

## 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 58/2015 號行政長官公告

#### Aviso do Chefe do Executivo n.º 58/2015

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二零零八年五月十六日透過第MSC.261(84)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》(經修正的第A.744(18)號決議)的修正案，該修正案自二零一零年一月一日起適用於澳門特別行政區；

Considerando igualmente que, em 16 de Maio de 2008, o Comité de Segurança Marítima da Organização Marítima Internacional, através da resolução MSC.261(84), 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 2010;

基於此，行政長官根據澳門特別行政區第3/1999號法律第六條第一款的規定，命令公佈包含上指修正案的MSC.261(84)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 da Região Administrativa Especial de Macau, a resolução MSC. 261(84), que contém as referidas emendas, nos seus textos em línguas chinesa e inglesa.

二零一五年五月二十二日發佈。

Promulgado em 22 de Maio de 2015.

行政長官 崔世安

O Chefe do Executivo, *Chui Sai On*.

## 第 MSC.261 (84) 號決議

(2008 年 5 月 16 日通過)

通過《散貨船和油輪檢驗期間的強化檢查方案指南》

(經修正的第 A.744 (18) 號決議) 的修正案

海上安全委員會，

憶及《國際海事組織公約》關於本委員會的職能的第 28 (b) 條，

還憶及大會第 A.744 (18) 號決議，大會以該決議通過了關於在散貨船和油船檢驗期間的加強檢驗計劃導則（以下簡稱“導則”），

進一步憶及《1974 年國際海上人命安全公約》(SOLAS) (下文稱《公約》) 關於對《導則》修正程序的第 VIII (b) 條和第 XI-1/2 條，

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不斷審議該《導則》並在必要時根據他們在運用中所取得的經驗予以修改和更新，

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、MSC.197 (80) 號決議和 1997 年公約締約政府會議的第 2 號決議通過了對《導則》的修正案，

在其第 84 次會議上，審議了按照《公約》第 VIII (b) (i) 條提出並散發的《導則》修正案，

1. 按照《公約》第 VIII (b) (iv) 條，通過了對《導則》的修正案，其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 2009 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《公約》締約政府或其合計商船噸位不小於世界商船總噸位 50% 的締約政府表示反對該修正案；
3. 邀請各締約國政府注意，按照《公約》第 VIII (b) (vii) (2) 條，該修正案按照上述第 2 段獲接受後將於 2010 年 1 月 1 日生效；
4. 要求秘書長，按照《公約》第 VIII (b) (v) 條，將本決議和附件中所含修正案的核證無誤的副本發送交給《公約》所有締約國政府；
5. 進一步要求秘書長將本決議及其附件發送給非《公約》締約國政府的本組織成員國。

## 附件

### 《散貨船和油輪檢驗期間的強化檢查方案指南》

### （經修正的第 A.744（18）號大會決議）的修正案

#### 目錄

- 1 在現有的“附件 A”標題後插入以下新標題：

#### “A 部分

具有單舷側結構的散貨船檢驗期間的加強檢驗計劃導則”

- 2 在現有的“附件 A”目錄清單後插入以下內容：

#### “B 部分

具有雙舷側結構的散貨船檢驗期間的加強檢驗計劃導則

#### 1 總則

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- 4.2 船齡為 5 年至 10 年的散貨船
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- 5 檢驗準備**
  
- 5.1 檢驗計劃
- 5.2 檢驗條件
- 5.3 至結構的通道
- 5.4 檢驗設備
- 5.5 在海上或錨泊時的檢驗
- 5.6 檢驗規劃會議

## 6 船上的文件

### 6.1 綜述

### 6.2 檢驗報告檔案

### 6.3 支持文件

### 6.4 船上文件的檢查

## 7 厚度測量程序

### 7.1 綜述

### 7.2 對厚度測量公司的發證

### 7.3 報告

## 8 檢驗的報告和評估

### 8.1 檢驗報告的評估

### 8.2 報告

附件 1 換證檢驗時近觀檢驗的要求

附件 2 換證檢驗時厚度測量的最低要求

附件 3 船東的檢查報告

附件 4A 檢驗計劃

附件 4B 檢驗計劃問卷

附件 5 對船體結構厚度測量公司發證的程序

附件 6 檢驗報告原則

附件 7 狀況評估報告

- 附件 8 厚度測量的建議程序
- 附件 9 與計劃散貨船相關加強檢驗同時進行的技術評估導則
- 附件 10 貨物長度區域內具備雙舷側船殼的散貨船上嚴重腐蝕區域內厚度測量範圍的要求
- 附件 11 散貨船貨艙蓋緊固安排的強度
- 附件 12 厚度測量的程序要求”

## 附件 A

### 散貨船檢驗期間的加強檢驗計劃導則

- 3 在上述標題後插入下述內容：

#### “A 部分

#### 具有單舷側結構的散貨船檢驗期間的加強檢驗計劃導則”

##### 1.1 適用範圍

- 4 將現有的第 1.1.1 段文字替代如下：

“1.1.1 本導則應適用於所有 500 總噸及以上具有單側船殼結構的自推進式散貨船。如果散貨船具有單舷側船殼和雙舷側船殼的組合結構，應酌情對該結構適用 A 部分和 B 部分的相關要求。”

- 5 在 A 部分後增加 B 部分如下：

## “B 部分

### 具有雙舷側結構的散貨船檢驗期間的加強檢驗計劃導則

#### 1 綜述

##### 1.1 適用範圍

1.1.1 本導則應適用於所有 500 總噸及以上具有雙側船殼結構的自推進式散貨船。如果散貨船具有單舷側船殼和雙舷側船殼的組合結構，應酌情對該結構適用 A 部分和 B 部分的相關要求。

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《公約》第 I/10 條規定的檢驗期間進行。

1.1.3 本導則包括檢查，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 散貨船係指在貨物處所內具有單舷側船殼，頂部邊艙和底部壓載艙結構，主要用於運輸散裝乾貨的船舶，包括礦砂運輸船和組合運輸船等船型。

1.2.2 壓載艙係指用於裝載壓載水的液艙並包括側壓載艙，雙層底壓載處所，頂部邊艙，底部壓載艙和尖艙。就檢驗目的而言，雙舷側艙，即使其與頂部邊艙或底部壓載艙相連接，應被認為是獨立的液艙。

1.2.3 處所係指包括貨艙和液艙在內的獨立艙室。

**1.2.4** 總體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的檢驗。

**1.2.5** 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。

**1.2.6** 橫切面包括甲板、船側、船底、內底、底邊、內側、頂邊內側和縱向艙壁上的全部縱向構件，諸如板材、縱桁和樑。

**1.2.7** 代表性處所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，及可視為相同的危險區域和/或可疑區域。

**1.2.8** 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。

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

**1.2.10** 防腐蝕系統通常係指一個全面的硬塗層。

保護性塗層通常為環氧塗層或其等效物。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。

在已經使用軟塗層的地方，應為驗船師提供安全通道以核實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。

**1.2.11** 塗層狀況定義如下：

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，但小於不良狀況規定的範圍；

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

**1.2.12 關鍵性結構區域**係指根據計算被確定為需要進行監測的區域或根據對象船舶或其他類似船舶或姊妹船舶的維修史，被確定為容易發生龜裂、起皺、鏽蝕會影響船舶結構完整性的區域。

**1.2.13 貨物區域**係指船上包括所有貨艙及毗鄰區域包括燃油艙，隔離艙，壓載艙和空位的區域。

**1.2.14 中期檢驗**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檢驗。

**1.2.15 適當和徹底修理**係指在檢驗時完成的使驗船師滿意的一種永久性修理，清除入級必須接受或建議的任何相關狀況的需要。

**1.2.16 公約**係指經修正的 1974 年海上人命安全公約（安全公約）。

**1.2.17 特殊考慮**係指採取充分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。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 艙口蓋或艙口圍板。

如無充足修理設備，則主管機關可允許船舶直接駛入修理設施。這可能要求卸貨並/或進行臨時修理以完成預定的航程。

**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糾正措施。

#### **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中期檢驗。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 換證檢驗**

### **2.1 綜述**

**2.1.1** 換證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** 作為換證檢驗準備工作的一部分，應在換證檢驗前事先制訂檢驗計劃。厚度測量不應在第四個年度檢驗之前進行。



**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，維修保養和操作恰當並適合進行更新檢驗。

**2.1.4** 所有的貨艙、壓載艙、包括雙層底和雙舷側液艙，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按第 2.6 和 2.7 款的要求增加厚度測量和測試，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、損壞或其他結構性變形。

**2.1.5** 上述處所內的所有管路系統均應進行檢查並在工作條件下進行操作測試以確保其保持滿意狀態。

**2.1.6** 改造為空位處所的壓載艙的檢驗範圍應特別結合壓載艙的要求進行考慮。

## **2.2 乾塢檢驗**

**2.2.1** 乾塢檢驗應該是換證檢驗的一個部分。在證書的 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，不可結合換證檢驗進行船底選擇性檢查可在船舶漂浮狀態下進行。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換證檢驗一起完成或如果不符合第 2.2.1 段中提到的 36 個月最大間隔期，則在乾塢檢驗完成之前，貨船構造安全證書應該停止有效。

## **2.3 處所保護**

如配備，應對壓載艙的防腐蝕系統進行檢查。對於壓載艙，不包括雙層底液艙，當發現塗層處於第 1.2.11 段定義的不良狀況，並未予更新時，或已施塗了軟塗層，或未施塗塗層時，該壓載艙應每年進行檢查。當在雙層底壓載艙發現此類塗層的損壞時，或已施塗了軟塗層，或未施塗塗層時，該壓載艙應每年進行檢查。如驗船師認為必要，或存在嚴重鏽蝕，應進行厚度測量。如果貨艙內已配備了保護塗層並處於良好狀態，可特殊考慮近觀檢驗和厚度測量的範圍。

## **2.4 艙蓋和艙口圍**

**2.4.1** 對第 3.3 段所列各項應進行徹底檢查。

**2.4.2** 對所有機械操作的艙蓋操作滿意度應進行核實，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；
- .3 對液壓和電器元件、線路、鉸鏈及鏈驅動的運行測試。

**2.4.3** 應使用水龍測試或等效方法核實所有艙蓋密封的有效性。

**2.4.4** 艙蓋和艙口圍板及加強件應按附件 2 進行厚度測量。

## **2.5 全面檢驗和近觀檢驗的範圍**

**2.5.1** 除燃油艙外，所有處所應在換證檢驗時進行總體檢驗。通過貨艙的燃油艙應進行充分的檢查以確保其狀況滿意。

**2.5.2** 每次換證檢驗應包括充分範圍的近觀檢驗以確定附件 1 所列明的貨艙和壓載艙的狀況。

## **2.6 厚度測量的範圍**

**2.6.1** 附件 2 規定了換證檢驗時厚度測量的要求。

**2.6.2** 應進行有代表性的厚度測量以確定所有壓載水艙內橫向網狀肋骨的總體和局部的腐蝕程度。也可以通過進行厚度測量來確定橫向艙壁板的腐蝕程度。如果驗船師通過近觀檢驗認為無結構降低現象並且施塗的塗層保持充分，可免除厚度測量。

**2.6.3** 驗船師如認為必要，可擴大厚度測量的範圍。對按照第 1.2.9 段定義的存在嚴重腐蝕區域擴大測量的規定見附件 10。

**2.6.4** 對於各處所中塗層處於第 1.2.11 段界定的良好狀況的區域，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。如果貨艙內配備的保護塗層處於良好狀況可特別考慮近觀檢驗和厚度測量的範圍。

**2.6.5** 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。

## **2.7 液艙壓力測試的範圍**

**2.7.1** 壓載艙，深艙和在整個貨艙長度用於壓載的貨艙的所有邊界部分都應進行壓力試驗。用於淡水，燃油和潤滑油的代表性液艙也應進行壓力試驗。

**2.7.2** 一般來說，靜水力學壓力應相當於壓載艙/貨艙艙口頂部的水位或壓載艙或燃油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，艙蓋，艙口圍和管路均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 對艙蓋和艙口圍的檢查

3.3.1 應確認艙蓋，艙口圍及其固定和密封裝置自上次檢驗以來未進行過任何未經批准的改變。

3.3.2 A 只有在開啟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、鉸鏈及鏈驅動的操作。

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 11。

**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、組合運輸船的彈性密封、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、張力器和鉸筒；
- .10 液壓系統、電器安全裝置和聯動裝置；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。

**3.3.8** 如配備有木製或鋼製的移動式艙蓋，應確認以下各項的滿意狀況：

- .1 木艙蓋和可移動樑，可移動樑的支撐架或槽，及緊固裝置；
- .2 鋼製箱型艙蓋，包括對艙蓋板的近觀檢驗；
- .3 防水油布；
- .4 夾板，板條和楔子；
- .5 艙口壓條及其緊固裝置；
- .6 裝載墊和側板邊；
- .7 導板和木楔；
- .8 抗壓條，排水溝，和排水管（如果有）。

### **3.4 貨艙檢查**

**3.4.1** 對於船齡為 10 年以上的散貨船，應進行以下各項：

- .1 對兩個選擇的貨艙進行全面檢驗。如果艙內具有保護塗層而且狀況良好，可特別考慮近觀檢驗和厚度測量的範圍；  
及
- .2 驗船師認為必要時，應進行厚度測量。如果厚度測量結果表明有嚴重腐蝕，應按照附件 10 增加厚度測量的範圍。

**3.4.2** 對於船齡為 15 年以上的散貨船，應進行以下各項：

- .1 對所有貨艙進行總體檢驗。如果艙內具有保護塗層而且狀況良好，可特別考慮近觀檢驗和厚度測量的範圍；
- .2 驗船師認為必要時，應進行厚度測量。如果厚度測量結果表明有嚴重腐蝕，應按照附件 10 增加厚度測量的範圍。

**3.4.3** 對於船齡為 10 年以上的散貨船，應檢查所有的管路和在貨艙內的穿越部分，包括舷外管路。

### **3.5 壓載艙的檢查**

如換證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。驗船師認為必要時，應進行厚度測量。如果厚度測量結果表明有嚴重腐蝕，應按照附件 10 增加厚度測量的範圍。

## **4 中期檢驗**

### **4.1 綜述**

**4.1.1** 儘管有第 1.1.2 段的規定，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第 4.2、4.3 和 4.4 段規定的船齡。

### **4.2 船齡為 5-10 年的散貨船**

#### **4.2.1 壓載艙**

**4.2.1.1** 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總體檢驗。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。



**4.2.1.2** 如在鹹水壓載處所發現塗層狀況為不良、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。

**4.2.1.3** 如在鹹水壓載處所（不包括雙層底液艙）發現保護塗層狀況為不良且未進行刷新，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。如果在鹹水雙層底壓載艙中發現此類塗層缺陷，或已刷了軟塗層，或未刷保護塗層，則應在年度檢驗期間對這些艙進行查驗。如驗船師認為必要，或存在廣泛的腐蝕，應進行厚度測量。

**4.2.1.4** 除上述要求外，對上次換證檢驗時發現的可疑區域應進行全面檢驗和近觀檢驗。

## **4.2.2 貨艙**

**4.2.2.1** 應對所有貨艙進行總體檢驗。

**4.2.2.2** 作為對第 4.2.2.1 段所述任一貨艙全面檢驗的結果，驗船師認為必要時，應將檢驗擴大到包括對該貨艙的近觀檢驗及對認為必要的結構區域進行足夠範圍的近觀檢驗。

## **4.2.3 厚度測量的範圍**

**4.2.3.1** 進行厚度測量的範圍應足以確定按第 4.2.2.1 段經過近觀檢驗的區域的總體和局部的腐蝕級別。中期檢驗關於厚度測量的最低要求是上次換證檢驗時發現的可疑區域。

**4.2.3.2** 如果發現有嚴重腐蝕，應按照附件 10 增加厚度測量的範圍。

**4.2.3.3** 如果驗船師通過近觀檢驗認為無結構降低現象並且施塗的塗層保持充分，可免除厚度測量。

### 4.3 船齡為 10-15 年的散貨船

#### 4.3.1 壓載艙

##### 4.3.1.1 對於散貨船：

應對所有的鹹水壓載艙進行檢查。如果上述檢查未發現明顯的結構缺陷，則檢查可僅局限於驗證保護塗層仍然有效。

##### 4.3.1.2 對於礦砂運輸船：

- .1 所有的桁板肋骨環-在一個壓載邊艙內；
- .2 一個甲板桁材-在其餘的每個壓載邊艙內；
- .3 兩個橫向艙壁-在一個壓載邊艙內；
- .4 一個橫向艙壁-在其餘的每個壓載邊艙內。

4.3.1.3 除此之外，還適用第 4.2.1.2 至 4.2.1.4 段所述要求。

#### 4.3.2 貨艙

4.3.2.1 對所有貨艙應進行總體檢驗。

4.3.2.2 作為對第 4.3.2.1 段所述任一貨艙全面檢驗的結果，驗船師認為必要時，應將檢驗擴大到包括對該貨艙的近觀檢驗及對認為必要的結構區域進行足夠範圍的近觀檢驗。

#### 4.3.3 厚度測量的範圍

4.3.3.1 進行厚度測量的範圍應足以確定按第 4.3.2.1 段經過近觀檢驗的區域的總體和局部的腐蝕級別。中期檢驗關於厚度測量的最低要求是上次換證檢驗時發現的可疑區域。

**4.3.3.2** 除此之外，還適用第 4.2.3.2 至 4.2.3.3 段所述要求。

#### **4.4 船齡超過 15 年的散貨船**

**4.4.1** 中期檢驗的要求應與第 2 章和 5.1 段要求的上次換證檢驗的範圍相同。但並不要求對液艙和用於壓載水貨艙進行壓力測試，除非在場的驗船師認為有必要。

**4.4.2** 在適用第 4.4.1 時，中期檢驗可在第二次年度檢驗開始並在下一年進行以便替代第 2.1.1 段的適用在第三次年度檢驗時完成。

### **5 檢驗準備**

#### **5.1 檢驗計劃**

**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。

**5.1.2** 在制訂檢驗計劃之前，應基於附件 4B 規定的信息，由船東填寫檢驗計劃問卷，並交到主管機關。

**5.1.3** 在制定檢驗計劃時，應收集下列文件以便商定選擇將要檢查的液艙、貨艙，區域和構件：

- .1** 檢驗現狀和基本的船舶信息；
- .2** 在第 7.2 和 7.3 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** 來自船級社和船東的以往檢驗和檢查的相關報告；

- .5 關於船舶貨檔和液艙的使用和典型貨物的資料及其他相關數據；
- .6 關於新造船的防腐蝕級別的信息；和
- .7 有關營運期間維護保養水平的相關資料；

5.1.4 提交的檢驗方案應分別考慮附件 1、附件 2 和第 2.7 段關於近觀檢驗、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 貨艙和液艙的佈置；
- .4 具有塗層使用，保護和狀況信息的貨艙和液艙的清單；
- .5 檢驗的條件（例如有關液艙清潔、除氣、通風、照明等信息）；
- .6 接近構件的規定和方法；
- .7 檢驗設備；
- .8 近觀檢驗的液艙和區域的識別（見附件 1）；
- .9 厚度測量截面的識別（見附件 2）；
- .10 測試液艙的識別（見第 2.7 段）；和
- .11 關於所述船舶的破損經歷。

**5.1.5** 主管機關應告訴船東適用該船可接受的結構腐蝕減少的最大程度。

**5.1.6** 還可以使用附件 9 所含的技術評估和散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計劃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。

**5.2.2** 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安全通道。

**5.2.3** 應在檢驗計劃問卷中提供檢查通道的具體情況。

**5.2.4** 當參加檢驗的驗船師斷定提供的所需安全通道不合適時，則不應繼續對涉及的處所進行檢驗。

**5.2.5** 貨艙、液艙和處所應能安全出入。貨艙、液艙和處所應沒有有害氣體並適當通風。在進入液艙、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。

**5.2.6** 貨艙，液艙和處所應足夠乾淨和無水跡、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。此要求特別適用於厚度測量的區域。

**5.2.7** 應提供充足的照明以能顯示腐蝕、變形、裂縫、損壞或其他結構性惡化和塗層的狀況。

**5.2.8** 驗船師應該至少由一個船東指定的經歷過液艙和封閉處所檢查的負責人陪同。此外，應至少有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。

**5.2.9** 正在檢查貨艙，液艙或處所的檢驗方與甲板上負責駕駛員以及需要時與駕駛台之間應安排通信系統。該通信安排應保持於整個檢驗過程中。

### **5.3 至結構的通道**

**5.3.1** 對於總體檢驗，應提供能使驗船師以安全可行的方法檢查構件的手段。

**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 通過結構的永久性階梯和過道；
- .2 通過結構的臨時性階梯和過道；
- .3 升降裝置和移動平台；
- .4 便攜式梯子；
- .5 其他等效的裝置。

### **5.4 檢驗設備**

**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** 如果驗船師認為必要，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 染色滲透劑；和
- .5 其他等效的手段。

**5.4.3** 爆炸性氣體濃度測驗儀，氧氣探測儀、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。應提供安全檢查清單。

**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** 應提供充分的保護服並在檢驗時使用（例如：安全帽、手套、安全鞋等）。

## **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第 5.1、5.2、5.3 和 5.4 段的要求。

**5.5.2** 應為在處所實施檢驗的人員和甲板上的負責駕駛員之間安排通信系統。

**5.5.3** 如果使用筏或艇進行近觀檢驗，應符合下列條件：

- .1 應使用抗浪型的，即使有一個氣室破損仍能保持令人滿意的剩餘浮力和穩性的氣脹筏或艇；
- .2 艇或筏應該栓在梯子上而且另有一人被安排在梯子下口清楚地看得見艇或筏；



- .3 所有參加者應有一件合適的救生衣；
- .4 液艙或貨艙內的水表面應該是平靜的（在所有可預料的條件下預計艙內的水上升不應該超過 0.25 米），而水位固定或下降。在使用艇或筏時，水位在任何情況下均不應上升；
- .5 液艙，貨艙或處所應只含有清潔的壓載水。即使水中一層薄的油光都是不能接受的；和
- .6 任何時候允許的水位均不應控制在最深甲板腹板表面下 1 米以內，以便檢驗人員不會與通向艙口的直接逃生路線隔開。只有在被檢查的艙隔間內裝有通往甲板的人孔且人孔是開啟時，才可考慮填充至甲板橫材上方的高度，以便檢驗人員隨時有逃生路線可走。其他有效的到達甲板的逃生手段也可以考慮；

**5.5.4** 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艇對液艙或處所甲板下區域的檢查。

**5.5.5** 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艇：

- .1 在甲板下構件的塗層處於良好狀態而且沒有明顯的腐蝕時；或
- .2 如果在每個艙隔間內配備有可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 米的小平台通過垂直梯進入。也可以考慮其他通往甲板的逃生手段。

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。

**5.5.6** 在第 5.5.4 和 5.5.5 段所述單獨使用筏或艇不排除在檢驗期間使用艇或筏在一個液艙內進行移動。

## **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上船東代表之間的適當準備和密切合作對安全有效進行檢驗至關重要。檢驗期間應定期召開船上安全會議。

**5.6.2** 在任何部分的換證檢驗和中期檢驗開始之前，應召開由現場驗船師、船東代表、厚度測量公司操作員（如果適用），船長或船長或公司指定相應合格代表參加的檢驗計劃會議，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：航程、入塢和出塢、靠泊時間、貨物和壓載操作，等）；
- .2 厚度測量的器械和安排（即：通道、清洗/除鏽、照明、通風、人員安全）；
- .3 厚度測量的範圍；
- .4 合格標準（查閱最小厚度的表）；
- .5 近觀檢驗和厚度測量的範圍，考慮到塗層狀況和可疑區域/嚴重腐蝕區域；
- .6 厚度測量的實施；
- .7 一般情況下和發現不規則的腐蝕/深坑時代表性數據的讀取；

- .8 嚴重腐蝕區域的製圖；和
- .9 現場驗船師、厚度測量公司測量員和船東代表之間就檢查結果的溝通。

## 6 船上文件

### 6.1 綜述

6.1.1 船東應按第 6.2 和 6.3 段的規定獲得船舶文件，提供並保持在船上，這些文件應隨時供驗船師使用。第 6.2 段中所述狀況評估報告應包括英文翻譯本。

6.1.2 該文件應在船舶的整個壽命期間保存在船上。

### 6.2 檢驗報告檔案

6.2.1 檢驗報告檔案應該是船上文件的一部分，包括：

- .1 結構檢驗的報告（附件 6）；
- .2 狀況評估報告（附件 7）；和
- .3 厚度測量報告（附件 8）。

6.2.2 船東和主管機關的辦公室也應有檢驗報告檔案。

### 6.3 支持文件

6.3.1 船上應有下列附加文件：

- .1 貨艙和壓載艙的主結構設計圖；
- .2 以前的修理歷史；
- .3 貨物和壓載歷史；

**.4 船上人員就以下各項進行的檢查：**

**.4.1 結構退化概況；**

**.4.2 艙壁和管路的滲漏；**

**.4.3 塗層或防腐蝕系統的狀況，如果有的話。報告指南見附件 3；**

**.5 第 5.1 段要求的檢驗計劃，直至換證檢驗完成之時，**

及有助於判斷需檢查的關鍵結構區和/或可疑區域的任何其他信息。

**6.4 船上文件的檢查**

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 厚度測量程序**

**7.1 綜述**

**7.1.1** 如要求的厚度測量不是由代表主管機關行使職能的認可組織進行的，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程度的控制。

**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。

**7.1.4** 厚度測量的程序要求見附件 12。

**7.2 對厚度測量公司的發證**

厚度測量應該按照附件 5 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** 應準備厚度測量報告並提交給主管機關。該報告應提供測量位置、所測得的厚度以及相應的原始厚度。此外，該報告應該提供進行測量的日期、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 8 中所載厚度測量建議程序規定的原則。

**7.3.2** 驗船師應該驗證並且會簽厚度測量報告。

## 8 檢驗的報告和評估

### 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，以確定可接受性和船舶連續結構完整性。

**8.1.2** 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。

### 8.2 報告

**8.2.1** 檢驗報告的原則見附件 6。

**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（壓力測試，厚度測量等）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 7 所示，檢驗的狀況評估報告和結果應簽發給船東並存放在船上供將來檢驗時參考。狀況評估報告應由主管機關簽註。

附件 1  
換證檢驗的近觀檢驗要求

船齡 ≤ 5 年	5 < 船齡 ≤ 10 年	10 < 船齡 ≤ 15 年	船齡 > 15 年
<p>1</p> <p>每個類型的兩個代表壓載水艙中，一個具有相應板材的橫向桁材和縱向桁材。這將包括最前面的頂邊水艙和任一側的雙舷側壓載水艙 (A)</p> <p>兩個選擇的貨艙艙壁，包括上下支座，如配備的話 (C)</p> <p>所有貨艙蓋和艙口圍 (D)</p>	<p>2</p> <p>每個壓載艙中適用的一個具有相應板材的橫向桁材和縱向桁材 (A)</p> <p>前後橫向艙壁，包括橫斷面中的加強系統，包括頂邊水艙，底邊壓載艙和雙舷側壓載艙。(A)</p> <p>最前面雙舷側壓載艙普通橫骨架的 25%。(B)</p> <p>每個貨艙內的一個橫向艙壁，包括上下支座的內部結構，如配備的話。(C)</p> <p>所有貨艙蓋和艙口圍 (D)</p> <p>所有甲板板材和貨艙艙口之間艙口開啟線內的甲板結構。(E)</p>	<p>3</p> <p>每個壓載艙中適用的一個具有相應板材的橫向桁材和縱向桁材 (A)</p> <p>所有橫向艙壁，包括每個壓載水艙的加強系統。(A)</p> <p>最前面雙舷側壓載艙普通橫骨架的 25%。(B)</p> <p>所有貨艙內的橫向艙壁，包括上下支座的內部結構，如配備的話。(C)</p> <p>所有貨艙蓋和艙口圍 (D)</p> <p>所有甲板板材和貨艙艙口之間艙口開啟線內的甲板結構。(E)</p>	<p>4</p> <p>每個壓載艙中適用的所有具有相應板材的橫向桁材和縱向桁材 (A)</p> <p>所有橫向艙壁，包括每個壓載水艙的加強系統。(A)</p> <p>所有雙舷側壓載艙內所有的普通橫向骨架。(B)</p> <p>第 3 欄內的 (C) - (E) 區域</p>



- (A) 頂邊，底邊，和雙舷側壓載艙內的橫向桁材或水密橫向艙壁。在前後尖艙橫向桁材係指包括毗鄰結構件完整的橫向桁材環。
- (B) 雙舷側壓載艙內的普通橫向骨架。
- (C) 貨艙橫向艙壁，船殼板，加強件和樑。
- (D) 貨艙蓋和艙口圍。
- (E) 甲板板材和貨艙艙口之間艙口開啟線內的甲板結構。

註： 在四個層面對橫向艙壁的近觀檢驗：

- 層面 (a) 內底的直接上方和未配備下支座船舶的角撐板（如配備）與船棚連線的直接上方。
- 層面 (b) 下支座水平桁材（對配備下支座的船舶）的直接上方和下方，及棚板線的直接上方。
- 層面 (c) 艙壁的約中間高度。
- 層面 (d) 上甲板板材的直接下方和上邊艙直接毗連處，和對於配備上支座船舶的上支座水平桁材的直接下方，或頂邊艙的直接下方。



附件 2  
換證檢驗時厚度測量的要求

船齡 ≤ 5 年	5 < 船齡 ≤ 10 年	10 < 船齡 ≤ 15 年	船齡 > 15 年
1	2	3	4
<p>1 可疑區域</p>	<p>1 可疑區域</p> <p>2 貨物長度區域內：貨艙口線外的甲板板的兩個橫截面</p> <p>3 對按照附件 1 接受近觀檢驗的結構件進行測量以總體評估和記錄腐蝕模式</p> <p>4 所有貨艙蓋和艙口圍（船殼板和加強件）</p> <p>5 各貨艙口之間開口線內的所有甲板板</p> <p>6 上述第 2 項下考慮的橫截面線上的風水擋板</p>	<p>1 可疑區域</p> <p>2 貨物長度區域內：</p> <p>.1 貨艙口線外的每個甲板板</p> <p>.2 貨艙口線外的兩個橫截面，其中之一應在船中部區域</p> <p>3 對按照附件 1 接受近觀檢驗的結構件進行測量以總體評估和記錄腐蝕模式</p> <p>4 所有貨艙蓋和艙口圍（船殼板和加強件）</p> <p>5 各貨艙口之間開口線內的所有甲板板</p> <p>6 貨物長度區域內所有的風水擋板</p> <p>7 貨物長度區域外選擇的風水擋板</p>	<p>1 可疑區域</p> <p>2 貨物長度區域內：</p> <p>.1 貨艙口線外的每個甲板板</p> <p>.2 貨艙口線外的三個橫截面，其中之一應在船中部區域</p> <p>.3 每個底板</p> <p>3 第 3 欄中第 3 至 7 項</p>

## 附件 3

## 船東的檢查報告

## 結構狀況

船名：.....						
船東檢查報告－結構狀況						
液艙/貨艙編號：.....						
鋼的等級：        甲板：.....        側：.....						
底：.....        縱向艙壁：.....						
部件	裂縫	起皺	腐蝕	塗層狀況	鏽斑	改進/其他修理
甲板						
底：						
側						
側骨架：						
縱向艙壁：						
橫向艙壁：						
進行修理的原因：						
進行的厚度測量（日期）：						
總體結果：						
逾期檢驗：						
未解決的船級條件：						
意見：						
檢查日期：.....						
檢查人：.....						
簽字：.....						

## 附件 4A

### 檢驗計劃

#### 基本信息和細節

船名：
IMO 編號：
船旗國：
船籍港：
總噸位：
載重噸（公噸）：
垂線間長度（米）：
造船廠：
船體編號：
被認可組織（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 本檢驗計劃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）內最低範圍的全面檢驗、近觀檢驗、厚度測量和壓力試驗。

1.1.2 檢驗的安排和安全方面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提供在船上。

## 2 貨艙、液艙和處所的佈置

檢驗計劃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

檢驗計劃的本節應指出與“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 檢驗用設備清單

檢驗方案的本節應確定和列出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結構。

## **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 .1 或 .2 或需接受檢驗的船體結構的最低厚度：

- .1  根據所附的消耗餘量表和船體結構圖原始厚度來確定；
- .2  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			
縱樑			
橫向甲板板材			
橫向甲板加強件			
底			
板材			
縱材			
縱樑			
內底			
板材			
縱材			
縱樑			
船底板			
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			
縱材或普通橫向骨架			
縱桁			
縱向艙壁（如適用）			
板材			
縱材（如適用）			
縱樑（如適用）			
橫向艙壁			
板材			
縱桁（如適用）			
上支架腹板			
上支架翼緣			



下支架腹板			
下支架翼緣			
頂邊艙橫向桁材			
板材			
翼緣			
加強肋			
底邊艙橫腹板骨架			
板材			
翼緣			
加強肋			
雙船側液艙橫腹板骨架			
板材			
翼緣			
加強肋			
<b>艙蓋</b>			
板材			
加強肋			
<b>艙口圍</b>			
板材			
加強肋			

註： 損耗餘度表應附在檢驗計劃後。

## 11 厚度測量公司

檢驗計劃的本節應指出與“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，如果有的話。

## 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、壓載艙和空位處所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，如已知	破損描述	位置	修理	修理的日期

## 姊妹船或類似船舶（如果有）的與設計有關的船體破損

貨艙、液艙或處所的編號或區域	可能的原因，如已知	破損描述	位置	修理	修理日期

**13 以前的檢驗所確定的嚴重腐蝕區域**

檢驗計劃的本節應確定並列出以前檢驗所確定的嚴重腐蝕區域。

**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 其他相關意見和信息

檢驗計劃的本節應提供與檢驗相關的其他意見和信息。

### 附錄

#### 附錄 1 – 圖紙清單

第 5.1.4.2 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。檢驗計劃的本附錄應確定並列出作為檢驗計劃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 5.1.4 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）

## 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計劃。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。

#### 細目

船名：

IMO 編號：

船旗國：

船籍港：

所有人：

被認可組織：

總噸位：

載重噸（公噸）：

交船日期：

#### 關於近觀檢驗和厚度測量通道的信息

2 船舶所有人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詳細情況均位於主管驗船師的近距離目視檢查範圍之內的檢查，即，最好在手能接觸到範圍。

貨艙/液艙編號	結構	臨時腳手架	船筏	梯子	直接進入	其他方式 (請說明)
F.P.	首尖艙					
A.P.	尾尖艙					
貨艙	艙口側圍					
	頂邊艙斜板					
	上支座板材					
	橫甲板					
	雙船側液艙板材					
	橫向艙壁					
	底邊艙板材					
	下支架					
	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					
雙船側液艙	側殼及結構					
	內層及結構					
	腹板和艙壁					
	雙層底結構					
	上支架的內結構					
	下支架的內結構					
雙層礦砂運輸船 的翼艙	上甲板及結構					
	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空位處所進行檢驗的詳細結果。

液艙/貨艙編號	防腐蝕 (1)	塗層範圍 (2)	塗層狀況 (3)	結構退化 (4)	貨艙和液艙歷史 (5)
貨艙					
頂邊艙					
底邊艙					
雙舷側液艙					
雙層底液艙					
上支架					
下支架					
翼艙（礦砂船）					
首尖艙					
尾尖艙					
其他處所					

註： 指明用於裝油/壓載的艙。





經認可的厚度測量公司的名稱和地址：


## 附件 5

### 對船體結構厚度測量的公司發證的程序

#### 1 適用範圍

本指南適用於對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。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 8）的測量記錄格式。

##### *對公司的審核*

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 發證的條件還包括在上船進行厚度測量展示並提交令人滿意的報告。

### 3 發證

3.1 在第 2.2 段所述的對公司的審查和第 2.3 段所述的展示性測試均感到滿意後，主管機關或主管機關認可的組織應頒發認可證書並簽發已經對該公司的厚度測量操作系統已獲證明的通知。

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

如果經認證的厚度測量操作系統進行任何改動，應立即將這種改動報告經主管機關認可組織。如果主管機關認可組織認為必要，應進行重新審核。

### 5 證書的撤銷

在下述情況下可撤銷證書：

- .1 未能正確開展測量或未能正確報告結果；
- .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；及
- .3 該公司未按要求按第 4 節中所述向主管機關認可組織報告任何改動。

## 附件 6

### 檢驗報告原則

作為一項原則，對於本導則管轄的散貨船，驗船師應在其船體結構和管系的檢驗報告中包括以下與該檢驗有關的內容。

#### 1 綜述

##### 1.1 在以下情況下應編寫檢驗報告：

- .1 涉及定期船體檢驗（即相關的年度、中期和換證檢驗）的開始、繼續和/或完成；
- .2 當發現結構破損和（或）缺陷時；
- .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 說明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）的文件；
- .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檔案內；
- .4 關於計劃未來檢驗的信息；以及
- .5 可用來保持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。並在繼續或完成檢驗前向下一位主管驗船師提供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繼續檢驗的說明。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 指明已進行了總體檢驗的艙室。

2.2 指明各個壓載艙，和貨艙包括艙口和艙口圍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 指明各個壓載艙，和貨艙包括艙口和艙口圍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，如，一個橫向桁材，兩個選擇的貨艙橫向艙壁，該位置說明應包括使用肋骨編號來指明在各壓載艙和貨艙中的位置。

2.4 對於液艙和貨艙中使用保護塗層的區域並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，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及貨艙，壓載艙、管隧、隔離艙和空位處所內的管系：



- .1 進行了包括對帶有閥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 各艙內保護塗層的相關類型、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 扭曲，連同位置和範圍的描述；以及
  - .1.5 凹痕，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；和
- .3 厚度測量報告應由船上監督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（即更新或修改），包括：**
  - .3.1 鋼材級別和尺度（如果與原來不同）；**
  - .3.2 草圖/照片，視情況；**
- .4 修理範圍；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，入級條件/建議應足夠詳細，指明需要維修的每一項目。關於明確大量修理的情況，可對檢驗報告進行參照。**

附件 7

狀況評估報告

在完成換證檢驗時簽發

一般性細目

船名：	船級/主管機關識別號：
	原船級/主管機關識別號：
	IMO 編號：
船籍港：	國旗：
	原國旗：
載重噸 (公噸)：	總噸：
	國家的：
	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人審核並滿意。
- 2 換證檢驗已於 (日期) .....按照本指南完成。

狀況評估報告完成人	姓名 簽字	職務
辦事處	日期	
狀況評估報告審核人 verified by	姓名 簽字	職務
辦事處	日期	

所附報告和文件：

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

### 狀況評估報告的內容

- 第 1 部分 - 一般細目： - 見標題頁
- 第 2 部分 - 報告審核： - 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 - 厚度測量： - 參閱厚度測量報告  
- 測量位置概要  
- 另表，註明嚴重鏽蝕液艙和相應的：  
- 厚度減小  
- 鏽蝕類型
- 第 5 部分 - 液艙防腐系統： - 另表，註明：  
- 塗層/陽級位置  
- 塗層狀況（如適用）
- 第 6 部分 - 修理： - 指明處所/區域
- 第 7 部分 - 入級條件/船旗國要求：
- 第 8 部分 - 備忘： - 可接受的缺陷  
- 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 9 部分 - 結論： - 對檢驗報告的評估/審核說明

### 厚度測量摘要

參閱厚度測量報告：

嚴重鏽蝕的液艙 <sup>1</sup> /區域的或深點蝕 <sup>3</sup> 區域的位置	厚度減薄[%]	鏽蝕類型 <sup>2</sup>	備註： (例如：參照所附草圖)

註：

- 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/貨艙防鏽蝕系統

液艙/貨艙編號 <sup>1</sup>	液艙/貨艙防鏽蝕系統 <sup>2</sup>	塗層狀況 <sup>3</sup>	備註

註：

- 1 所有壓載艙和貨艙均應列明：
- 2 C = 塗層                      A = 陽級                      NP = 無保護
- 3 根據以下標準的塗層狀況：

- |    |   |
|----|---|
| 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”狀況規定的。 |
| 不良 | 塗層普遍開裂，佔考慮區域的 20%或以上或硬質鏽皮佔考慮區域的 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 7 部分中作出說明。



## 附件 8

### 厚度測量的建議程序

- 1 這些程序應用於記錄附件 A 的 B 部分所要求的厚度測量。
- 2 附錄 2 至附錄 5 所載報告單格式 TM1-DSBC，TM2-DSBC，TM3-DSBC，TM4-DSBC，TM5-DSBC 和 TM6-DSBC 應酌情用於記錄厚度測量值，這些報告單應與附錄 1 的一般性細目報告的封面裝訂在一起。應說明最大允許減小值。最大允許減小值可在一份附加的文件中說明。
- 3 附錄 3 至附錄 5 是關於厚度測量的報告格式和程序。

## 附錄 1

## 厚度測量報告

## 一般性細目

船名：  
IMO 編號：  
主管機關識別號：  
船籍港：  
總噸：  
載重噸：  
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單位：  
證書號：  
證書有效期自：..... 至.....  
測量地點：  
首次測量日：  
末次測量日：  
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：  
共包括.....表

---

操作員：..... 驗船師姓名：.....  
操作者簽字：..... 驗船師簽字：.....  
公司公章：..... 主管機關公章：.....

**附錄 2**  
**TMI-DSBC 關於所有甲板板材、所有船底殼板材或舷側殼板材的厚度測量報告**  
 (\*不適用者刪除)

船名：..... 船級識別號：..... 報告號：..... IMO 編號：.....

列板位置	號碼或字符	原厚度 mm	前讀數				後讀數				平均減少%		
			測量		右舷減少		測量		左舷減少		左	右	
			左	右	mm	%	mm	%	mm	%			
前第 12													
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													
第 12													

操作員簽字：.....

備註 – 參見反面

### 對 TM1-DSBC 報告的註釋

- 1 本報告應用於記錄以下厚度測量：
  - .1 貨物長度區域內的所有強力甲板板材；
  - .2 貨物長度區域內的龍骨、船底殼板材和舳板材；
  - .3 舷側船殼板，包括貨物長度區域以外選擇的風、水列板；及
  - .4 貨物長度區域內的所有風、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 對船底板，標明龍骨板外側的列板號碼；及
  - .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 僅記錄開口線外側的甲板板材列板。
- 4 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，應記錄通往每個類型液艙的板材區域的分次測量。
- 5 記錄的單一測量數據將代表多次測量的平均數。
- 6 允許減少的最大值可在所附的文件中說明。

**TM2-DSBC (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: ..... IMO 編號: .....

強力甲板和舷側護板板材																				
列板位置	肋骨號碼處第一橫截面				肋骨號碼處第二橫截面				肋骨號碼處第三橫截面											
	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	左	右	mm	mm	mm	mm	左	右	mm	mm	
						%						%						%		
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																				

操作員簽名 ..... 註釋 – 見反面

### 對 TM2-DSBC (i) 報告的註釋

- 1 本報告應用於記錄強力甲板板材和剪力列板橫截面的厚度測量：  
在貨物長度區域內一、二或三個橫截面，由典型橫截面圖所示的結構項目 (0)、(1) 和 (2) 組成 (附錄 3 和 4)。
- 2 應僅記錄開口線外側的甲板板材列板。
- 3 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。
- 4 應註明測量的準確肋骨位置。
- 5 記錄的單次測量數據應代表多次測量的平均值。
- 6 最大允許減少值應在所附的文件中說明。

T M2-DSBC ( 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：..... IMO 編號：.....

列板 位置	船殼板材																			
	肋骨號碼處第一橫截面					肋骨號碼處第二橫截面					肋骨號碼處第三橫截面									
	號碼 或字 符	原 厚 度	最大 允許 減少	測量	右舷減 少	左舷減 少	測量	最大 允許 減少	右舷減 少	左舷減 少	測量	最大 允許 減少	右舷減 少	左舷減 少	測量	最大 允許 減少	右舷減 少	左舷減 少		
mm	mm	mm	左	右	mm	%	mm	%	mm	mm	mm	mm	mm	mm	mm	mm	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 11																				
第 12																				
第 13																				
第 14																				
第 15																				
第 16																				
第 17																				
第 18																				
第 19																				
第 20																				
龍骨列板																				
船底合計																				

操作員簽名 ..... 註釋 – 見反面



### 對 TM2-DSBC (ii) 報告的註釋

1 本報告應用於記錄橫截面處船殼板材的厚度測量：

在貨物長度區域內一、二或三個橫截面，由附錄 3 和附錄 4 中典型橫截面圖所示的結構項目 (3)、(4)、(5) 和 (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 最大允許減少值可在所附的文件中說明。

TM3-DSBC (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：..... IMO 編號：.....

結構性構件	肋骨號碼處第一橫截面						肋骨號碼處第二橫截面						肋骨號碼處第三橫截面								
	項目號碼	原厚度 mm	最大允許減少 mm	測量		右舷減少 %	左舷減少 %	原厚度 mm	最大允許減少 mm	測量		右舷減少 %	左舷減少 %	項目號碼	原厚度 mm	最大允許減少 mm	測量		右舷減少 %	左舷減少 %	
左				右	左					右	左						右	左			右

操作員簽名..... 註釋一 見反面

### 對 TM3-DSBC 報告的註釋

1 本報告應用於記錄橫截面處縱桁部件的厚度測量：

在貨物長度區域內二或三個橫截面，由附錄 3 和附錄 4 中典型橫截面圖所示的結構項目（10）至（25）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 最大允許減少值可在所附的文件中說明。

TM4-DSBC

雙層底、底邊和頂邊壓載水艙內橫向結構構件厚度測量報告

船名：..... 船級識別號：..... 報告號：..... IMO 編號：.....

液艙描述：									
結構位置：									
結構構件	項目	原厚度 mm	最大允許減少量 mm	測量		左舷減少		右舷減少	
				左	右	mm	%	mm	%

操作員簽名.....

備註 – 見反面

### 對 TM4-DSBC 報告的註釋

1 本報告應用於記錄以下的厚度測量：

附錄 3 和附錄 4 中的典型橫截面圖所示的相應結構項目 (30) 至 (34) 組成的橫向結構構件。

2 關於測量區域的指南見附錄 5。

3 記錄的單一測量數據應代表多次測量的平均值。

4 最大允許減少值可在所附的文件中說明。

TM5-DSBC

貨艙內橫向水密艙壁厚度報告

船名：..... 船級識別號：..... 報告號：..... IMO 編號：.....

結構位置：		肋骨編號：							
		結構構件（板材，加強材）	原厚度	最大允許減少量	測量		左舷減少		右舷減少
mm			mm	左舷	右舷	mm	%	mm	%

操作員簽名.....

註釋－見反面

### 對 TM5 – DSBC 報告的註釋

- 1 本報告應用於記錄貨艙內橫向水密艙壁的厚度測量：
- 2 關於測量區域的指南見附錄 3。
- 3 記錄的單一測量應代表多次測量的平均值。
- 4 最大允許減少值可在所附的文件中說明。



TM6-DSBC

其他結構構件的厚度測量報告

船名: ..... 船級識別號: ..... 報告號: ..... IMO 編號: .....

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

操作員簽名.....

註釋 -- 見反面

### 對 TM6 – DSBC 報告的註釋

1 本報告應用於記錄以下厚度測量：

附錄 3 中的典型橫截面圖所示的包括結構項目 (40)、(41) 和 (42) 的其他結構構件。

2 關於測量區域的指南見附錄 5。

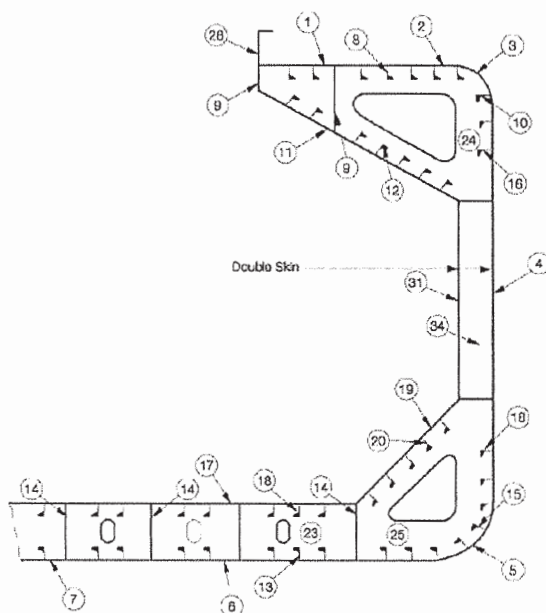
3 記錄的單一測量應代表多次測量的平均值。

4 最大允許減少值可在所附的文件中說明。

### 附錄 3

#### 厚度測量-雙舷側結構

標明縱向和橫向構件的雙舷側散貨船的典型橫向截面



TM2-DSBC (i) 和 (ii) 的報告
1 強力甲板板材
2 縱桁板
3 剪力列板
4 舷側殼板
5 舳板
6 船底殼板材
7 龍骨板

TM3-DSBC 的報告	
8 甲板縱材	17 內底板材
9 甲板縱桁	18 內底縱桁
10 剪力列板縱桁	19 底邊艙板材
11 邊艙斜板頂	20 底邊艙縱桁
12 邊艙斜板頂縱桁	31 內側板材
13 船底縱材	- 內側縱桁，如果有
14 船底縱桁	- 壓載邊艙內水平縱桁
15 舳縱桁	
16 側船殼縱桁，如果有	

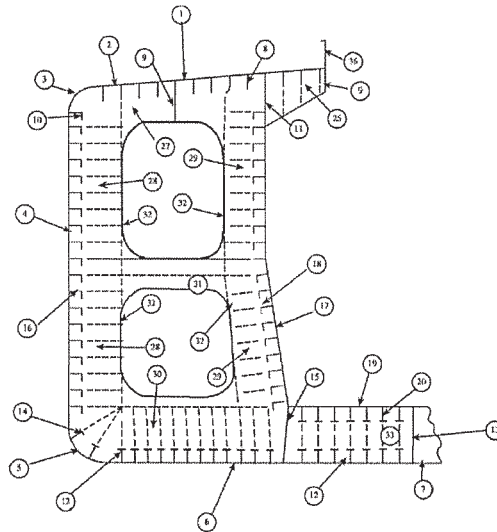
TM4-DSBC 的報告
23 雙層底液艙底板
25 底邊艙橫材
34 橫向桁板肋骨
- 頂邊艙橫材

TM6-DSBC 的報告
28 艙口圍
- 艙口間甲板板材
- 艙蓋

附錄 4

厚度測量-礦砂運輸船

標明縱向和橫向構件的礦砂運輸船的典型橫向截面



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

TM6-DSBC 報告	
36	艙口圍
37	艙口間甲板板材
38	艙蓋
39	
40	

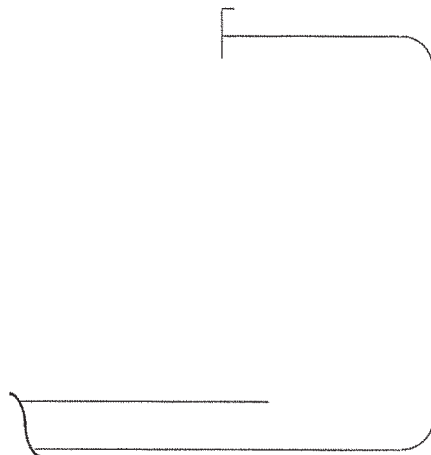
TM3-DSBC 的報告	
8	甲板縱材
9	甲板縱桁
10	剪力列板縱桁
11	縱向艙壁頂列板
12	船底縱材
13	船底縱桁
14	舳縱桁
15	縱向艙壁下列板
16	舷側殼縱材
17	縱向艙壁板材(剩餘的)
18	縱向艙壁縱材
19	內底板材
20	內底縱桁
21	
22	
23	
24	

TM4-DSBC 的報告	
25	甲板橫向中膈
26	船底橫向中膈
27	甲板橫向翼膈
28	舷側殼垂直桁材
29	縱向艙壁垂直桁材
30	船底橫向翼膈
31	撐架
32	橫向桁材面板
33	雙層底底板
34	
35	

### 附錄 5

#### 厚度測量-雙舷側結構

橫截面輪廓：此圖可用於不適用附錄 3 和 4 所示圖形的船舶



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

TM3-DSBC 的報告	
8 甲板縱材	17 內底板材
9 甲板縱桁	18 內底縱桁
10 剪力列板縱桁	19 底邊艙板材
11 頂邊艙斜板	20 底邊艙縱桁
12 頂邊艙斜板縱桁	31 內側板材
13 船底縱材	- 內底縱桁，如果有
14 船底縱桁	- 翼壓載艙內水平縱桁
15 舳縱桁	
16 舷側殼縱材，如果有	

TM4-DSBC 的報告
23 雙層底艙底板
25 底邊艙橫材
34 橫向桁板肋骨
- 頂邊艙橫材

TM6-DSBC 的報告
28 艙口圍
- 艙口間甲板板材
- 艙蓋

## 附件 9

### 結合散貨船計劃加強檢驗的技術評估導則

#### 1 引言

本導則包括了關於可與雙舷側散貨船計劃加強檢驗相結合使用的技術評估的資料和建議。如第 5.1.6 段所述，本導則為建議性的工具，在主管機關認為必要且合適時，結合所要求檢驗計劃的準備工作自主採用。

#### 2 目的和原則

##### 2.1 目的

**2.1.1** 本導則中所述的技術評估旨在於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、貨艙和液艙。

**2.1.2** 關鍵結構區域係指通過計算確定的需要進行監測的位置，或從該船或其相似船或姊妹船（如果有）的營運歷史確定易發生影響船舶結構完整性的破裂、凹凸或腐蝕的位置。

##### 2.2 最低要求

但，本導則不可用於減低 B 部分附件 1 和 2 及第 2.7 段分別關於近觀檢驗、厚度測量和液艙測試的要求，這些要求，在各種情況下均應作為最低要求符合。

## 2.3 時限

如同檢驗計劃工作的其他方面，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至少 12 到 15 個月前完成。

## 2.4 需要考慮的方面

2.4.1 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，可用作判定需進行檢驗的貨艙，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、不同貨艙/液艙作為裝貨/壓載的使用、貨艙和液艙的保護以及塗層狀況，如果有。

2.4.2 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為基礎進行判斷和決定，例如可在參考 2，3 和 4 中見到的。

## 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、裂縫和凹凸。檢驗計劃通常不包括碰撞破損，因為凹痕通常記錄在案，並假定將由驗船師按常規處理。



**3.1.2** 與檢驗計劃工作過程結合進行的技術評估原則上應按圖 1 的流程所示。其方法基本上是依據以下方面的知識和經驗對以下方面的風險評估：

.1 設計；和

.2 腐蝕。

**3.1.3** 對於設計的考慮應結合可能因震動、高應力水平或疲勞而發生彎曲或裂縫的構造細節。

**3.1.4** 鏽蝕與老化進程相關，並與新建造時的防鏽和後來服役期間的保養的質量密切相關。鏽蝕還可能導致裂縫和（或）凹凸。

## **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或姊妹船舶有關的破損經歷，將是用於計劃檢驗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。

**3.2.1.2** 需考慮的典型破損經歷將包括：

.1 裂縫的數量、範圍、位置和密度；以及

.2 凹凸處的位置。

**3.2.1.3** 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。

**3.2.1.4** 此外，應利用一般經驗。還應參見參考 2，該參考包括了單殼散貨船各種結構細節的破損和建議維修方法目錄。還應參見參考 3，該參考包括了對雙殼油船各種結構細節的破損和建議維修方法目錄，其在某些程度上與雙殼散貨

船相似。此類數字應結合主要圖紙的審核使用，以便與實際結構相比較並尋找可能造成損壞的類似細節。特別是，參考 3 的第 3 章解決的是與雙殼油船具體相關的各個方面，例如應力集中位置，建造時線向不準，鏽蝕趨向，疲勞考慮和需特別注意的區域。參考 3 的第 4 章論及的是雙殼船（散化船，OBO 運輸船，礦/油運輸船，氣體船）有關結構缺陷方面已獲得的經驗。這些在制定檢驗計劃中都應考慮到。

**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。應仔細考慮引發破損的因素。

**3.2.1.6** HTS 的使用是一個重要因素。細節表明使用普通中等強度鋼曾表現了良好的服役經歷，當使用了 HTS 及其更高的相關應力時可能更易於損壞。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，納入檢驗計劃。

### **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 液艙，貨艙和處所的使用；
- .2 塗層的狀況；
- .3 洗艙程序；
- .4 以前的鏽蝕破壞；

- .5 貨艙用於壓載及時間；
- .6 貨艙和壓載艙內的鏽蝕風險；及
- .7 毗鄰加熱燃油艙的壓載艙位置。

3.2.2.2 參考 4 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具體範例。

3.2.2.3 鏽蝕風險評估應基於參考 2 和參考 4 中的儘可能與雙殼結構有關部分的信息，連同從準備檢驗方案而收集的信息中得出的船舶預期狀況的相關信息和船舶的船齡。應列出各種貨艙，液艙和處所並包括提出的相應鏽蝕風險。

### 3.2.3 近觀檢驗和厚度測量的位置

3.2.3.1 根據鏽蝕風險表和設計經驗評估，可提出初始近觀檢驗和厚度測量（區域和截面）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，貨艙和處所內。

3.2.3.3 對近觀檢驗和厚度測量的液艙，貨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。

輸入：

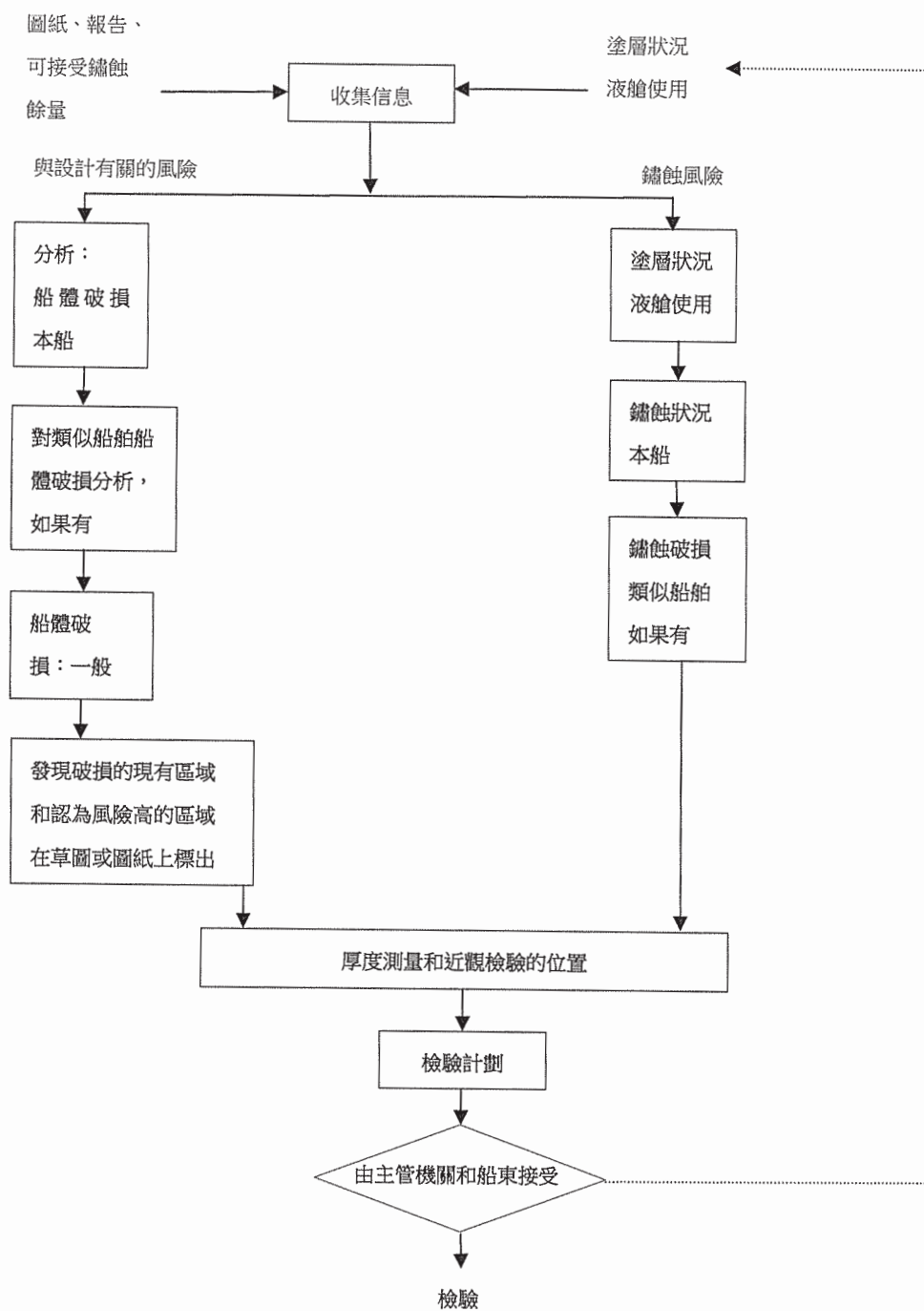


圖 1：技術評估和檢驗計劃過程

## 附件 10

## 關於雙舷側結構散貨船貨物長度區域內厚度測量範圍的要求

表 1 - 船底，內底和底邊艙結構		
結構構件	測量範圍	測量方式
船底，內底和底邊艙結構板材	橫越雙層底液艙的最少三個分段，包括船後部 對所有截面喇叭口的周圍和下部進行測量	縱材和底板間每個面板：5-點方式
船底、內底和底邊艙結構縱材	在測量船底板材處每個分段上至少三個縱材	橫越法蘭線上測量 3 處和垂直桁材上測量 3 處
船底縱桁，包括水密類	在前和後水密底板和液艙中央	縱桁板材單一測量垂線，在每塊面板加強材之間測量 1 處，或至少測量 3 處
船底底板，包括水密類	在測量過的船底列板的分段處的 3 個底板，在兩端和中間測量	在 2 平方米區域上的 5 點型
底邊艙結構桁板肋骨環	測量過的船底列板的分段處的 3 個底板	在板材 1 平方米區域上的 5 點型 在法蘭線測量 1 處
倒邊艙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 5 點型
	- 上部 2/3 艙壁	- 在板材 2 平方米區域上 5 點型
	- 加強材（最少三個）	- 對於桁板，在跨上，5 點型（橫跨桁板兩端各測 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	適用時	單次測量

表 2 – 甲板結構包括跨條，主貨艙艙口，艙蓋，艙口圍和頂邊艙		
結構構件	測量範圍	測量方式
跨甲板條板	可疑跨甲板條板	甲板下加強件之間上方 1 米長度：五點方式
甲板下加強件	橫向構件 縱向構件	每端和跨距中間：五點方式 桁板和法蘭：五點方式
艙蓋	側圍板和端圍板，每三個位置 三個縱向帶板， 舷外列板（2）和 中線列板（1）	每個位置：五點方式  每帶板五點測量
艙口圍	艙口圍的每側和每端 艙口圍下部 1/3 一個帶板，上 2/3 一個帶板	每個帶板，即艙口圍的每側和每端：五點測量方式
頂邊壓載艙	a) 橫向水密艙壁： - 艙壁下方 1/3 - 艙壁上方 2/3 - 加強件	1 平方米板材：五點方式 1 平方米板材：五點方式 1 平方米板材：五點方式
頂邊壓載艙	b) 兩個代表性緩衝艙壁： - 艙壁下方 1/3 - 艙壁上方 2/3 - 加強件	1 平方米板材：五點方式 1 平方米板材：五點方式 1 平方米板材：五點方式
頂邊壓載艙	c) 斜板材的三個分段： - 液艙下部 1/3 - 液艙上部 2/3	1 平方米板材：五點方式 1 平方米板材：五點方式
頂邊壓載艙	d) 縱材，可疑和毗連處	桁板和法蘭二者上方 1 米長度： 五點方式
主甲板板材	可疑板和毗連處（4）	1 平方米板材：五點方式
主甲板縱材	可疑板	桁板和法蘭二者上方 1 米長度： 五點方式
桁板肋骨/橫材	可疑板	一平方米五點方式

表 3 - 雙舷側壓載艙內結構

結構構件	測量範圍	測量方式
舷殼和內板材： - 上層列板和水平桁上的列板 - 所有其他列板	- 至少三個分段中的每對橫骨/縱材之間的板材（沿液艙） - 在同樣三個分段上每第三對縱材之間的板材	- 測量一處 - 測量一處
舷殼和內側橫向肋骨/縱材 - 上層列板 - 所有其他列板	- 在同樣三個分段內每個橫向肋骨/縱材 - 在同樣三個分段上每第三個橫向肋骨/縱材 s	- 跨桁板測量 3 處及在法蘭上測量 1 處 - 跨桁板測量 3 處及在法蘭上測量 1 處
橫向肋骨/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
垂直桁板和橫向艙壁： - 沿水平桁材的列板 - 其他列板	- 至少兩塊桁板和兩個橫艙壁 - 至少兩塊桁板和兩個橫艙壁	- 約 2 平方米區域上：5 點型 - 在每對垂直加強材間測量 2 處
水平桁材	至少三個分段上的每個桁材上的板材	在每對縱向加強材間測量 2 處
面板加強材	適用時	測量一次



表 4 – 貨艙內的橫向艙壁

結構構件	測量範圍	測量方式
下部支座，如果有	<ul style="list-style-type: none"> <li>- 在與內底焊接合處 25 毫米內的橫向帶條</li> <li>- 在與殼板焊接合處 25 毫米內的橫向帶條</li> </ul>	<ul style="list-style-type: none"> <li>- 在一米長度上加強件之間：五點測量方式</li> <li>- 在一米長度上加強件之間：五點測量方式</li> </ul>
橫向艙壁	<ul style="list-style-type: none"> <li>- 在大約中間高度的橫向帶條</li> <li>- 在毗連上甲板或上支座殼板（裝有上支座的船舶）部分的橫向帶條</li> </ul>	<ul style="list-style-type: none"> <li>- 在一平方米板材上：五點方式</li> <li>- 在一平方米板材上：五點方式</li> </ul>

## 附件 11

## 散貨船貨艙蓋緊固裝置的強度

## 1 緊固裝置

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，沿艙口圍板與艙蓋組件之間間隔應恰當。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緊固裝置之間艙口蓋邊沿的硬度。

- .2 每一緊固裝置的淨截面面積不應小於：

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

式中：

$a$  = 每一固定裝置之間間距，取值不小於 2 米

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

$\sigma_Y$  = 對於裝配所使用的鋼材，規定的以  $\text{N/mm}^2$  表示的最小上部屈服應力，不得取大於最後抗拉強度的 70%。

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

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

對於面積超過  $5\text{m}^2$  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，應使用緊固裝置來使封閉線壓力足以保持風雨密。如果封閉線壓力大於  $5 \text{ N/mm}$ ，橫截面面積應按正比例增加。應規定封閉線壓力。

- .4 艙蓋邊沿剛度應足以保持繫固裝置之間的適當密封壓力。邊沿組件的慣性力矩  $I$  應小於：

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

式中：

$p$  = 以 N/mm 表示的封閉線壓力，最小為 5 N/mm

$a$  = 以米表示的繫固裝置間距

- .5 繫固裝置應有可靠的結構並緊緊附着在艙口圍板、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剛性特徵。
- .6 如果安裝螺桿楔子，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  $175 \text{ kN/m}^2$  壓力引起的橫向力。
- 2.2 No.2 艙蓋應該通過制動器進行有效繫固，承受  $175 \text{ kN/m}^2$  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  $230 \text{ kN/m}^2$  壓力引起的首部末端的縱向力量，如果安裝有前桅房，則該壓力可以減少到  $175 \text{ kN/m}^2$ 。
- 2.4 在制動器及其支撐構件內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

如裝有制動或繫固裝置以符合本附則要求，則製作的材料，包括電焊條，應達到主管機關滿意。

## 附件 12

### 厚度測量的程序要求

#### 1 概述

船體結構檢驗要求的厚度測量如果不是由船級社自己來完成，應有一名驗船師在場驗證。驗船師的參與應予以記錄。這也適用於在航程中進行的厚度測量。

#### 2 檢驗會議

2.1 在開始換證檢驗或中期檢驗之前，應召開由主管驗船師，船東代表和厚度測量公司的代表參加的會議，以確保檢驗的安全有效實施和在船上進行的厚度測量。

2.2 在會議上厚度測量操作員和船東代表應就以下問題的溝通達成一致：

- .1 定期報告厚度測量；
- .2 發現以下問題迅速向驗船師報告：
  - .2.1 大量和/或大面積的鏽蝕或鏽斑/鏽洞；
  - .2.2 結構缺陷，如皺折，斷裂和變形；
  - .2.3 結構分離和/或有洞；及
  - .2.4 焊縫鏽蝕。

2.3 檢驗報告應說明會議召開的時間，地點和參加會議的人員（驗船師，船東代表，和厚度測量公司代表的姓名）。

#### 3 對船上厚度測量過程的監測

3.1 在對船上代表性處所進行了全面檢驗之後，驗船師應決定厚度測量的範圍和位置。

**3.2** 如果船舶所有人趨向於在全面檢驗之前開始厚度測量，驗船師應提出計劃的厚度測量範圍和位置要在全面檢驗進行期間給予確認。根據檢驗中的發現，驗船師可要求進行附加的厚度測量。

**3.3** 驗船師應通過選擇測量位置來指導測量工作以使測量的讀數代表該區域的平均狀況。

**3.4** 厚度測量主要是評估鏽蝕的程度，這種鏽蝕會影響船體桁材的強度。厚度測量應以系統的方式進行，使所有的縱向結構構件都能按要求進行測量。

**3.5** 如果厚度測量顯示存在嚴重鏽蝕或其消耗已超過了所允許的減少量，驗船師應指示進行附加測量的位置以便描述嚴重鏽蝕的範圍和確定需修理/更換的結構構件。

**3.6** 在要求近觀檢驗區域內進行的厚度測量應與近觀檢驗同時進行。

## **4 回顧和驗證**

**4.1** 厚度測量完成後，驗船師應確認無進一步測量的必要，或指定附加測量。

**4.2** 雖然本導則允許驗船師在經過特別考慮後減少厚度測量的範圍，但此類特別考慮應酌情報告。

**4.3** 如果厚度測量只完成了一部分，則其餘厚度測量範圍應予以報告以供下一個驗船師使用。”

**RESOLUTION MSC.261(84)**  
**(adopted on 16 May 2008)**

**ADOPTION OF 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), MSC.197(80) and resolution 2 of the 1997 Conference of Contracting Governments to the Convention, by which amendments to the Guidelines 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/2 of the Convention,

HAVING CONSIDERED, at its eighty-fourth 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 2009, 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 2010 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**

**Contents**

- 1 After the existing title of “ANNEX A” the following new title is inserted:

**“Part A**

**GUIDELINES ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF BULK CARRIERS HAVING SINGLE-SIDE SKIN CONSTRUCTION”**

- 2 After the existing list of contents for “ANNEX A”, the following is inserted:

**“Part B**

**GUIDELINES ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF BULK CARRIERS HAVING DOUBLE-SIDE SKIN CONSTRUCTION**

**1 General**

- 1.1 Application
- 1.2 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

**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 planning for enhanced surveys of bulk carriers relevant survey
Annex 10	Requirements for extent of thickness measurements at those areas of substantial corrosion of bulk carriers with double-side skin construction within the cargo length area
Annex 11	Strength of cargo hatch cover securing arrangements for bulk carriers
Annex 12	Procedural requirements for thickness measurements”

## ANNEX A

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

- 3 After the above title, the following is inserted:

#### “Part A

#### GUIDELINES ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF BULK CARRIERS HAVING SINGLE-SIDE SKIN CONSTRUCTION”

##### 1.1 Application

- 4 The existing text of paragraph 1.1.1 is replaced by the following:

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

- 5 The following new part B is inserted after part A:

## “Part B

### GUIDELINES ON THE ENHANCED PROGRAMME OF INSPECTIONS DURING SURVEYS OF BULK CARRIERS HAVING DOUBLE-SIDE SKIN CONSTRUCTION

#### 1 General

##### 1.1 Application

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

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

**1.1.3** The Guidelines contain the extent of examination, thickness measurements and tank testing. The survey should be extended when substantial corrosion and/or structural defects are found and include additional close-up survey when necessary.

##### 1.2 Definitions

**1.2.1** *Bulk carrier* is a ship which is constructed generally with single deck, topside tanks and hopper side tanks in cargo spaces, and is intended primarily to carry dry cargo in bulk and includes such types as ore carriers and combination carriers.

**1.2.2** *Ballast tank* is a tank which is used for water ballast and includes side ballast tanks, ballast double bottom spaces, topside tanks, hopper side tanks and peak tanks. A double-side tank should be considered, for survey purposes, as a separate tank even if it is in connection to either the topside tank or the hopper side tank.

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

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

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

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

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

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

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

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

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

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

**1.2.11** *Coating condition* is defined as follows:

GOOD condition with only minor spot rusting;

FAIR condition with local breakdown of coating at edges of stiffeners and weld connections and/or light rusting over 20% or more of areas under consideration, but less than as defined for POOR condition;

POOR condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration.

**1.2.12** *Critical structural areas* are locations which have been identified from calculations to require monitoring or from the service history of the subject ship or from similar or sister ships to be sensitive to cracking, buckling or corrosion which would impair the structural integrity of the ship.

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

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

**1.2.15** A *prompt and thorough repair* is a permanent repair completed at the time of survey to the satisfaction of the surveyor, therein removing the need for the imposition of any associated condition of classification or recommendation.

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

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



### **1.3 Repairs**

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

- .1 side shell frames, their end attachments or adjacent shell plating;
- .2 deck structure and deck plating;
- .3 bottom structure and bottom plating;
- .4 watertight or oiltight bulkheads; and
- .5 hatch covers or hatch coamings.

Where adequate repair facilities are not available, the Administration may allow the ship to proceed directly to a repair facility. This may require discharging the cargo and/or temporary repairs for the intended voyage.

**1.3.2** Additionally, when a survey results in the identification of corrosion or structural defects, either of which, in the opinion of the Administration, will impair the ship's fitness for continued service, remedial measures should be implemented before the ship continues in service.

### **1.4 Surveyors**

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

## **2 Renewal survey**

### **2.1 General**

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

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

**2.1.3** The survey should include, in addition to the requirements of the annual survey, examination, tests and checks of sufficient extent to ensure that the hull and related piping is in a satisfactory condition and is fit for its intended purpose for the new period of validity of the Cargo Ship Safety Construction Certificate, subject to proper maintenance and operation and to renewal surveys being carried out.



**2.1.4** All cargo holds, ballast tanks, including double bottom and double-side tanks, pipe tunnels, cofferdams and void spaces bounding cargo holds, decks and outer hull should be examined, and this examination should be supplemented by thickness measurement and testing, as required by 2.6 and 2.7, to ensure that the structural integrity remains effective. The examination should be sufficient to discover substantial corrosion, significant deformation, fractures, damages or other structural deterioration.

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

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

## **2.2 Dry-dock survey**

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

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

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

## **2.3 Space protection**

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

## **2.4 Hatch covers and coamings**

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

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

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

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

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

## **2.5 Extent of overall and close-up surveys**

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

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

## **2.6 Extent of thickness measurements**

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

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

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

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

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

## **2.7 Extent of tank pressure testing**

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

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

## **3 Annual survey**

### **3.1 General**

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

### **3.2 Examination of the hull**

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

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

### **3.3 Examination of hatch covers and coamings**

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

**3.3.2** A thorough survey of cargo hatch covers and coamings is only possible by examination in the open as well as closed positions and should include verification of proper opening and closing operation. As a result, at least the hatch covers sets within the forward 25% of the ship's length and at least one additional set, such that all the sets on the ship are assessed at least once in every 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 11.

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

- .1 cover panels, including side plates, and stiffener attachments that may be accessible in the open position by close-up survey (for corrosion, cracks, deformation);
- .2 sealing arrangements of perimeter and cross joints (gaskets for condition and permanent deformation, flexible seals on combination carriers, gasket lips, compression bars, drainage channels and non-return valves);
- .3 clamping devices, retaining bars, cleating (for wastage, adjustment, and condition of rubber components);
- .4 closed cover locating devices (for distortion and attachment);
- .5 chain or rope pulleys;
- .6 guides;
- .7 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.

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

- .1 wooden covers and portable beams, carriers or sockets for the portable beam, and their securing devices;
- .2 steel pontoons, including close-up survey of hatch cover plating;
- .3 tarpaulins;



- .4 cleats, battens and wedges;
- .5 hatch securing bars and their securing devices;
- .6 loading pads/bars and the side plate edge;
- .7 guide plates and chocks;
- .8 compression bars, drainage channels and drain pipes (if any).

### **3.4 Examination of cargo holds**

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

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

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

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

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

### **3.5 Examination of ballast tanks**

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

## **4 Intermediate survey**

### **4.1 General**

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

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

## **4.2 Bulk carriers 5 to 10 years of age**

### **4.2.1 Ballast tanks**

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

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

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

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

### **4.2.2 Cargo holds**

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

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

### **4.2.3 Extent of thickness measurement**

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

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

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

### **4.3 Bulk carriers 10 to 15 years of age**

#### **4.3.1 Ballast tanks**

##### **4.3.1.1 For bulk carriers:**

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

##### **4.3.1.2 For ore carriers:**

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

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

#### **4.3.2 Cargo holds**

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

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

#### **4.3.3 Extent of thickness measurement**

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

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

### **4.4 Bulk carriers exceeding 15 years of age**

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

**4.4.2** In application of 4.4.1, the intermediate survey may be commenced at the second annual survey and be progressed during the succeeding year with a view to completion at the third annual survey in lieu of the application of 2.1.1.



## **5 Preparations for survey**

### **5.1 Survey programme**

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

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

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

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

**5.1.4** The submitted survey programme should account for, and comply, as a minimum, with the provisions of annexes 1 and 2 and paragraph 2.7 for close-up survey, thickness measurement and tank testing, respectively, and should include relevant information, including at least:

- .1** basic ship information and particulars;
- .2** main structural plans (scantling drawings), including information regarding use of high-tensile steels (HTS);
- .3** plan of holds and tanks;
- .4** list of holds and tanks with information on use, protection and condition of coating;
- .5** conditions for survey (e.g., information regarding tank cleaning, gas-freeing, ventilation, lighting, etc.);
- .6** provisions and methods for access to structures;

- .7 equipment for surveys;
- .8 nomination of holds and tanks and areas for close-up survey (per annex 1);
- .9 nomination of sections for thickness measurement (per annex 2);
- .10 nomination of tanks for testing (per 2.7); and
- .11 damage experience related to ship in question.

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

**5.1.6** Use may also be made of the Guidelines for technical assessment in conjunction with the planning of enhanced surveys for bulk carriers, contained in annex 9. These Guidelines are a recommended tool which may be invoked at the discretion of the Administration, when considered necessary and appropriate, in conjunction with the preparation of the required survey programme.

## **5.2 Conditions for survey**

**5.2.1** The owner should provide the necessary facilities for a safe execution of the survey.

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

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

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

**5.2.5** Cargo holds, tanks and spaces should be safe for access. Cargo holds, tanks and spaces should be gas free and properly ventilated. Prior to entering a tank, void or enclosed space, it should be verified that the atmosphere in the tank is free from hazardous gas and contains sufficient oxygen.

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

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

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

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

### **5.3 Access to structures**

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

**5.3.2** For close-up survey, one or more of the following means for access, acceptable to the surveyor, should be provided:

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

### **5.4 Equipment for survey**

**5.4.1** Thickness measurements should normally be carried out by means of ultrasonic test equipment. The accuracy of the equipment should be proven to the surveyor as required.

**5.4.2** One or more of the following fracture detection procedures may be required if deemed necessary by the surveyor:

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

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

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

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

## **5.5 Survey at sea or at anchorage**

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

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

**5.5.3** When rafts or boats will be used for close-up survey, the following conditions should be observed:

- .1** only rough duty, inflatable rafts or boats, having satisfactory residual buoyancy and stability even if one chamber is ruptured, should be used;
- .2** the boat or raft should be tethered to the access ladder and an additional person should be stationed down the access ladder with a clear view of the boat or raft;
- .3** appropriate lifejackets should be available for all participants;
- .4** the surface of water in the tank or hold should be calm (under all foreseeable conditions the expected rise of water within the tank should not exceed 0.25 m) and the water level either stationary or falling. On no account should the level of the water be rising while the boat or raft is in use;
- .5** the tank, hold or space should contain clean ballast water only. Even a thin sheen of oil on the water is not acceptable; and
- .6** at no time should the water level be allowed to be within 1 m of the deepest under deck web face flat so that the survey team is not isolated from a direct escape route to the tank hatch. Filling to levels above the deck transverses should only be contemplated if a deck access manhole is fitted and open in the bay being examined, so that an escape route for the survey party is available at all times. Other effective means of escape to the deck may be considered.

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

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

- .1** when the coating of the under deck structure is in GOOD condition and there is no evidence of wastage; or
- .2** if a permanent means of access is provided in each bay to allow safe entry and exit. This means of access should be direct from the deck via a vertical ladder with a small platform fitted approximately 2 m below the deck. Other effective means of escape to the deck may be considered.

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



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

## **5.6 Survey planning meeting**

**5.6.1** The establishment of proper preparation and the close co-operation between the attending surveyor(s) and the owner's representatives 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 or an appropriately qualified representative appointed by the master or Company for the purpose to ascertain that all the arrangements envisaged in the survey programme are in place, so as to ensure the safe and efficient conduct of the survey work to be carried out.

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

- .1 schedule of the ship (i.e. the voyage, docking and undocking manoeuvres, periods alongside, cargo and ballast operations, etc.);
- .2 provisions and arrangements for thickness measurements (i.e. access, cleaning/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's representative(s) concerning findings.

## **6 Documentation on board**

### **6.1 General**

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

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

## **6.2 Survey report file**

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

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

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

## **6.3 Supporting documents**

**6.3.1** The following additional documentation should be available on board:

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

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

## **6.4 Review of documentation on board**

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

## **7 Procedures for thickness measurements**

### **7.1 General**

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

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

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

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

## **7.2 Certification of thickness measurement company**

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

## **7.3 Reporting**

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

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

## **8 Reporting and evaluation of survey**

### **8.1 Evaluation of survey report**

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

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

### **8.2 Reporting**

**8.2.1** Principles for survey reporting are shown in annex 6.

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

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



ANNEX I

REQUIREMENTS FOR CLOSE-UP SURVEY AT RENEWAL SURVEYS

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

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

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

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

ANNEX 2

REQUIREMENTS FOR THICKNESS MEASUREMENTS AT RENEWAL SURVEYS

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

ANNEX 3

**OWNER'S INSPECTION REPORT**

**Structural condition**

Ship's name: .....  <i>OWNER'S INSPECTION REPORT – Structural condition</i>  For tank/hold no.: ..... Grade of steel:      deck: .....      side: ..... bottom: .....      longitudinal bulkhead: .....						
Elements	Cracks	Buckles	Corrosion	Coating condition	Pitting	Modification/ Other repair
Deck:  Bottom:  Side:  Side framing:  Longitudinal bulkheads:  Transverse bulkheads:						
Repairs carried out due to:  Thickness measurements carried out (dates):  Results in general:  Overdue surveys:  Outstanding conditions of class:  Comments:						
Date of inspection: ..... Inspected by: ..... Signature: .....						

## ANNEX 4A

**SURVEY PROGRAMME****Basic information and particulars**

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

**1 Preamble****1.1 Scope**

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

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

**1.2 Documentation**

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

**2 Arrangement of cargo holds, tanks and spaces**

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

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

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



#### **4 Conditions for survey**

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

#### **5 Provisions and method of access to structures**

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

#### **6 List of equipment for survey**

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

#### **7 Survey requirements**

##### **7.1 Overall survey**

This section of the survey programme should identify and list the spaces that should undergo an overall survey for this ship in accordance with 2.4.1 and 2.5.1.

##### **7.2 Close-up survey**

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

#### **8 Identification of tanks for tank testing**

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

#### **9 Identification of areas and sections for thickness measurements**

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

#### **10 Minimum thickness of hull structures**

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

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

Area or location	Original thickness (mm)	as-built	Minimum thickness (mm)	Substantial corrosion thickness (mm)
<b>Deck</b>				
Plating				
Longitudinals				
Longitudinal girders				
Cross deck plating				
Cross deck stiffeners				
<b>Bottom</b>				
Plating				
Longitudinals				
Longitudinal girders				
<b>Inner bottom</b>				
Plating				
Longitudinals				
Longitudinal girders				
Floors				
<b>Ship side in way of topside tanks</b>				
Plating				
Longitudinals				
<b>Ship side in way of hopper side tanks</b>				
Plating				
Longitudinals				
<b>Ship side in way of double-side tanks (if applicable)</b>				
Plating				
Longitudinals or ordinary transverse frames				
Longitudinal stringers				
<b>Longitudinal bulkhead (if applicable)</b>				
Plating				
Longitudinals (if applicable)				
Longitudinal girders (if applicable)				
<b>Transverse bulkheads</b>				
Plating				
Stiffeners (if applicable)				
Upper stool plating				
Upper stool stiffeners				
Lower stool plating				
Lower stool stiffeners				
<b>Transverse web in topside tanks</b>				
Plating				
Flanges				
Stiffeners				



<b>Transverse web in hopper tanks</b>			
Plating			
Flanges			
Stiffeners			
<b>Transverse web in double-side tanks</b>			
Plating			
Flanges			
Stiffeners			
<b>Hatch covers</b>			
Plating			
Stiffeners			
<b>Hatch coamings</b>			
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**

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

**13 Areas identified with substantial corrosion from previous surveys**

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

**14 Critical structural areas and suspect areas**

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

**15 Other relevant comments and information**

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

**Appendices****Appendix 1 – List of plans**

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

**Appendix 2 – Survey Planning Questionnaire**

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

**Appendix 3 – Other documentation**

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

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

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

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

## ANNEX 4B

**SURVEY PLANNING QUESTIONNAIRE**

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

**Particulars**

Ship's name:

IMO number:

Flag State:

Port of registry:

Owner:

Recognized organization:

Gross tonnage:

Deadweight (metric tonnes):

Date of delivery:

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

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

Hold/Tank No.	Structure	Temporary staging	Rafts	Ladders	Direct access	Other means (please specify)
F.P.	Fore peak					
A.P.	Aft peak					
Cargo holds	Hatch side coamings					
	Topside sloping plate					
	Upper stool plating					
	Cross deck					
	Double-side tank plating					
	Transverse bulkhead					
	Hopper tank plating					
	Lower stool					
	Tank top					
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-side tanks	Side shell and structure					
	Inner skin and structure					
	Webs and bulkheads					
	Double bottom structure					
	Upper stool internal structure					
	Lower stool internal structure					
Wing tanks of double ore carriers	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 carriers)					
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:**


## ANNEX 5

**PROCEDURES FOR CERTIFICATION OF A COMPANY ENGAGED IN THICKNESS MEASUREMENT OF HULL STRUCTURES****1 Application**

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

**2 Procedures for certification***Submission of documents*

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

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

*Auditing of the company*

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

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

### **3 Certification**

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

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

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

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

### **5 Withdrawal of the certification**

The certification may be withdrawn in the following cases:

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

## ANNEX 6

**SURVEY REPORTING PRINCIPLES**

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

**1 General**

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

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

**1.2** The reporting should provide:

- .1 evidence that prescribed surveys have been carried out in accordance with applicable requirements;
- .2 documentation of surveys carried out with findings, repairs carried out and condition of class (recommendation) imposed or deleted;
- .3 survey records, including actions taken, which should form an auditable documentary trail. Survey reports should be kept in the survey report file required to be on board;
- .4 information for planning of future surveys; and
- .5 information which may be used as input for maintenance of classification rules and instructions.

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

**2 Extent of the survey**

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

**2.2** Identification of locations, in each ballast tank and cargo hold including hatch covers and coamings, where a close-up survey has been carried out, together with information on the means of access used.

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

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

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

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

**2.5** Identification of tanks subject to tank testing.

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

- .1 examination including internal examination of piping with valves and fittings and thickness measurement, as relevant, has been carried out; and
- .2 operational test to working pressure has been carried out.

### **3 Result of the survey**

**3.1** Type, extent and condition of protective coating in each tank, as relevant (rated GOOD, FAIR or POOR) including identification of tanks fitted with anodes.

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

- .1 identification of findings, such as:
  - .1.1 corrosion with description of location, type and extent;
  - .1.2 areas with substantial corrosion;
  - .1.3 cracks/fractures with description of location and extent;
  - .1.4 buckling with description of location and extent; and
  - .1.5 indents with description of location and extent;

- .2 identification of compartments where no structural damages/defects are found. The report may be supplemented by sketches/photos; and
- .3 thickness measurement report should be verified and signed by the surveyor controlling the measurements on board.

#### **4 Actions taken with respect to findings**

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

**4.2** Repairs carried out should be reported with identification of:

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

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



ANNEX 7

**CONDITION EVALUATION REPORT  
Issued upon completion of renewal survey**

**General particulars**

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

- 1 The survey reports and documents listed below have been reviewed by the undersigned and found to be satisfactory
  
- 2 The renewal survey has been completed in accordance with the present Guidelines on (date) .....

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

Attached reports and documents:

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



**Contents of condition evaluation report**

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

**Extract of thickness measurements**

Reference is made to the thickness measurement report:

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

**Notes:**

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

**Tank/hold corrosion prevention system**

Tank/hold Nos. <sup>1</sup>	Tank/hold corrosion prevention system <sup>2</sup>	Coating condition <sup>3</sup>	Remarks

**Notes:**

- 1 All ballast tanks and cargo holds should be listed.
- 2 C = Coating                      A = Anodes                      NP = No protection
- 3 Coating condition according to the following standard:
 

GOOD	condition with only minor spot rusting.
FAIR	condition with local breakdown of coating at edges of stiffeners and weld connections and/or light rusting over 20% or more of areas under consideration, but less than as defined for POOR condition.
POOR	condition with general breakdown of coating over 20% or more of areas or hard scale at 10% or more of areas under consideration.

If coating condition POOR is given, extended annual surveys should be introduced. This should be noted in part 7 of the Contents of condition evaluation report.

## ANNEX 8

### RECOMMENDED PROCEDURES FOR THICKNESS MEASUREMENTS

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

## APPENDIX 1

## THICKNESS MEASUREMENT REPORT

## GENERAL PARTICULARS

Ship's name:

IMO Number:

Administration Identification Number:

Port of registry:

Gross tonnage:

Deadweight:

Date of build:

Classification society:

Name of Company performing the thickness measurement:

Thickness measurement company certified by:

Certificate No.:

Certificate valid from: ..... to .....

Place of measurement:

First date of measurement:

Last date of measurement:

Renewal survey/intermediate survey due:

Details of measurement equipment:

Qualification of operator:

Report Number:

Consisting of ..... Forms

Name of operator: ..... Name of surveyor: .....

Signature of operator: ..... Signature of surveyor: .....

Company official stamp: ..... Administration official stamp: .....

APPENDIX 2

TMI-DSBC Report on THICKNESS MEASUREMENT OF ALL DECK PLATING, ALL BOTTOM SHEEL PLATING AND SIDE SHELL PLATING\*  
 (\* – delete as appropriate)

Ship's name ..... Class Identity No. .... Report No. .... IMO No. ....

STRAKE POSITION	No. of Letter	Org. Thk. mm	Forward Reading				Aft Reading				Mean Diminution								
			Gauged		Diminution P		Diminution S		Gauged		Diminution P		Diminution S		%				
PLATE POSITION			P	S	mm	%	mm	%	P	S	mm	%	mm	%	P	S	mm	%	
12th forward																			
11th																			
10th																			
9th																			
8th																			
7th																			
6th																			
5th																			
4th																			
3rd																			
2nd																			
1st																			
Amidships																			
1st aft																			
2nd																			
3rd																			
4th																			
5th																			
6th																			
7th																			
8th																			
9th																			
10th																			
11th																			
12th																			

Operator's Signature ..... NOTES – See Reverse

**NOTES TO REPORT TM1-DSBC**

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

**TM2-DSBC(i) Report on THICKNESS MEASUREMENT OF SHELL AND DECK PLATING at transverse sections (one, two or three transverse sections)**

Ship's name ..... Class Identity No. .... Report No. .... IMO 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	Org. Thk. mm	Max. Alwb. Dim. mm	Gauged P S	Diminution P mm	Diminution S %	No. or Letter	Org. Thk. mm	Max. Alwb. Dim. mm	Gauged P S	Diminution P mm	Diminution S %	No. or Letter	Org. Thk. mm	Max. Alwb. Dim. mm	Gauged P S	Diminution P mm	Diminution S %	
Stringer Plate																			
1st strake inboard																			
2nd																			
3rd																			
4th																			
5th																			
6th																			
7th																			
8th																			
9th																			
10th																			
11th																			
12th																			
13th																			
14th																			
centre strake																			
sheer strake																			
<b>TOPSIDE TOTAL</b>																			

Operator's Signature .....

NOTES -- See Reverse



**NOTES TO REPORT TM2-DSBC(i)**

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

TMI-DSBC(ii) Report on THICKNESS MEASUREMENT OF SHELL AND DECK PLATING at transverse sections (one, two or three transverse sections)

Ship's name ..... Class Identity No. .... Report No. .... IMO 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	Org. Thk. mm	Max. Allow. Dim. mm	Gauged P S	Denomination P %	Denomination S %	No. or Letter	Org. Thk. mm	Max. Allow. Dim. mm	Gauged P S	Denomination P %	Denomination S %
1st below sheer strake												
2nd												
3rd												
4th												
5th												
6th												
7th												
8th												
9th												
10th												
11th												
12th												
13th												
14th												
15th												
16th												
17th												
18th												
19th												
20th												
keel strake												
<b>BOTTOM TOTAL</b>												

Operator's Signature .....

NOTES – See Reverse

**NOTES TO REPORT TM2-DSBC(ii)**

- 1 This report should be used for recording the thickness measurement of:  
  
Shell plating at transverse sections:  
  
One, two or three sections within the cargo length area, comprising the structural items (3), (4), (5) and (6) as shown on the diagrams of typical transverse sections in appendices 3 and 4.
- 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 should represent the average of multiple measurements.
- 5 The maximum allowable diminution could be stated in an attached document.

**TMS-DSBC** Report on **THICKNESS MEASUREMENT OF LONGITUDINAL MEMBERS** at transverse sections (one, two or three transverse sections)

Ship's name ..... Class Identity No. .... Report No. .... IMO No. ....

STRUCTURAL MEMBER	FIRST TRANSVERSE SECTION AT FRAME NUMBER					SECOND TRANSVERSE SECTION AT FRAME NUMBER					THIRD TRANSVERSE SECTION AT FRAME NUMBER						
	Item No.	Org. Thk. mm	Max. Allow. Dim. mm	Diminution		Item No.	Org. Thk. mm	Max. Allow. Dim. mm	Diminution		Item No.	Org. Thk. mm	Max. Allow. Dim. mm	Diminution			
				P mm	S %				P mm	S %				P mm	S %	P mm	S %

Operator's Signature .....

NOTES – See Reverse

**NOTES TO REPORT TM3-DSBC**

- 1 This report should be used for recording the thickness measurement of:

Longitudinal members at transverse sections:

Two, or three sections within the cargo length area comprising the appropriate structural items (10) to (25) as shown on diagrams of typical transverse sections in appendices 3 and 4.

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

**TM4-DSBC**     **Report on THICKNESS MEASUREMENT OF TRANSVERSE STRUCTURAL MEMBERS**  
**In the double bottom, hopper side and topside water ballast tanks**

Ship's name ..... Class Identity No. .... Report No. .... IMO No. ....

TANK DESCRIPTION:  
LOCATION OF STRUCTURE:

STRUCTURAL MEMBER	ITEM	Original Thickness	Max. Allow. Dim.	Gauged		Dimination P		Dimination S	
		mm	mm	P	S	mm	%	mm	%

Operator's Signature ..... NOTES – See Reverse

**NOTES TO REPORT TM4-DSBC**

- 1 This report should be used for recording the thickness measurement:  
  
Transverse structural members, comprising the appropriate structural items (30) to (34) as shown on diagrams of typical transverse sections illustrated in appendices 3 and 4.
- 2 Guidance for areas of measurements is indicated in appendix 5.
- 3 The single measurements recorded should represent the average of multiple measurements.
- 4 The maximum allowable diminution could be stated in an attached document.



TM5-D5BC Report on THICKNESS OF WATERTIGHT TRANSVERSE BULKHEADS IN CARGO HOLDS

Ship's name ..... Class Identity No. .... Report No. .... IMO No. ....

FRAME NO.:

LOCATION OF STRUCTURE: STRUCTURAL COMPONENT (PLATING/STIFFENER)	Original Thickness mm	Max. Alwb. Dim. mm	Gauged		Diminution P		Diminution S	
			Port	Starboard	mm	%	mm	%

Operator's Signature ..... NOTES - See Reverse

**NOTES TO REPORT TM5-DSBC**

- 1 This report should be used for recording the thickness measurement of:  
Watertight transverse bulkheads in cargo holds.
- 2 Guidance for areas of measurements is indicated in appendix 3.
- 3 The single measurements recorded should represent the average of multiple measurements.
- 4 The maximum allowable diminution could be stated in an attached document.

**TM6-DSBC** Report on THICKNESS MEASUREMENT OF MISCELLANEOUS STRUCTURAL MEMBERS

Ship's name ..... Class Identity No. .... Report No. .... IMO No. ....

STRUCTURAL MEMBER:		SKETCH							
LOCATION OF STRUCTURE:									
Description	Org. Thk.	Max. Allow. Dim.	Gauged		Diminution P		Diminution S		
	mm		mm	P	S	mm	%	mm	%

Operator's Signature ..... NOTES – See Reverse

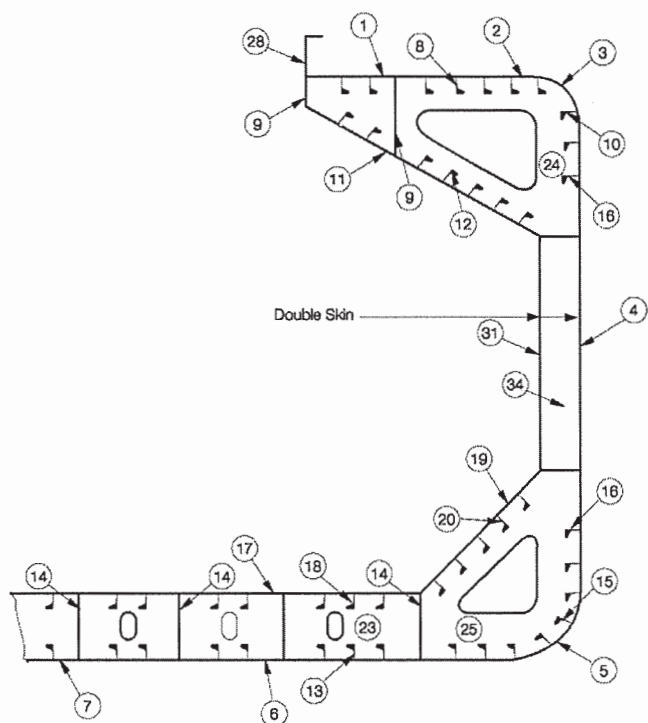
**NOTES TO REPORT TM6-DSBC**

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

### APPENDIX 3

#### THICKNESS MEASUREMENT – DOUBLE-SIDE SKIN CONSTRUCTION

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



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

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

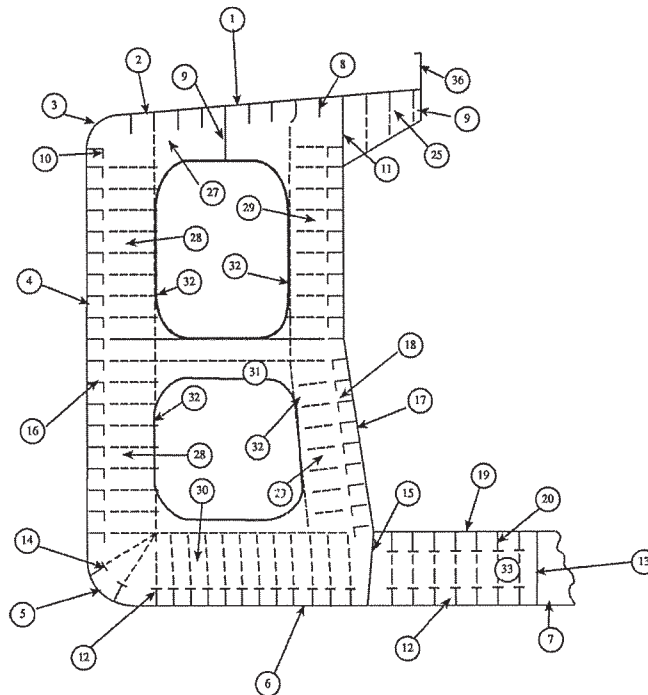
Report on TM4-DSBC
23 Double bottom tank floors
25 Hopper side tank transverses
34 Transverse web frame - Topside tank transverses

Report on TM6-DSBC
28 Hatch coamings - Deck plating between hatches - Hatch covers

**APPENDIX 4**

**THICKNESS MEASUREMENT – ORE CARRIERS**

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



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

Report on TM6-DSBC	
36	Hatch coamings
37	Deck plating between hatches
38	Hatch covers
39	
40	

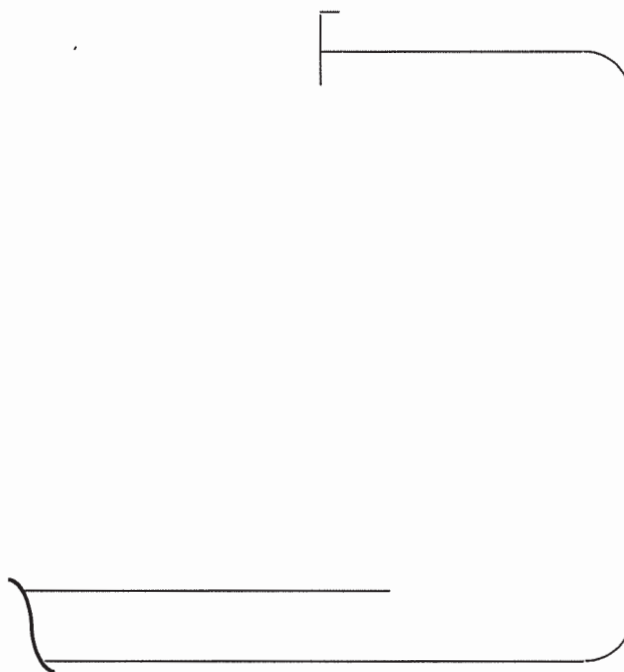
Report on TM3-DSBC	
8	Deck longitudinals
9	Deck girders
10	Sheerstrake longitudinals
11	Longitudinal bulkhead top strake
12	Bottom longitudinals
13	Bottom girders
14	Bilge longitudinals
15	Longitudinal bulkhead lower strake
16	Side shell longitudinals
17	Longitudinal bulkhead plating (remainder)
18	Longitudinal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

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

**APPENDIX 5**

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

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



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

Report on TM3-DSBC	
8	Deck longitudinals
9	Deck girders
10	Sheerstrake longitudinals
11	Topside tank sloping plating
12	Topside tank sloping plating longitudinals
13	Bottom longitudinals
14	Bottom girders
15	Bilge longitudinals
16	Side shell longitudinals, if any

17	Inner bottom plating
18	Inner bottom longitudinals
19	Hopper plating
20	Hopper longitudinals
31	Inner side plating
	- Inner side longitudinals, if any
	- Horizontal girders in wing ballast tanks

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

Report on TM6-DSBC	
28	Hatch coamings
	- Deck plating between hatches
	- Hatch covers



## ANNEX 9

**GUIDELINES FOR TECHNICAL ASSESSMENT IN CONJUNCTION WITH  
PLANNING FOR ENHANCED SURVEYS OF BULK CARRIERS****1 INTRODUCTION**

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

**2 PURPOSE AND PRINCIPLES****2.1 Purpose**

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

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

**2.2 Minimum requirements**

However, these guidelines may not be used to reduce the requirements pertaining to thickness measurement, close-up survey and tank testing contained in annexes 1 and 2 of part B and in paragraph 2.7, respectively, which, in all cases, should be complied with as a minimum.

**2.3 Timing**

As with other aspects of survey planning, the technical assessments described in these guidelines should be worked out by the owner or operator in co-operation with the Administration well in advance of the commencement of the renewal survey, i.e. prior to commencing the survey and normally at least 12 to 15 months before the survey's completion due date.

**2.4 Aspects to be considered**

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

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

**2.4.2** Technical assessments of the relative risks of susceptibility to damage or deterioration of various structural elements and areas are to be judged and decided on the basis of recognized principles and practices, such as may be found in references 2, 3 and 4.

### **3 TECHNICAL ASSESSMENT**

#### **3.1 General**

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

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

- .1 design; and
- .2 corrosion.

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

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

#### **3.2 Methods**

##### **3.2.1 Design details**

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

**3.2.1.2** Typical damage experience to be considered will consist of:

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

**3.2.1.3** This information may be found in the survey reports and/or the owner's files, including the results of the owner's own inspections. The defects should be analysed, noted and marked on sketches.

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

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

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

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

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

## **3.2.2** Corrosion

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

- .1** usage of tanks, holds and spaces;
- .2** condition of coatings;
- .3** cleaning procedures;
- .4** previous corrosion damage;
- .5** ballast use and time for cargo holds;

- .6 risk of corrosion in cargo holds and ballast tanks; and
- .7 location of ballast tanks adjacent to heated fuel oil tanks.

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

**3.2.2.3** The evaluation of corrosion risks should be based on information in both reference 2 and reference 4, as far as applicable to double-side skin construction, together with relevant information on the anticipated condition of the ship as derived from the information collected in order to prepare the Survey Programme and the age of the ship. The various holds, tanks and spaces should be listed with the corrosion risks nominated accordingly.

### **3.2.3** Locations for close-up survey and thickness measurement

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

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

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

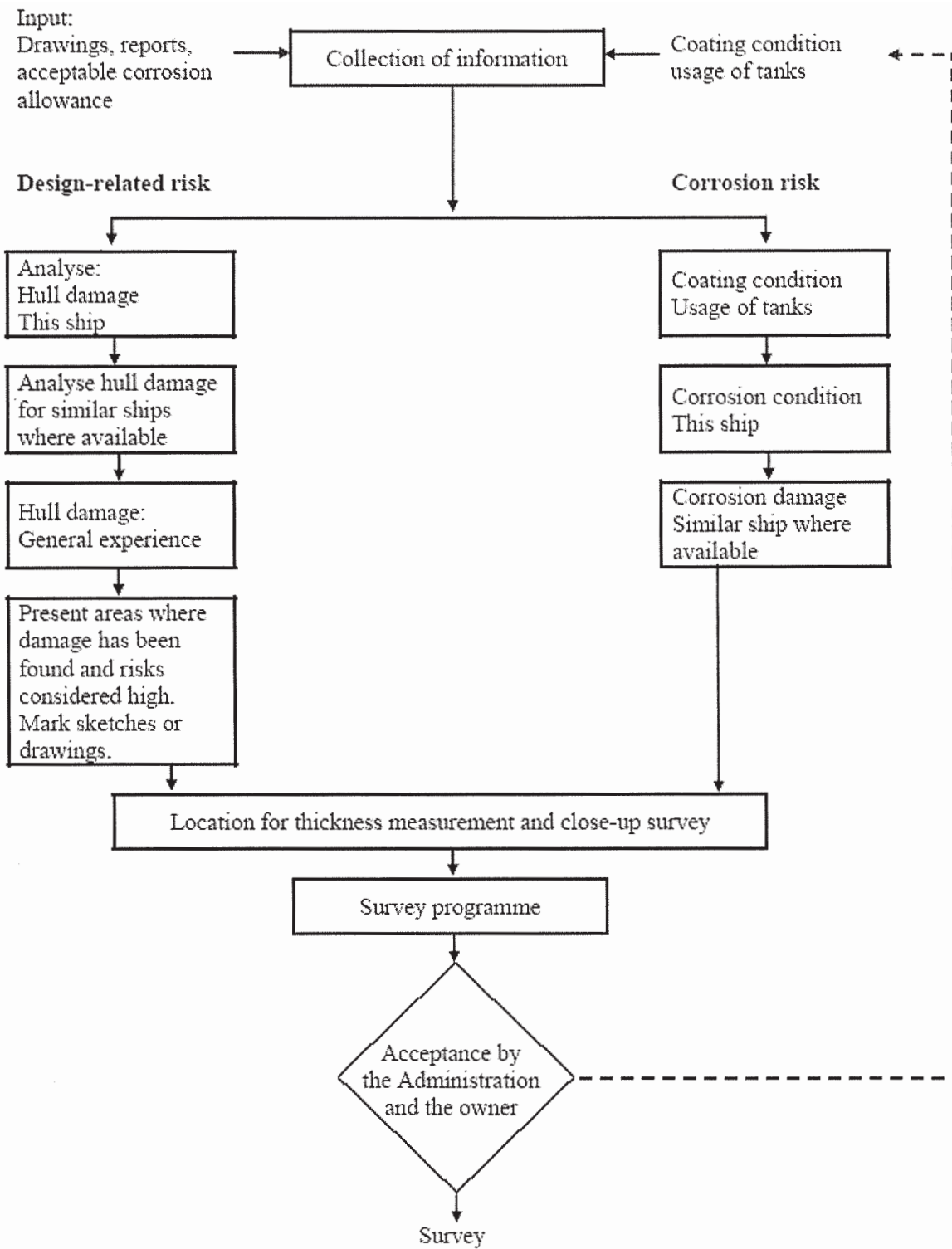


Figure 1 – Technical assessment and the survey planning process



ANNEX 10

**REQUIREMENTS FOR EXTENT OF THICKNESS MEASUREMENTS AT THOSE AREAS OF SUBSTANTIAL CORROSION OF BULK CARRIERS WITH DOUBLE-SIDE SKIN CONSTRUCTION WITHIN THE CARGO LENGTH AREA**

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

<b>TABLE 2 – DECK STRUCTURE INCLUDING CROSS STRIPS, MAIN CARGO HATCHWAYS, HATCH COVERS, COAMINGS AND TOPSIDE TANKS</b>		
<b>Structural member</b>	<b>Extent of measurement</b>	<b>Pattern of measurement</b>
Cross deck strip plating	Suspect cross deck strip plating	Five-point pattern between under deck stiffeners over 1 metre length
Under deck stiffeners	Transverse members Longitudinal member	Five-point pattern at each end and mid span Five-point pattern on both web and flange
Hatch covers	Side and end skirts, each three locations Three longitudinal bands, outboard strakes (2) and centreline strake (1)	Five-point pattern at each location Five-point measurement each band
Hatch coamings	Each side and end of coaming, one band lower 1/3, one band upper 2/3 of coaming	Five-point measurement each band i.e. end or side coaming
Topside ballast tanks	a) watertight transverse bulkheads: - Lower 1/3 of bulkhead - Upper 2/3 of bulkhead - Stiffeners	Five-point pattern over 1 sq. metre of plating Five-point pattern over 1 sq. metre of plating Five-point pattern over 1 metre length
Topside ballast tanks	b) two representative swash transverse bulkheads: - Lower 1/3 of bulkhead - Upper 2/3 of bulkhead - Stiffeners	Five-point pattern over 1 sq. metre of plating Five-point pattern over 1 sq. metre of plating Five-point pattern over 1 metre length
Topside ballast tanks	c) three representative bays of slope plating: - Lower 1/3 of tank - Upper 2/3 of tank	Five-point pattern over 1 sq. metre of plating Five point pattern over 1 sq. metre of plating
Topside ballast tanks	d) Longitudinals, suspect and adjacent	Five point pattern on both web and flange over 1 metre length
Main deck plating	Suspect plates and adjacent (4)	Five-point pattern over 1 sq. metre of plating
Main deck longitudinals	Suspect plates	Five point pattern on both web and flange over 1 metre length
Web frames/transverses	Suspect plates	Five-point pattern over 1 sq. metre



<b>TABLE 3 – STRUCTURE IN DOUBLE-SIDE BALLAST TANKS</b>		
<b>Structural member</b>	<b>Extent of measurement</b>	<b>Pattern of measurement</b>
Side shell and inner plating: – Upper strake and strakes in way of horizontal girders – All other strakes	– Plating between each pair of transverse frames/longitudinals in a minimum of three bays (along the tank) – Plating between every third pair of longitudinals in same three bays	– Single measurement – Single measurement
Side shell and inner side transverse frames/longitudinals on: – upper strake – all other strakes	– Each transverse frame/longitudinal in same three bays – Every third transverse frame/longitudinal in same three bays	– Three measurements across web and 1 measurement on flange – Three measurements across web and 1 measurement on flange
Transverse frames/longitudinals: – brackets	Minimum of three at top, middle and bottom of tank in same three bays	Five-point pattern over area of bracket
Vertical web and transverse bulkheads: – strakes in a way of horizontal girders – other strakes	– Minimum of two webs and both transverse bulkheads – Minimum of two webs and both transverse bulkheads	– Five-point pattern over 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

**TABLE 4 – TRANSVERSE BULKHEADS IN CARGO HOLDS**

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

## ANNEX 11

**STRENGTH OF CARGO HATCH COVER SECURING ARRANGEMENTS  
FOR BULK CARRIERS****1 Securing devices**

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

- .1 Panel hatch covers should be secured by appropriate devices (bolts, wedges or similar) suitably spaced alongside the coamings and between cover elements. Arrangement and spacing should be determined with due attention to the effectiveness for weather-tightness, 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:

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

where:

- a = spacing between securing devices not to be taken less than 2 metres  
 f =  $(\sigma_Y/235)^e$   
 $\sigma_Y$  = specified minimum upper yield stress in N/mm<sup>2</sup> 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 m<sup>2</sup> 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  $175 \text{ kN/m}^2$ .
- 2.2 No.2 hatch cover should be effectively secured, by means of stoppers, against the longitudinal forces acting on the forward end arising from a pressure of  $175 \text{ kN/m}^2$ .
- 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  $230 \text{ kN/m}^2$ . This pressure may be reduced to  $175 \text{ kN/m}^2$  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  $0.8 \sigma_Y$ .

## **3 Materials and welding**

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

## ANNEX 12

**PROCEDURAL REQUIREMENTS FOR THICKNESS MEASUREMENTS****1 General**

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

**2 Survey meeting**

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

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

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

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

**3 Monitoring of the thickness measurement process on board**

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

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

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

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

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

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

#### **4 Review and verification**

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

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

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

#### **第 59/2015 號行政長官公告**

中華人民共和國是國際海事組織的成員國及一九七四年十一月一日訂於倫敦的《國際海上人命安全公約》的締約國；

國際海事組織大會於一九九三年十一月四日透過第 A.744 (18) 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》，有關指南自一九九九年十二月二十日起適用於澳門特別行政區；

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，命令公佈包含上指指南的第 A.744 (18) 號決議的中文及英文文本。

二零一五年六月三日發佈。

行政長官 崔世安

#### **Aviso do Chefe do Executivo n.º 59/2015**

Considerando que a República Popular da China é um Estado Membro da Organização Marítima Internacional e um Estado Contratante da Convenção Internacional para a Salvaguarda da Vida Humana no Mar, concluída em Londres em 1 de Novembro de 1974;

Considerando igualmente que, em 4 de Novembro de 1993, a Assembleia da Organização Marítima Internacional, através da resolução A.744(18), adoptou as Directrizes relativas ao Programa Reforçado de Inspeções no âmbito das Vistorias a Graneleiros e Petroleiros, e que tais Directrizes são aplicáveis na Região Administrativa Especial de Macau desde 20 de Dezembro de 1999;

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 A.744(18), que contém as referidas Directrizes, nos seus textos em línguas chinesa e inglesa.

Promulgado em 3 de Junho de 2015.

O Chefe do Executivo, *Chui Sai On*.