 1.3 Repairs
- 1.4 Surveyors

2 Renewal survey

- 2.1 General
- 2.2 Dry-dock survey
- 2.3 Tank corrosion prevention system
- 2.4 Extent of overall and close-up surveys
- 2.5 Extent of thickness measurements
- 2.6 Extent of tank pressure testing

3 Annual survey

- 3.1 General
- 3.2 Examination of the hull
- 3.3 Examination of weather decks
- 3.4 Examination of cargo pump-rooms and pipe tunnels
- 3.5 Examination of ballast tanks

4 Intermediate survey

- 4.1 General
- 4.2 Oil tankers 5 to 10 years of age
- 4.3 Oil tankers 10 to 15 years of age
- 4.4 Oil tankers exceeding 15 years of age

5 Preparations for survey

- 5.1 Survey programme
- 5.2 Conditions for survey
- 5.3 Access to structures
- 5.4 Equipment for survey
- 5.5 Survey at sea or at anchorage
- 5.6 Survey planning meeting

- 6 Documentation on board**
 - 6.1 General
 - 6.2 Survey report file
 - 6.3 Supporting documents
 - 6.4 Review of documentation on board
- 7 Procedures for thickness measurements**
 - 7.1 General
 - 7.2 Certification of thickness measurement company
 - 7.3 Reporting
- 8 Reporting and evaluation of survey**
 - 8.1 Evaluation of survey report
 - 8.2 Reporting
- Annex 1 Minimum requirements for close-up survey at renewal survey of double hull oil tankers
- Annex 2 Minimum requirements for thickness measurements at renewal survey of double hull oil tankers
- Annex 3 Minimum requirements for tank testing at renewal survey of double hull oil tankers
- Annex 4 Requirements for extent of thickness measurements at areas of substantial corrosion of double hull oil tankers
- Annex 5 Minimum requirements for overall and close-up survey and thickness measurements at intermediate survey of double hull oil tankers
- Annex 6A Survey programme
- Annex 6B Survey planning questionnaire
- Annex 6C Owner's inspection report
- Annex 7 Procedures for certification of a company engaged in thickness measurement of hull structures
- Annex 8 Survey reporting principles
- Annex 9 Condition evaluation report
- Annex 10 Recommended procedures for thickness measurements of double hull oil tankers
- Annex 11 Guidelines for technical assessment in conjunction with the planning of enhanced surveys for oil tankers
- Annex 12 Criteria for longitudinal strength of hull girder for oil tankers

Part B**GUIDELINES ON THE ENHANCED PROGRAMME OF INSPECTIONS
DURING SURVEYS OF OIL TANKERS OTHER THAN DOUBLE HULL OIL
TANKERS****1 General**

- 1.1 Application
- 1.2 Definitions
- 1.3 Repairs
- 1.4 Surveyors

2 Renewal survey

- 2.1 General
- 2.2 Dry-dock survey
- 2.3 Tank corrosion prevention system
- 2.4 Extent of overall and close-up surveys
- 2.5 Extent of thickness measurements
- 2.6 Extent of tank pressure testing

3 Annual survey

- 3.1 General
- 3.2 Examination of the hull
- 3.3 Examination of weather decks
- 3.4 Examination of cargo pump-rooms and pipe tunnels
- 3.5 Examination of ballast tanks

4 Intermediate survey

- 4.1 General
- 4.2 Oil tankers 5 to 10 years of age
- 4.3 Oil tankers 10 to 15 years of age
- 4.4 Oil tankers exceeding 15 years of age

5 Preparations for survey

- 5.1 Survey programme
- 5.2 Conditions for survey
- 5.3 Access to structures
- 5.4 Equipment for survey
- 5.5 Survey at sea or at anchorage
- 5.6 Survey planning meeting

- 6 Documentation on board**
 - 6.1 General
 - 6.2 Survey report file
 - 6.3 Supporting documents
 - 6.4 Review of documentation on board
 - 7 Procedures for thickness measurements**
 - 7.1 General
 - 7.2 Certification of thickness measurement company
 - 7.3 Reporting
 - 8 Reporting and evaluation of survey**
 - 8.1 Evaluation of survey report
 - 8.2 Reporting
 - Annex 1 Requirements for close-up survey at renewal surveys
 - Annex 2 Requirements for thickness measurements at renewal surveys
 - Annex 3 Requirements for tank pressure testing at renewal surveys
 - Annex 4 Requirements for extent of thickness measurements at areas of substantial corrosion
 - Annex 5 Owner's inspection report
 - Annex 6A Survey programme
 - Annex 6B Survey planning questionnaire
 - Annex 7 Procedures for certification of a company engaged in thickness measurement of hull structures
 - Annex 8 Survey reporting principles
 - Annex 9 Condition evaluation report
 - Annex 10 Recommended procedures for thickness measurements
 - Annex 11 Guidelines for technical assessment in conjunction with the planning of enhanced surveys for oil tankers
 - Annex 12 Criteria for longitudinal strength of hull girder for oil tankers"
- 2 Throughout the Guidelines:
- .1 the words "enhanced survey during the periodical survey", "periodical survey" and "enhanced survey" are replaced with the words "renewal survey";

- .2 the words “enhanced survey during annual survey” are replaced with the words “annual survey”;
- .3 the words “intermediate enhanced survey” are replaced with the words “intermediate survey”; and
- .4 the words “is to be” and “are to be” are replaced with the words “should be”.

ANNEX A

GUIDELINES ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF BULK CARRIERS

- 3 A new paragraph 1.1.1 is added as follows:

“1.1.1 The Guidelines should apply to all self-propelled bulk carriers of 500 gross tonnage and above.”

Existing paragraphs 1.1.1 and 1.1.2 are renumbered as paragraphs 1.1.2 and 1.1.3.

- 4 In new paragraph 1.1.2 (existing paragraph 1.1.1), in the second sentence, the words “regulation I/10 of” are inserted between “by” and “the 1974 SOLAS Convention”.

- 5 In paragraph 1.2.14, the words “Intermediate enhanced survey is an enhanced survey” are replaced by “Intermediate survey is a survey”.

- 6 In existing paragraph 1.2.15, the words “condition of classification” are replaced by “condition of classification or recommendation”.

- 7 A new paragraph 1.2.17 is added as follows:

“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.”

- 8 The word “significant” in paragraph 1.3.2 is deleted.

- 9 The following new paragraph 1.4 is added:

“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.”

- 10 The words “thickness measurement and” in paragraph 2.1.2 are deleted.

- 11 Paragraph 2.2.4 is deleted.

- 12 The references to a footnote regarding “specially considered” in paragraphs 2.3.1, 2.6.4, 3.4.1.1 and 3.4.2.1 are deleted.
- 13 In paragraph 3.1, the word “annual” is inserted before the word “survey”.
- 14 Existing paragraphs 3.3.2, 3.3.4, 3.3.5 and 3.3.6 are deleted.
- 15 The following new paragraphs 3.3.2 to 3.3.7 are added after existing paragraph 3.3.1:

“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, the hatch cover sets within the forward 25% of the ship’s length and at least one additional set, such that all sets on the ship are assessed at least once in every 5-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 13.

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 guide rails 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.”

16 Existing paragraph 3.3.3 is renumbered as 3.3.8.

17 Existing paragraph 5.1.1 is replaced by the following:

“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.

5.1.1.1 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.”

18 The seven subitems in paragraph 5.1.2 are numbered from “.1” to “.7” and the eleven subitems in paragraph 5.1.3 are numbered from “.1” to “.11”.

19 Paragraph 5.1.4 is deleted and paragraphs 5.1.5 and 5.1.6 are renumbered as 5.1.4 and 5.1.5.

20 The following new paragraphs 5.2.1.1 to 5.2.1.3 are added:

“5.2.1.1 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.

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

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

- 21 Existing paragraphs 5.2.2, 5.2.3 and 5.2.4 are replaced by the following:
- “5.2.2 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.
- 5.2.3 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.
- 5.2.4 Sufficient illumination should be provided to reveal corrosion, deformation, fractures, damages or other structural deterioration as well as the condition of the coating.”
- 22 The following new paragraphs 5.2.5 and 5.2.6 are added:
- “5.2.5 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.
- 5.2.6 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.”
- 23 In existing paragraph 5.3.2, a new subitem “portable ladders” is inserted between the third and fourth subitems.
- 24 The five subitems in paragraph 5.3.2 are numbered from “.1” to “.5” and the five subitems in paragraph 5.4.2 are numbered from “.1” to “.5”.
- 25 New paragraphs 5.4.3 to 5.4.5 are added as follows:
- “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.”

26 The existing paragraph 5.5.3 is replaced by the following:

“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 must 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.”

27 The following new paragraphs 5.5.4 to 5.5.6 are added:

“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 paragraphs 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.”

28 The following new section 5.6 is added:

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

29 The words “supply and maintain on-board” in paragraph 6.1.1 are replaced with “obtain, supply and maintain on board the ship”.

30 Paragraph 6.2.1.4 is deleted.

31 The word “inspection” in paragraph 6.4 is replaced with “survey”.

32 The word “extend” in paragraph 7.1.3 is replaced with “extent”.

33 The following new paragraph 8.2.2 is added after existing paragraph 8.2.1:

“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.”

- 34 The existing paragraph 8.2.2 is renumbered as 8.2.3.
- 35 The existing annex 4 is deleted.
- 36 The following new annex 4A is added after existing annex 3:

“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 (a) or (b):

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

Area or location	Original as-built thickness (mm)	Minimum thickness (mm)	Substantial corrosion thickness (mm)
Deck			
Plating			
Longitudinals			
Longitudinal girders			
Cross deck plating			
Cross deck stiffeners			
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 tanks (if applicable)			
Plating			
Longitudinals			
Longitudinal stringers			

Ship side in way of cargo holds			
Plating			
Side frames webs			
Side frames flanges			
Upper brackets webs			
Upper brackets flanges			
Lower brackets webs			
Lower brackets flanges			
Longitudinal bulkhead if applicable			
Plating			
Longitudinals, if applicable			
Longitudinal girders, if applicable			
Transverse bulkheads			
Plating			
Stiffeners, if applicable			
Upper stool plating			
Upper stool stiffeners			
Lower stool plating			
Lower stool stiffeners			
Transverse web frames in topside tanks			
Plating			
Flanges			
Stiffeners			
Transverse web frames in hopper 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

Paragraph 5.1.3.2 requires that main structural plans of cargo holds and ballast tanks (scantling drawings), including information on regarding 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 5.1.3:

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

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

37 The following new Annex 4B is added after Annex 4A:

“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					
	Side shell, frames and brackets					
	Transverse bulkhead					
	Hopper tank plating					
	Lower stool					
	Tank top					
Topside tanks	Under-deck structure					
	Side shell and structure					
	Sloping plate and structure					
	Webs and bulkheads					
Hopper tanks	Hopper sloping plate and structure					
	Side shell and structure					
	Bottom structure					
	Webs and bulkheads					
	Double bottom structure					
	Upper stool internal structure					
	Lower stool internal structure					
Wing tanks of double ore carriers	Under-deck and structure					
	Side shell and structure					
	Side shell vertical web and structure					
	Longitudinal bulkhead and structure					
	Longitudinal bulkhead web and structure					
	Bottom plating and 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 3 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 3 years)
- 4) N=no findings recorded; Y=findings recorded, description of findings should be attached to this questionnaire
- 5) DR=Damage and 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:

”

38 The existing text of Annex 6 is replaced by the following:

“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, should 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, i.e. 25% of shell frames, 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);

- .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.”

39 Table 1 and table 2 in appendix 3 of Annex 8 are deleted and table 3 is renumbered as table 1.

40 In paragraph 1 of annex 9, the words “the paragraph 5.1.6 of annex A” are replaced with “5.1.5”.

41 The following new Annex 13 is added:

“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 metres
- 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 for $\sigma_Y > 235$
= 1.0 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:
- $$I = 6 p a^4 (\text{cm}^4)$$
- where:
- p = packing line pressure in N/mm, minimum 5 N/mm
 a = spacing in m 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 B

GUIDELINES ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF OIL TANKERS

- 42 The text of existing Annex B is replaced by a new part A with the title:

**“Part A
GUIDELINES ON THE ENHANCED PROGRAMME OF INSPECTIONS
DURING SURVEYS OF DOUBLE HULL OIL TANKERS”**

and a new part B with the title:

**“Part B
GUIDELINES ON THE ENHANCED PROGRAMME OF INSPECTIONS
DURING SURVEYS OF OIL TANKERS OTHER THAN DOUBLE HULL OIL
TANKERS”**

- 43 The text of the new part A is as follows:

**“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 I/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 have 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 paragraph 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 periodical 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 is 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.

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

3.5.3 Double hull oil tankers exceeding 15 years of age

3.5.3.1 All ballast tanks adjacent to (i.e. with a common plane boundary) a cargo or fuel tank with any means of heating should be examined internally. When considered necessary by the surveyor, thickness measurement should be carried out and 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 4.

3.5.3.2 Ballast tanks which were found, at the previous intermediate or renewal survey, to have no substantial corrosion within the tank and which were found in compliance with either of the following conditions:

- .1 coating in GOOD condition; or
- .2 coating of the common boundary, including adjacent structures, in GOOD condition and the coating of the remaining parts of the tank in FAIR condition,

may be specially considered by the Administration.

4 Intermediate survey

4.1 General

4.1.1 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 survey extent of cargo and ballast tanks dependent on the age of the ship is specified in 4.2, 4.3 and 4.4 and shown in annex 5.

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

4.2 Oil tankers of 5 to 10 years of age

4.2.1 The requirements of 4.1.3 apply.

4.2.2 For tanks used for salt water ballast, an overall survey of representative tanks selected by the surveyor should be carried out. If the overall survey of salt water ballast tanks reveals no visible structural defects, the examination may be limited to verification that the protective coatings remain efficient.

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

4.2.4 In salt water ballast tanks where a protective coating is found in POOR condition and it is not renewed, 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.

4.3 Oil tankers of 10 to 15 years of age

4.3.1 The requirements of 4.2 apply.

4.3.2 An overall survey of at least two representative cargo tanks should be carried out.

4.3.3 For ballast tanks, where fitted, an overall survey of all such tanks should be carried out. If such survey reveals no visible structural defects, the survey may be limited to a verification that the protective coatings remain efficient.

4.3.4 Extent of close-up survey

Ballast tanks: to the same extent as previous renewal survey;

Cargo tanks: the extent of survey should be based on the record of the previous renewal survey and repair history of the tanks, and be applied to two cargo tanks after the second renewal survey.

The minimum requirements of close-up surveys are given in annex 5. The extent of close-up surveys may be extended as stated in 2.4.3. For areas in tanks where coatings are found to be in GOOD condition, the extent of the close-up surveys according to annex 5 may be specially considered by the Administration.

4.3.5 Extent of thickness measurements

The extent of thickness measurements is also given in annex 5. The minimum requirements for thickness measurements at the intermediate survey are areas found to be suspect areas according to 1.2.7 at the previous renewal survey. Where substantial corrosion as defined in 1.2.8 is found, the extent of the thickness measurements according to annex 5 should be increased in accordance with the requirements of annex 4.

4.4 Oil tankers exceeding 15 years of age

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

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 6A. The survey should not commence until the survey programme has been agreed.

5.1.1.1 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 6B, and forwarded to the Administration.

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

- .1 survey status and basic ship information;
- .2 documentation on board, as described in 6.2 and 6.3;
- .3 main structural plans of cargo and ballast tanks (scantlings drawings), including information regarding use of high-tensile steels (HTS);
- .4 Condition Evaluation Report, according to annex 9;
- .5 relevant previous damage and repair history;
- .6 relevant previous survey and inspection reports from both the recognized organization and the owner;
- .7 cargo and ballast history for the last 3 years, including carriage of cargo under heated conditions;
- .8 details of the inert gas plant and tank cleaning procedures;
- .9 information and other relevant data regarding conversion or modification of the ship's cargo and ballast tanks since the time of construction;
- .10 description and history of the coating and corrosion protection system (including anodes and previous class notations), if any;
- .11 inspections of the Owner's personnel during the last 3 years with reference to structural deterioration in general, leakages in tank boundaries and piping and condition of the coating and corrosion protection system (including anodes), if any. A guidance for reporting is shown in annex 6C;
- .12 information regarding the relevant maintenance level during operation including port state control reports of inspection containing hull-related deficiencies, Safety Management System non-conformities relating to hull maintenance, including the associated corrective action(s); and
- .13 any other information that will help identify suspect areas and critical structural areas.

5.1.3 The submitted survey programme should account for and comply, as a minimum, with the requirements of annexes 1, 2 and 3 and paragraph 2.6 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 of cargo and ballast tanks (scantling drawings), including information regarding use of high tensile steels (HTS);

- .3 arrangement of tanks;
- .4 list of tanks with information on their use, extent of coatings and corrosion protection systems;
- .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 identification of tanks and areas for close-up survey (see 2.4);
- .9 identification of areas and sections for thickness measurement (see 2.5);
- .10 identification of tanks for tank testing (see 2.6);
- .11 identification of the thickness measurement company;
- .12 damage experience related to the ship in question; and
- .13 critical structural areas and suspect areas, where relevant.

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

5.1.5 Use may also be made of the Guidelines for technical assessment in conjunction with the planning of enhanced surveys for tankers, contained in annex 11. 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.

5.2.1.1 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.

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

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

5.2.2 Tanks and spaces should be safe for access. 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 that space is free from hazardous gas and contains sufficient oxygen.

5.2.3 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.

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

5.2.5 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 backup 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 lifesaving and evacuation equipment ready for use.

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

5.3 Access to structures

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

5.3.2 For close-up surveys, 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 boats or rafts;
- .5 portable ladders;
- .6 other equivalent means.

5.4 Equipment for survey

5.4.1 Thickness measurement 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; and
- .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 during the survey (e.g., safety helmet, gloves, safety shoes, etc.).

5.5 Surveys at sea or at anchorage

5.5.1 Surveys at sea or at anchorage may be accepted provided the surveyor(s) 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 tank and the responsible officer on deck. This system should also include the personnel in charge of ballast pump handling if boats or rafts are used.

5.5.3 Surveys of tanks by means of boats or rafts may only be undertaken with the agreement of the surveyor, who should take into account the safety arrangements provided, including weather forecasting and ship response in reasonable sea conditions.

5.5.4 When rafts or boats are used for close-up surveys, 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 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 or space must contain clean ballast water only. Even a thin sheen of oil on the water is not acceptable;
- .6 at no time should the water level be allowed to be within 1 m of the deepest under-deck web face flat so that the survey team is not isolated

from a direct escape route to the tank hatch. Filling to levels above the deck transverses should only be contemplated if a deck access manhole is fitted and open in the bay being examined, so that an escape route for the survey party is available at all times. Other effective means of escape to the deck may be considered;

- .7 if the tanks (or spaces) are connected by a common venting system, or inert gas system, the tank in which the boat or raft should be used should be isolated to prevent a transfer of gas from other tanks (or spaces).

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

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

- .1 when the coating of the under-deck structure is in GOOD condition and there is no evidence of wastage; or
- .2 if a permanent means of access is provided in each bay to allow safe entry and exit. This means 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.

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

5.6 Survey planning meeting

5.6.1 Proper preparation and 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 for the purpose of ascertaining that all the arrangements envisaged in the survey programme are in place, so as to ensure the safe and efficient conduct of the survey work to be carried out.

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

- .1 schedule of the vessel (i.e. the voyage, docking and undocking manoeuvres, periods alongside, cargo and ballast operations, etc.);
- .2 provisions and arrangements for thickness measurements (i.e. access, cleaning/de-scaling, illumination, ventilation, personal safety);

- .3 extent of the thickness measurements;
- .4 acceptance criteria (refer to the list of minimum thicknesses);
- .5 extent of close-up survey and thickness measurement considering the coating condition and suspect areas/areas of substantial corrosion;
- .6 execution of thickness measurements;
- .7 taking representative readings in general and where uneven corrosion/pitting is found;
- .8 mapping of areas of substantial corrosion; and
- .9 communication between attending surveyor(s) the thickness measurement company operator(s) and owner representative(s) concerning findings.

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 8);
- .2 condition evaluation report (annex 9); and
- .3 thickness measurement reports (annex 10).

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

6.3 Supporting documents

The following additional documentation should be available on board:

- .1 all documents required by 5.1.2;
- .2 survey programme as required by 5.1 until such time as the renewal survey has been completed; and
- .3 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.

7.2 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 7.

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 10.

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 In case of oil tankers of 130 m in length and upwards (as defined in the International Convention on Load Lines in force), the ship's longitudinal strength should be evaluated by using the thickness of structural members measured, renewed and reinforced, as appropriate, during the renewal survey of safety construction carried out after the ship reached 10 years of age, in accordance with the criteria for longitudinal strength of the ship's hull girder for oil tankers specified in annex 12.

8.1.3 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.

8.1.4 The final result of the evaluation of the ship's longitudinal strength required in 8.1.2, after renewal or reinforcement work of structural members, if carried out as a result of initial evaluation, should be reported as a part of the condition evaluation report.

8.2 Reporting

8.2.1 Principles for survey reporting are shown in annex 8.

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 9 and placed on board the ship for reference at future surveys. The condition evaluation report should be endorsed by the Administration.

ANNEX 1

**MINIMUM REQUIREMENTS FOR CLOSE-UP SURVEY AT RENEWAL
SURVEY OF DOUBLE HULL OIL TANKERS**

Age \leq 5 years 1	5 < age \leq 10 years 2	10 < age \leq 15 years 3	Age > 15 years 4
One web frame (1), in a complete ballast tank (see Note 1)	All web frames (1), in a complete ballast tank (see Note 1) The knuckle area and the upper part (5 m approximately) of one web frame in each remaining ballast tank (6)	All web frames (1), in all ballast tanks	As for ships referred to in column 3 Additional transverse areas as deemed necessary by the Administration
One deck transverse, in a cargo oil tank (2)	One deck transverse, in two cargo oil tanks (2)	All web frames (7), including deck transverse and cross ties, if fitted, in a cargo oil tank One web frame (7), including deck transverse and cross ties, if fitted, in each remaining cargo oil tank	
One transverse bulkhead (4), in a complete ballast tank (see Note 1)	One transverse bulkhead (4), in each complete ballast tank (see Note 1)	All transverse bulkheads, in all cargo oil (3) and ballast (4) tanks	
One transverse bulkhead (5) in a cargo oil centre tank One transverse bulkhead (5), in a cargo oil wing tank (see Note 2)	One transverse bulkhead (5), in two cargo oil centre tanks One transverse bulkhead (5), in a cargo oil wing tank (see Note 2)		

NOTES:

(1), (2), (3), (4), (5), (6) and (7) are areas to be subjected to close-up surveys and thickness measurements (see appendix 3 of annex 10).

- (1) Web frame in a ballast tank means vertical web in side tank, hopper web in hopper tank, floor in double bottom tank and deck transverse in double deck tank (where fitted), including adjacent structural members. In fore and aft peak tanks web frame means a complete transverse web frame ring including adjacent structural members.
- (2) Deck transverse, including adjacent deck structural members (or external structure on deck in way of the tank, where applicable).
- (3) Transverse bulkhead complete in cargo tanks, including girder system, adjacent structural members (such as longitudinal bulkheads) and internal structure of lower and upper stools, where fitted.
- (4) Transverse bulkhead complete in ballast tanks, including girder system and adjacent structural members, such as longitudinal bulkheads, girders in double bottom tanks, inner bottom plating, hopper side, connecting brackets.
- (5) Transverse bulkhead lower part in cargo tank, including girder system, adjacent structural members (such as longitudinal bulkheads) and internal structure of lower stool, where fitted.
- (6) The knuckle area and the upper part (5 metres approximately), including adjacent structural members. Knuckle area is the area of the web frame around the connections of the slope hopper plating to the inner hull bulkhead and the inner bottom plating, up to 2 metres from the corners both on the bulkhead and the double bottom.
- (7) Web frame in a cargo oil tank means deck transverse, longitudinal bulkhead vertical girder and cross ties, where fitted, including adjacent structural members.

Note 1 Complete ballast tank: means double bottom tank plus double side tank plus double deck tank, as applicable, even if these tanks are separate.

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

ANNEX 2

**MINIMUM REQUIREMENTS FOR THICKNESS MEASUREMENTS AT
RENEWAL SURVEY OF DOUBLE HULL OIL TANKERS**

Age≤5 years	5<age≤10 years	10<age≤15 years	Age>15 years
1	2	3	4
One section of deck plating for the full beam of the ship within the cargo area	Within the cargo area: each deck plate one transverse section	Within the cargo area: each deck plate two transverse sections (1) all wind and water strakes	Within the cargo area: each deck plate three transverse sections (1) each bottom plate all wind and water strakes
	Selected wind and water strakes outside the cargo area	Selected wind and water strakes outside the cargo area	Selected wind and water strakes outside the cargo area
Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to annex 1	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to annex 1	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to annex 1	Measurements, for general assessment and recording of corrosion pattern, of those structural members subject to close-up survey according to annex 1
Suspect areas	Suspect areas	Suspect areas	Suspect areas
(1): at least one section should be within 0.5L amidships.			

ANNEX 3

**MINIMUM REQUIREMENTS FOR TANK TESTING AT RENEWAL SURVEY
OF DOUBLE HULL OIL TANKERS**

Age ≤ 5 years	5 < age ≤ 10 years	Age > 10 years
1	2	3
All ballast tank boundaries	All ballast tank boundaries	All ballast tank boundaries
Cargo tank boundaries facing ballast tanks, void spaces, pipe tunnels, representative fuel oil tanks, pump-rooms or cofferdams	Cargo tank boundaries facing ballast tanks, void spaces, pipe tunnels, representative fuel oil tanks, pump-rooms or cofferdams	Cargo tank boundaries facing ballast tanks, void spaces, pipe tunnels, representative fuel oil tanks, pump-rooms or cofferdams
	All cargo tank bulkheads which form the boundaries of segregated cargoes	All remaining cargo tank bulkheads

ANNEX 4/Sheet 1

**REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT
AREAS OF SUBSTANTIAL CORROSION
RENEWAL SURVEY OF DOUBLE HULL OIL TANKERS**

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

ANNEX 4/Sheet 2

**REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT
AREAS OF SUBSTANTIAL CORROSION RENEWAL SURVEY OF DOUBLE
HULL OIL TANKERS WITHIN THE CARGO AREA LENGTH**

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

ANNEX 4/Sheet 3

**REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT
AREAS OF SUBSTANTIAL CORROSION RENEWAL SURVEY OF DOUBLE
HULL OIL TANKERS WITHIN THE CARGO AREA LENGTH**

STRUCTURE IN WING BALLAST TANKS		
Structural member	Extent of measurement	Pattern of measurement
Side shell and longitudinal bulkhead plating: - upper strake and strakes in way of horizontal girders - all other strakes	Plating between each pair of longitudinals in a minimum of three bays (along the tank) Plating between every third pair of longitudinals in same three bays	Single measurement Single measurement
Side shell and longitudinal bulkhead longitudinals on: - upper strake - all other strakes	Each longitudinal in same three bays Every third longitudinal in same three bays	3 measurements across web and 1 measurement on flange 3 measurements across web and 1 measurement on flange
Longitudinals - brackets	Minimum of three at top, middle and bottom of tank in same three bays	5-point pattern over area of bracket
Vertical web and transverse bulkheads (excluding deckhead area): - strakes in way of horizontal girders - other strakes	Minimum of two webs and both transverse bulkheads Minimum of two webs and both transverse bulkheads	5-point pattern over approx. two square metre 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

ANNEX 4/Sheet 4

**REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT
AREAS OF SUBSTANTIAL CORROSION RENEWAL SURVEY OF DOUBLE
HULL OIL TANKERS WITHIN THE CARGO AREA LENGTH**

LONGITUDINAL BULKHEADS IN CARGO TANKS		
Structural member	Extent of measurement	Pattern of measurement.
Deckhead and bottom strakes, and strakes in way of the horizontal stringers of transverse bulkheads	Plating between each pair of longitudinals in a minimum of three bays	Single measurement
All other strakes	Plating between every third pair of longitudinals in same three bays	Single measurement
Longitudinals on deckhead and bottom strakes	Each longitudinal in same three bays	Three measurements across web and one measurement on flange
All other longitudinals	Every third longitudinal in same three bays	Three measurements across web and one measurement on flange
Longitudinals - brackets	Minimum of three at top, middle and bottom of tank in same three bays	5-point pattern over area of bracket
Web frames and cross ties	Three webs with minimum of three locations on each web, including in way of cross tie connections	5-point pattern over approximately two square metre area of webs, plus single measurements on flanges of web frame and cross ties
Lower end brackets (opposite side of web frame)	Minimum of three brackets	5-point pattern over approximately two square metre area of brackets, plus single measurements on bracket flanges

ANNEX 4/Sheet 5

**REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT
AREAS OF SUBSTANTIAL CORROSION RENEWAL SURVEY OF DOUBLE
HULL OIL TANKERS WITHIN THE CARGO AREA LENGTH**

TRANSVERSE WATERTIGHT AND SWASH BULKHEADS IN CARGO TANKS		
Structural member	Extent of measurement	Pattern of measurement
Upper and lower stool, where fitted	Transverse band within 25 mm of welded connection to inner bottom/deck plating Transverse band within 25 mm of welded connection to shelf plate	5-point pattern between stiffeners over one metre length
Deckhead and bottom strakes, and strakes in way of horizontal stringers	Plating between pair of stiffeners at three locations: approximately 1/4, 1/2 and 3/4 width of tank	5-point pattern between stiffeners over one metre length
All other strakes	Plating between pair of stiffeners at middle location	Single measurement
Strakes in corrugated bulkheads	Plating for each change of scantling at centre of panel and at flange of fabricated connection	5-point pattern over about one square metre of plating
Stiffeners	Minimum of three typical stiffeners	For web, 5-point pattern over span between bracket connections (two measurements across web at each bracket connection and one at centre of span). For flange, single measurements at each bracket toe and at centre of span
Brackets	Minimum of three at top, middle and bottom of tank	5-point pattern over area of bracket
Horizontal stringers	All stringers with measurements at both ends and middle	5-point pattern over one square metre area, plus single measurements near bracket toes and on flanges

ANNEX 5

MINIMUM REQUIREMENTS FOR OVERALL AND CLOSE-UP SURVEY AND THICKNESS MEASUREMENTS AT INTERMEDIATE SURVEY OF DOUBLE HULL OIL TANKERS

5<age≤ 10 years	10<age≤15 years	Age> 15 years
1	2	3
Overall survey of representative salt water ballast tanks, selected by the attending surveyor (the selection should include fore and aft peak tanks and three other tanks) (see 4.2)	Overall survey of all salt water ballast tanks, including combined cargo/ballast tanks where fitted (see 4.3)	As for renewal survey given in annex 1
	Overall survey of at least two representative cargo tanks	As for renewal survey given in annex 1
	Close-up survey in salt water ballast tanks of: - all web frames (1) in one complete tank (see Note 1) - the knuckle area and the upper part (5 m approximately) of one web frame in each remaining ballast tank (6) - one transverse bulkhead (4) in each complete tank (see Note 1) (see 4.2.3)	As for renewal survey given in annex 1
	Close-up survey in two cargo tanks (or two combined cargo/ballast tanks, where fitted): the extent of survey should be based on the records of the previous renewal survey and repair history of the tanks (see 4.3)	As for renewal survey given in annex 1
Thickness measurements of those areas found to be suspect areas, as defined in 1.2.7, at the previous renewal survey (see 4.3.5)	Thickness measurements of those areas found to be suspect areas, as defined in 1.2.7, at the previous renewal survey (see 4.3.5)	As for renewal survey given in annex 2

Notes:

(1), (4) and (6) are areas to be subjected to close-up surveys and thickness measurements (see appendix 3 of annex 3).

- (1) Web frame means vertical web in side tank, hopper web in hopper tank, floor in double bottom tank and deck transverse in double deck tank (where fitted), including adjacent structural members. In fore and aft peak tanks web frame means a complete transverse web frame ring including adjacent structural members.
- (4) Transverse bulkhead complete in ballast tanks, including girder system and adjacent structural members, such as longitudinal bulkheads, girders in double bottom tanks, inner bottom plating, hopper side, inner hull longitudinal bulkhead, connecting brackets.
- (6) The knuckle area and the upper part (5 metres approximately), including adjacent structural members. Knuckle area is the area of the web frame around the connections of the slope hopper plating to the inner hull bulkhead and the inner bottom plating, up to 2 metres from the corners both on the bulkhead and the double bottom.

Note 1 Complete ballast tank: means double bottom tank plus double side tank plus double deck tank, as applicable, even if these tanks are separate.

ANNEX 6A

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 area, 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 tanks and spaces

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

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

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

4 Conditions for survey

This section of the survey programme 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 the ship in accordance with 2.4.1.

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 the ship in accordance with 2.4.2.

8 Identification of tanks for tank testing

This section of the survey programme should identify and list the tanks that should undergo tank testing for the ship in accordance with 2.6.

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 2.5.1.

10 Minimum thickness of hull structures

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

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

Area or location	Original as-built thickness (mm)	Minimum thickness (mm)	Substantial corrosion thickness (mm)
Deck			
Plating			
Longitudinals			
Longitudinal girders			
Bottom			
Plating			
Longitudinals			
Longitudinal girders			
Ship side			
Plating			
Longitudinals			
Longitudinal girders			
Longitudinal bulkhead			
Plating			
Longitudinals			
Longitudinal girders			
Inner bottom			
Plating			
Longitudinals			
Longitudinal girders			
Transverse bulkheads			
Plating			
Stiffeners			
Transverse web frames, floors and stringers			
Plating			
Flanges			
Stiffeners			
Cross ties			
Flanges			
Webs			

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

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, if 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**

5.1.3.2 requires that main structural plans of cargo and ballast tanks (scantling drawings), including information on regarding use of high tensile steel (HTS), to 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 6B), 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 5.1.3.

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

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

ANNEX 6B

SURVEY PLANNING QUESTIONNAIRE

The following information will enable the owner in co-operation with the Administration to develop a survey programme 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 resolution.

Particulars

Ship's name:
 IMO number:
 Flag State:
 Port of registry:
 Owner:
 Recognized organization (RO):
 Gross tonnage:
 Deadweight (metric tonnes):
 Date of delivery:

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

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.

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

Safety Management System

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

Name and address of the approved thickness measurement company:

ANNEX 6C

OWNER'S INSPECTION REPORT

Structural condition

Ship's name:

For tank No.:

Grade of steel: deck: side:

bottom: longitudinal bulkhead:

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

Repairs carried out due to:

Thickness measurements carried out (dates):

Results in general:

Overdue surveys:

Outstanding conditions of class:

Comments:

Date of inspection:

Inspected by:

Signature:

ANNEX 7

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 in 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 non-destructive test (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; and
- .7 measurement record format in accordance with recommended procedures for thickness measurements (see annex 10). Recommended procedures for thickness measurements of double hull oil tankers are contained in annex 2.

Auditing of the company

2.2 Upon satisfactory review of the documents submitted, the company should be audited in order to ascertain that the company is duly organized and managed in accordance with the documents submitted and 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 carried out 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 case any alteration to the certified thickness measurement operation system of the company is made, such alteration should be immediately reported to the organization recognized by the Administration. A re-audit should be carried out where deemed necessary by the organization recognized by the Administration.

5 Withdrawal of 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 system of the company;
- .3 where the company failed to report any alteration referred to in 4 to the organization recognized by the Administration as required.

ANNEX 8

SURVEY REPORTING PRINCIPLES

As a principle, for oil tankers 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 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, should be made available to the next attending surveyor, prior to continuing or completing the survey. Thickness measurement and tank testing carried out should also be listed for the next surveyor.

2 Extent of the survey

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

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

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

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

Where only partial survey is required, i.e. one web frame ring/one deck transverse, the identification should include location within each ballast tank and cargo hold by reference to frame numbers.

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

2.5 Identification of tanks subject to tank testing.

2.6 Identification of piping systems on deck, including crude oil washing (COW) piping, and ballast piping within cargo and 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 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.
- .3 Thickness measurement report should be verified and signed by the surveyor controlling the measurements on board.

- .4 Evaluation result of longitudinal strength of the hull girder of oil tankers of 130 m in length and upwards and over 10 years of age. The following data should be included, as relevant:
 - .4.1 measured and as-built transverse sectional areas of deck and bottom flanges;
 - .4.2 diminution of transverse sectional areas of deck and bottom flanges; and
 - .4.3 details of renewals or reinforcements carried out, as relevant (see 4.2).

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);
 - .3.2 sketches/photos, as appropriate;
- .4 repair extent; and
- .5 non-destructive tests (NDT).

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 given to the survey report.

ANNEX 9

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 Gross tonnage:
 (metric tonnes): 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 completed by	Name Signature	Title
Office	Date	

Attached reports and documents:

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)
- Part 4 – Cargo and ballast piping system:
 - Examined
 - Operationally tested
- Part 5 – 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 6 – Tank corrosion prevention system:
 - Separate form indicating:
 - location of coating/anodes
 - condition of coating (if applicable)
- Part 7 – Repairs: – Identification of tanks/areas
- Part 8 – Condition of class/flag State requirements:
- Part 9 – Memoranda:
 - Acceptable defects
 - Any points of attention for future surveys, e.g. for suspect areas
 - Extended annual/intermediate survey due to coating breakdown
- Part 10 – Conclusion: – Statement on evaluation/verification of survey report

Extract of thickness measurements

Reference is made to the thickness measurements report:

Position of substantially corroded tanks/areas ¹ or areas with deep pitting ³	Thickness diminution (%)	Corrosion pattern ²	Remarks: (e.g. reference to 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 1/3 or more of actual plate thickness should be noted.

Tank corrosion prevention system

Tank Nos. ¹	Tank corrosion prevention system ²	Coating condition ³	Remarks

Notes:

- 1 All segregated ballast tanks and combined cargo/ballast tanks 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 8 of the contents of the condition evaluation report.

**Evaluation result of longitudinal strength of the hull girder of oil tankers of 130 m
in length and upwards and of over 10 years of age
(of sections 1, 2 and 3 below, only one applicable section should be completed)**

- 1 This section applies to ships regardless of the date of construction: Transverse sectional areas of deck flange (deck plating and deck longitudinals) and bottom flange (bottom shell plating and bottom longitudinals) of the ship's hull girder have been calculated by using the thickness measured, renewed or reinforced, as appropriate, during the renewal survey of the Cargo Ship Safety Construction Certificate or the Cargo Ship Safety Certificate (SC renewal survey) most recently conducted after the ship reached 10 years of age, and found that the diminution of the transverse sectional area does not exceed 10% of the as-built area, as shown in the following table:

		Measured	As-built	Diminution
Transverse section 1	Deck flange	cm ²	cm ²	cm ² (%)
	Bottom flange	cm ²	cm ²	cm ² (%)
Transverse section 2	Deck flange	cm ²	cm ²	cm ² (%)
	Bottom Flange	cm ²	cm ²	cm ² (%)
Transverse section 3	Deck Flange	cm ²	cm ²	cm ² (%)
	Bottom Flange	cm ²	cm ²	cm ² (%)

2 This section applies to ships constructed on or after 1 July 2002: Section moduli of transverse section of the ship's hull girder have been calculated by using the thickness of structural members measured, renewed or reinforced, as appropriate, during the SC renewal survey most recently conducted after the ship reached 10 years of age in accordance with the provisions of paragraph 2.1.1 of annex 12, and are found to be within their diminution limits determined by the Administration, taking into account the recommendations adopted by the Organization, as shown in the following table:

		Z _{act} (cm ³) ¹	Z _{req} (cm ³) ²	Remarks
Transverse section 1	Upper deck			
	Bottom			
Transverse section 2	Upper deck			
	Bottom			
Transverse section 3	Upper deck			
	Bottom			

Notes:

- 1 Z_{act} means the actual section moduli of the transverse section of the ship's hull girder calculated by using the thickness of structural members measured, renewed or reinforced, as appropriate, during the SC renewal survey, in accordance with the provisions of paragraph 2.1.1 of annex 12.
- 2 Z_{req} means the diminution limit of the longitudinal bending strength of ships, as calculated in accordance with the provisions of paragraph 2.1.1 of annex 12.

The calculation sheets for Z_{act} should be attached to this report.

3 This section applies to ships constructed before 1 July 2002: Section moduli of transverse sections of the ship's hull girder have been calculated by using the thickness of structural members measured, renewed or reinforced, as appropriate, during the SC renewal survey most recently conducted after the ship reached 10 years of age in accordance with the provisions of paragraph 2.2.1.2 of annex 12, and found to meet the criteria required by the Administration or the recognized classification society and that Z_{act} is not less than Z_{mc} (defined in Note 2 below) as specified in appendix 2 to annex 12, as shown in the following table.

Describe the criteria for acceptance of the minimum section moduli of the ship's hull girder for ships in service required by the Administration or the recognized classification society.

Table 3 – Transverse section modulus of hull girder				
		$Z_{act} (cm^3)^1$	$Z_{mc} (cm^3)^2$	Remarks
Transverse section 1	Upper deck			
	Bottom			
Transverse section 2	Upper deck			
	Bottom			
Transverse section 3	Upper deck			
	Bottom			

Notes:

- 1 As defined in note 1 of table 2.
- 2 Z_{mc} means the diminution limit of minimum section modulus calculated in accordance with provisions of paragraph 2.1.2 of annex 12.

ANNEX 10

**RECOMMENDED PROCEDURES FOR THICKNESS MEASUREMENTS
OF DOUBLE HULL OIL TANKERS****General**

1 These procedures should be used for recording thickness measurements as required by annexes 2 and 4.

2 Reporting forms TM1-DHT, TM2-DHT(i), TM2-DHT(ii), TM3-DHT, TM4-DHT, TM5-DHT and TM6-DHT, set out in appendix 2, should be used for recording thickness measurements and the maximum allowable diminution should be stated.

3 Appendix 3 contains guidance diagrams and notes relating to the reporting forms and the requirements for thickness measurement.

4 The reporting forms should, where appropriate, be supplemented by data presented on structural sketches.

APPENDIX 1

Ship's name:
 IMO number:
 Class/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 pages.
 Name of operator: Name of surveyor:
 Signature of operator: Signature of surveyor:

 Company official stamp: Administration:
 Official stamp:

* Delete as appropriate.

APPENDIX 2

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

Ship's name Class identity No.

Report No.

STRAKE POSITION PLATE POSITION	No. or letter	Original thickness (mm)	Forward reading						Aft reading						%		
			Gauged		Diminution P		Diminution S		Gauged		Diminution P		Diminution S				
			P	S	mm	%	mm	%	P	S	mm	%	mm	%	P	S	
																	mm
11 th for																	
10 th																	
9 th																	
8 th																	
7 th																	
6 th																	
5 th																	
4 th																	
3 rd																	
2 nd																	
1 st																	
Amidships																	
1 st aft																	
2 nd																	
3 rd																	
4 th																	
5 th																	
6 th																	
7 th																	
8 th																	
9 th																	
10 th																	
11 th																	

Operator's signature Surveyor's signature

NOTES – See reverse

* Delete as appropriate.

NOTES TO THE REPORT TMI-DHT:

- 1 This report should be used for recording the thickness measurement of:
 - .1 All strength deck plating within the cargo area.
 - .2 All keel, bottom shell plating and bilge plating within the cargo area.
 - .3 Side shell plating, including selected wind and water strakes outside cargo area.
 - .4 All wind and water strakes within cargo area.
- 2 The strake position should be clearly indicated 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.
 - .3 For side shell plating give number of the strake of plating below sheerstrake and letter as shown on shell expansion.
- 3 Measurements should be taken at the forward and aft areas of all 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.
- 4 The single measurements recorded are to represent the average of multiple measurements.
- 5 The maximum allowable diminution could be stated in an attached document.

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

Ship's name Class identity No. Report No.

STRAKE POSITION	STRENGTH DECK AND SHEERSTRAKE PLATING																	
	FIRST TRANSVERSE SECTION AT FRAME NUMBER				SECOND TRANSVERSE SECTION AT FRAME NUMBER				THIRD TRANSVERSE SECTION AT FRAME NUMBER									
	No. or Letter	Original thickness	Maximum allowable diminution	Gauged	Diminution P	Diminution S	No. or Letter	Original thickness	Maximum allowable diminution	Gauged	Diminution P	Diminution S	No. or Letter	Original thickness	Maximum allowable diminution	Gauged	Diminution P	Diminution S
	mm	mm	P	S	%		mm	mm	P	S	%		mm	mm	P	S	%	
Stringer Plate																		
1st strake inboard																		
2 nd																		
3 ^d																		
4 th																		
5 th																		
6 th																		
7 th																		
8 th																		
9 th																		
10 th																		
11 th																		
12 th																		
13 th																		
14 th																		
Centre strake																		
Sheer strake																		
TOPSIDE TOTAL																		

Operator's Signature Surveyor's Signature NOTES - See reverse

NOTES TO THE REPORT TM2-DHT (i)

- 1 This report form should be used for recording the thickness measurements of strength deck plating and sheerstrake plating transverse sections:

One, two or three sections within the cargo area comprising of the structural items (0), (1) and (2) as shown on the diagrams of typical transverse sections illustrated in appendix 3 of annex 10.
- 2 The topside area comprises deck plating, stringer plate and sheerstrake (including rounded gunwales).
- 3 The exact frame station of measurement should be stated.
- 4 The single measurements recorded are to represent the average of multiple measurements.
- 5 The maximum allowable diminution could be stated in an attached document.

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

Ship's name Class identity No. Report No.

STRAKE POSITION	SHELL PLATING																		
	FIRST TRANSVERSE SECTION AT FRAME NUMBER				SECOND TRANSVERSE SECTION AT FRAME NUMBER				THIRD TRANSVERSE SECTION AT FRAME NUMBER										
	No. or Letter	Original thickness mm	Maximum allowable diminution mm	Gauged P S	Diminution P mm	Diminution S mm	No. or Letter	Original thickness mm	Maximum allowable diminution mm	Gauged P S	Diminution P mm	Diminution S mm	No. or Letter	Original thickness mm	Maximum allowable diminution mm	Gauged P S	Diminution P mm	Diminution S mm	
1 st below sheer strake																			
2 nd																			
3 rd																			
4 th																			
5 th																			
6 th																			
7 th																			
8 th																			
9 th																			
10 th																			
.....																			
17 th																			
18 th																			
19 th																			
20 th																			
Keel strake																			
Bottom total																			

Operator's Signature Surveyor's Signature NOTES - See reverse

NOTES TO THE REPORT TM2-DHT(ii)

- 1 This report form should be used for recording the thickness measurements of shell plating transverse sections:

One, two or three sections within the cargo area comprising of the structural items (3), (4) and (5) and (6) as shown on the diagrams of typical transverse sections illustrated in appendix 3 of annex 10.
- 2 The bottom area comprises keel, bottom and bilge plating.
- 3 The exact frame station of measurement should be stated.
- 4 The single measurements recorded are to represent the average of multiple measurements.
- 5 The maximum allowable diminution could be stated in an attached document.

NOTES TO THE REPORT TM3-DHT

- 1 This report should be used for recording the thickness measurements of longitudinal members at transverse sections:

One, two or three sections within the cargo area comprising of the appropriate structural items (10) to (29) as shown on the diagrams of typical transverse sections illustrated in appendix 3 of annex 10.

- 2 The exact frame station of measurement should be stated.
- 3 The single measurements recorded are to represent the average of multiple measurements.
- 4 The maximum allowable diminution could be stated in an attached document.

NOTES TO THE REPORT TM4-DHT

- 1 This report should be used for recording the thickness measurements of transverse structural members, comprising of the appropriate structural items (30) to (36) as shown on diagrams of typical transverse sections illustrated in appendix 3 of annex 10.
- 2 Guidance for areas of measurement is indicated in appendix 3 of annex 10. The single measurements recorded are to represent the average of multiple measurements.
- 3 The maximum allowable diminution could be stated in an attached document.

NOTES TO THE REPORT TM5-DHT

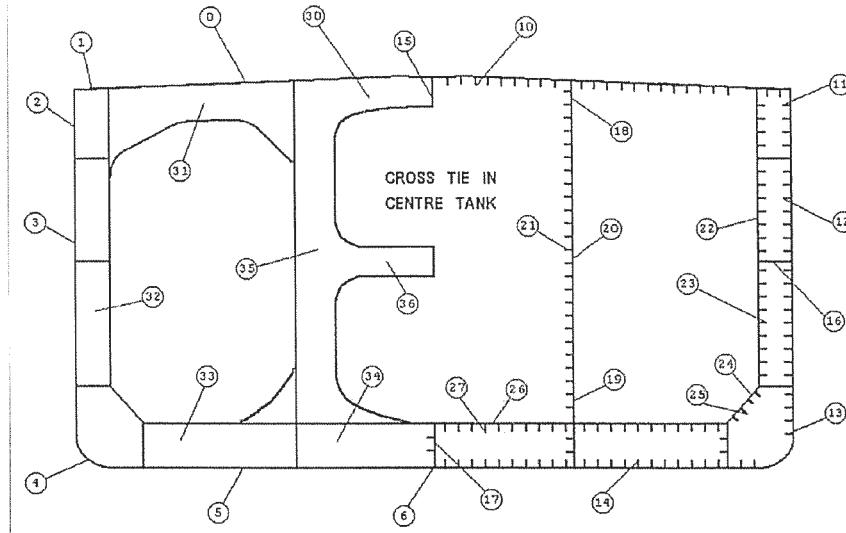
- 1 This report should be used for recording the thickness measurement of W.T./O.T. transverse bulkheads.
- 2 Guidance for areas of measurement is indicated in appendix 3 of annex 10.
- 3 The single measurements recorded are to represent the average of multiple measurements.
- 4 The maximum allowable diminution could be stated in an attached document.

NOTES TO THE REPORT TM6-DHT

- 1 This report should be used for recording the thickness measurement of miscellaneous structural members.
- 2 The single measurements recorded are to represent the average of multiple measurements.
- 3 The maximum allowable diminution could be stated in an attached document.

APPENDIX 3

Thickness measurement – Double hull oil tankers
 Typical transverse section of a double hull oil tanker above 150,000 dwt with
 indication of longitudinal and transverse members

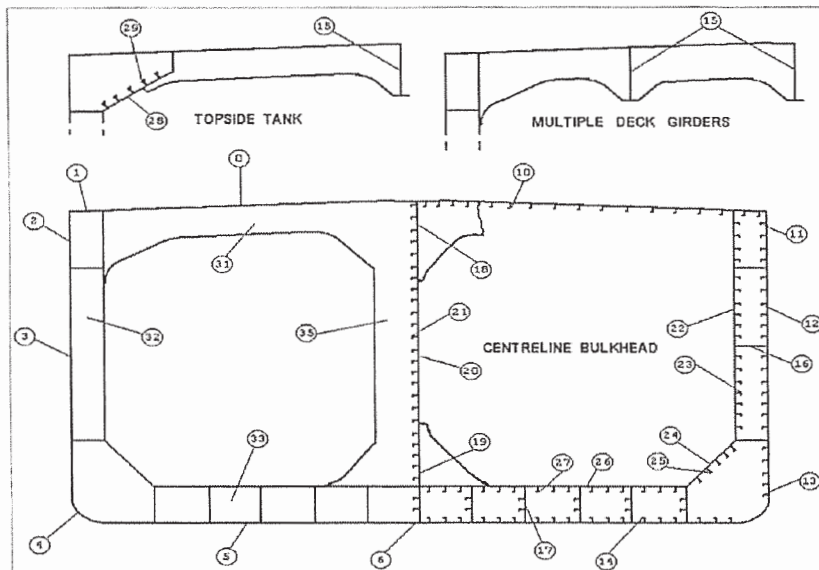


Report on TM2-DHT (i) and (ii)
0. Strength deck plating
1. Stringer plate
2. Sheerstrake
3. Side shell plating
4. Bilge plating
5. Bottom shell plating
6. Keel plate

Report on TM3-DHT	
10. Deck longitudinals	20. Longitudinal bulkhead plating (remainder)
11. Sheerstrake longitudinals	21. Longitudinal bulkhead longitudinals
12. Side shell longitudinals	22. Inner side plating
13. Bilge longitudinals	23. Inner side longitudinals
14. Bottom longitudinals	24. Hopper plating
15. Deck girders	25. Hopper longitudinals
16. Horizontal girders in wing ballast tanks	26. Inner bottom plating
17. Bottom girders	27. Inner bottom longitudinals
18. Longitudinal bulkhead top strake	28. Topside tank plating
19. Longitudinal bulkhead bottom strake	29. Topside tank longitudinals

Report on TM4-DHT
30. Deck transverse – centre tank
31. Deck transverse – wing tank
32. Vertical web in wing ballast tank
33. Double bottom floor – wing tank
34. Double bottom floor – centre tank
35. Longitudinal bulkhead vertical web
36. Cross ties

Thickness measurement – Double hull oil tankers
Typical transverse section of a double hull oil tanker up to 150,000 dwt with
indication of longitudinal and transverse members

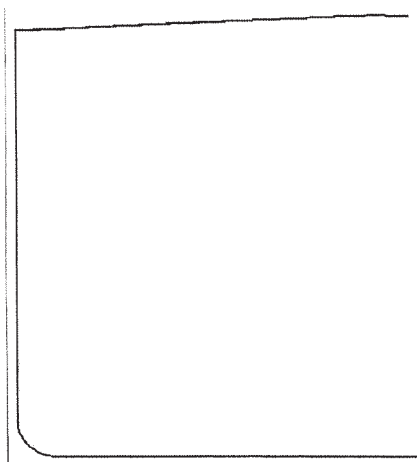


Report on TM2-DHT (i) and (ii)	Report on TM3-DHT		Report on TM4-DHT
0. Strength deck plating	10. Deck longitudinals	20. Longitudinal bulkhead plating (remainder)	30. Deck transverse – centre tank
1. Stringer plate	11. Sheerstrake longitudinals	21. Longitudinal bulkhead longitudinals	31. Deck transverse – wing tank
2. Sheerstrake	12. Side shell longitudinals	22. Inner side plating	32. Vertical web in wing ballast tank
3. Side shell plating	13. Bilge longitudinals	23. Inner side longitudinals	33. Double bottom floor – wing tank
4. Bilge plating	14. Bottom longitudinals	24. Hopper plating	34. Double bottom floor – centre tank
5. Bottom shell plating	15. Deck girders	25. Hopper longitudinals	35. Longitudinal bulkhead vertical web
6. Keel plate	16. Horizontal girders in wing ballast tanks	26. Inner bottom plating	36. Cross ties
	17. Bottom girders	27. Inner bottom longitudinals	
	18. Longitudinal bulkhead top strake	28. Topside tank plating	
	19. Longitudinal bulkhead bottom strake	29. Topside tank longitudinals	

Thickness measurement – Double hull oil tankers

Transverse section outline.

(The diagram may be used for those ships where typical sections are not applicable.)



Report on TM2-DHT (i) and (ii)
0. Strength deck plating
1. Stringer plate
2. Sheerstrake
3. Side shell plating
4. Bilge plating
5. Bottom shell plating
6. Keel plate

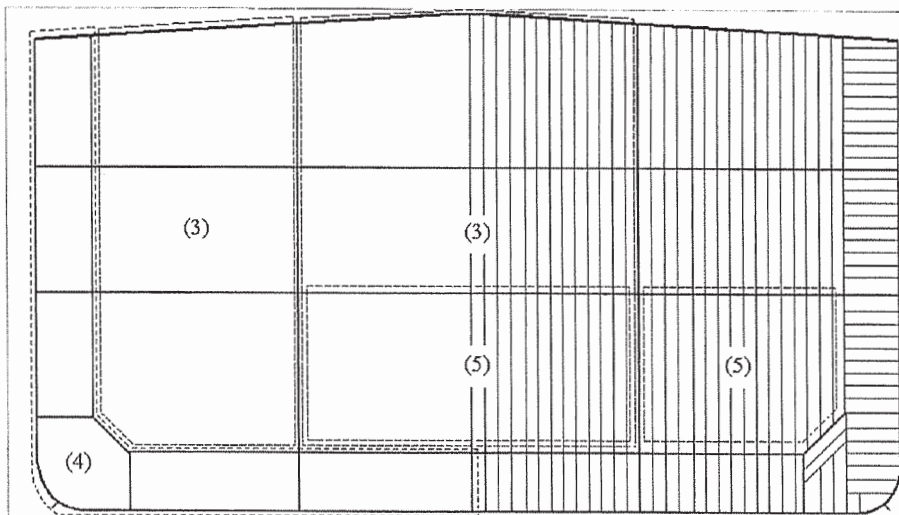
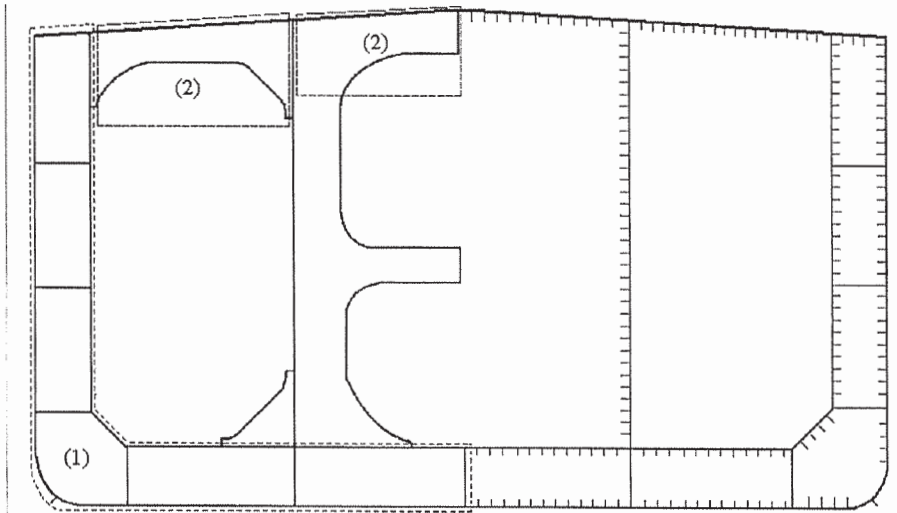
Report on TM3-DHT	
10. Deck longitudinals	20. Longitudinal bulkhead plating (remainder)
11. Sheerstrake longitudinals	21. Longitudinal bulkhead longitudinals
12. Side shell longitudinals	22. Inner side plating
13. Bilge longitudinals	23. Inner side longitudinals
14. Bottom longitudinals	24. Hopper plating
15. Deck girders	25. Hopper longitudinals
16. Horizontal girders in wing ballast tanks	26. Inner bottom plating
17. Bottom girders	27. Inner bottom longitudinals
18. Longitudinal bulkhead top strake	28. Topside tank plating
19. Longitudinal bulkhead bottom strake	29. Topside tank longitudinals

Report on TM4-DHT
30. Deck transverse – centre tank
31. Deck transverse – wing tank
32. Vertical web in wing ballast tank
33. Double bottom floor – wing tank
34. Double bottom floor – centre tank
35. Longitudinal bulkhead vertical web
36. Cross ties

Thickness measurement – double hull oil tankers

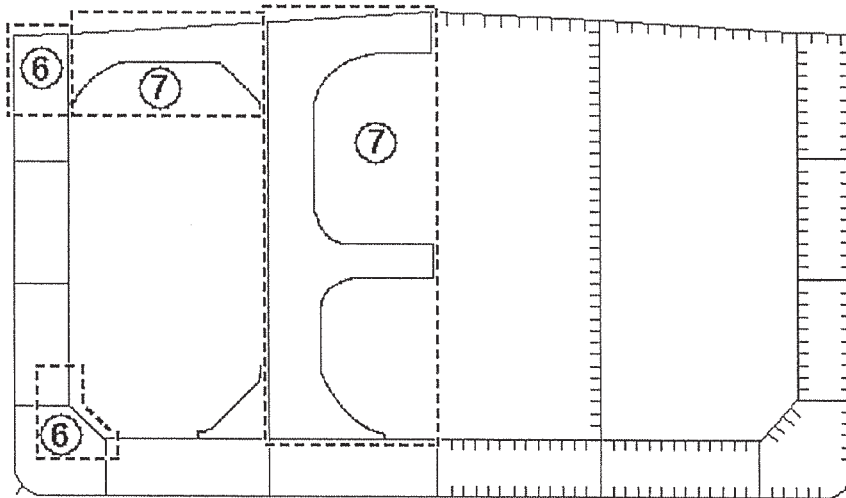
Areas subject to close-up survey and thickness measurements – areas (1) to (5) as defined in annex 1 – thickness to be reported on TM3-DHT, TM4-DHT and TM5-DHT, as appropriate

Close-up survey area



Areas subject to close-up survey and thickness measurements – areas (6) to (7) as defined in annex 1 – thickness to be reported on TM3-DHT and TM4-DHT, as appropriate

Close-up survey area



ANNEX 11

**GUIDELINES FOR TECHNICAL ASSESSMENT IN CONJUNCTION WITH
THE PLANNING OF ENHANCED SURVEYS FOR OIL TANKERS****Renewal survey****1 Introduction**

These Guidelines contain information and suggestions concerning technical assessments which may be of use in conjunction with the planning of renewal surveys of oil tankers. As indicated in 5.1.5, these Guidelines are a recommended tool which may be invoked at the discretion of an Administration, when considered necessary and appropriate, in conjunction with the preparation of the required survey programme.

2 Purpose and principles**2.1 Purpose**

The technical assessments described in these Guidelines should assist in identifying critical structural areas, nominating suspect areas and in focusing attention on structural elements or areas of structural elements which may be particularly susceptible to, or evidence a history of, wastage or damage. This information may be useful in nominating locations, areas and tanks for thickness measurement, close-up survey and tank testing.

2.2 Minimum requirements

These Guidelines may not be used to reduce the requirements of annexes 1, 2 and 3 for close-up survey, thickness measurement and tank testing, respectively, which are, in all cases, to be complied with as a minimum.

2.3 Timing

As with other aspects of survey planning, the technical assessments described in these Guidelines should be completed 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

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

- .1 design features such as stress levels on various structural elements, design details and extent of use of high-tensile steel (HTS);

- .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 tanks for cargo/ballast, protection of tanks and condition of coating, if any.

Technical assessments of the relative risks of susceptibility to damage or deterioration of various structural elements and areas should be judged and decided on the basis of recognized principles and practices, such as may be found in references 1 and 2.

3 Technical assessment

3.1 General

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

3.1.2 Technical assessments performed in conjunction with the survey planning process should, in principle, be as shown schematically in figure 1 which depicts how technical assessments can be carried out in conjunction with the survey planning process. The approach is basically an evaluation of the risk, based on the knowledge and experience related to design and corrosion.

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 protection at newbuilding 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 similar ships, where available, are the main source of information to be used in the process of planning. In addition, a selection of structural details from the design drawings should be included. Typical damage experience to be considered will consist of:

- .1.1 number, extent, location and frequency of cracks; and
- .1.2 location of buckles.

3.2.1.2 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.

3.2.1.3 In addition, general experience should be utilized. For example, reference should be made to reference 1, which contains a catalogue of typical damages and proposed repair methods for various tanker structural details.

3.2.1.4 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 which may be susceptible to damage. An example is shown in figure 2. In particular, chapter 3 of reference 1 deals with various aspects specific to double hull tankers, such as stress concentration locations, misalignment during construction, corrosion trends, fatigue considerations and areas requiring special attention, which should 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 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 is generally to be considered:

- .1.1 usage of tanks and spaces;
- .1.2 condition of coatings;
- .1.3 condition of anodes;
- .1.4 cleaning procedures;
- .1.5 previous corrosion damage;
- .1.6 ballast use and time for cargo tanks;
- .1.7 corrosion risk scheme (see reference 2, table 2.1); and
- .1.8 location of heated tanks.

3.2.2.2 Reference 2 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 reference 2, together with the age of the ship and relevant information on the anticipated condition as derived from the information collected in order to prepare the survey programme.

3.2.2.4 The various tanks and spaces should be listed with the corrosion risks nominated accordingly. Special attention should be given to the areas where the double hull tanker is particularly exposed to corrosion. To this end, the specific aspects addressing corrosion in double hull tankers indicated in 3.4 (Corrosion trends) of reference 1 should be taken into account.

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 (sections) may be nominated.

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

3.2.3.3 The nomination of tanks 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 Tanker Structure Co-operative Forum (TSCF), "Guidelines for the Inspection and Maintenance of Double Hull Tanker Structures, 1995".
- 2 Tanker Structure Co-operative Forum (TSCF), "Guidance Manual for Tanker Structures, 1997".

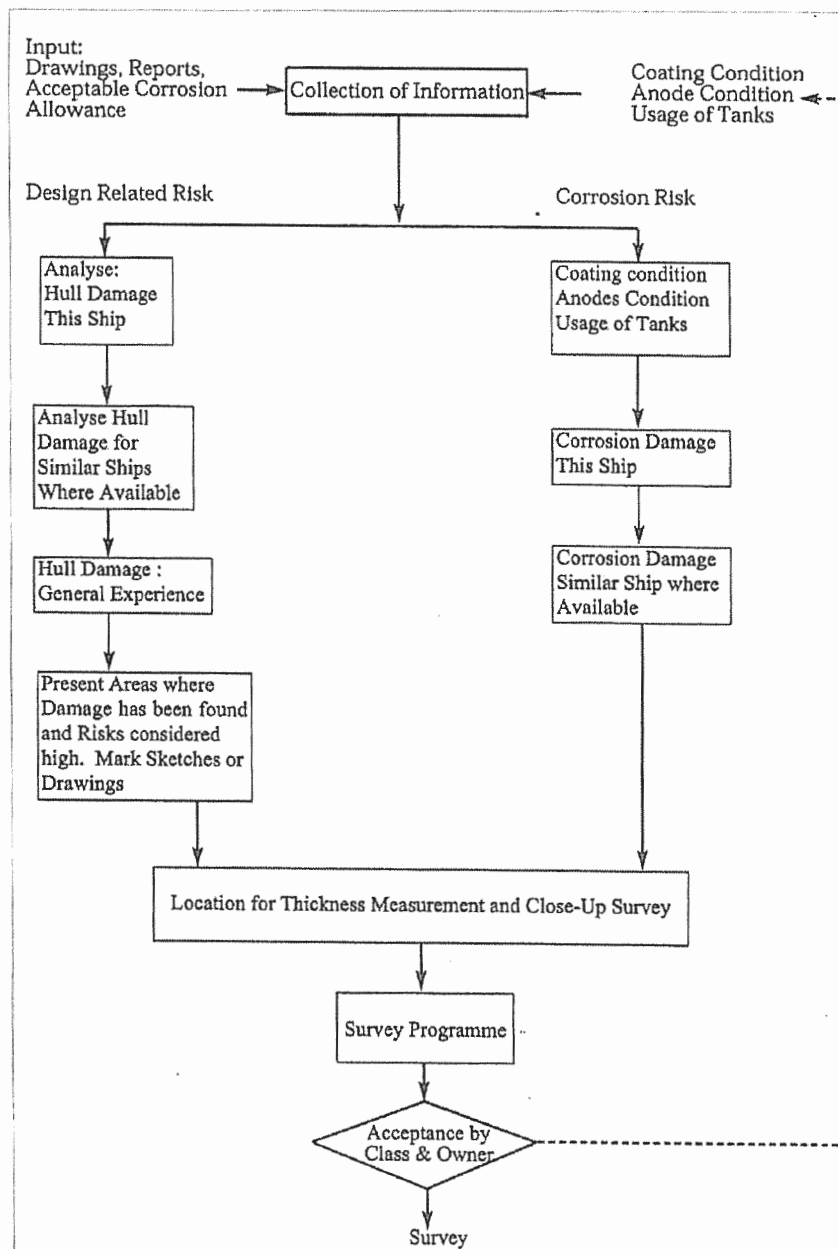


FIGURE 1: TECHNICAL ASSESSMENT AND THE SURVEY PLANNING PROCESS

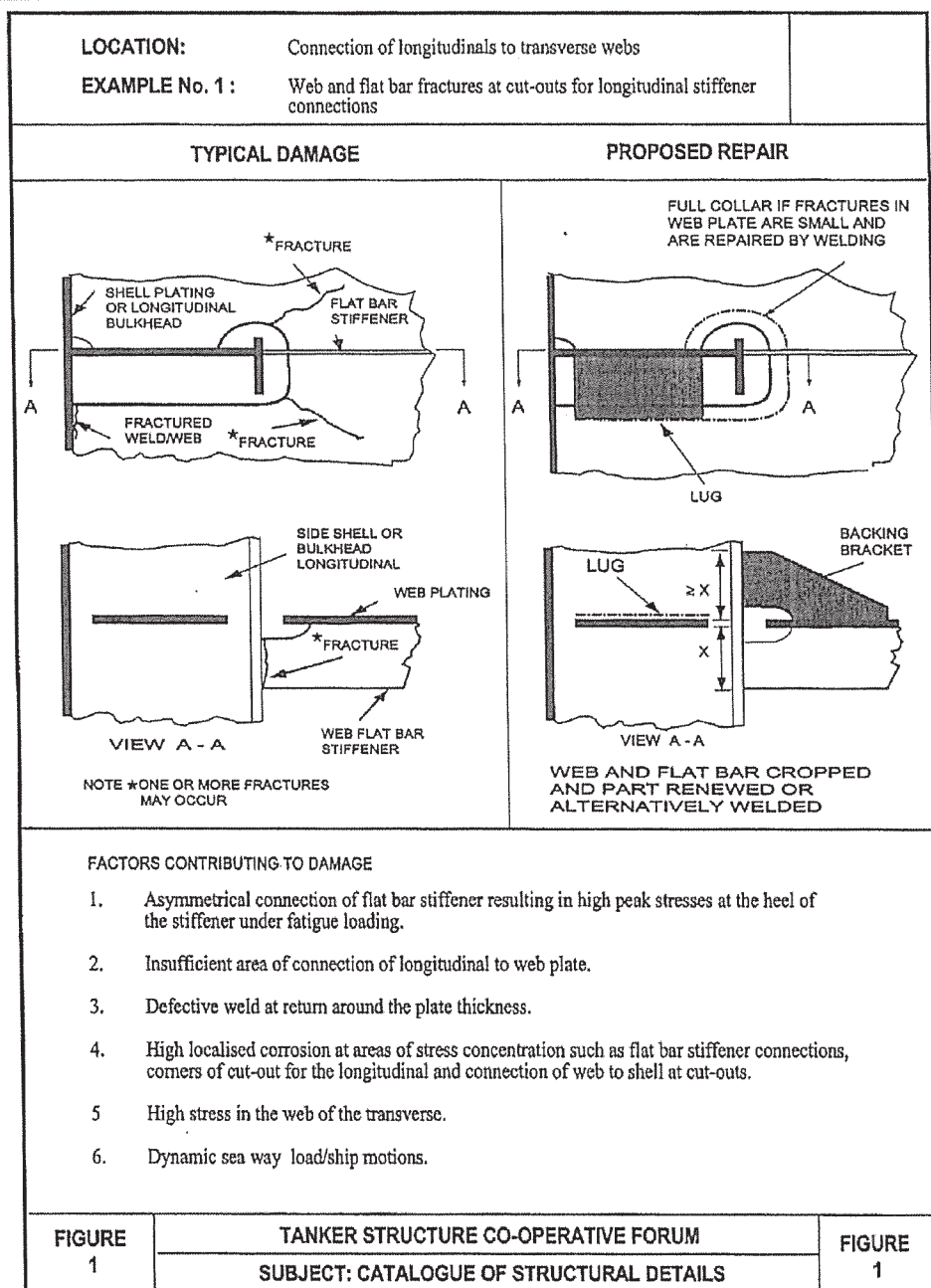


FIGURE 2: TYPICAL DAMAGE AND REPAIR EXAMPLE (REPRODUCED FROM REF. 2)

ANNEX 12

**CRITERIA FOR LONGITUDINAL STRENGTH OF HULL GIRDER
FOR OIL TANKERS****1 General**

1.1 These criteria should be used for the evaluation of the longitudinal strength of the ship's hull girder as required by 8.1.2.

1.2 In order that the ship's longitudinal strength to be evaluated can be recognized as valid, fillet welding between longitudinal internal members and hull envelopes should be in sound condition so as to keep the integrity of longitudinal internal members with hull envelopes.

2 Evaluation of longitudinal strength

On oil tankers of 130 m in length and upwards and over 10 years of age, the longitudinal strength of the ship's hull girder should be evaluated in compliance with the requirements of this annex on the basis of the thickness measured, renewed or reinforced, as appropriate, during the renewal survey of the Cargo Ship Safety Construction Certificate or Cargo Ship Safety Certificate (SC renewal survey). The condition of the hull girder for longitudinal strength evaluation should be determined in accordance with the methods specified in appendix 3.

2.1 Calculation of transverse sectional areas of deck and bottom flanges of hull girder

2.1.1 The transverse sectional areas of deck flange (deck plating and deck longitudinals) and bottom flange (bottom shell plating and bottom longitudinals) of the ship's hull girder should be calculated by using the thickness measured, renewed or reinforced, as appropriate, during the SC renewal survey.

2.1.2 If the diminution of sectional areas of either deck or bottom flange exceeds 10% of their respective as-built area (i.e., original sectional area when the ship was built), either one of the following measures should be taken:

- .1 to renew or reinforce the deck or bottom flanges so that the actual sectional area is not less than 90% of the as-built area; or
- .2 to calculate the actual section of moduli (Z_{act}) of transverse section of the ship's hull girder by applying the calculation method specified in appendix 1, by using the thickness measured, renewed or reinforced, as appropriate, during the SC renewal survey.

2.2 Requirements for transverse section modulus of hull girder

2.2.1 The actual section moduli of the transverse section of the ship's hull girder, calculated in accordance with 2.1.2.2, should satisfy either of the following provisions, as applicable:

- .1 for ships constructed on or after 1 July 2002, the actual section moduli (Z_{act}) of the transverse section of the ship's hull girder calculated in accordance with the requirements of 2.1.2.2 should be not less than the diminution limits determined by the Administration, taking into account the recommendations adopted by the Organization; or
- .2 for ships constructed before 1 July 2002, the actual section moduli (Z_{act}) of the transverse section of the ship's hull girder calculated in accordance with the requirements of 2.1.2.2 should meet the criteria for minimum section modulus for ships in service required by the Administration or recognized classification society, provided that in no case Z_{act} should be less than the diminution limit of the minimum section modulus (Z_{mc}) as specified in appendix 2.

Appendix 1

Calculation criteria of section moduli of midship section of hull girder

- 1 When calculating the transverse section modulus of the ship's hull girder, the sectional area of all continuous longitudinal strength members should be taken into account.
- 2 Large openings, i.e. openings exceeding 2.5 m in length or 1.2 m in breadth, and scallops, where scallop welding is applied, are always to be deducted from the sectional areas used in the section modulus calculation.
- 3 Smaller openings (manholes, lightening holes, single scallops in way of seams, etc.) need not be deducted, provided that the sum of their breadths or shadow area breadths in one transverse section does not reduce the section modulus at deck or bottom by more than 3% and provided that the height of lightening holes, draining holes and single scallops in longitudinals or longitudinal girders does not exceed 25% of the web depth, for scallops maximum 75 mm.
- 4 A deduction-free sum of smaller opening breadths in one transverse section in the bottom or deck area of 0.06 ($B - \Sigma b$) (where B = breadth of ship, Σb = total breadth of large openings) may be considered equivalent to the above reduction in sectional modulus.
- 5 The shadow area will be obtained by drawing two tangent lines with an opening angle of 30°.
- 6 The deck modulus is related to the moulded deck line at side.
- 7 The bottom modulus is related to the baseline.
- 8 Continuous trunks and longitudinal hatch coamings should be included in the longitudinal sectional area provided they are effectively supported by longitudinal bulkheads or deep girders. The deck modulus is then to be calculated by dividing the moment of inertia by the following distance, provided this is greater than the distance to the deck line at side:

$$y_r = y \left(0.9 + 0.2 \frac{x}{B} \right)$$

where:

y = distance from neutral axis to top of continuous strength member;

x = distance from top of continuous strength member to centreline of the ship;

x and y to be measured to the point giving the largest value of y_t .

9 Longitudinal girders between multi-hatchways will be considered by special calculations.

Appendix 2

Diminution limit of minimum longitudinal strength of ships in service

1 The diminution limit of the minimum section modulus (Z_{mc}) of oil tankers in service is given by the following formula:

$$Z_{mc} = cL^2 B (C_b + 0.7)k \quad (\text{cm}^3)$$

where:

L = Length of ship. L is the distance, in metres, on the summer load waterline from the fore side of stem to the after side of the rudder post, or the centre of the rudder stock if there is no rudder post. L should not be less than 96%, and need not be greater than 97%, of the extreme length on the summer load waterline. In ships with unusual stern and bow arrangement, the length L may be specially considered.

B = Greatest moulded breadth in metres.

C_b = Moulded block coefficient at draught d corresponding to summer load waterline, based on L and B . C_b should not be taken less than 0.6.

$$C_b = \frac{\text{moulded displacement}(\text{m}^3) \text{ at draught } d}{LBd}$$

C = $0.9c_n$

$$c_n = 10.75 - \left(\frac{300 - L}{100} \right)^{1.5} \quad \text{for } 130 \text{ m} \leq L \leq 300 \text{ m}$$

$$c_n = 10.75 \quad \text{for } 300 \text{ m} < L < 350 \text{ m}$$

$$c_n = 10.75 - \left(\frac{L - 350}{150} \right)^{1.5} \quad \text{for } 350 \text{ m} \leq L \leq 500 \text{ m}$$

k = material factor, e.g.

k = 1.0 for mild steel with yield stress of 235 N/mm² and over

k = 0.78 for high-tensile steel with yield stress of 315 N/mm² and over

$k = 0.72$ for high-tensile steel with yield stress of 355 N/mm^2 and over.

2 Scantlings of all continuous longitudinal members of the ship's hull girder based on the section modulus requirement in 1 above should be maintained within 0.4L amidships. However, in special cases, based on consideration of type of ship, hull form and loading conditions, the scantlings may be gradually reduced towards the end of 0.4L part, bearing in mind the desire not to inhibit the ship's loading flexibility.

3 However, the above standard may not be applicable to ships of unusual type or design, e.g. for ships of unusual main proportions and/or weight distributions.

Appendix 3

Sampling method of thickness measurements for longitudinal strength evaluation and repair methods

1 Extent of longitudinal strength evaluation

Longitudinal strength should be evaluated within 0.4L amidships for the extent of the hull girder length that contains tanks therein and within 0.5L amidships for adjacent tanks which may extend beyond 0.4L amidships, where tanks means ballast tanks and cargo tanks.

2 Sampling method of thickness measurement

2.1 Pursuant to the requirements of section 2.5, transverse sections should be chosen such that thickness measurements can be taken for as many different tanks in corrosive environments as possible, e.g. ballast tanks sharing a common plane boundary with cargo tanks fitted with heating coils, other ballast tanks, cargo tanks permitted to be filled with seawater and other cargo tanks. Ballast tanks sharing a common plane boundary with cargo tanks fitted with heating coils and cargo tanks permitted to be filled with seawater should be selected where present.

2.2 The minimum number of transverse sections to be sampled should be in accordance with annex 2. The transverse sections should be located where the largest thickness reductions are suspected to occur or are revealed from deck and bottom plating measurements prescribed in 2.3 and should be clear of areas which have been locally renewed or reinforced.

2.3 At least two points should be measured on each deck plate and/or bottom shell plate required to be measured within the cargo area in accordance with the requirements of annex 2.

2.4 Within $0.1D$ (where D is the ship's moulded depth) of the deck and bottom at each transverse section to be measured in accordance with the requirements of annex 2, every longitudinal and girder should be measured on the web and face plate, and every plate should be measured at one point between longitudinals.

2.5 For longitudinal members other than those specified in 2.4 to be measured at each transverse section in accordance with the requirements of annex 2, every longitudinal and girder should be measured on the web and face plate, and every plate should be measured at least in one point per strake.

2.6 The thickness of each component should be determined by averaging all of the measurements taken in way of the transverse section on each component.

3 Additional measurements where the longitudinal strength is deficient

3.1 Where one or more of the transverse sections are found to be deficient in respect of the longitudinal strength requirements given in this annex, the number of transverse sections for thickness measurement should be increased such that each tank within the 0.5L amidships region has been sampled. Tank spaces that are partially within, but extend beyond, the 0.5L region, should be sampled.

3.2 Additional thickness measurements should also be performed on one transverse section forward and one aft of each repaired area to the extent necessary to ensure that the areas bordering the repaired section also comply with the requirements of the Guidelines.

4 Effective repair methods

4.1 The extent of renewal or reinforcement carried out to comply with this annex should be in accordance with 4.2.

4.2 The minimum continuous length of a renewed or reinforced structural member should be not less than twice the spacing of the primary members in way. In addition, the thickness diminution in way of the butt joint of each joining member forward and aft of the replaced member (plates, stiffeners, girder webs and flanges, etc.) should not be within the substantial corrosion range (75% of the allowable diminution associated with each particular member). Where differences in thickness at the butt joint exceed 15% of the lower thickness, a transition taper should be provided.

4.3 Alternative repair methods involving the fitting of straps or structural member modification should be subject to special consideration. In considering the fitting of straps, it should be limited to the following conditions:

- .1 to restore and/or increase longitudinal strength;
- .2 the thickness diminution of the deck or bottom plating to be reinforced should not be within the substantial corrosion range (75% of the allowable diminution associated with the deck plating);
- .3 the alignment and arrangement, including the termination of the straps, is in accordance with a standard recognized by the Administration;
- .4 the straps are continuous over the entire 0.5L amidships length; and
- .5 continuous fillet welding and full penetration welds are used at butt welding and, depending on the width of the strap, slot welds. The welding procedures applied should be acceptable to the Administration.

4.4 The existing structure adjacent to replacement areas and in conjunction with the fitted straps, etc., should be capable of withstanding the applied loads, taking into account the buckling resistance and the condition of welds between the longitudinal members and hull envelope plating.”

Part B**GUIDELINES ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF OIL TANKERS OTHER THAN DOUBLE HULL OIL TANKERS**

- 44 The text of the new Part B is the text of existing Annex B subject to the following amendments.
- 45 The existing paragraph 1.1.1 is replaced with the following:
“1.1.1 The Guidelines should apply to self-propelled oil tankers of 500 gross tonnage and above other than double hull oil tankers, as defined in 1.2.1 of Part A of Annex B.”
- 46 Paragraph 1.1.2 is deleted and paragraphs 1.1.3 and 1.1.4 are renumbered as paragraphs 1.1.2 and 1.1.3.
- 47 At the end of the new paragraph 1.1.2 (existing paragraph 1.1.3), the following sentence is added:
“The surveys should be carried out during the surveys prescribed by regulation I/10 of the 1974 SOLAS Convention, as amended.”
- 48 In paragraph 1.2.11, the reference “II-2/3.32” is replaced with “II-2/3.6”.
- 49 In paragraph 1.2.12, the words “Intermediated enhanced survey is an enhanced survey” are replaced by “Intermediate survey is a survey”.
- 50 In paragraph 1.2.13, the words “condition of classification” are replaced by “condition of classification or recommendation”.
- 51 A new paragraph 1.2.14 is added as follows:
“1.2.14 *Specially considered* means sufficient close-up inspection and thickness measurements are taken to confirm the actual average condition of the structure under coating.”
- 52 A new subitem “.6 items in 3.3.” is added in paragraph 1.3.1.
- 53 The word “significant” in paragraph 1.3.2 is deleted.
- 54 The following new paragraph 1.4 is added:
“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.”
- 55 The words “thickness measurement and” in paragraph 2.1.2 are deleted.

56 The words “Cargo Ship Safety Construction” are inserted between the words “the” and “Certificate” in paragraphs 2.1.3 and 2.2.1.

57 The words “issued to oil tankers referred to in paragraph 1.1.1 and/or the International Oil Pollution Prevention Certificate, as appropriate, issued to oil tankers referred to in paragraph 1.1.2” in paragraph 2.2.3 are deleted.

58 Paragraph 2.2.4 is deleted.

59 The references to a footnote regarding “specially considered” in paragraphs 2.4.4 and 2.5.4 are deleted.

60 The words “or as specified in planning document as described in annex 6” in paragraph 2.5.2 are deleted.

61 In paragraph 3.1, the word “annual” is inserted before the word “survey”.

62 The words “, oily ballast” are deleted in paragraph 3.3.3.

63 In paragraph 3.5.3, the words “a cargo tank” are replaced by “a cargo or fuel tank”.

64 The words “For tanks used for salt water ballast including combined cargo/ballast tanks” in paragraph 4.3.3 are replaced by “For ballast tanks”.

65 Existing paragraph 5.1.1 is replaced by the following:

“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 6A. The survey should not commence until the survey programme has been agreed.

5.1.1.1 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 6B, and forwarded to the Administration.”

66 The existing paragraph 5.1.2 is replaced with the following:

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

- .1 survey status and basic ship information;
- .2 documentation on board, as described in 6.2 and 6.3;
- .3 main structural plans of cargo and ballast tanks (scantlings drawings), including information regarding use of high-tensile steels (HTS);
- .4 Condition Evaluation Report, according to annex 9;
- .5 relevant previous damage and repair history;

- .6 relevant previous survey and inspection reports from both the recognized organization and the owner;
- .7 cargo and ballast history for the last 3 years, including carriage of cargo under heated conditions;
- .8 details of the inert gas plant and tank cleaning procedures;
- .9 information and other relevant data regarding conversion or modification of the ship's cargo and ballast tanks since the time of construction;
- .10 description and history of the coating and corrosion protection system (including anodes and previous class notations), if any;
- .11 inspections of the Owner's personnel during the last 3 years with reference to structural deterioration in general, leakages in tank boundaries and piping and condition of the coating and corrosion protection system (including anodes), if any. A guidance for reporting is shown in annex 5;
- .12 information regarding the relevant maintenance level during operation including port state control reports of inspection containing hull related deficiencies, Safety Management System non-conformities relating to hull maintenance, including the associated corrective action(s); and
- .13 any other information that will help identify suspect areas and critical structural areas."

67 The existing paragraph 5.1.3 is replaced with the following:

"5.1.3 The submitted survey programme should account for and comply, as a minimum, with the requirements of 2.6 and annexes 1, 2 and 3 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 of cargo and ballast tanks (scantling drawings), including information regarding use of high tensile steels (HTS);
- .3 arrangement of tanks;
- .4 list of tanks with information on their use, extent of coatings and corrosion protection systems;
- .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 identification of tanks and areas for close-up survey (see 2.4);
- .9 identification of areas and sections for thickness measurement (see 2.5);
- .10 identification of tanks for tank testing (see 2.6);
- .11 identification of the thickness measurement company;
- .12 damage experience related to the ship in question; and
- .13 critical structural areas and suspect areas, where relevant.”

68 Paragraph 5.1.4 is deleted, and paragraphs 5.1.5 and 5.1.6 are renumbered as 5.1.4 and 5.1.5.

69 The following new paragraphs 5.2.1.1 to 5.2.1.3 are added after existing paragraph 5.2.1:

“5.2.1.1 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.

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

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

70 Existing paragraphs 5.2.2 to 5.2.4 are replaced by the following:

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

5.2.3 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 measurements.

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

71 The following new paragraphs 5.2.5 and 5.2.6 are added:

“5.2.5 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 backup 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 lifesaving and evacuation equipment ready for use.

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

72 In existing paragraph 5.3.2, between the fourth and fifth subitems, a new subitem “portable ladders” is inserted.

73 The six subitems in paragraph 5.3.2 are numbered from “.1” to “.6” and the five subitems in paragraph 5.4.2 are numbered from “.1” to “.5”.

74 New paragraphs 5.4.3 to 5.4.5 are added as follows:

“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.”

75 The existing paragraph 5.5.3 is deleted and the existing paragraph 5.5.4 is renumbered as 5.5.3.

76 The following new paragraphs 5.5.4 to 5.5.7 are added:

“5.5.4 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 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 or space must contain clean ballast water only. Even a thin sheen of oil on the water is not acceptable;
- .6 at no time should the water level be allowed to be within 1 m of the deepest under-deck web face flat so that the survey team is not isolated from a direct escape route to the tank hatch. Filling to levels above the deck transverses should only be contemplated if a deck access manhole is fitted and open in the bay being examined, so that an escape route for the

survey party is available at all times. Other effective means of escape to the deck may be considered;

- .7 if the tanks (or spaces) are connected by a common venting system, or Inert Gas system, the tank in which the boat or raft should be used should be isolated to prevent a transfer of gas from other tanks (or spaces).

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

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

- .1 when the coating of the under-deck structure is in GOOD condition and there is no evidence of wastage; or
- .2 if a permanent means of access is provided in each bay to allow safe entry and exit. This means 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.

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

77 The following new section 5.6 is added:

“5.6 Survey planning meeting

5.6.1 Proper preparation and 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 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 vessel (i.e. the voyage, docking and undocking manoeuvres, periods alongside, cargo and ballast operations, etc.);
- .2 provisions and arrangements for thickness measurements (i.e. access, cleaning/de-scaling, illumination, ventilation, personal safety);

- .3 extent of the thickness measurements;
- .4 acceptance criteria (refer to the list of minimum thicknesses);
- .5 extent of close-up survey and thickness measurement considering the coating condition and suspect areas/areas of substantial corrosion;
- .6 execution of thickness measurements;
- .7 taking representative readings in general and where uneven corrosion/pitting is found;
- .8 mapping of areas of substantial corrosion;
- .9 communication between attending surveyor(s) the thickness measurement company operator(s) and owner representative(s) concerning findings.”

78 The words “supply and maintain on-board” in paragraph 6.1.1 are replaced with “obtain, supply and maintain on board the ship”.

79 Paragraph 6.2.1.4 is deleted.

80 The word “inspection” in paragraph 6.4 is replaced with “survey”.

81 The word “extend” in paragraph 7.1.3 is replaced with “extent”.

82 The following new paragraph 8.2.2 is added after existing paragraph 8.2.1:

“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.”

83 The existing paragraph 8.2.2 is renumbered as 8.2.3.

84 In the third column of annex 1, the words “One web frame rings in each remaining cargo wing tank” are replaced with “A minimum of 30% of all web frame rings in each remaining cargo wing tank (see Note 1)” and the words “One deck and bottom transverse in each cargo centre tank” are replaced with “A minimum of 30% of deck and bottom transverses, including adjacent structural members in each cargo centre tank (see Note 1)”. A Note 1 is added at the bottom of that annex as:

“Note 1: The 30% should be rounded up to the next whole integer.”

85 A new annex 6A “Survey programme” is added after existing annex 5. The text of the annex is identical to annex 6A of Part A (see amendment no.43).

86 A new annex 6B is added after the new annex 6A. The text of the annex is identical to annex 6B of Part A (see amendment no.43).

87 The existing annex 6 is deleted.

88 The existing text of annex 8 is replaced by new text with the heading “Survey reporting principles”. The new text is identical to the text of annex 8 of Part A (see amendment no.43).

89 Table 1 and table 2 in appendix 3 of annex 10 are deleted and table 3 is renumbered as table 1.

90 In paragraph 1 of annex 11, the words “paragraph 5.1.6 of annex B” are replaced by “5.1.5”.

二零一六年五月三十日於行政長官辦公室

Gabinete do Chefe do Executivo, aos 30 de Maio de 2016. —

辦公室主任 柯嵐 A Chefe do Gabinete, *O Lam*.