

12 COMPANY VERIFICATION, REVIEW AND EVALUATION

12.1 The Company should carry out internal safety audits to verify whether safety and pollution-prevention activities comply with the SMS.

12.2 The Company should periodically evaluate the efficiency of and, when needed, review the SMS in accordance with procedures established by the Company.

12.3 The audits and possible corrective actions should be carried out in accordance with documented procedures.

12.4 Personnel carrying out audits should be independent of the areas being audited unless this is impracticable due to the size and the nature of the Company.

12.5 The results of the audits and reviews should be brought to the attention of all personnel having responsibility in the area involved.

12.6 The management personnel responsible for the area involved should take timely corrective action on deficiencies found.

13 CERTIFICATION, VERIFICATION AND CONTROL

13.1 The ship should be operated by a Company which is issued a document of compliance relevant to that ship.

13.2 A document of compliance should be issued for every Company complying with the requirements of the ISM Code by the Administration, by an organization recognized by the Administration or by the Government of the country acting on behalf of the Administration in which the Company has chosen to conduct its business. This document should be accepted as evidence that the Company is capable of complying with the requirements of the Code.

13.3 A copy of such a document should be placed on board in order that the master, if so asked, may produce it for the verification of the Administration or organizations recognized by it.

13.4 A certificate, called a Safety Management Certificate, should be issued to a ship by the Administration or organization recognized by the Administration. The Administration should, when issuing the certificate, verify that the Company and its shipboard management operate in accordance with the approved SMS.

13.5 The Administration or an organization recognized by the Administration should periodically verify the proper functioning of the ship's SMS as approved.

第 55/2014 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一九九一年十一月六日透過第A.714 (17)號決議通過了《貨物積載和繫固安全實用規則》，且有相關規則自一九九九年十二月二十日起對澳門特別行政區生效；

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，命令公佈包含上指規則的第A.714 (17)號決議的中文及英文文本。

二零一四年九月十二日發佈。

行政長官 崔世安

Aviso do Chefe do Executivo n.º 55/2014

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 6 de Novembro de 1991, a Assembleia da Organização Marítima Internacional, através da resolução A.714(17), adoptou o Código de Prática Segura em Armazenamento e Fixação de Carga, e que tal Código entrou em vigor, em relação à Região Administrativa Especial de Macau, em 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 da Região Administrativa Especial de Macau, a resolução A.714(17), que contém o referido Código, nos seus textos em línguas chinesa e inglesa.

Promulgado em 12 de Setembro de 2014.

O Chefe do Executivo, *Chui Sai On*.

第 A.714 (17) 號決議

1991 年 11 月 6 日通過

貨物積載和繫固安全實用規則

大會，

憶及《國際海事組織公約》關於大會在海上安全規則和指南方面的職責的第 15 (j) 條，

又憶及關於成組貨物和其他實物在非分格式集裝箱船的安全積載和繫固的第 A.489 (XII) 號決議和海上安全委員會 1985 年 1 月的載有將列入隨船攜帶的《貨物繫固手冊》中的規定的第 MSC/Circ.385 號通函，

還憶及關於在船上安全積載和繫固貨物裝置和車輛時應考慮的因素的第 A.533 (13) 號決議，

考慮到關於貨運集裝箱和車輛中裝填貨物的經修訂的國際海事組織/國際勞工組織指南，

又考慮到關於滾裝船運輸公路車輛的繫固裝置指南的第 A.581 (14) 號決議，

注意到由於船上繫固裝置不當和車中和集裝箱中貨物的積載和繫固不良，已經發生了許多次嚴重事故，並且只有在設計周到和裝備適當的船上對貨物適當積載和繫固，才能防止今後再發生類似事故，

認識到有必要對經驗證明會對船舶安全構成特定危險的貨物積載和繫固以及滾裝船上運輸的公路車輛的積載和繫固進行改進，

又認識到制定包括公路車輛和貨運集裝箱中裝填有貨物的船上貨物積載和繫固安全綜合實用規則，可以實現這種改進，

相信這種安全實用規則的應用將增進海上安全，

審議了海上安全委員會在其第五十八次會議上提出的建議，

1. 通過本決議附件中所載的《貨物積載和繫固安全實用規則》；
2. 敦促成員國政府儘早貫徹本規則；
3. 要求海上安全委員會隨時審議本規則，並作出必要修改；
4. 廢除第 A.288 (VIII) 號決議。

附件

貨物積載和繫固安全實用規則

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前言

貨物的適當積載和繫固對於海上人命安全是最為重要的。貨物的不適當積載和繫固已經造成了許多嚴重的船舶事故以及人員傷亡，不僅在海上，而且在裝卸貨期間也有發生。

為了處理這個問題和船上若干種貨物的不適當積載和繫固而造成的危險，國際海事組織以大會決議或以海上安全委員會通過的通函形式頒佈了一些指南，這些指南列舉如下*：

- 第 A.489 (XII) 號決議：成組貨物和其他實物在非分格式集裝箱船舶上的安全積載和繫固，
- 第 MSC/Circ.385 號通函：將列入隨船攜帶的《貨物繫固手冊》中的規定，
- 第 A.533 (13) 號決議：在考慮貨物單元和車輛在船舶上的安全積載和繫固問題時應計及的因素，
- 第 A.581 (14) 號決議：滾裝船運輸道路車輛繫固裝置指南，
- 海事組織/勞工組織貨物集裝箱和車輛的貨物裝填指南，
- 第 MSC/Circ.487 號通函：與進入圍蔽處所有關的危險，

縱向、垂直向和主要是橫向的擺動的綜合效應造成了作用於海上船舶的加速度。大部分的繫固問題是這些加速度所造成的各種力帶來的。

這些力造成的危害應由採取確保船上貨物的適當積載和繫固和降低船舶擺動的幅度和頻率兩方面的措施加以解決。

* 有關決議、通函和指南將作為附錄編入大會決議和規則的合編出版物內。

本規則的目的是為以下列方式促進貨物的安全積載和繫固提供一個國際標準：

- 提請船舶所有人和經營人注意確保船舶適合其預定用途；
- 對確保船舶裝備合適貨物繫固裝置提出建議；
- 提供關於適當貨物積載和繫固的一般建議以減少船舶和人員風險；
- 對在積載和繫固上會造成困難和危險的那些貨物提出具體建議；
- 對在惡劣海況下可採取的行動提出建議；和
- 對貨物移動的影響可採取的補救行動提出建議。

在提供這些建議時，應注意船長負責航次的安全指導、船舶、其船員和其貨物的安全。

一般原則

所有貨物的積載和繫固均不應對船舶和船上人員造成風險。

貨物的安全積載和繫固決定於適當的計劃、實施和監督。

擔任貨物積載和繫固任務的人員應有適當資格和經驗。

計劃和監督貨物積載和繫固的人員應對應用《貨物繫固手冊》(如提供的話)和該手冊的內容有良好的實踐知識。

在任何情況下，貨物的不當積載和繫固將對其他貨物的繫固和對船舶自身造成潛在的危險。

對貨物積載和繫固的措施所作的決定應根據從經驗預計在預定航次中可能出現的最惡劣氣候條件。

船長所作的船舶操縱的決定，特別是在壞天氣條件下，應考慮到貨物類型、積載位置和繫固裝置。

第 1 章—總則

1.1 適用範圍

本規則適用於船舶運輸的貨物（除固體和液體散裝貨及甲板上裝載木材外），特別是實踐已證明在積載和繫固上會造成困難的那些貨物。

1.2 所用名詞的定義

就本規則而言：

貨物單元：

- 係指車輛、集裝箱、平板、貨盤、移動式罐櫃、包裝單元、或任何其他實物等等，以及在大會第 A.489（XII）號決議中規定的屬於船舶但並非固定於船舶的裝貨設備或其任何部分。

中間散裝容器：

- 係指一種剛性、半剛性或撓性輕便式散裝容器，其裝載容量不大於 3 米³（3,000 升），設計用於機械裝卸並經測試能滿意地承受裝卸和運輸應力。

移動式罐櫃：

- 係指非永久繫固在船舶上的罐櫃，其容量大於 450 升，外殼裝有穩定構件和運輸氣體、液體或固體所必需的輔助設備和結構性設備。

公路罐車：

- 係指帶有車輪、裝有一個或多個罐櫃的車輛，在公路和海上運輸中用於運輸氣體、液體或固體，其罐櫃在裝貨、運輸和卸貨的所有正常作業期間均剛性和永久地連接在車輛上，在船舶上既不充填也不排放。

公路車輛：

- 係指大會第 A.581 (14) 號決議中規定的商業用車輛、半拖車、公路列車、鉸接式公路列車或車輛組合體。

滾裝掛車：

- 係指其後部有一個或多個輪軸，前端有一支架的低架貨車，由特殊拖車在港口對其進行拖帶或推帶，出入於它在船上的積載處所。

滾裝船：

- 係指有一層或數層封閉或露天甲板的船舶，該甲板通常不以任何方式分隔，往往貫穿船舶的整個長度。其裝載的貨物一般是橫向裝卸的。

成組貨物：

一 係指符合下述情況之一的成組包裝貨物：

- .1 放置或堆裝在貨盤之類的裝貨板上並捆紮、熱裝冷縮包紮或其他合適方法繫固；或
- .2 放置在箱形托盤之類保護性外包裝內；或
- .3 作為一吊貨被永久地繫固在一起。

1.3 力

1.3.1 為防止貨物移動而必須由適當積載和繫固裝置吸收的力，通常由作用於船舶軸線的下列分力組成：

- 縱向分力；
- 橫向分力；和
- 垂向分力。

註：就積載和繫固貨物而言，縱向和橫向的力是主要的。

1.3.2 單純的橫向力或橫向、縱向和垂向力的合力，通常隨積載物高度和離船舶在航行時的擺動中心的橫向距離增加而增加。最強烈的力位於最前部、最後部和船舶每一側的最高積載位置。

1.3.3 橫向力的增加與船舶穩心高度有直接關係。不適當的穩心高度可由下述情況造成：

- 船舶設計不當；
- 貨物配置不當；和

— 燃油和壓載水的分佈不當。

1.3.4 貨物的配置應使船舶穩心高度超出所要求的最低值，在可行時，應在可接受的上限內，以減少作用到貨物的力。

1.3.5 除上述提到的力外，還有甲板上裝運的貨物可能受到風和連續海浪影響而產生的力。

1.3.6 不適當的船舶操縱（航向或航速）可能造成作用於船貨的不利的力。

1.3.7 力的大小可使用《貨物繫固手冊》（如提供的話）中的有關計算方法進行估計。

1.3.8 雖然使用抗橫搖裝置可改善船舶在風浪中的特性，但這種裝置的作用在計劃貨物積載和繫固時不應考慮進去。

1.4 貨物的特性

1.4.1 有些貨物在航行中會變形或自壓實，造成其繫固設施變鬆。

1.4.2 低摩擦系數的貨物，如在裝載時沒有適當增加摩擦力的設施，如墊板、軟板、橡膠墊等，就難於繫固，除非緊緊地從船舶一邊裝到另一邊。

1.5 估計貨物移動風險的標準

1.5.1 在估計貨物移動風險時，應考慮下述因素：

- 貨物的尺寸和物理性質；
- 貨物在船上的位置和積載；
- 船舶適於運輸特定的貨物；

- 繫固裝置是否適合特定貨物；
- 預計的季節性氣候和海況；
- 在預定航次期間預計的船舶特性；
- 船舶穩性；
- 航次的地理區域；和
- 航次時間。

1.5.2 在選擇適當的積載和繫固方法和在檢查被繫固設備抵銷的力時，應考慮到這些標準。

1.5.3 考慮到上述標準，船長只有在確信貨物能被安全運輸時，才應在其船上接受貨物。

1.6 《貨物繫固手冊》

1.6.1 按照本規則和第 A.489 (XII) 決議 (附錄) 規定承運成組貨物和其他實物的船舶，應攜帶第 MSC/Circ.385 號通函中詳細規定的《貨物繫固手冊》。

1.6.2 在船舶的《貨物繫固手冊》中詳述的貨物繫固裝置，如配備的話，應根據船上貨物可能受到的作用力，此種作用力應按照主管機關接受的方法或為經主管機關接受的、由船級社核准的方法計算。

1.7 設備

船舶的貨物繫固設備應：

- 有足夠的數量；

- 適合其預定目的，並考慮到《貨物繫固手冊》（如提供該手冊的話）的建議；
- 有合適的強度；
- 易於使用；和
- 得到很好的維修。

1.8 特別貨物運輸裝置

船舶所有人和船舶經營人，在必要時，當考慮運輸有異常特性的貨物時，如該貨物可能要求對其在船上的位置（根據船舶結構強度）、其積載和繫固和在預定航次期間預計的氣候情況給與特別注意，則應使用有關的專門知識。

1.9 貨物資料

1.9.1 在接受待運貨物前，船舶所有人或船舶經營人應得到關於貨物的所有必要資料並確保：

- 所裝運的不同貨物是彼此相容的或得到適當隔離的；
- 貨物適合於該船；
- 該船適合裝運該貨物；和
- 在預定航次期間的所有預計情況下，貨物能在船上安全積載、繫固和運輸。

1.9.2 應向船長提供所裝貨物的適當資料，以便為裝卸和運輸，對積載作出正確計劃。

第 2 章—貨物安全積載和繫固原則

2.1 貨物的適運性

裝在集裝箱、公路車輛、船載駁船、火車車廂和其他貨物運輸裝置裏的貨物，其在這些裝置中的裝填和繫固，應能在整個航次中防止對船舶、對船上人員和對海洋環境造成損害或危險。

2.2 貨物配載

2.2.1 為防止貨物滑動、翻倒、傾斜和倒塌等等，船長對貨物積載和繫固計劃和監督給與巨大關注是極其重要的。

2.2.2 貨物的配載應能確保在整個航次中船舶穩性保持在可接受的限制內，以儘可能減少出現過度加速度的危險。

2.2.3 貨物的配載應對船舶結構不會造成不利影響。

2.3 貨物繫固裝置

2.3.1 應特別注意在貨物繫固裝置間力的分佈應儘可能平均，如果做不到，則這些裝置應相應加固。

2.3.2 如果由於繫固裝置的複雜結構或其他情況，負責的人不能根據經驗和良好的船藝知識來評定該裝置的適當性，則應使用可接受的計算方法對裝置加以驗證。

2.4 磨損後的剩餘強度

貨物繫固裝置和設備應有足夠的剩餘強度，可經受使用壽命期間的正常磨損。

2.5 摩擦力

如貨物和船舶甲板或結構或貨物運輸裝置間的摩擦力不足以避免滑動的危險，則應使用軟板或墊板之類的適合的材料增加摩擦力。

2.6 船上監督

2.6.1 防止貨物不當積載和繫固的主要方法是監督裝貨作業和檢查積載。

2.6.2 凡可能時，應在整個航行期間對貨物處所進行定期檢查，以確保貨物、車輛和貨物運輸裝置保持安全繫固狀態。

2.7 進入圍蔽處所

任何圍蔽處所的空氣，由於缺氧可能不足以維持人的生命或可能含有易燃或有毒氣體。船長應確保進入任何圍蔽處所的安全。

2.8 船長應考慮的一般要素

在評估了貨物移動的風險後，船長應根據 1.5 中標準，在任何貨物、貨物運輸單位或車輛裝船前確保：

- .1 甲板積載區域應儘可能清潔、乾燥並沒有油、脂；
- .2 貨物、貨物運輸裝置或車輛應處於適合運輸的狀態，並能有效地繫固；
- .3 船上備有所有必需的貨物繫固設備並處於良好工作狀態；和
- .4 在貨物運輸裝置和車輛之中或之上的貨物應儘可能被適當積載並繫固在裝置或車輛上。

2.9 貨物積載和繫固聲明書

2.9.1 如有理由懷疑裝有危險貨物的集裝箱或車輛不符合《國際危規》總前言第 12 或 17 節（視情而定）的規定，或如沒有集裝箱裝箱證書/車輛裝車聲明書，則不應接受裝運該運輸裝置。

2.9.2 當適當和可行時，公路車輛應備有貨物積載和繫固聲明書，說明公路車輛上的貨物已根據海事組織/勞工組織貨運集裝箱或車輛中裝貨指南為預定的海上航次作了適當的積載和繫固。下邊提供此種聲明書的範例。《國際危規》建議的裝車聲明書也可接受用於此目的。

範例

貨物積載和繫固聲明書

車輛號碼

裝貨地點

裝貨日期

貨物名稱

上述車輛中的貨物已根據海事組織/勞工組織貨運集裝箱或車輛中裝貨指南為海上運輸作了適當積載和繫固，特此聲明。

簽字人姓名

職務

地點..... 日期

代表裝貨人的簽字

備註：

.....

.....

.....

第 3 章—標準化積載和繫固系統

3.1 建議

擬以標準化積載和繫固系統（如集裝箱、火車車箱、船載駁船等等）裝運貨物的船舶應做到：

- .1 其設計和裝備應使有關的標準化貨物在預定航次的一切預計狀況下在船上得到安全積載和繫固；
- .2 其設計和裝備應得到主管機關接受或由主管機關接受的一家船級社的批准；和
- .3 備有供船長使用的有關船舶為其設計或改裝的貨物的安全積載和繫固裝置的適當資料。

第 4 章 一半標準化積載和繫固

4.1 繫固裝置

4.1.1 欲裝載公路車輛、在滾裝船上裝載系統化貨物的輪式掛車和機動車輛等具體貨物的船舶應備有繫固點，其間距應小到適合於船舶的預定作業，並符合指南中有關供滾裝船上運輸公路車輛的繫固裝置的第 4 節（第 A.581（14）號決議）。

4.1.2 供海上運輸的公路車輛，應具備有在第 A.581（14）號決議附件第 5 節詳細說明的安全積載和繫固裝置。

4.1.3 運輸系統化貨物的輪式掛車應備有安全積載和繫固車輛及其貨物的裝置。應對積載高度、積載的緊密度和貨物高重心的影響給與特別考慮。

4.2 車輛的積載和繫固

4.2.1 車輛，包括未備有適當繫固裝置的輪式掛車，應按本規則第 5 章積載和繫固。

4.2.2 不符合第 A.581（14）號決議附件第 4 節要求的滾裝船或不備有在海上運輸中提供等效安全程度的等效積載和繫固裝置的滾裝船，應按本規則第 5 章處理。

4.2.3 車輛應按第 A.581(14)號決議附件第 6 和第 7 節積載和繫固。對於運輸系統化貨物的輪式掛車、公路罐車和輪式活動罐櫃的積載和繫固，應根據罐櫃的高重心和自由液面效應，給與特別考慮。

4.3 接受供滾裝船海運的公路車輛

4.3.1 除非船長確信公路車輛顯然適合預定的航行，並至少配有第 A.581(14)號決議附件第 5 節規定的緊固點，否則船長不應在其船上運輸該公路車輛。

4.3.2 在例外情況下，如對能否或是否需要執行 4.3.1 的建議有懷疑時，船長在考慮到車輛狀況和預定航次的預計特點後，可接受車輛裝運。

第 5 章—非標準化積載和繫固

5.1 建議

5.1.1 本章及附件對本規則第 3 和第 4 章未作規定的貨物積載和繫固提供了一般性建議，是對已被證明難於在船上積載和繫固的貨物的積載和繫固提供了具體建議。

5.1.2 在 5.3 中提供的貨物清單不應認為是詳盡無遺的，因為可能有另一些貨物，其積載和繫固因不適當會造成危害。

5.2 等效積載和繫固

附件中提供的指導對所述貨物的固有問題的防備措施作出了規定。積載和繫固的替代辦法可以提供同樣程度的安全性。選用的任何替代辦法所提供的安全程度必須至少相當於與本規則前言中列舉的決議、通函和指南所提供者。

5.3 證明為潛在危險源的貨物

這些貨物包括：

- .1 在不是特別為運輸集裝箱而設計或裝備的船舶甲板上裝載的集裝箱（附件 1）；
- .2 移動式罐櫃（罐櫃集裝箱）（附件 2）；
- .3 移動式容器（附件 3）；
- .4 輪載（滾動）的特別貨物（附件 4）；
- .5 機車、變壓器等重型貨物（附件 5）；
- .6 成卷薄板（附件 6）；
- .7 重金屬製品（附件 7）；
- .8 錨鏈（附件 8）；
- .9 散裝金屬廢料（附件 9）；
- .10 撓性中間散裝容器（附件 10）；
- .11 甲板下裝載的原木（附件 11）；和
- .12 成組運輸的貨物（附件 12）。

第 6 章—在惡劣氣候中可能採取的行動

6.1 通則

本章的目的不是僭取船長職責，而是對如何避免惡劣氣候狀況造成的過分加速度所引起的應力提出建議。

6.2 過分的加速度

避免過分的加速度的措施為：

- .1 改變航向或船速或兩者一起改變；
- .2 滯航；
- .3 儘早避開不利氣候和海況區域；
- .4 根據實際穩性情況，及時加壓載或卸壓載，以改善船舶特性（也見 7.2）。

6.3 航次計劃

船長在可能及可行時要仔細計劃船舶航次，避開惡劣氣候和海況是降低過分的加速度的一個辦法。船長應不斷查閱可得到的最新氣象資料。

第 7 章—貨物移位時可採取的行動

7.1 可考慮採取下述行動：

- .1 改變航向以降低加速度；
- .2 減速以降低加速度和震動；
- .3 監視船舶的完整性；
- .4 重新積載或重新繫固貨物，並在可能時增加摩擦力；和
- .5 改變航向，以尋找避風錨地或較好氣候和海況。

7.2 液艙的加壓載或卸壓載作業只有在船舶有適當穩性才能考慮。

附件 1

不是特別設計和裝備用於運輸集裝箱的船舶

甲板上的集裝箱的安全積載和繫固

1 積載

- 1.1 裝在這類船舶甲板或艙口蓋上的集裝箱最好沿首尾方向積載。
- 1.2 集裝箱不應超出船舷。當集裝箱伸出艙口蓋或甲板結構物外時應提供適當的支架。
- 1.3 集裝箱的積載和繫固應能允許從事船舶必要作業的人員安全走近。
- 1.4 集裝箱在任何時候都不應使承載它們的甲板或艙口蓋受到過度應力。
- 1.5 底層集裝箱，當不是放在堆碼裝置上時，應積載在有足夠厚度的木材上，其佈置應能使堆積的負荷均勻地轉移到積載區域的結構物上。
- 1.6 在堆置集裝箱時，在集裝箱間應視情使用鎖緊裝置、圓錐體或相似的堆垛器材。
- 1.7 當在甲板或艙蓋上積載集裝箱時，應考慮到繫固點的位置和程度。

2 繫固

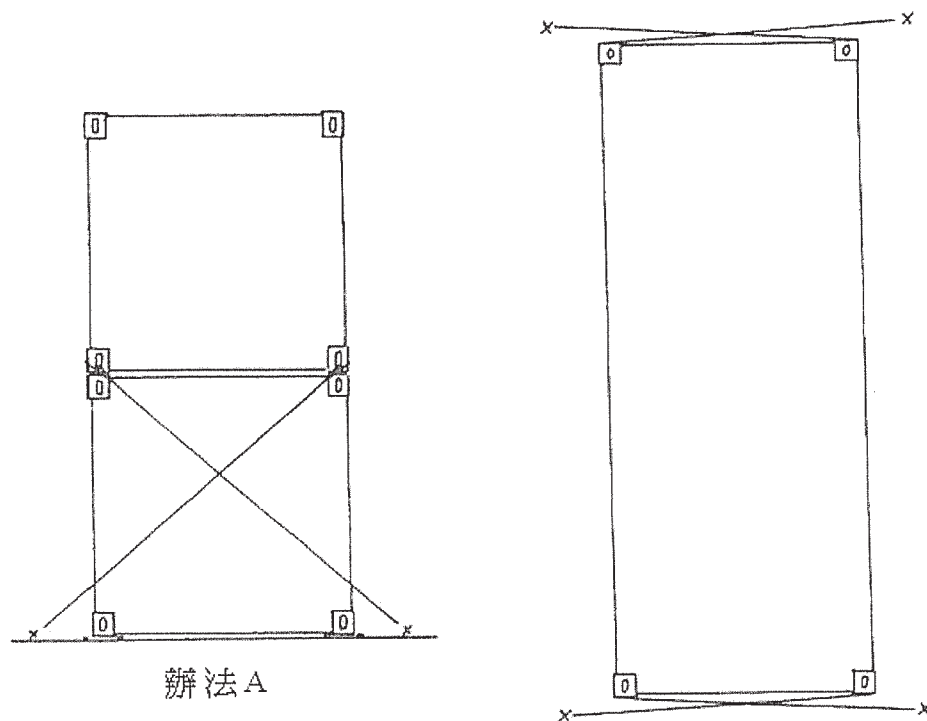
2.1 所有集裝箱應有效地繫固，使之不會滑動和翻倒。承載集裝箱的艙口蓋應適當地繫固在船上。

2.2 集裝箱應使用圖 1 推薦的三種方法之一或與此等效的方法繫固。

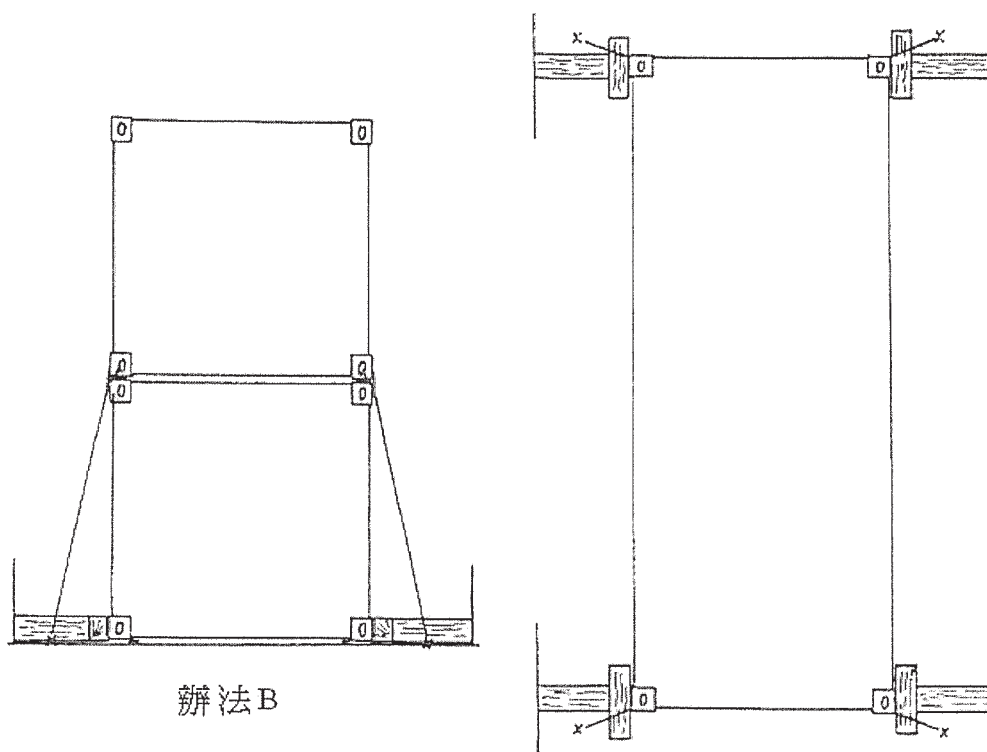
2.3 綁繩最好由鋼絲繩或鏈條或具有等效強度和伸長特性的材料構成。

2.4 木橫支架的長度不應超過 2 米。

圖 1：集裝箱非標準化繫固的推薦辦法

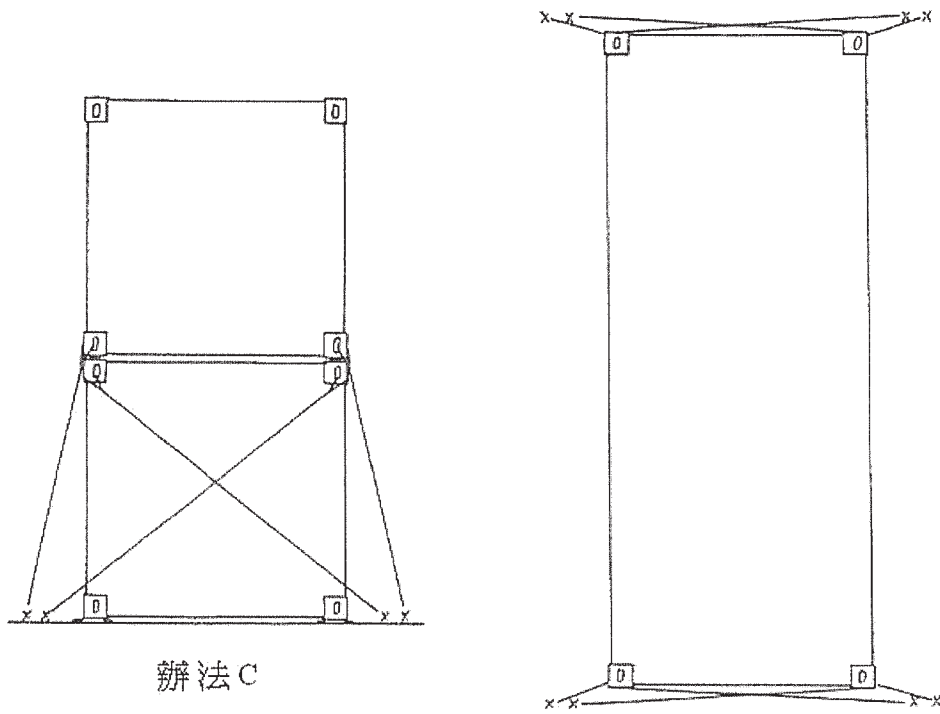


辦法 A：中等重量集裝箱：頂部集裝箱重量不大於底部集裝箱重量的 70%



辦法 B

辦法 B：中等重量集裝箱：頂部集裝箱重量可大於底部集裝箱重量的 70%



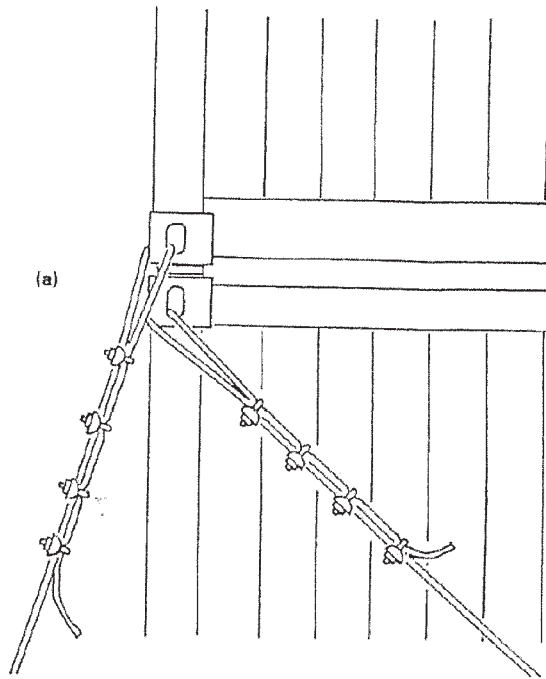
辦法 C：重集裝箱：頂部集裝箱重量可大於底部集裝箱重量的 70%

2.5 鋼絲夾應有適量油脂，並拉緊至鋼絲繩的終端明顯受到壓力（圖 2）。

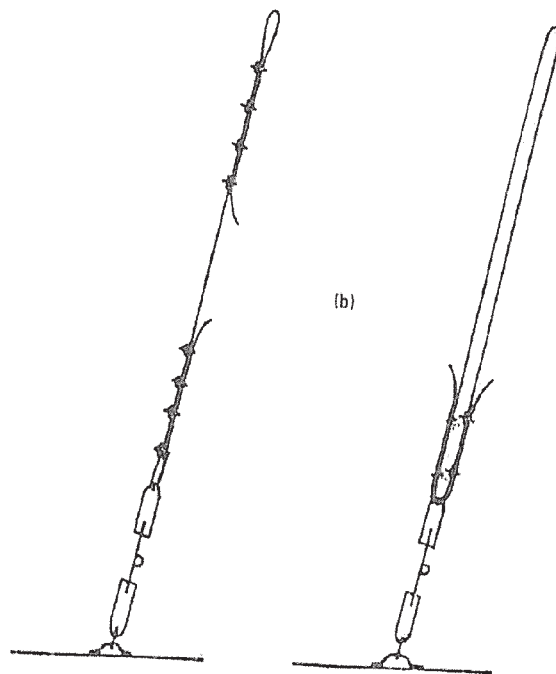
2.6 綁繩在可能時應受到均勻的拉力。

圖 2 :

鋼絲綁繩在角
配件上的捆紮



鋼絲綁繩的替代結構



附件 2

移動式罐櫃的安全積載和繫固

1 前言

1.1 本附件的規定適用於移動式罐櫃，在本附件中，它們係指非永久性繫固在船上、容積大於 450 升、其外殼裝有外部穩定構件和運輸液體、固體或氣體所必需的維修工具和結構性設備的罐櫃。

1.2 這些規定不適用於容量為 450 升或小於 450 升、運輸液體、固體或氣體的罐櫃。

註：裝運氣體的移動式罐櫃的容積為 1000 升或大於 1000 升。

2 對移動式罐櫃的一般規定

2.1 移動式罐櫃應能在不移開其結構設備的情況下裝卸，並能在裝有貨物時在船上吊上、吊下。

2.2 經修正的《1972 年國際安全集裝箱公約》的適用要求，符合該公約集裝箱定義的任何罐櫃式集裝箱均應滿足。此外，《國際危規》總前言第 13 節的規定，在罐櫃用於運輸危險貨物時，也應予以滿足。

2.3 未裝滿的移動式罐櫃，由於罐櫃內的晃動會產生不能接受的液壓力，不應用於船運。

2.4 運輸危險貨物的移動式罐櫃，應按照《國際危規》規定，由主管批准當局或由該當局授權的機構提供證書。

3 移動式罐櫃的裝置

3.1 移動式罐櫃的外部穩定構件可由墊木或支架構成，此外，該罐櫃可繫固在有架式底部的集裝箱上。或者，罐櫃可固定在國際標準化組織或非國際標準化組織框架尺寸的框架內。

3.2 移動式罐櫃的裝置應包括船上的提升和繫固配件。

註：所有上述移動式罐櫃可在多用途船上裝運，但需要對船上的綁紮和繫固給與特別注意。

4 貨物資料

4.1 至少應向船長提供下述資料：

- .1 如係非危險貨物：移動式罐櫃的尺寸和貨品；如係危險貨物，按照《國際危規》要求的資料；
- .2 移動式罐櫃的毛重；和
- .3 移動式罐櫃是否長期繫固在有架式底座的集裝箱上，或繫固在框架裏，是否有繫固點。

5 積載

5.1 在決定移動式罐櫃應裝在甲板上還是甲板下時，應考慮船舶加速度的典型分佈。

5.2 罐櫃應沿首尾方向在甲板上或甲板下積載。

5.3 積載的罐櫃不應超出船舷。

5.4 罐櫃的積載應能使從事船舶必要作業的人員安全走近。

5.5 任何時候罐櫃都不應超過甲板或艙蓋的應力；艙蓋應繫固在船上以防止整個艙蓋翻倒。

6 防滑動和翻倒的繫固

6.1 非標準化移動式罐櫃

6.1.1 在非標準化移動式罐櫃上和船上的繫固裝置應安裝得能承受可能引起的滑動和翻倒的橫向力和縱向力。防滑動的繫索角度不應高於 25 度，防翻傾的繫索的角度不低於 45 至 60 度（圖 1）。

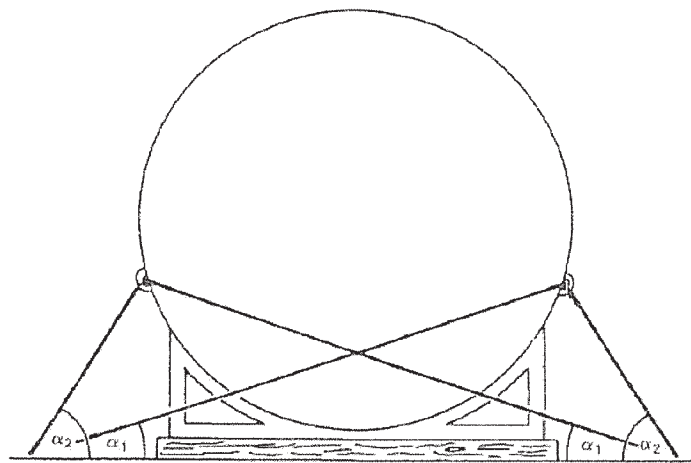


圖 1：以有利的綁繩角度繫固移動式罐櫃

α_1 ：防滑動的有利角度

α_2 ：防翻倒的有利角度

6.1.2 在必要時，在甲板表面和移動式罐櫃底部結構間應使用木材以增加摩擦力。這不適用於木製裝置上的罐櫃或有相似的高摩擦系數的底部材料的罐櫃。

6.1.3 如允許在甲板下積載，積載應能使移動式罐櫃直接落在其位置和基座上。

6.1.4 罐櫃上的繫固點應有適當強度並作出明顯標誌。

註：為公路和火車運輸設計的繫固可能不適合於海上運輸。

6.1.5 縛在無繫固點的罐櫃上的繫索應繞罐櫃一周，繫索兩端應繫固在罐櫃的同一邊（圖 2）。

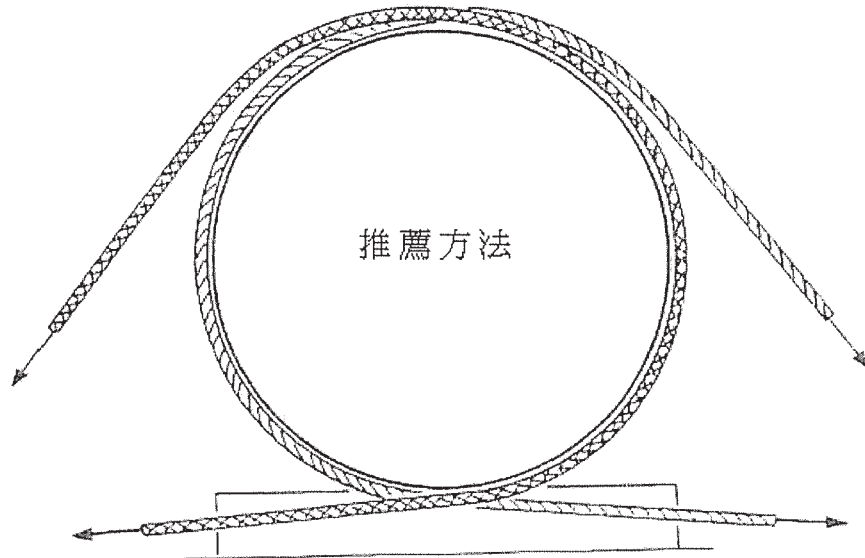


圖 2：沒有繫固點的移動式罐櫃的繫固

6.1.6 應將足夠的繫固裝置佈置成每一裝置均分擔負荷並有足夠的安全系數。

6.1.7 當罐櫃裝在甲板或艙口部件上時和當佈置和安裝繫固裝置時，應考慮甲板或艙口部件的結構強度。

6.1.8 移動式罐櫃的繫固應使罐櫃或附件上的負荷不超出其設計負荷。

6.2 標準化移動式罐櫃（罐櫃集裝箱）

6.2.1 符合國際標準化組織框架尺寸的標準化移動式罐櫃應按照船舶裝備的索具系統加以繫固，並考慮到罐櫃在甲板以上的高度和罐櫃中的罐虧。

7 繫固裝置的保持

7.1 繫固裝置的完整性應在整個航次中得到保持。

7.2 對需要拉緊繫索、夾子和扣鉤以防止因磨損和弱化一事應予特別注意。

7.3 應定期檢查繫索和重新收緊。

附件 3

移動式容器的安全積載和繫固*

1 前言

1.1 在本指南中，移動式容器係指不是移動式罐櫃的容器，它們不是永久地繫固在船上、容量為 1000 升或小於 1000 升，在長度、寬度、高度和形狀上有不同的尺寸，用於運輸氣體或液體。

2 移動式容器可分為以下幾種：

- .1 沒有繫固點、容量不超過 150 升的不同尺寸的圓筒；
- .2 除符合 2.1 的圓筒外的容量不小於 100 升並不大於 1000 升的不同尺寸的容器，不論是否裝有足夠強度的提升裝置；和
- .3 符合 2.1 的中的圓筒的組件：稱作“框架”，圓筒由歧管在框架內互相連接並用金屬配件牢固連接在一起；框架裝有足夠強度的繫固和裝卸裝置（即圓筒狀容器裝備有滾動箍而容器繫固在墊木上）。

3 貨物資料

3.1 至少應向船長提供下述資料：

- .1 容器和貨物的尺寸（如係非危險貨物）；如係危險貨物，則按照《國際危規》所要求的資料；

* 本附件中使用的“容器”一詞係包括容器和圓筒兩者。

.2 容器毛重；和

.3 容器是否裝有足夠強度的提升裝置。

4 積載

4.1 在決定容器裝在甲板上或甲板下時，應考慮到船舶加速度的典型分佈。

4.2 容器最好在甲板上或甲板下縱向積載。

4.3 容器應予襯墊以防止其直接放在鋼甲板上。除作為一個裝置安裝在框架內外，在積載容器時，如必要，應用塞子止動。裝運液化氣的容器應直立積載。

4.4 容器在直立積載時，應以方型積載，用合適和堅固木材製作的木筐或木箱圍住。木箱或木筐應在下邊墊起以便在鋼甲板上有一空隙。木箱或木筐中的容器應予圍緊，以免移動。箱或筐應牢固地塞緊和綁牢以避免任何方向的移動。

5 防止滑動和移動的繫固

5.1 圓筒

圓筒應在橫向墊木上縱向積載。如可行，貨堆使用橫向放置的二根或更多的鋼絲繩繫固，鋼絲繩在裝貨前放上，繞貨堆一周，繫在相對各邊的繫由點上。使用合適的收緊裝置收緊鋼絲繩以使貨堆密實。在裝貨期間，為防止圓筒滾動，可能必需使用楔子。

5.2 集裝箱中的圓筒

在可行時，圓筒應直立積載，闔在頂部，防護蓋蓋緊。圓筒應使用鋼帶裝置或導向集裝箱底的綁紮點的等效裝置給與適當繫固，以至於能經受預期航次的嚴酷條件。當集裝箱不能在封閉集裝箱中直立裝載時，它們應裝在開頂或擱架式底盤的集裝箱內。

5.3 容器

裝在甲板上或甲板下的容器應按下述方法繫固：

- .1 應按圖 1 所示放置繫索；
- .2 可能時，容器上的提升裝置應用於綁住它們；和
- .3 繫索應定期檢查和重新收緊。

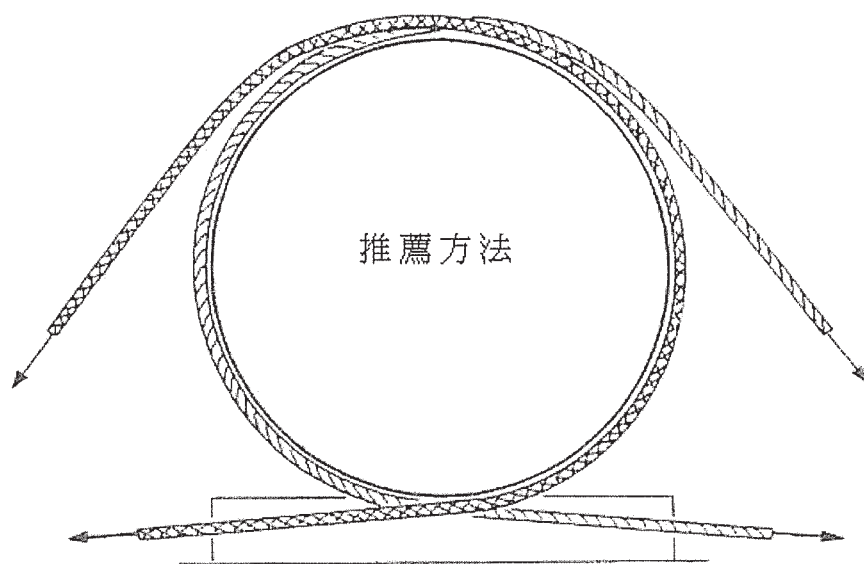


圖 1：沒有繫固點的容器的繫固

附件 4

輪載（滾動）貨物的安全積載和繫固

1 前言

在本指南中，輪載貨物為所有裝有輪子或履帶的貨物，包括用於積載和運輸其他貨物的輪子和履帶，拖車和公路列車除外（由本規則第 4 章管轄），但包括公共汽車、帶有或不帶履帶的軍用車輛、拖拉機、運土設備和輪式拖車等等。

2 一般建議

- 2.1 積載輪載貨物的貨物處所應是乾燥、清潔而沒有油脂的。
- 2.2 輪載貨物應備有合適而明顯的標誌的繫固點或可用於綁紮的足夠強度的其他等效裝置。
- 2.3 沒有繫固點的輪載貨物應具備可使用繫索並明顯標誌的地方。
- 2.4 沒有增加摩擦力的下層表面的橡膠輪子或履帶的輪載貨物始終應在墊木或其他增加摩擦力的材料上積載，如軟板、橡膠墊等。
- 2.5 當在積載位置上時，應使用輪載裝置剎車（如有的話）。
- 2.6 船上繫固輪載貨物的繫索的材料，其強度和拉伸特性應至少等同於鋼鏈或鋼繩。
- 2.7 可能時，作為貨物組成部分裝運的輪載貨物，應緊靠船舷積載或裝在備有足夠強度的足夠的繫固點的位置上，或在整個貨物處所中塞緊裝載。

2.8 為了防止沒有合適繫固點的輪載貨物的任何橫向移動，在可行時，這些貨物應緊靠船舷並相互緊靠裝載，或由其他合適的成組貨物如已滿載集裝箱等擋住。

2.9 為了防止輪載貨物移動，可行時，最好把這些貨物作縱向而不是橫向積載。如果輪載貨物不可避免地只能橫向積載，則足夠強度的額外繫固可能是必需的。

2.10 輪載貨物的輪子應塞牢止動。

2.11 裝在輪載裝置上的貨物應適當地繫固在積載平台上或在備有合適工具時，繫固到其邊上。裝在輪載裝置上的任何活動的外部件，如吊杆、臂狀物或轉塔，應在位置上適當鎖牢或繫固。

附件 5

機車、變壓器等重件貨的安全積載和繫固

1 貨物資料

應向船長提供任何要裝船重貨的足夠資料，以使他能適當地計劃其積載和繫固；該資料應至少包括下述內容：

- .1 毛重；
- .2 如可能，帶有圖紙或圖片說明的主要尺寸；
- .3 重心位置；
- .4 基座面積和特定基座的防護措施（如適用）；
- .5 提升點和吊貨位置；和
- .6 繫固點（如有的話），包括其強度的詳情。

2 積載位置

2.1 當考慮重件貨積載位置時，應計及船舶加速度的典型分佈：

- .1 在船中段和露天甲板以下發生的向下加速度；和
- .2 端部和露天甲板以上發生的向上加速度。

2.2 當重件在甲板上積載時，如可能應考慮到具體航次的“風雨舷”。

2.3 重件最好縱向積載。

3 重量分佈

重件的重量分佈應避免對船舶結構的不合適應力。特別在甲板或艙蓋上運輸重件時，應使用具有適當強度的木材或鋼樑將重件的重量轉移到船舶結構上。

4 防滑動和翻倒的繫固

4.1 在可能時，在積載表面和裝置底部之間應使用木材以增加摩擦力。這不適用於裝在木支架上或橡膠胎上或有高摩擦系數的相似底部材料上的重件。

4.2 繫固裝置的佈置應能經受可能造成滑動或翻倒的橫向力和縱向力。

4.3 防滑動的最佳綁紮角度為 25 度，而防翻倒的最佳綁紮角度一般認為在 45 至 60 度之間（圖 1）。

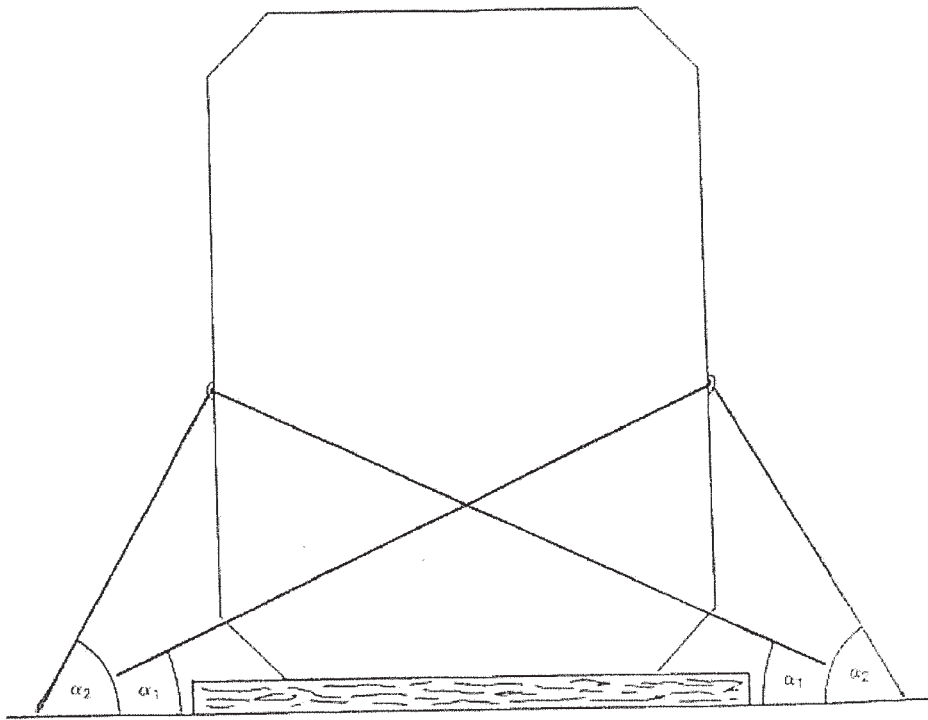


圖 1：防滑動和翻倒繫固重件的原理

α_1 ：防滑動的有利綁紮角度

α_2 ：防翻倒的有利綁紮角度

4.4 如重件是在加了潤滑油的滑板上或以降低摩擦力的其他方法拖到位置上，防滑動的繫索數量應相應增加。

4.5 如由於當時情況，僅能用大角度綁紮，則必須用木支柱、焊接配件或其他適當方法防止滑動。任何焊接應按可接受的熱加工程序進行。

5 甲板上抗惡劣海況的繫固

雖然人們認識到在甲板上對貨物進行抗惡劣海況的繫固是困難的，但應做出一切努力保證這些貨物和其支撐能經受這種衝擊，並考慮使用特別的繫固方法。

6 伸出舷外的重件貨

伸出舷外的重件貨另應加用在縱向和垂向上起作用的繫索繫固。

7 繫索在重件貨上的繫縛

7.1 如繫索要繫縛在貨物的繫固點上，則這些繫固點應有適當強度和明顯標誌。應考慮到設計用於公路或火車運輸的繫固點可能不適合在船上繫固貨物。

7.2 繫索在沒有繫固點的貨物上繫縛時，應圍繞貨物或其剛性部分一周，繫索兩端應繫固在裝置的同一邊（圖 2）。

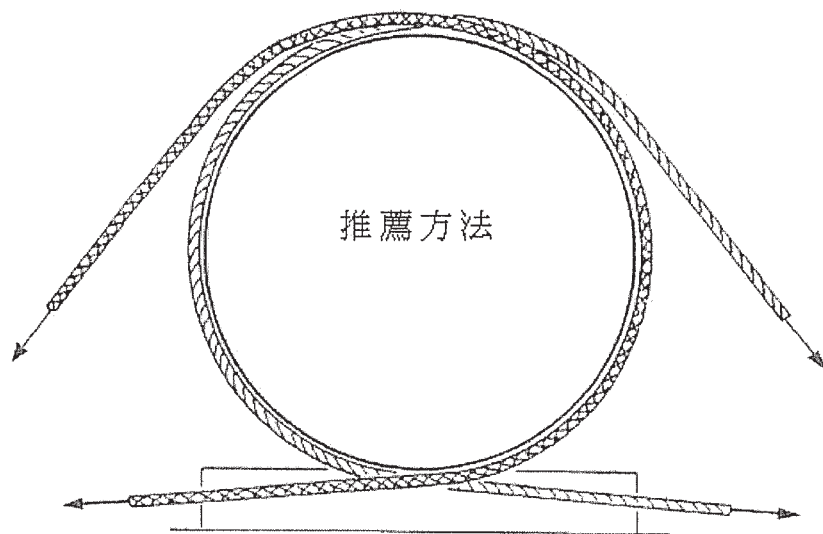


圖 2：沒有合適繫固點的重件繫固原理

8 繫固裝置的構造和應用

8.1 繫固裝置應安裝得使每一部件有相等強度。

8.2 應正確使用連接部件和張緊裝置。

8.3 對於正確使用鋼絲繩、夾具和夾子應給與特別注意。夾子的鞍形部分應用於活荷載部分而 U 形螺栓應用於靜荷載或收短端部分。

8.4 繫固裝置的安排應使每一裝置按其強度承受負荷。

8.5 將不同強度和伸長特性的裝置混合在一起的繫固佈置應予避免。

9 繫固佈置的保持

9.1 應在整個航次保持繫固佈置的完整性。

9.2 應特別注意需要收緊繫索、夾具和夾子和防止因摩擦而弱化。

9.3 在夾子和鬆緊螺套的螺紋加潤滑脂可增加夾持能力和防鏽。

10 繫固計算

10.1 在必要時，重件貨的繫固佈置由適當的計算核實。

附件 6

成卷鋼板的安全積載和繫固

1 總則

1.1 本附件僅論述在圓面上積載的成卷鋼板。垂向積載不予論述，因為這種積載不會造成特別的繫固問題。

1.2 通常成卷鋼板的每卷毛重超過 10 噸。

2 卷材

2.1 卷材應為底積載，在可能時，應以規律的層次在船上裝滿。

2.2 卷材應在橫向放置在墊木上積載。卷材應使軸線在縱向積載。每卷應緊靠另一卷積載。在裝卸時為防止移動，必要時應使用楔子（圖 1 和 2）。

2.3 每排最後一卷通常應放在鄰近的兩卷上邊。這卷的質量將固定住該排的其他卷材。

2.4 如果有必要在第一層上裝第二層，那麼第二層的卷材應裝在第一層的卷材之間（圖 2）。

2.5 在最高一層中卷材間的任何空檔應加以適當繫固（圖 3）。

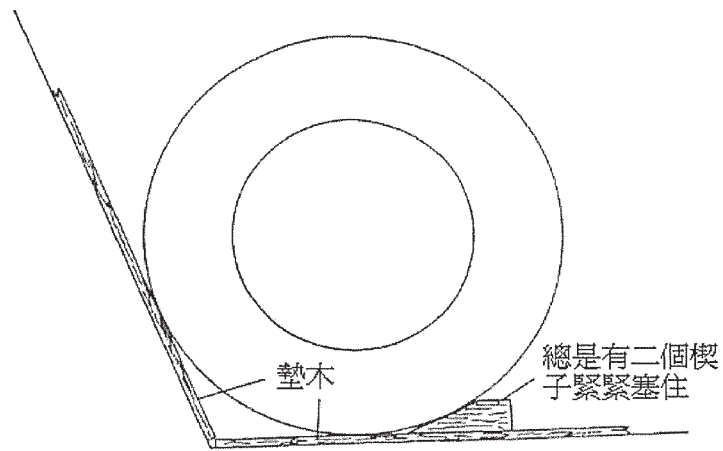
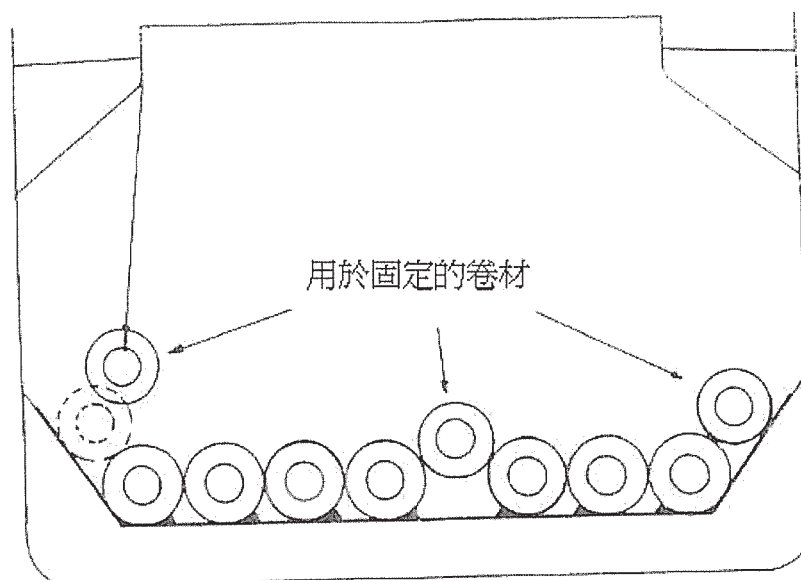


圖 1：用墊木墊住和用楔子塞住卷材的原理



每個卷材所用楔子

圖 2：插入用於固定的卷材

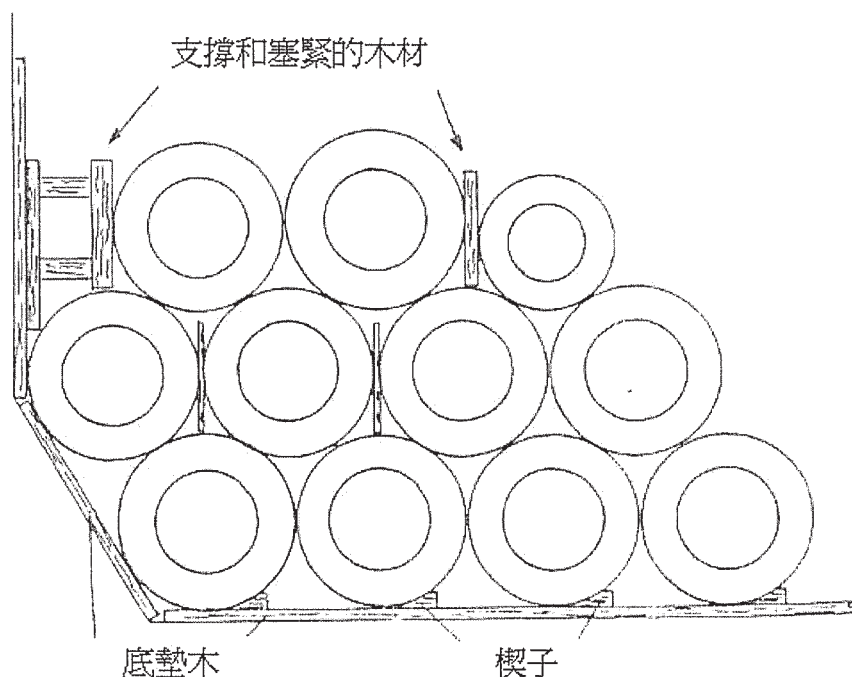


圖 3：卷材間空隙中的支撐和塞緊

3 繫索

3.1 目的是通過將它們綁在一起使之在艙裏形成一個大的不可移動的卷材組。一般來說，最高一層最後三排的帶鋼卷材應予綁紮。由於它們的易損特性，為防止縱向移動在無外包裝卷材的頂層不應使用成組綁紮，頂層最後一排應用墊木和鋼絲繩繫固，並應從一側到另一側拉緊和使用附加鋼絲繩拉到艙壁。當卷材裝滿整個底下處所並有良好支撐時，除用於固定卷材外，不需要繫索（圖 4、5 和 6）。

3.2 繫索可以是使用鋼絲繩或任何等效方法的常規類型。

3.3 常規繫索應由有足夠拉力強度的鋼絲繩構成。第一層應用楔子塞緊。在航行中應能重新收緊繫索。

3.4 鋼絲繫索應有防止利刃損壞的保護。

3.5 如只有少量卷材，或僅有一個卷材，它們應適當地繫固在船上，可以把它們放在支架裏，用楔子塞牢或給予支撐和綁紮，以防橫向和縱向移動。

3.6 集裝箱、火車車箱和公路車輛中裝載的卷材應裝在支架裏或特別製作的底座上，並應以適當的繫固防止移動。

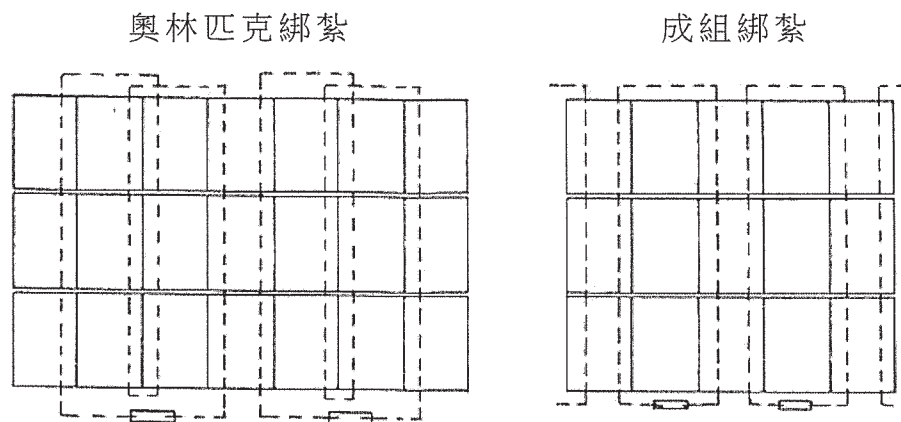


圖 4：為防止首尾向移動對最高層的繫固（俯視圖）

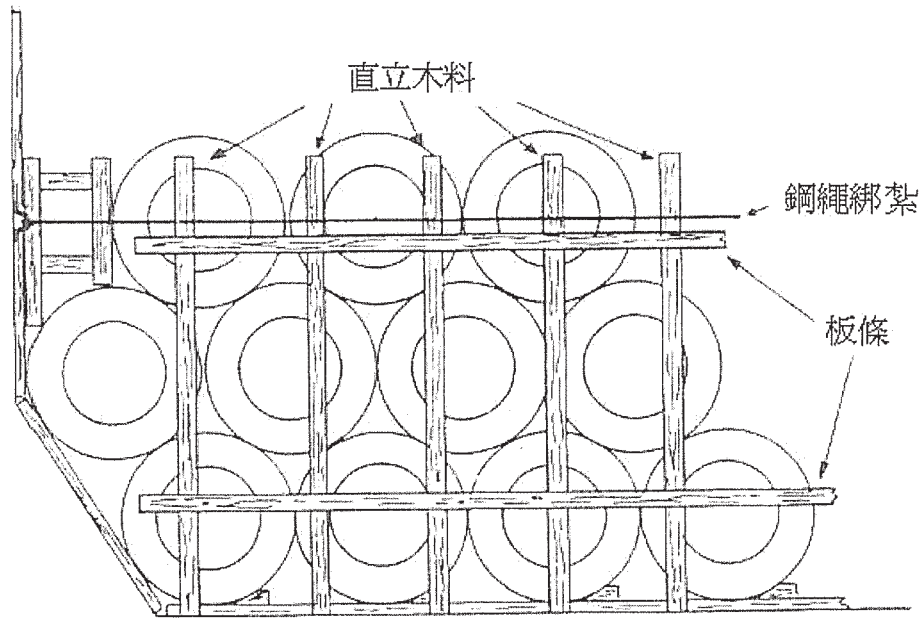


圖 5：為防止首尾向移動對最高一層最後一排的繫固

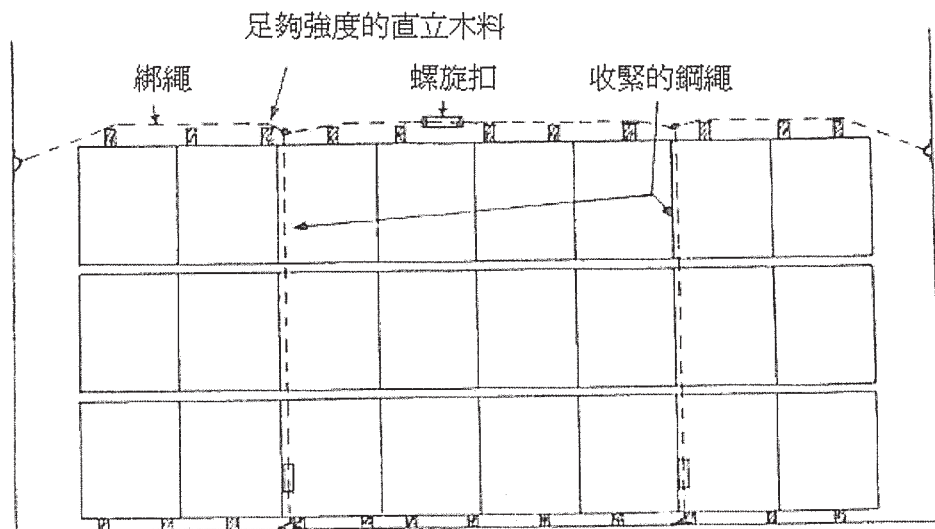


圖 6：為防止首尾向移動對最高一層最後一排的繫固（俯視圖）

附件 7

重金屬製品的安全積載和繫固

1 總則

1.1 在本規則中，重金屬製品包括任何金屬製造的重件，如棒材、管材、盤條、板材和線材卷等等。

1.2 海上運輸重金屬製品會給船舶造成下述危險：

- .1 船舶結構的過度超限應力，如果超過船殼容許應力或甲板容許負荷；
- .2 船舶結構的過度超限應力，由於超過穩心高度造成短橫搖周期的結果；
- .3 由於不當繫固造成貨物移動引起失去穩心或對船殼造成損害或二者。

2 建議

2.1 積載重金屬製品的貨物處所應是乾淨、乾燥和沒有油脂的。

2.2 貨物應避免以不當船殼應力方式配載。

2.3 不應超過允許的甲板和艙頂負荷。

2.4 在積載和繫固重金屬製品時，應採取下述措施：

- .1 貨物應從船舶一側向另一側密實積載，在貨物間不要留出空檔，如必要在貨物間使用木塊；

- .2 在可能和可行時，貨物應裝平；
 - .3 貨物表面應予繫固；和
 - .4 支柱應由牢固、無裂紋的木頭製成，其尺寸應足以經受加速力。船舶的每根肋骨應用一個橫支柱，但間隔不應小於 1 米。
- 2.5 對於薄板和小包件，已證明縱向和橫向交替積載是令人滿意的。應在不同層次間使用足夠的乾墊木或其他材料增加摩擦力。
- 2.6 管材、鐵軌、型鋼和鋼坯等等應縱向積載以避免貨物移動對船舶造成損害。
- 2.7 貨物，特別是最高一層的貨物，可用下述方式繫固：
- .1 在其上部裝有其他貨物；或
 - .2 用鋼絲繩綁紮、塞牢或類似方法。
- 2.8 當重金屬製品不是從船的一側裝到另一側時，對適當地繫固這種積載要給與特別的注意。
- 2.9 在繫固貨物表面時，每根繫索應是相互獨立的，對貨物表面施加垂向壓力，並應使貨物任何部分均得到繫固。

3 線材卷

- 3.1 線材卷應放平積載，以使每卷靠在鄰近一卷上。逐層積載的卷材應使每一卷材疊放在下邊的卷材上。
- 3.2 線材卷應緊緊地積載在一起並應使用牢固的繫固裝置。在卷材間空檔不能避免時或在貨物處所邊上或端部有空檔時，貨堆應有適當繫固。

3.3 當繫固像桶一樣多層側置積載的線材卷時，要記住除非頂層被繫固住，不然放在貨堆中的卷材會因為船舶的運動被下邊的卷材擠出貨堆。

附件 8

錨鏈的安全積載和繫固

1 總則

1.1 船舶和近海結構物的錨鏈通常是成捆或連續長度裝載的。

1.2 只要在裝載前、裝載中和裝載後採取一定安全措施，錨鏈可成捆地直接放在積載處而不需作進一步處理；或沿着船舶整個或部分貨物處所縱向積載。

1.3 如果船舶文件中提供的貨物積載圖沒有具體要求，貨物在底層艙和甲板間的配載應使得到的穩性值將能保證適當的穩性。

2 建議

2.1 積載錨鏈的貨物處所應是清潔和無油脂的。

2.2 錨鏈僅應裝在永久覆蓋有木質艙底鋪板或覆蓋有足夠的墊木層或其他增加摩擦力的材料的表面上。錨鏈決不應直接在金屬表面上積載。

3 成捆錨鏈的積載和繫固

3.1 成捆錨鏈可直接被吊到積載處，而不需作進一步處理，吊索應留在錨鏈上，另用鋼絲繞在錨鏈捆上繫紮。

3.2 不需要用墊木等增加摩擦力的材料來隔開錨鏈層，因為錨鏈捆會相互夾持。錨鏈捆的最高一層應用合適的繫索繫在船舶兩舷。錨鏈捆可用吊索獨立或成組繫紮。

4 縱向積載的錨鏈的積載和繫固

4.1 在可能和可行時，每層錨鏈的積載應在接近船舷處開始或結束。應注意堆貨的密實。

4.2 不需要用墊木等增加摩擦力的材料來隔開錨鏈層，因為錨鏈各層會相互夾持。

4.3 根據預計的氣候和海況、航次長度和性質及裝在錨鏈頂上的貨物的性質，每一貨堆的頂層應由適當強度的繫索繫固，繫索在貨堆上的間距要適當，以便固定住整個貨堆。

附件 9

散裝金屬廢料的安全積載和繫固

1 前言

1.1 本附件論述因其大小、形狀和質量難以緊密積載的金屬廢料的積載，不適用於像金屬鑽屑、刨屑或車床切屑等金屬廢料，此種廢料的運輸在《固體散裝貨物安全作業規則》中有規定。

1.2 運輸金屬廢料的危險包括：

- .1 貨堆移動，它會造成橫傾；
- .2 個別重件移動，它會擊穿水線下船側外板而造成嚴重浸水；
- .3 液艙頂或甲板間超負荷；和
- .4 過大的穩心高度造成的激烈橫搖。

2 建議

2.1 在裝貨前，貨艙壁護條的下層板條應用牢固墊木保護以減少損失和防止重的和銳利的廢物接觸船側板。只有木板保護的空氣管、聲納管和污水和壓載水管應作類似保護。

2.2 在裝貨時，應注意保證第一批裝入的貨物不能從可能損壞液艙頂部的高度上掉下。

2.3 如輕的和重的廢料裝在同一貨物處所，應先裝重廢料。廢料決不在金屬車床切屑或類似形式的廢金屬頂上積載。

2.4 廢料應密實和均勻積載，沒有空檔或沒有鬆散的廢料的無支撐面。

2.5 重件廢物如果移動能造成船側板或端艙壁損壞，因此應在上面壓載或用適當的繫索繫固。因廢料的性質使用撐擋可能無效。

2.6 應注意避免在液艙頂上和甲板上超負荷。

附件 10

撓性中間散裝容器的安全積載和繫固

1 前言

1.1 在本指南中，撓性中間散裝容器係指容積不大於 3 米³（3,000 升），用於運輸固體的撓性移動式包裝，設計用於機械裝卸，經測試能滿意地承受運輸和運輸應力，可為單用途或多用途設計。

2 貨物資料

至少應向船長提供下述資料：

- .1 撓性中間散裝容器的總數量和要裝的是何種貨物；
- .2 撓性中間散裝容器的尺寸；
- .3 撓性中間散裝容器的總質量；
- .4 是單用途或多用途設計；和
- .5 吊具種類（使用單鉤或多鉤）。

3 建議

3.1 運輸撓性中間散裝容器的理想船舶是大艙口船，因為可將該種容器直接放到積載位置上而不需移動。

3.2 在可行時，貨物處所應是矩形的並且沒有障礙物。

3.3 積載處所應是乾淨、乾燥的，並沒有油和釘子。

3.4 當該種容器在深艙翼部積載時，應有供適合改裝的叉車使用的方便通道和足夠的活動空間。

3.5 當該種容器僅在艙口積載時，貨物處所的翼側和前後端應裝有其他合適貨物或用東西擋住，以便此種容器得到適當支撐。

4 積載

4.1 當裝該種容器時，應記住船舶加速度的典型分佈。

4.2 將船舶寬度除以該種容器寬度便得出橫向積載該種容器的數目和餘下的空檔。如有空檔，則該種容器應從兩側向中心積載，使任何空檔均在艙口的中央。

4.3 該種容器應互相儘可能靠緊積載，任何空檔均應塞牢。

4.4 以後各層這種容器應以相同方法積載，使其完全覆蓋住下邊的該種容器。如這層餘有空檔，也應在艙口中央部位予以塞牢。

4.5 當在艙口位置有足夠空間在下面幾層之上積載另一層時，應確定艙口圍板能否作為圍壁。如不能夠，應採取措施防止該種容器移動到舷側敞露部位。否則該種容器應在艙口圍板間滿裝積載。在這兩種情況下，任何空檔均應在中央部位並予塞牢。

4.6 為防止該種容器向任何一側移動和防止在惡劣氣候下船舶傾斜，在上述兩種情況下，塞牢該種容器是必要的（圖 1）。

5 繫固

5.1 在甲板間或底艙僅有一個部分用來裝撓性中間散裝容器的情況下，應採取措施防止其移動。這些措施應包括用足夠的格子板或膠合板頂住這種容器和使用鋼絲繩從一側到另一側繫固住撓性中間散裝容器貨物。

5.2 用於繫固的鋼絲繩和膠合板應定期檢查，特別在惡劣氣候前和後，如必要時，要重新收緊。

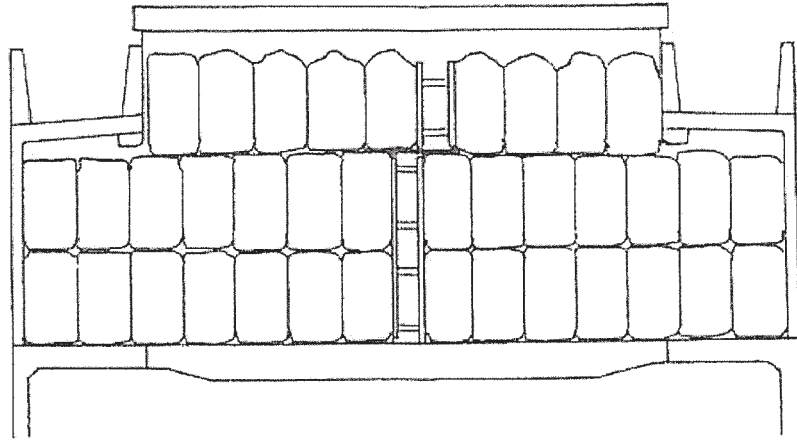


圖 1：在積載區域中心塞滿空檔的撓性中間散裝容器的積載

附件 11

原木甲板下積載的一般指南

1 前言

本附件的目的是建議原木甲板下積載的安全做法和用於確保此類貨物安全運輸的其他操作性安全措施。

2 裝貨前

- .1 確定每個貨物處所的形狀（長、寬、深）、有關貨物處所的包裝艙容、待裝原木的不同長度、體積（原木平均值）和裝原木的用具的能力；
- .2 使用上述資料，制訂積載前計劃，使處所得最大利用，甲板下積載做得愈好，則可安全地在甲板上承運的貨物就愈多。
- .3 應檢查貨物處所和有關設備以查明結構部件、框架和設備的情況是否會影響原木貨的安全運輸。在此種檢查中發現的任何損壞應以適當方式修復；
- .4 應檢查艙底水吸口濾網，保證它們清潔、有效並得到適當維修，防止碎片進入污水管系統；
- .5 污水井應沒有樹皮和木屑之類的外來物質；
- .6 污水泵系統的能力應予查清。得到適當保養和操作的系統是對船舶安全至關重要的。具有足夠功率和提程的移動式排水泵是防止污水管系堵塞的額外的措施；

- .7 設計用於保護內殼的部件，如貨艙舷側護條、管道防護裝置等，應在其位置上；和
- .8 船長應保證任何高位壓載放洩閥的開啟和關閉均適當地記入航海日誌。如果這種高位壓載艙對方便裝載是必要的，根據《1966 年國際載重線公約》第 22（1）條關於要求在重力舷外排水管系內裝有螺旋閥的規定，船長應保證這種泵閥得到適當監視，以防止水意外地重新進入這些艙內。使這些艙通海可導致明顯的不可解釋的傾斜、甲板貨的移動和潛在的傾覆。

3 裝載作業期間

- .1 每吊原木均應在船舶附近處吊到船上，以減少被吊貨物的任何潛在擺動；
- .2 應考慮到船舶損壞的可能性和在貨物處所中工作人員的安全。原木在降放到處所時不應擺動。如必要，應使用艙口圍板，將原木輕輕靠在圍板內側上放下，或在降下前，落在上邊，以便消除原木的任何搖擺；
- .3 原木應密實積載，以便消除儘可能多的空檔。積載在甲板下的原木數量和垂直重心將決定可以在甲板上安全積載貨物的數量。根據這一原則，最重的原木應首先放入貨物處所內；
- .4 一般而言，原木應縱向密實積載，較長者應放在處所的前、後部區域。如果縱向長度間有空檔，應沿處所寬度墊進橫向積載的原木，根據原木長度的許可情況，儘量填滿空隙；

- .5 如果處所中的原木僅能以一根長度縱向積載，任何在前或後部餘下空檔應沿處所寬度以橫向積載的原木填入，根據原木長度的許可情況，儘量填滿；
 - .6 橫向空檔應在裝貨過程中逐層墊入；
 - .7 原木的粗端應首尾交替放置，以達到較平的積載，但內底舷弧過大者除外；
 - .8 應儘最大可能避免原木成金字塔形。如處所的寬度大於艙口的寬度，將縱向裝入的原木滑入處所的左、右舷端部，可避免金字塔形。將原木滑入處所左、右舷端部的做法應從裝貨的早期開始（在內層底上的高度達到 2 米後），並應在裝貨過程中繼續；
 - .9 可能有必要使用活動滑車以把重原木運到艙口範圍外甲板下區域。滑車、滑車組和其他活動滑車應裝在帶環螺栓或眼板之類為此目的提供的、經適當加固的固定物上。但如果遵照這一程序，應注意避免用具超負荷；
 - .10 在整個裝貨期間，船上人員應仔細觀察，以保證不發生結構性損壞。任何影響船舶適航性的損壞均應予以修復；
 - .11 當原木高度達到在前或後橫向艙口圍板下約 1 米處時，應減少每吊原木的尺寸，以便於在餘下區域積載；和
 - .12 在艙口圍板區域的原木應儘量密實積載至最大容量。
- 4 裝貨後，應對船舶進行徹底檢查，以確定其結構情況。應對污水進行測深，核實船舶的水密完整性。

5 在航行中

- .1 航行時應對船舶的傾斜角和搖擺周期進行定期檢查；
- .2 如提供楔子、紗頭、錘子和活動泵，則應存放在易於得到處；
和
- .3 船長或負責駕駛員應以下述方式保證進入圍蔽貨物處所的安全：
 - .3.1 保證以自然或機械方式對處所進行徹底通風；
 - .3.2 在有適當儀器時，檢查處所不同高度上的空氣有無缺氧情況；
 - .3.3 如懷疑處所通風不足，則要求進入該處所的人帶上獨立的呼吸裝置或在進入前先進行測試。

附件 12

成組貨物的安全積載和繫固

1 前言

就本附件而言，成組貨物係指一些包裝貨物：

- .1 在貨盤等承貨板上放置或堆載並用繫帶、收緊包裝或其他適當方式繫固；或
- .2 放置在貨箱之類保護性外包裝裏；或
- .3 作為一吊貨永久地繫固在一起。

註：移動式罐櫃或容器、中間散裝容器或貨運集裝箱等單件的大包裝貨物不包括在本附件的建議內。

2 貨物資料

至少應向船長提供下述資料：

- .1 成組貨物的總件數和待裝貨物；
- .2 所用的包紮類型；
- .3 以米計的成組貨物尺碼；和
- .4 以千克計的成組貨物毛重。

3 建議

- 3.1 將要積載成組貨物的船舶貨物處所應是乾淨、乾燥和沒有油脂的。

3.2 包括液艙頂部在內的甲板應全部是平的。

3.3 貨物處所最好在水平和垂直方向上都是矩形。前貨艙或甲板間的其他形狀貨物處所應使用適當的木料將其形狀在橫向和縱向上均改成矩形（圖 1）。

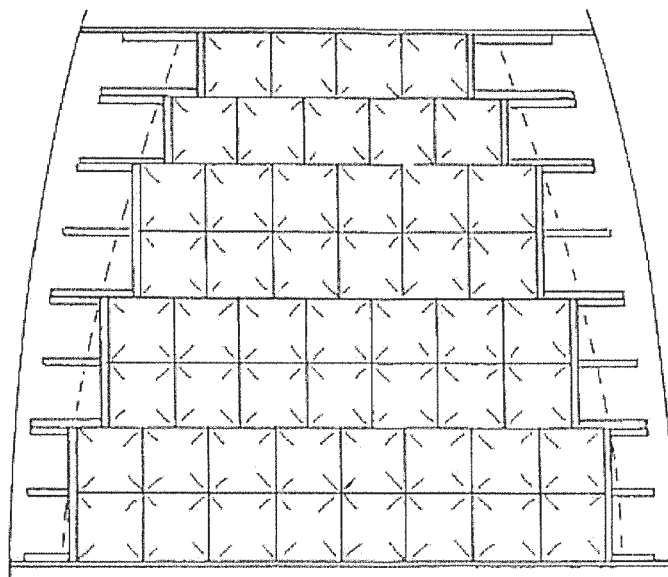


圖 1：錐形積載區域內成組貨物的積載和塞牢（俯視圖）

4 積載

4.1 成組貨物的積載應做到，如必要，能從貨堆的所有面上進行繫固。

4.2 積載成組貨物時，在貨物與船舷之間不應有任何空檔，以防止成組貨物傾斜。

4.3 當成組貨物需要重疊積載時，應注意貨盤強度和成組貨物的形狀和狀況。

4.4 當使用機械裝卸時，應採取預防措施，避免成組貨物受損。

5 繫固

應確保成組積載在成組貨物間不留空檔。

6 橫向積載時的繫固

6.1 當成組貨物在底艙或甲板間中靠着艙壁從一側裝到另一側時，應靠着成組貨物貨堆垂直安置格子板或膠合板。應用鋼絲繫索從一側拉到另一側，以固定住格子板或膠合板使之能緊貼貨堆。

6.2 此外，為進一步收緊貨堆，鋼絲繫索可以不同間隔從艙壁繞過貨堆聯接到橫向放置的鋼絲繫索上。

7 在貨物處所一側的積載，兩邊不靠

當成組貨物積載於貨物處所的前部或後部，有可能在向兩個方向上移動時，應在貨堆無繫固面垂直安置格子板或膠合板。將鋼絲繩從一側繞過貨堆至另一側固定在艙壁上。在鋼絲繩可能損壞成組貨物處（特別是在貨堆角上），應安置格子板和膠合板使角隅處不會損壞。

8 三邊不靠的積載

當成組貨物沿船舷積載而可能在三面移動時，應在成組貨物堆裝面上垂直安置格子板和膠合板。特別要注意貨堆的角隅，防止鋼絲繫索損壞成組貨物。應在不同高度上使用鋼絲繫索，收緊邊上裝有格子板或膠合板的貨堆（圖 2）。

9 通則

9.1 可使用鋁質撐柱或足夠強度的板條代替格子板或膠合板。

9.2 在航行中，應定期檢查鋼絲繫索，如必要，鬆動的繫索應予重新收緊。特別是在惡劣氣候後，應檢查鋼絲繫索的狀況，如必要應予重新收緊。

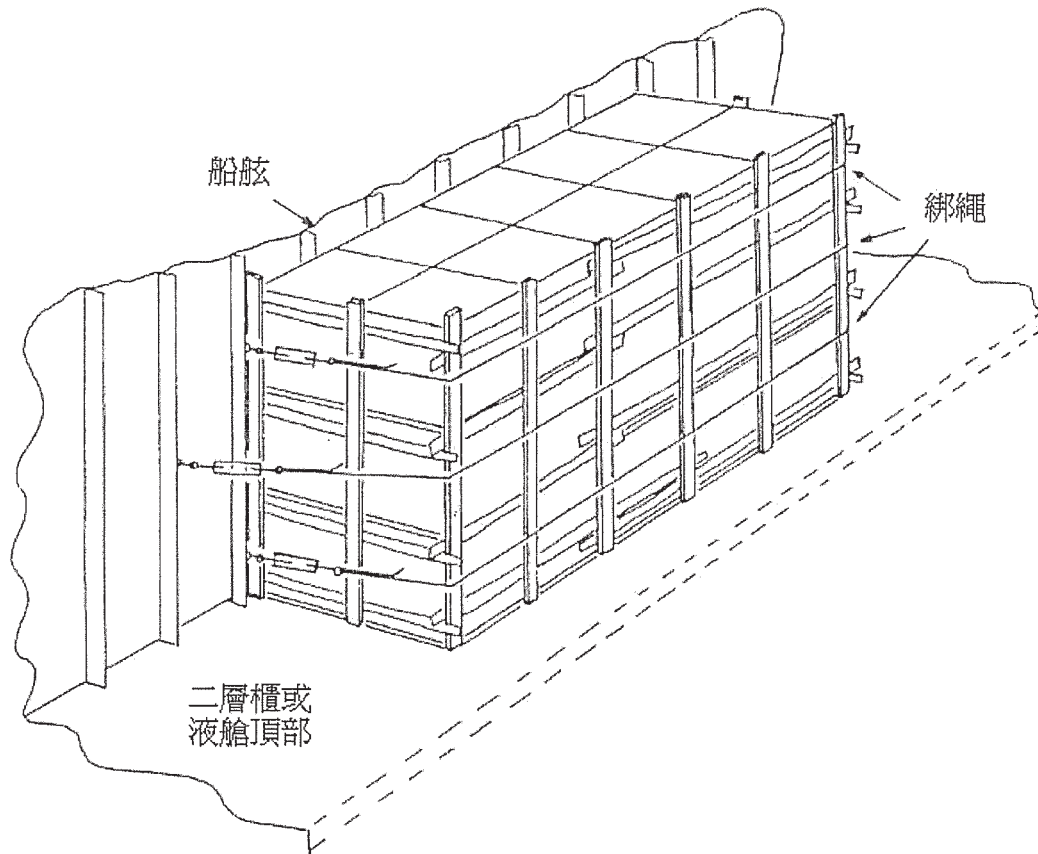


圖 2：船舷裝載成組貨物的繫固

Resolution A.714(17)*Adopted on 6 November 1991***CODE OF SAFE PRACTICE FOR CARGO STOWAGE AND SECURING**

THE ASSEMBLY,

RECALLING Article 15(j) of the Convention on the International Maritime Organization concerning the functions of the Assembly in relation to regulations and guidelines concerning maritime safety,

RECALLING ALSO resolution A.489(XII) on safe stowage and securing of cargo units and other entities in ships other than cellular container ships and MSC/Circ.385 of January 1985 containing the provisions to be included in a cargo securing manual to be carried on board ships,

RECALLING FURTHER resolution A.533(13) on elements to be taken into account when considering the safe stowage and securing of cargo units and vehicles in ships,

CONSIDERING the revised IMO/ILO Guidelines for Packing Cargo in Freight Containers or Vehicles,

CONSIDERING ALSO resolution A.581(14) on guidelines for securing arrangements for the transport of road vehicles on ro-ro ships,

BEARING IN MIND that a number of serious accidents have occurred as a result of inadequate securing arrangements on board and deficient stowage and securing of cargoes in vehicles and containers, and that only proper stowage and securing of cargo on adequately designed and properly equipped ships can prevent the occurrence of such accidents in the future,

RECOGNIZING the need to improve the stowage and securing of cargoes shown by experience to create specific hazards to the safety of ships, and the stowage and securing of road vehicles transported on board ro-ro ships,

RECOGNIZING FURTHER that such improvement could be achieved by the establishment of a composite code of safe practice for cargo stowage and securing on board ships, including packing or loading cargo in road vehicles and freight containers,

BELIEVING that the application of such a code of safe practice would enhance maritime safety,

HAVING CONSIDERED the recommendations made by the Maritime Safety Committee at its fifty-eighth session,

1. ADOPTS the Code of Safe Practice for Cargo Stowage and Securing set out in the annex to the present resolution;
2. URGES Governments to implement this Code at the earliest possible opportunity;
3. REQUESTS the Maritime Safety Committee to keep this Code under review and to amend it, as necessary;
4. REVOKES resolution A.288(VIII).

Annex

**CODE OF SAFE PRACTICE
FOR CARGO STOWAGE AND SECURING**

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FOREWORD

The proper stowage and securing of cargoes is of the utmost importance for the safety of life at sea. Improper stowage and securing of cargoes has resulted in numerous serious ship casualties and caused injury and loss of life, not only at sea but also during loading and discharge.

In order to deal with the problems and hazards arising from improper stowage and securing of certain cargoes on ships, the International Maritime Organization has issued guidelines in the form of either Assembly resolutions or circulars adopted by the Maritime Safety Committee; these are listed hereunder:*

- Safe stowage and securing of cargo units and other entities in ships other than cellular containerships, resolution A.489(XII);
- Provisions to be included in the Cargo Securing Manual to be carried on board ships, MSC/Circ.385;
- Elements to be taken into account when considering the safe stowage and securing of cargo units and vehicles in ships, resolution A.533(13);
- Guidelines for securing arrangements for the transport of road vehicles on ro-ro ships, resolution A.581(14);
- IMO/ILO Guidelines for Packing Cargo in Freight Containers or Vehicles;
- Hazards associated with the entry into enclosed spaces, MSC/Circ.487.

The accelerations acting on a ship in a seaway result from a combination of longitudinal, vertical and predominantly transverse motions. The forces created by these accelerations give rise to the majority of securing problems.

The hazards arising from these forces should be dealt with by taking measures both to ensure proper stowage and securing of cargoes on board and to reduce the amplitude and frequency of ship motions.

The purpose of this Code is to provide an international standard to promote the safe stowage and securing of cargoes by:

- drawing the attention of shipowners and ship operators to the need to ensure that the ship is suitable for its intended purpose;
- providing advice to ensure that the ship is equipped with proper cargo securing means;
- providing general advice concerning the proper stowage and securing of cargoes to minimize the risks to the ship and personnel;
- providing specific advice on those cargoes which are known to create difficulties and hazards with regard to their stowage and securing;
- advising on actions which may be taken in heavy sea conditions; and
- advising on actions which may be taken to remedy the effects of cargo shifting.

In providing such advice, it should be borne in mind that the master is responsible for the safe conduct of the voyage and the safety of the ship, its crew and its cargo.

* The relevant resolutions, circulars and guidelines will be included as an appendix in the consolidated publication of the Assembly resolution and the Code.

GENERAL PRINCIPLES

All cargoes should be stowed and secured in such a way that the ship and persons on board are not put at risk.

The safe stowage and securing of cargoes depend on proper planning, execution and supervision.

Personnel commissioned to tasks of cargo stowage and securing should be properly qualified and experienced.

Personnel planning and supervising the stowage and securing of cargo should have a sound practical knowledge of the application and content of the Cargo Securing Manual, if provided.

In all cases, improper stowage and securing of cargo will be potentially hazardous to the securing of other cargoes and to the ship itself.

Decisions taken for measures of stowage and securing cargo should be based on the most severe weather conditions which may be expected by experience for the intended voyage.

Ship-handling decisions taken by the master, especially in bad weather conditions, should take into account the type and stowage position of the cargo and the securing arrangements.

CHAPTER 1 - GENERAL

1.1 Application

This Code applies to cargoes carried on board ships (other than solid and liquid bulk cargoes and timber stowed on deck) and, in particular, to those cargoes whose stowage and securing have proved in practice to create difficulties.

1.2 Definitions of the terms used

For the purposes of this Code:

Cargo unit means a vehicle, container, flat, pallet, portable tank, packaged unit, or any other entity, etc., and loading equipment, or any part thereof, which belongs to the ship but is not fixed to the ship as defined in Assembly resolution A.489(XII).

Intermediate bulk container (IBC) means a rigid, semi-rigid or flexible portable bulk container packaging of a capacity of not more than 3 m³ (3,000 l), designed for mechanical handling and tested for its satisfactory resistance to handling and transport stresses.

Portable tank means a tank which is not permanently secured on board a ship, and has a capacity of more than 450 l and a shell fitted with external stabilizing members and items of service equipment and structural equipment necessary for the transport of gases, liquids or solids.

Road tank-vehicle means a vehicle with wheels and fitted with a tank or tanks intended for the transport of gases, liquids or solids by both road and sea modes of transport, the tank or tanks of which are rigidly and permanently attached to the vehicle during all normal operations of loading, transport and discharge and are neither filled nor emptied on board.

Road vehicle means a commercial vehicle, semi-trailer, road train, articulated road train or a combination of vehicles, as defined in Assembly resolution A.581(14).

Roll-trailer means a low vehicle for the carriage of cargo with one or more wheel axles on the rear and a support on the front end, which is towed or pushed in the port to and from its stowage on board the ship by a special tow-vehicle.

Ro-ro ship means a ship which has one or more decks either closed or open, not normally subdivided in any way and generally running the entire length of the ship, carrying goods which are loaded and unloaded normally in a horizontal manner.

Unit load means that a number of packages are either:

- .1 placed or stacked, and secured by strapping, shrink-wrapping or other suitable means, on to a load board such as a pallet; or
- .2 placed in a protective outer packaging such as a pallet box; or
- .3 permanently secured together in a sling.

1.3 Forces

1.3.1 Forces, which have to be absorbed by suitable arrangements for stowage and securing to prevent cargo shifting, are generally composed of components acting relative to the axes of the ship:

- longitudinal;
- transversal; and
- vertical.

Remark: For the purpose of stowage and securing cargo, longitudinal and transverse forces are considered predominant.

1.3.2 Transverse forces alone, or the resultant of transverse, longitudinal and vertical forces, normally increase with the height of the stow and the longitudinal distance of the stow from the ship's centre of motion in a seaway. The most severe forces can be expected in the furthest forward, the furthest aft and the highest stowage position on each side of the ship.

1.3.3 The transverse forces exerted increase directly with the metacentric height of the ship. An undue metacentric height may be caused by:

- improper design of the ship;
- unsuitable cargo distribution; and
- unsuitable bunker and ballast distribution.

1.3.4 Cargo should be so distributed that the ship has a metacentric height in excess of the required minimum and, whenever practicable, within an acceptable upper limit to minimize the forces acting on the cargo.

1.3.5 In addition to the forces referred to above, cargo carried on deck may be subjected to forces arising from the effects of wind and green seas.

1.3.6 Improper shiphandling (course or speed) may create adverse forces acting on the ship and the cargo.

1.3.7 The magnitude of the forces may be estimated by using the appropriate calculation methods as contained in the Cargo Securing Manual, if provided.

1.3.8 Although the operation of anti-roll devices may improve the behaviour of the ship in a seaway, the effect of such devices should not be taken into account when planning the stowage and securing of cargoes.

1.4 Behaviour of cargoes

1.4.1 Some cargoes have a tendency to deform or to compact themselves during the voyage, which will result in a slackening of their securing gear.

1.4.2 Cargoes with low friction coefficients, when stowed without proper friction-increasing devices such as dunnage, soft boards, rubber mats, etc., are difficult to secure unless tightly stowed across the ship.

1.5 Criteria for estimating the risk of cargo shifting

1.5.1 When estimating the risk of cargo shifting, the following should be considered:

- dimensional and physical properties of the cargo;
- location of the cargo and its stowage on board;
- suitability of the ship for the particular cargo;
- suitability of the securing arrangements for the particular cargo;
- expected seasonal weather and sea conditions;
- expected ship behaviour during the intended voyage;
- stability of the ship;
- geographical area of the voyage; and
- duration of the voyage.

1.5.2 These criteria should be taken into account when selecting suitable stowage and securing methods and whenever reviewing the forces to be absorbed by the securing equipment.

1.5.3 Bearing in mind the above criteria, the master should accept the cargo on board his ship only if he is satisfied that it can be safely transported.

1.6 Cargo Securing Manual

1.6.1 Ships carrying cargo units and other entities covered in this Code and as outlined in resolution A.489(XII) (appendix) should carry a Cargo Securing Manual as detailed in MSC/Circ.385.

1.6.2 The cargo securing arrangements detailed in the ship's Cargo Securing Manual, if provided, should be based on the forces expected to affect the cargo carried by the ship, calculated in accordance with a method accepted by the Administration or approved by a classification society acceptable to the Administration.

1.7 Equipment

The ship's cargo securing equipment should be:

- available in sufficient quantity;
- suitable for its intended purpose, taking into account the recommendations of the Cargo Securing Manual, if provided;
- of adequate strength;
- easy to use; and
- well maintained.

1.8 Special cargo transport units

The shipowner and the ship operator should, where necessary, make use of relevant expertise when considering the shipment of a cargo with unusual characteristics which may require special attention to be given to its location on board vis-à-vis the structural strength of the ship, its stowage and securing, and the weather conditions which may be expected during the intended voyage.

1.9 Cargo information

1.9.1 Before accepting a cargo for shipment, the shipowner or ship operator should obtain all necessary information about the cargo and ensure that:

- the different commodities to be carried are compatible with each other or suitably separated;
- the cargo is suitable for the ship;
- the ship is suitable for the cargo; and
- the cargo can be safely stowed and secured on board the ship and transported under all expected conditions during the intended voyage.

1.9.2 The master should be provided with adequate information regarding the cargo to be carried so that its stowage may be properly planned for handling and transport.

CHAPTER 2 – PRINCIPLES OF SAFE STOWAGE AND SECURING OF CARGOES

2.1 Suitability of cargo for transport

Cargo carried in containers, road vehicles, shipborne barges, railway wagons and other cargo transport units should be packed and secured within these units so as to prevent, throughout the voyage, damage or hazard to the ship, to the persons on board and to the marine environment.

2.2 Cargo distribution

2.2.1 It is of utmost importance that the master takes great care in planning and supervising the stowage and securing of cargoes in order to prevent cargo sliding, tipping, racking, collapsing, etc.

2.2.2 The cargo should be distributed so as to ensure that the stability of the ship throughout the entire voyage remains within acceptable limits so that the hazards of excessive accelerations are reduced as far as practicable.

2.2.3 Cargo distribution should be such that the structural strength of the ship is not adversely affected.

2.3 Cargo securing arrangements

2.3.1 Particular care should be taken to distribute forces as evenly as practicable between the cargo securing devices. If this is not feasible, the arrangements should be upgraded accordingly.

2.3.2 If, due to the complex structure of a securing arrangement or other circumstances, the person in charge is unable to assess the suitability of the arrangement from experience and knowledge of good seamanship, the arrangement should be verified by using an acceptable calculation method.

2.4 Residual strength after wear and tear

Cargo securing arrangements and equipment should have sufficient residual strength to allow for normal wear and tear during their lifetime.

2.5 Friction forces

Where friction between the cargo and the ship's deck or structure or between cargo transport units is insufficient to avoid the risk of sliding, suitable material such as soft boards or dunnage should be used to increase friction.

2.6 Shipboard supervision

2.6.1 The principal means of preventing the improper stowage and securing of cargoes is through proper supervision of the loading operation and inspections of the stow.

2.6.2 As far as practicable, cargo spaces should be regularly inspected throughout the voyage to ensure that the cargo, vehicles and cargo transport units remain safely secured.

2.7 Entering enclosed spaces

The atmosphere in any enclosed space may be incapable of supporting human life through lack of oxygen or it may contain flammable or toxic gases. The master should ensure that it is safe to enter any enclosed space.

2.8 General elements to be considered by the master

Having evaluated the risk of cargo-shifting, taking into account the criteria set out in 1.5, the master should ensure, prior to loading of any cargo, cargo transport unit or vehicle that:

- .1 the deck area for their stowage is, as far as practicable, clean, dry and free from oil and grease;
- .2 the cargo, cargo transport unit or vehicle, appears to be in suitable condition for transport, and can be effectively secured;
- .3 all necessary cargo securing equipment is on board and in good working condition; and
- .4 cargo in or on cargo transport units and vehicles is, to the extent practicable, properly stowed and secured on to the unit or vehicle.

2.9 Cargo stowage and securing declaration

2.9.1 Where there is reason to suspect that a container or vehicle into which dangerous goods have been packed or loaded is not in compliance with the provisions of section 12 or 17, as appropriate, of the General Introduction to the IMDG Code, or where a container packing certificate/vehicle packing declaration is not available, the unit should not be accepted for shipment.

2.9.2 Where practicable and feasible, road vehicles should be provided with a cargo stowage and securing declaration, stating that the cargo on the road vehicle has been properly stowed and secured for the intended sea voyage, taking into account the IMO/ILO guidelines for packing cargo in freight containers or vehicles. An example of such a declaration is given hereunder. The vehicle packing declaration, recommended by the IMDG Code (see 2.9.1), may be acceptable for this purpose.

Example

CARGO STOWAGE AND SECURING DECLARATION	
Vehicle no.
Place of loading
Date of loading
Commodity(ies)
I hereby declare that the cargo on the above-mentioned vehicle has been properly stowed and secured for transport by sea, by taking into account the IMO/ILO Guidelines for Packing Cargo in Freight Containers or Vehicles.	
Name of signatory
Status
Place	Date
Signature on behalf of the packer	
Remarks:	
.....	
.....	
.....	
.....	
.....	

CHAPTER 3 – STANDARDIZED STOWAGE AND SECURING SYSTEMS

3.1 Recommendations

Ships intended for the carriage of cargoes in a standardized stowage and securing system (e.g. containers, railway wagons, shipborne barges, etc.) should be:

- .1 so designed and equipped that the standardized cargoes concerned can be safely stowed and secured on board under all conditions expected during the intended voyage;
- .2 of a design and so equipped as to be accepted by the Administration or approved by a classification society acceptable to the Administration; and
- .3 provided with adequate information, for use by the master, on the arrangements provided for the safe stowage and securing of the specific cargoes for which the ship is designed or adapted.

CHAPTER 4 – SEMI-STANDARDIZED STOWAGE AND SECURING

4.1 Securing arrangements

4.1.1 Ships intended for the carriage of certain specific cargoes such as road vehicles, systemized cargo carrying roll-trailers and automobiles on ro-ro ships, etc., should be provided with securing points spaced sufficiently close to each other for the intended operation of the ship and in accordance with section 4 of the guidelines for securing arrangements for the transport of road vehicles on ro-ro ships (resolution A.581(14)).

4.1.2 Road vehicles intended for transport by sea should be provided with arrangements for their safe stowage and securing, as detailed in section 5 of the annex to resolution A.581(14).

4.1.3 Roll-trailers carrying systemized cargo should be provided with arrangements for the safe stowage and securing of the vehicle and its cargo. Special consideration should be given to the height of the stow, the compactness of the stow and the effects of a high centre of gravity of the cargo.

4.2 Stowage and securing of vehicles

4.2.1 Vehicles, including roll-trailers not provided with adequate securing arrangements, should be stowed and secured in accordance with chapter 5 of this Code.

4.2.2 Ro-ro ships which do not comply with the requirements of section 4 of the annex to resolution A.581(14) or are not provided with equivalent stowage and securing means providing for an equivalent degree of safety during transport by sea should be dealt with in accordance with chapter 5 of this Code.

4.2.3 Vehicles should be stowed and secured in accordance with sections 6 and 7 of the annex to resolution A.581(14). Special consideration should be given to the stowage and securing of roll-trailers carrying systemized cargo, road tank-vehicles and portable tanks on wheels, taking into account the effects of a tank's high centre of gravity and free surface.

4.3 Acceptance of road vehicles for transport by sea on ro-ro ships

4.3.1 The master should not accept a road vehicle for transport on board his ship unless satisfied that the road vehicle is apparently suitable for the intended voyage and is provided with at least the securing points specified in section 5 of the annex to resolution A.581(14).

4.3.2 In exceptional circumstances, where there is some doubt that the recommendations of 4.3.1 can or need to be fulfilled, the master may accept the vehicle for shipment, after taking into account the condition of the vehicle and the expected nature of the intended voyage.

CHAPTER 5 - NON-STANDARDIZED STOWAGE AND SECURING

5.1 Recommendations

5.1.1 This chapter and the annexes provide advice of a general nature for the stowage and securing of cargoes not covered by chapters 3 and 4 of this Code and particularly specific advice for the stowage and securing of cargoes which have proved to be difficult to stow and secure on board ships.

5.1.2 The list of cargoes given in 5.3 should not be regarded as exhaustive, as there may be other cargoes which could create hazards if not properly stowed and secured.

5.2 Equivalent stowage and securing

The guidance given in the annexes provides for certain safeguards against the problems inherent in the cargoes covered. Alternative methods of stowage and securing may afford the same degree of safety. It is imperative that any alternative method chosen should provide a level of securing safety at least equivalent to that described in the resolutions, circulars and guidelines listed in the foreword to this Code.

5.3 Cargoes which have proved to be a potential source of danger

Such cargoes include:

- .1 containers when carried on deck of ships which are not specially designed and fitted for the purpose of carrying containers (annex 1);
- .2 portable tanks (tank-containers) (annex 2);
- .3 portable receptacles (annex 3);
- .4 special wheel-based (rolling) cargoes (annex 4);
- .5 heavy cargo items such as locomotives, transformers, etc. (annex 5);
- .6 coiled sheet steel (annex 6);
- .7 heavy metal products (annex 7);
- .8 anchor chains (annex 8);
- .9 metal scrap in bulk (annex 9);
- .10 flexible intermediate bulk containers (FIBCs) (annex 10);
- .11 logs in under-deck stow (annex 11); and
- .12 unit loads (annex 12).

CHAPTER 6 - ACTIONS WHICH MAY BE TAKEN IN HEAVY WEATHER

6.1 General

The purpose of this chapter is not to usurp the responsibilities of the master, but rather to offer some advice on how stresses induced by excessive accelerations caused by bad weather conditions could be avoided.

6.2 Excessive accelerations

Measures to avoid excessive accelerations are:

- .1 alteration of course or speed or a combination of both;
- .2 heaving to;

- .3 early avoidance of areas of adverse weather and sea conditions; and
- .4 timely ballasting or deballasting to improve the behaviour of the ship, taking into account the actual stability conditions (see also 7.2).

6.3 Voyage planning

One way of reducing excessive accelerations is for the master, as far as possible and practicable, to plan the voyage of the ship carefully so as to avoid areas with severe weather and sea conditions. The master should always consult the latest available weather information.

CHAPTER 7 – ACTIONS WHICH MAY BE TAKEN ONCE CARGO HAS SHIFTED

7.1 The following actions may be considered:

- .1 alterations of course to reduce accelerations;
- .2 reductions of speed to reduce accelerations and vibration;
- .3 monitoring the integrity of the ship;
- .4 restowing or resecuring the cargo and, where possible, increasing the friction; and
- .5 diversion of route in order to seek shelter or improved weather and sea conditions.

7.2 Tank ballasting or deballasting operations should be considered only if the ship has adequate stability.

Annex 1

Safe stowage and securing of containers on deck of ships which are not specially designed and fitted for the purpose of carrying containers

1 STOWAGE

1.1 Containers carried on deck or on hatches of such ships should preferably be stowed in the fore-and-aft direction.

1.2 Containers should not extend over the ship's sides. Adequate supports should be provided when containers overhang hatches or deck structures.

1.3 Containers should be stowed and secured so as to permit safe access for personnel in the necessary operation of the ship.

1.4 Containers should at no time overstress the deck or hatches on which they are stowed.

1.5 Bottom-tier containers, when not resting on stacking devices, should be stowed on timber of sufficient thickness, arranged in such a way as to transfer the stack load evenly on to the structure of the stowage area.

1.6 When stacking containers, use should be made of locking devices, cones, or similar stacking aids, as appropriate, between them.

1.7 When stowing containers on deck or hatches, the position and strength of the securing points should be taken into consideration.

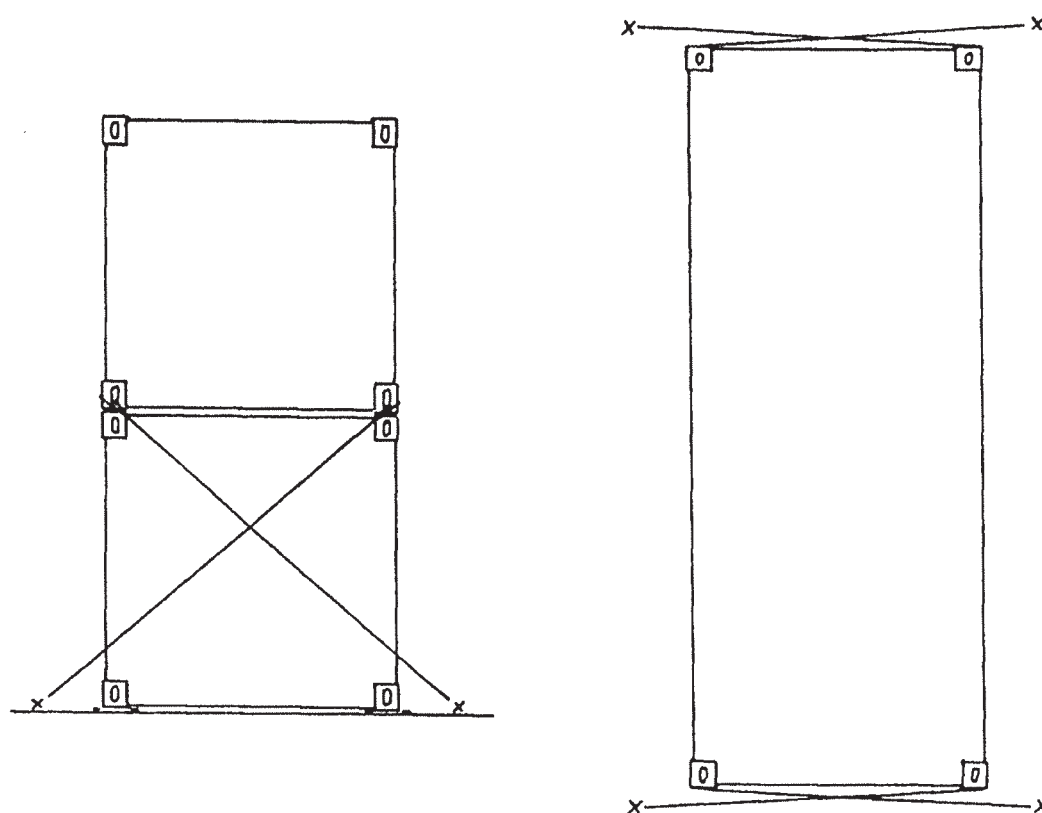
2 SECURING

2.1 All containers should be effectively secured in such a way as to protect them from sliding and tipping. Hatch covers carrying containers should be adequately secured to the ship.

2.2 Containers should be secured using one of the three methods recommended in figure 1 or methods equivalent thereto.

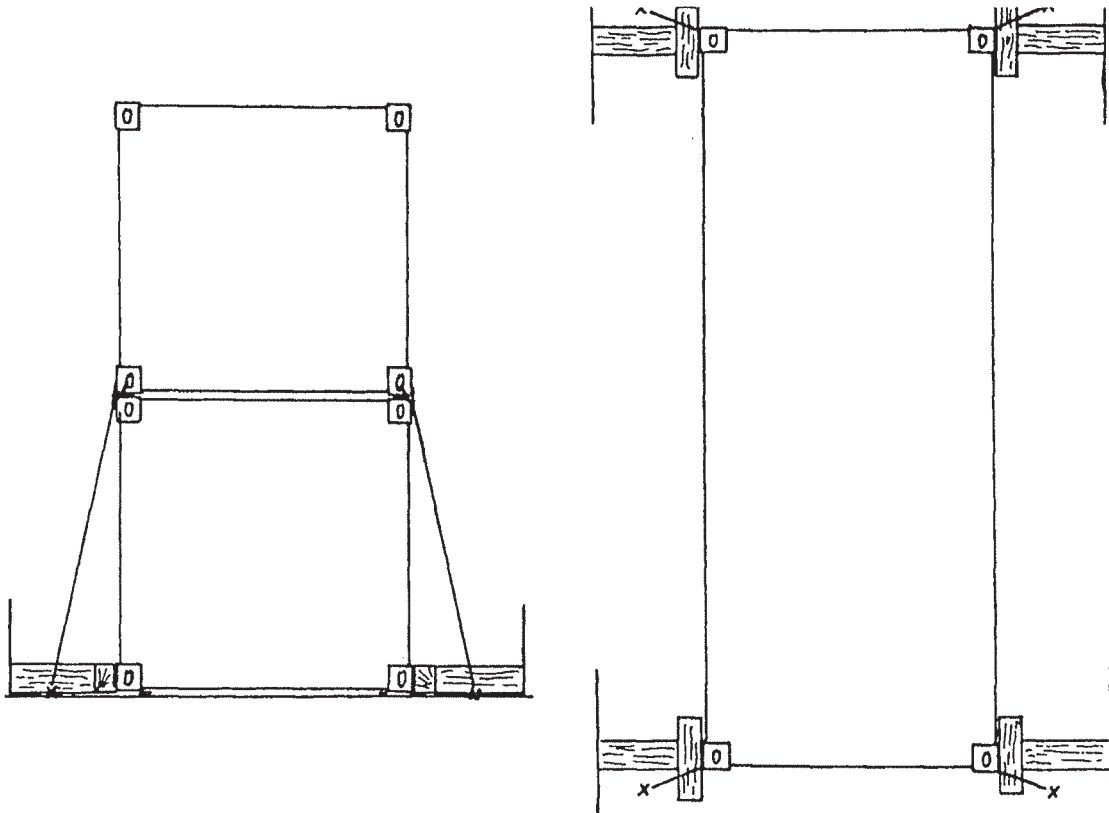
2.3 Lashings should preferably consist of wire ropes or chains or material with equivalent strength and elongation characteristics.

2.4 Timber shoring should not exceed 2 m in length.

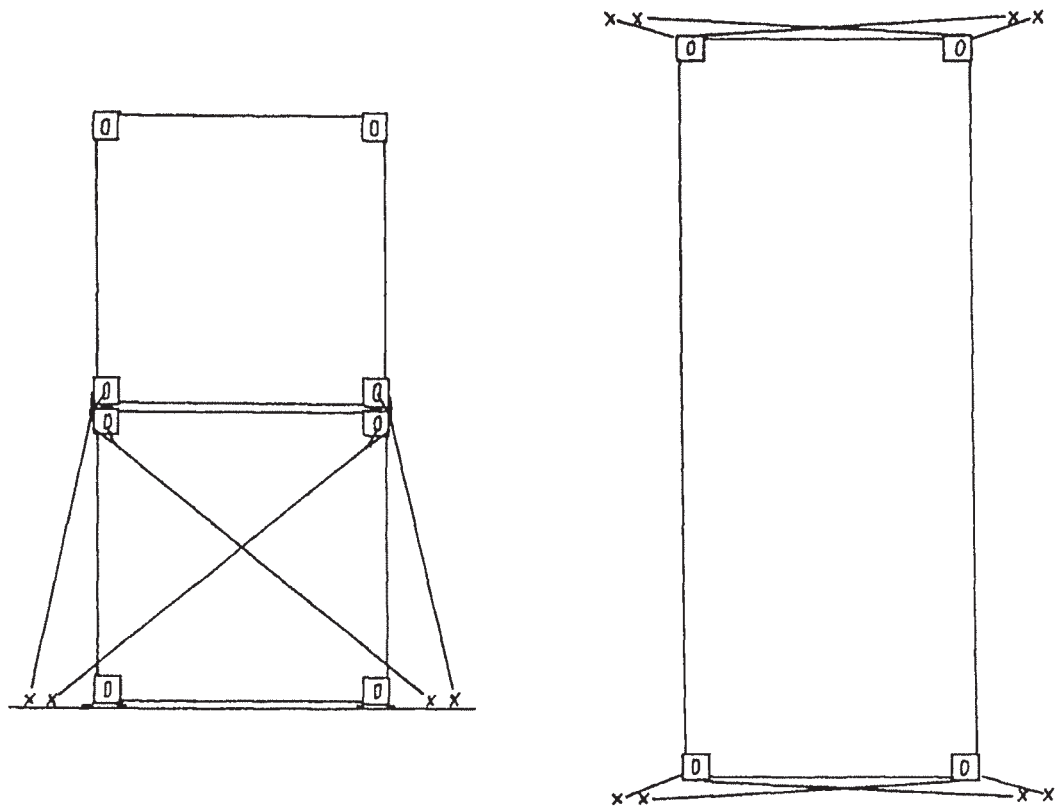


Method A – *Medium-weight containers: weight of top container not more than 70% of that of bottom container*

Figure 1 – Recommended methods of non-standardized securing of containers



Method B – *Medium-weight containers: weight of top container may be more than 70% of that of bottom container*



Method C – *Heavyweight containers: weight of top container may be more than 70% of that of bottom container*

Figure 1 – Recommended methods of non-standardized securing of containers (cont.)

2.5 Wire clips should be adequately greased, and tightened so that the dead end of the wire is visibly compressed (figure 2).

2.6 Lashings should be kept, when possible, under equal tension.

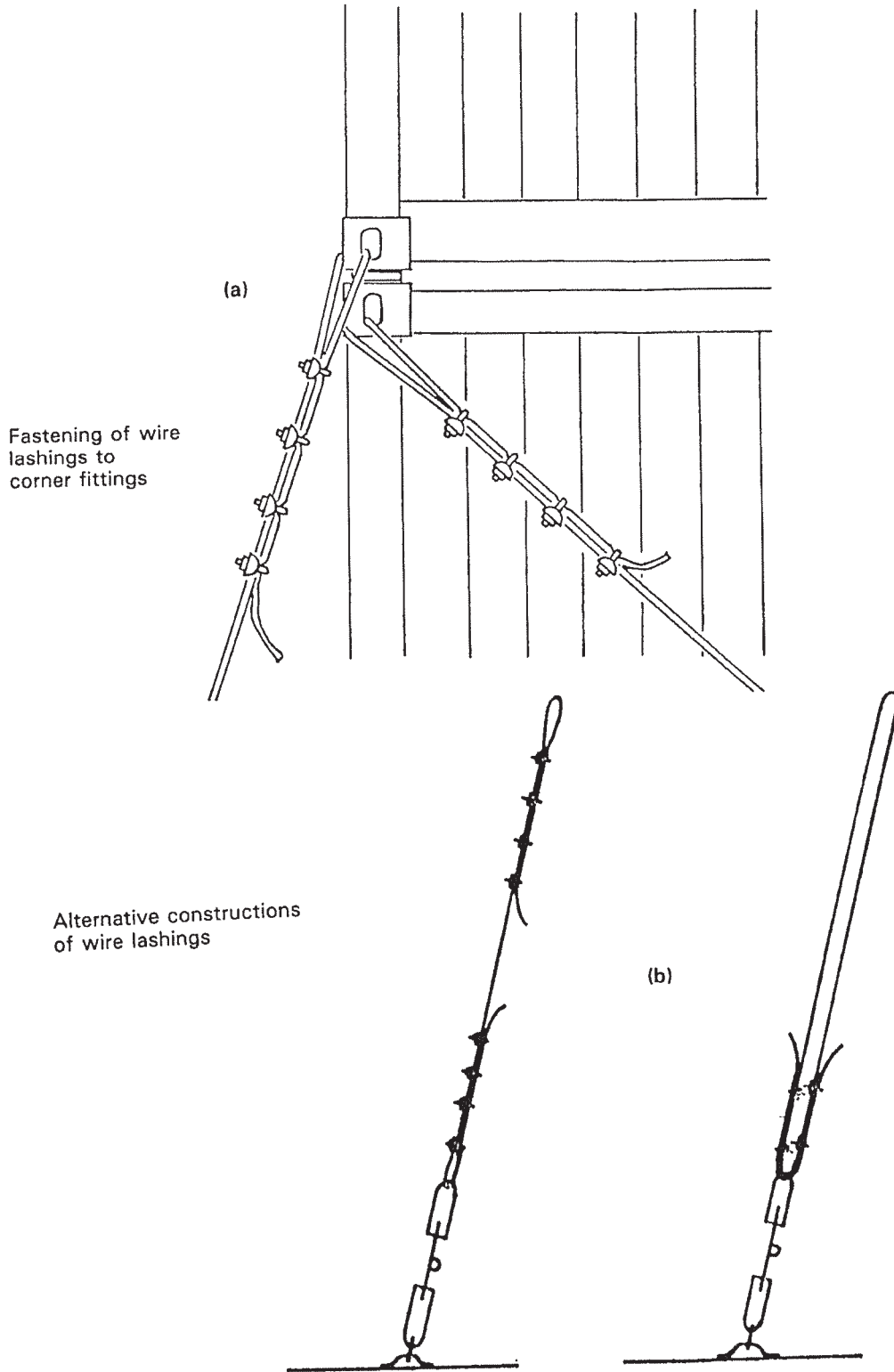


Figure 2

Annex 2

Safe stowage and securing of portable tanks

1 INTRODUCTION

1.1 The provisions of this annex apply to a portable tank, which in the context of this annex, means a tank which is not permanently secured on board the vessel and has a capacity of more than 450 l and a shell fitted with external stabilizing members and items of service equipment and structural equipment necessary for the transport of liquids, solids or gases.

1.2 These provisions do not apply to tanks intended for the transport of liquids, solids or gases having a capacity of 450 l or less.

Note: The capacity for portable tanks for gases is 1,000 l or more.

2 GENERAL PROVISIONS FOR PORTABLE TANKS

2.1 Portable tanks should be capable of being loaded and discharged without the need of removal of their structural equipment and be capable of being lifted on to and off the ship when loaded.

2.2 The applicable requirements of the International Convention for Safe Containers (CSC), 1972, as amended, should be fulfilled by any tank-container which meets the definition of a container within the terms of that Convention. Additionally, the provisions of section 13 of the General Introduction to the IMDG Code should be met when the tank will be used for the transport of dangerous goods.

2.3 Portable tanks should not be offered for shipment in an ullage condition liable to produce an unacceptable hydraulic force due to surge within the tank.

2.4 Portable tanks for the transport of dangerous goods should be certified in accordance with the provisions of the IMDG Code by the competent approval authority or a body authorized by that authority.

3 PORTABLE TANK ARRANGEMENT

3.1 The external stabilizing members of a portable tank may consist of skids or cradles and, in addition, the tank may be secured to a platform-based container. Alternatively, a tank may be fixed within a framework of ISO or non-ISO frame dimensions.

3.2 Portable tank arrangements should include fittings for lifting and securing on board.

Note: All types of the aforementioned portable tanks may be carried on multipurpose ships but need special attention for lashing and securing on board.

4 CARGO INFORMATION

4.1 The master should be provided with at least the following information:

- .1 dimensions of the portable tank and commodity if non-dangerous and, if dangerous, the information required in accordance with the IMDG Code;
- .2 the gross mass of the portable tank; and
- .3 whether the portable tank is permanently secured on to a platform-based container or in a frame and whether securing points are provided.

5 STOWAGE

- 5.1 The typical distribution of accelerations of the ship should be borne in mind in deciding whether the portable tank will be stowed on or under deck.
- 5.2 Tanks should be stowed in the fore-and-aft direction on or under deck.
- 5.3 Tanks should be stowed so that they do not extend over the ship's side.
- 5.4 Tanks should be stowed so as to permit safe access for personnel in the necessary operation of the ship.
- 5.5 At no time should the tanks overstress the deck or hatches; the hatchcovers should be so secured to the ship that tipping of the entire hatchcover is prevented.

6 SECURING AGAINST SLIDING AND TIPPING

6.1 Non-standardized portable tanks

6.1.1 The securing devices on non-standardized portable tanks and on the ship should be arranged in such a way as to withstand the transverse and longitudinal forces, which may give rise to sliding and tipping. The lashing angles against sliding should not be higher than 25° and against tipping not lower than 45° to 60° (figure 1).

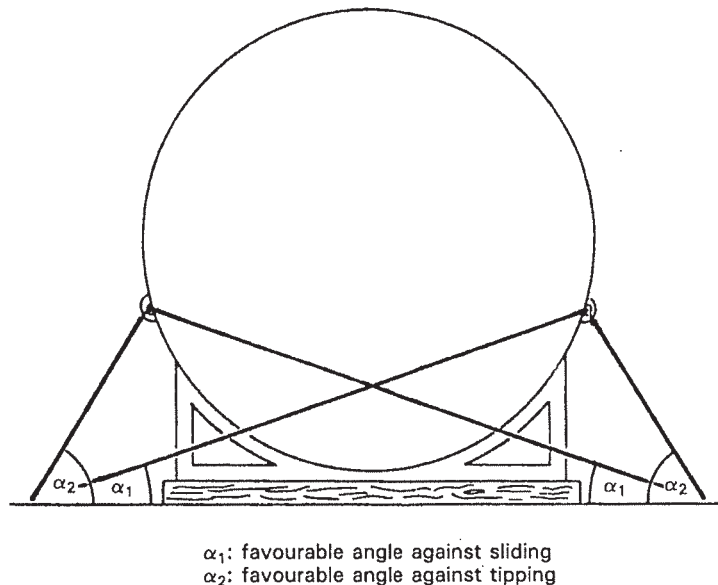


Figure 1 - Securing of portable tanks with favourable lashing angles

6.1.2 Whenever necessary, timber should be used between the deck surface and the bottom structure of the portable tank in order to increase friction. This does not apply to tanks on wooden units or with similar bottom material having a high coefficient of friction.

6.1.3 If stowage under deck is permitted, the stowage should be such that the portable non-standardized tank can be landed directly on its place and bedding.

6.1.4 Securing points on the tank should be of adequate strength and clearly marked.

Note: Securing points designed for road and rail-transport may not be suitable for transport by sea.

6.1.5 Lashings attached to tanks without securing points should pass around the tank and both ends of the lashing should be secured to the same side of the tank (figure 2).

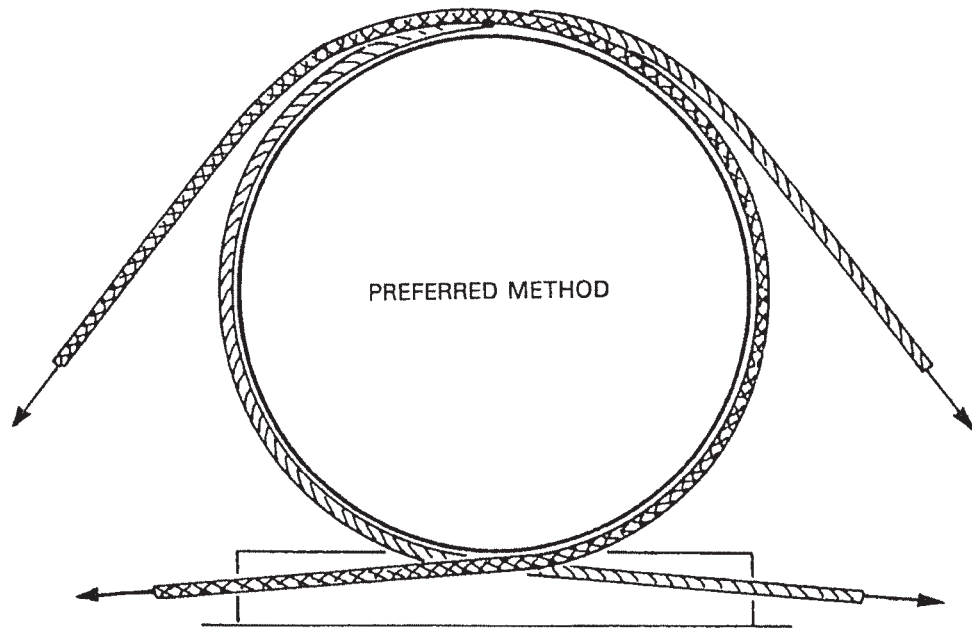


Figure 2 – Securing of portable tanks having no securing points

6.1.6 Sufficient securing devices should be arranged in such a way that each device takes its share of the load with an adequate factor of safety.

6.1.7 The structural strength of the deck or hatch components should be taken into consideration when tanks are carried thereon and when locating and affixing the securing devices.

6.1.8 Portable tanks should be secured in such a manner that no load is imposed on the tank or fittings in excess of those for which they have been designed.

6.2 Standardized portable tanks (tank-containers)

6.2.1 Standardized portable tanks with ISO frame dimensions should be secured according to the system of lashing with which the ship is equipped, taking into consideration the height of the tank above the deck and the ullage in the tank.

7 MAINTENANCE OF SECURING ARRANGEMENTS

7.1 The integrity of the securing arrangements should be maintained throughout the voyage.

7.2 Particular attention should be paid to the need for tight lashings, grips and clips to prevent weakening through chafing.

7.3 Lashings should be regularly checked and retightened.

Annex 3

Safe stowage and securing of portable receptacles*

1 INTRODUCTION

1.1 A portable receptacle, in the context of these guidelines, means a receptacle not being a portable tank, which is not permanently secured on board the ship and has a capacity of 1,000 l or less and has different dimensions in length, width, height and shape and which is used for the transport of gases or liquids.

2 Portable receptacles can be divided into:

- .1 cylinders of different dimensions without securing points and having a capacity not exceeding 150 l;
- .2 receptacles of different dimensions with the exception of cylinders in conformity with 2.1 having a capacity of not less than 100 l and not more than 1,000 l and whether or not fitted with hoisting devices of sufficient strength; and
- .3 assemblies, known as "frames", of cylinders in conformity with 2.1, the cylinders being interconnected by a manifold within the frame and held firmly together by metal fittings. The frames are equipped with securing and handling devices of sufficient strength (e.g. cylindrical receptacles are equipped with rolling hoops and receptacles are secured on skids).

3 CARGO INFORMATION

3.1 The master should be provided with at least the following information:

- .1 dimensions of the receptacle and commodity if non-dangerous and, if dangerous, the information as required in accordance with the IMDG Code;
- .2 gross mass of the receptacles; and
- .3 whether or not the receptacles are equipped with hoisting devices of sufficient strength.

4 STOWAGE

4.1 The typical distribution of accelerations of the ship should be borne in mind in deciding whether the receptacles should be stowed on or under deck.

4.2 The receptacles should preferably be stowed in the fore-and-aft direction on or under deck.

4.3 Receptacles should be dunnaged to prevent their resting directly on a steel deck. They should be stowed and chocked as necessary to prevent movement unless mounted in a frame as a unit. Receptacles for liquefied gases should be stowed in an upright position.

4.4 When the receptacles are stowed in an upright position, they should be stowed in a block, cribbed or boxed in with suitable and sound timber. The box or crib should be dunnaged underneath to provide clearance from a steel deck. The receptacles in a box or crib should be braced to prevent movement. The box or crib should be securely chocked and lashed to prevent movement in any direction.

* Where in this annex the term *receptacle* is used, it is meant to include both receptacles and cylinders.

5 SECURING AGAINST SLIDING AND SHIFTING

5.1 Cylinders

Cylinders should be stowed fore-and-aft on athwartships dunnage. Where practicable, the stow should be secured by using two or more wires, laid athwartships prior to loading, and passed around the stow to securing points on opposite sides. The wires are tightened to make a compact stow by using appropriate tightening devices. During loading, wedges may be necessary to prevent cylinders rolling.

5.2 Cylinders in containers

Cylinders should, whenever practicable, be stowed upright with their valves on top and with their protective caps firmly in place. Cylinders should be adequately secured, so as to withstand the rigours of the intended voyage, by means of steel strapping or equivalent means led to lashing points on the container floor. When cylinders cannot be stowed upright in a closed container, they should be carried in an open top or a platform-based container.

5.3 Receptacles

Securing of receptacles stowed on or under deck should be as follows:

- .1 lashings should be positioned as shown in figure 1;
- .2 where possible, the hoisting devices on receptacles should be used to lash them; and
- .3 at regular times the lashings should be checked and retightened.

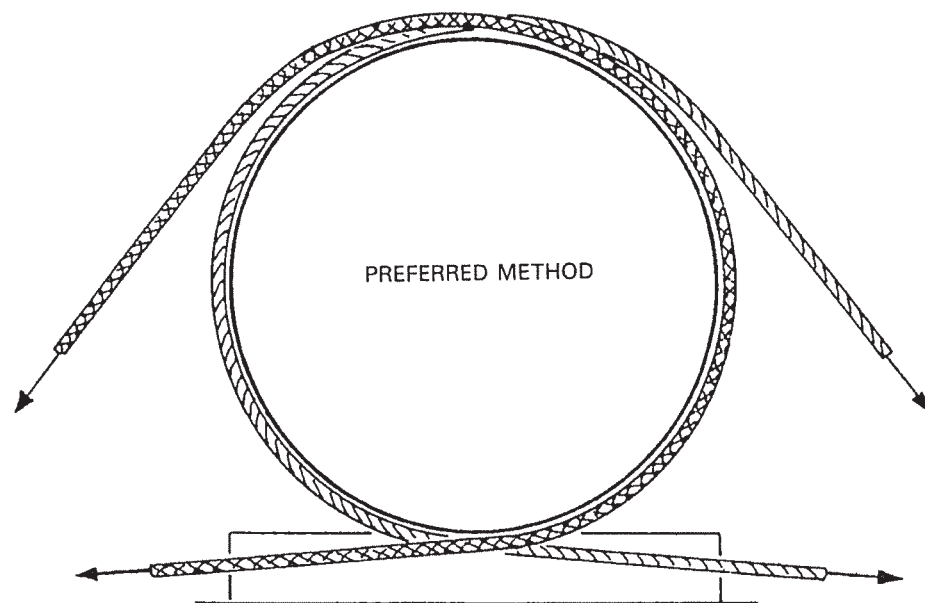


Figure 1 – Securing of receptacles having no securing points

Annex 4

Safe stowage and securing of wheel-based (rolling) cargoes

1 INTRODUCTION

Wheel-based cargoes, in the context of these guidelines, are all cargoes which are provided with wheels or tracks, including those which are used for the stowage and transport of other cargoes, except trailers and road-trains (covered by chapter 4 of this Code), but including buses, military vehicles with or without tracks, tractors, earth-moving equipment, roll-trailers, etc.

2 GENERAL RECOMMENDATIONS

2.1 The cargo spaces in which wheel-based cargo is to be stowed should be dry, clean and free from grease and oil.

2.2 Wheel-based cargoes should be provided with adequate and clearly marked securing points or other equivalent means of sufficient strength to which lashings may be applied.

2.3 Wheel-based cargoes which are not provided with securing points should have those places, where lashings may be applied, clearly marked.

2.4 Wheel-based cargoes, which are not provided with rubber wheels or tracks with friction-increasing lower surface, should always be stowed on wooden dunnage or other friction-increasing material such as soft boards, rubber mats, etc.

2.5 When in stowage position, the brakes of a wheel-based unit, if so equipped, should be set.

2.6 Wheel-based cargoes should be secured to the ship by lashings made of material having strength and elongation characteristics at least equivalent to steel chain or wire.

2.7 Where possible, wheel-based cargoes, carried as part cargo, should be stowed close to the ship's side or in stowage positions which are provided with sufficient securing points of sufficient strength, or be block-stowed from side to side of the cargo space.

2.8 To prevent any lateral shifting of wheel-based cargoes not provided with adequate securing points, such cargoes should, where practicable, be stowed close to the ship's side and close to each other, or be blocked off by other suitable cargo units such as loaded containers, etc.

2.9 To prevent the shifting of wheel-based cargoes, it is, where practicable, preferable to stow those cargoes in a fore-and-aft direction rather than athwartships. If wheel-based cargoes are inevitably stowed athwartships, additional securing of sufficient strength may be necessary.

2.10 The wheels of wheel-based cargoes should be blocked to prevent shifting.

2.11 Cargoes stowed on wheel-based units should be adequately secured to stowage platforms or, where provided with suitable means, to its sides. Any movable external components attached to a wheel-based unit, such as derricks, arms or turrets should be adequately locked or secured in position.

Annex 5

Safe stowage and securing of heavy cargo items such as locomotives, transformers, etc.

1 CARGO INFORMATION

The master should be provided with sufficient information on any heavy cargo offered for shipment so that he can properly plan its stowage and securing; the information should at least include the following:

- .1 gross mass;
- .2 principal dimensions with drawings or pictorial descriptions, if possible;
- .3 location of the centre of gravity;
- .4 bedding areas and particular bedding precautions if applicable;
- .5 lifting points or slinging positions; and
- .6 securing points, where provided, including details of their strength.

2 LOCATION OF STOWAGE

2.1 When considering the location for stowing a heavy cargo item, the typical distribution of accelerations on the ship should be kept in mind:

- .1 lower accelerations occur in the midship sections and below the weather deck; and
- .2 higher accelerations occur in the end sections and above the weather deck.

2.2 When heavy items are to be stowed on deck, the expected “weather side” of the particular voyage should be taken into account if possible.

2.3 Heavy items should preferably be stowed in the fore-and-aft direction.

3 DISTRIBUTION OF WEIGHT

The weight of the item should be distributed in such a way as to avoid undue stress on the ship’s structure. Particularly with the carriage of heavy items on decks or hatch covers, suitable beams of timber or steel of adequate strength should be used to transfer the weight of the item on to the ship’s structure.

4 SECURING AGAINST SLIDING AND TIPPING

4.1 Whenever possible, timber should be used between the stowage surface and the bottom of the unit in order to increase friction. This does not apply to items on wooden cradles or on rubber tyres or with similar bottom material having a high coefficient of friction.

4.2 The securing devices should be arranged in a way to withstand transverse and longitudinal forces which may give rise to sliding or tipping.

4.3 The optimum lashing angle against sliding is about 25°, while the optimum lashing angle against tipping is generally found between 45° and 60° (figure 1).

4.4 If a heavy cargo item has been dragged into position on greased skid boards or other means to reduce friction, the number of lashings used to prevent sliding should be increased accordingly.

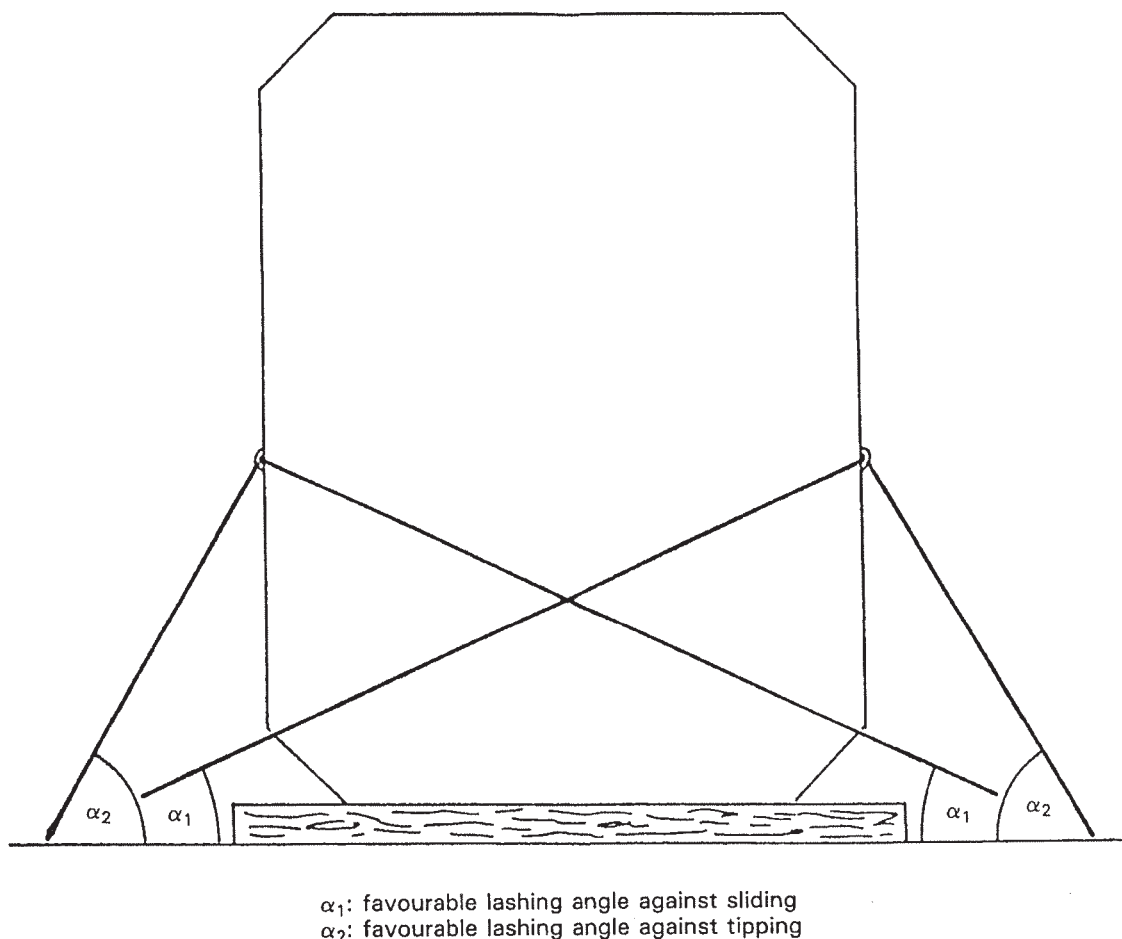


Figure 1 – Principles of securing heavy items against sliding and tipping

4.5 If, owing to circumstances, lashings can be set at large angles only, sliding must be prevented by timber shoring, welded fittings or other appropriate means. Any welding should be carried out in accordance with accepted hot work procedures.

5 SECURING AGAINST HEAVY SEAS ON DECK

Whilst it is recognized that securing cargo items against heavy seas on deck is difficult, all efforts should be made to secure such items and their supports to withstand such impact and special means of securing may have to be considered.

6 HEAVY CARGO ITEMS PROJECTING OVER THE SHIP'S SIDE

Items projecting over the ship's side should be additionally secured by lashings acting in longitudinal and vertical directions.

7 ATTACHMENT OF LASHINGS TO HEAVY CARGO ITEMS

7.1 If lashings are to be attached to securing points on the item, these securing points should be of adequate strength and clearly marked. It should be borne in mind that securing points designed for road or rail transport may not be suitable for securing the items on board ship.

7.2 Lashings attached to items without securing points should pass around the item, or a rigid part thereof, and both ends of the lashing should be secured to the same side of the unit (figure 2).

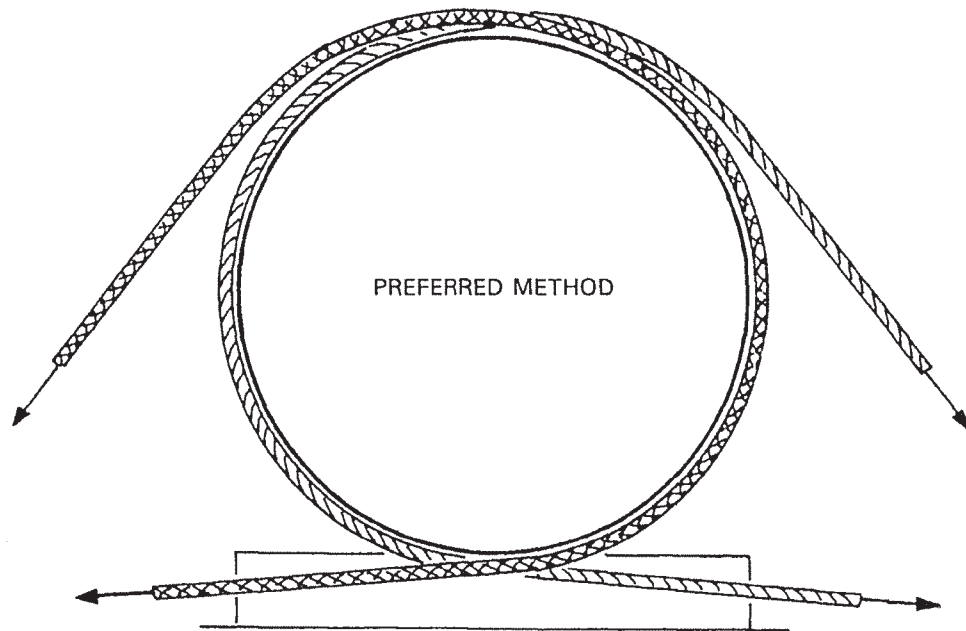


Figure 2 – Principle of securing heavy items having no suitable securing points

8 COMPOSITION AND APPLICATION OF SECURING DEVICES

8.1 Securing devices should be assembled so that each component is of equal strength.

8.2 Connecting elements and tightening devices should be used in the correct way. Consideration should be given to any reduction of the strength of the lashings during the voyage through corrosion, fatigue or mechanical deterioration and should be compensated by using stronger securing material.

8.3 Particular attention should be paid to the correct use of wire, grips and clips. The saddle portion of the clip should be applied to the live load segment and the U-bolt to the dead or shortened end segment.

8.4 Securing devices should be arranged in such a way that each device takes its share of load according to its strength.

8.5 Mixed securing arrangements of devices with different strength and elongation characteristics should be avoided.

9 MAINTENANCE OF SECURING ARRANGEMENTS

9.1 The integrity of the securing arrangements should be maintained throughout the voyage.

9.2 Particular attention should be paid to the need for tight lashings, grips and clips and to prevent weakening through chafing. Timber cradles, beddings and shorings should be checked.

9.3 Greasing the thread of clips and turnbuckles increases their holding capacity and prevents corrosion.

10 SECURING CALCULATION

10.1 Where necessary, the securing arrangements for heavy cargo items should be verified by an appropriate calculation.

Annex 6

Safe stowage and securing of coiled sheet steel**1 GENERAL**

1.1 This annex deals only with coiled sheet steel stowed on the round. Vertical stowage is not dealt with because this type of stowage does not create any special securing problems.

1.2 Normally, coils of sheet steel have a gross mass in excess of 10 tonnes each.

2 COILS

2.1 Coils should be given bottom stow and, whenever possible, be stowed in regular tiers from side to side of the ship.

2.2 Coils should be stowed on dunnage laid athwartships. Coils should be stowed with their axes in the fore-and-aft direction. Each coil should be stowed against its neighbour. Wedges should be used as stoppers when necessary during loading and discharging to prevent shifting (figures 1 and 2).

2.3 The final coil in each row should normally rest on the two adjacent coils. The mass of this coil will lock the other coils in the row.

2.4 If it is necessary to load a second tier over the first, then the coils should be stowed in between the coils of the first tier (figure 2).

2.5 Any void space between coils in the topmost tier should be adequately secured (figure 3).

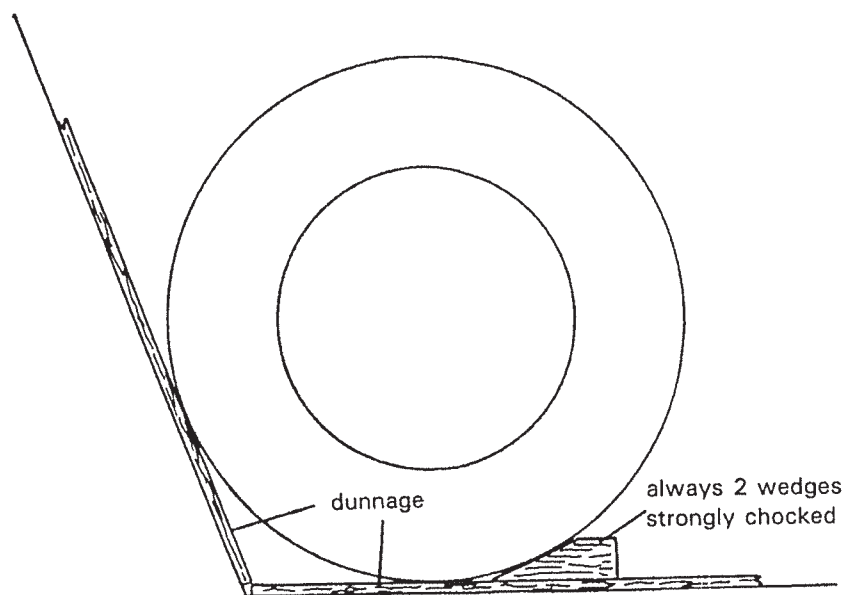


Figure 1 – Principle of dunnaging and wedging coils

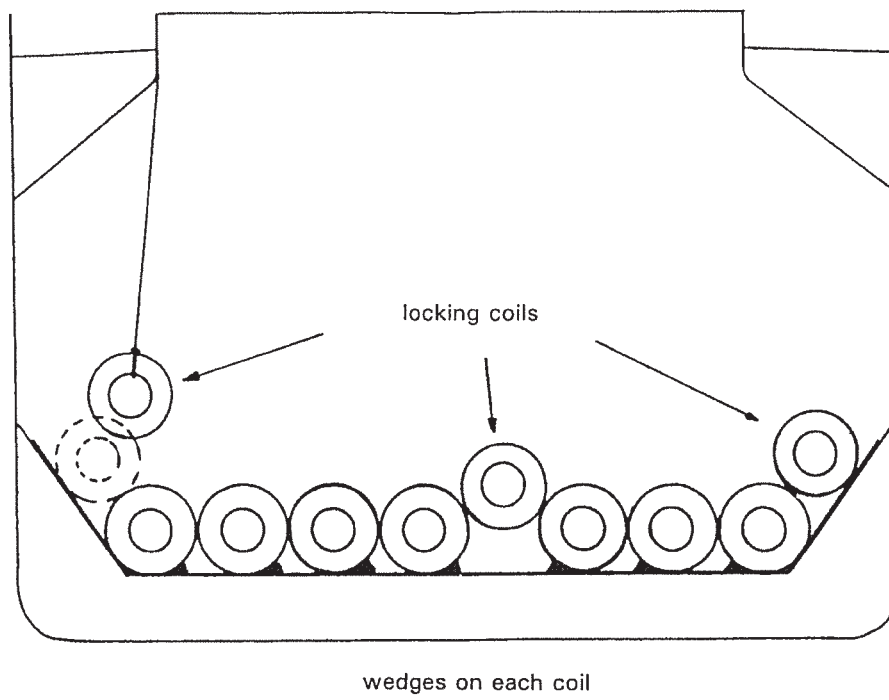


Figure 2 – Inserting of locking coils

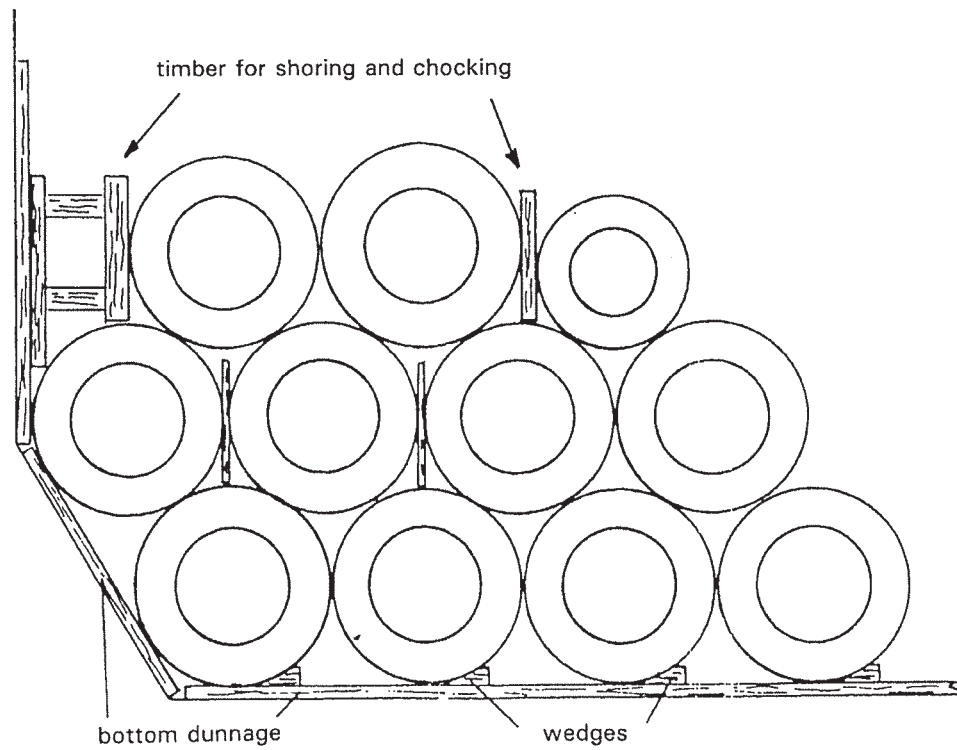


Figure 3 – Shoring and chocking in voids between coils

3 LASHINGS

3.1 The objective is to form one large, immovable block of coils in the hold by lashing them together. In general, strip coils in three end rows in the top tier should be lashed. To prevent fore-and-aft shifting in the top tier of bare-wound coils group-lashing should not be applied due to their fragile nature, the end row of a top tier should be secured by dunnage and wires, which are to be tightened from side to side and by additional wires to the bulkhead. When coils are fully loaded over the entire bottom space and are well shored, no lashings are required except for locking coils (figures 4, 5, and 6).

3.2 The lashings can be of a conventional type using wire or any equivalent means.

3.3 Conventional lashings should consist of wires having sufficient tensile strength. The first tier should be chocked. It should be possible to retighten the lashings during the voyage (figures 5 and 6).

3.4 Wire lashings should be protected against damage from sharp edges.

3.5 If there are few coils, or a single coil only, they should be adequately secured to the ship, by placing them in cradles, by wedging, or by shoring and then lashing to prevent transverse and longitudinal movement.

3.6 Coils carried in containers, railway wagons and road vehicles should be stowed in cradles or specially made beds and should be prevented from moving by adequate securing.

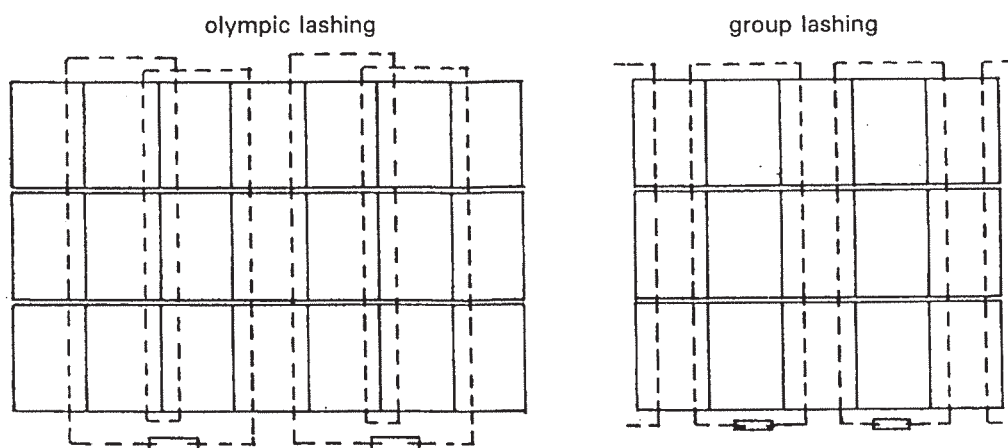


Figure 4 - Securing of top tier against fore-and-aft shifting (view from top)

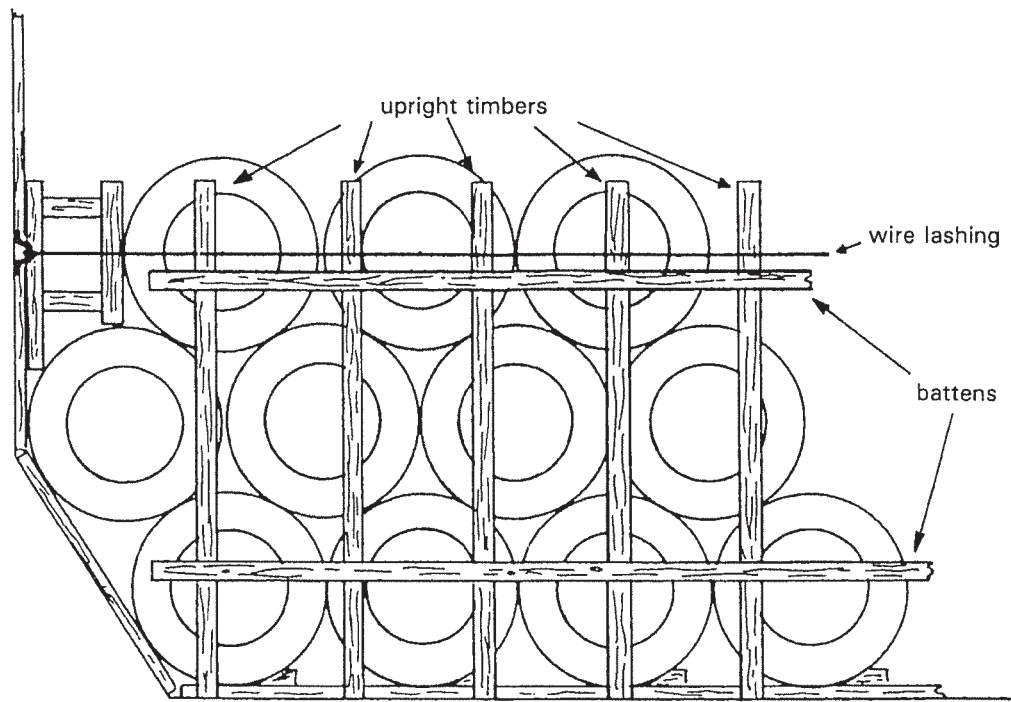


Figure 5 – Securing of end row in top tier against fore-and-aft shifting

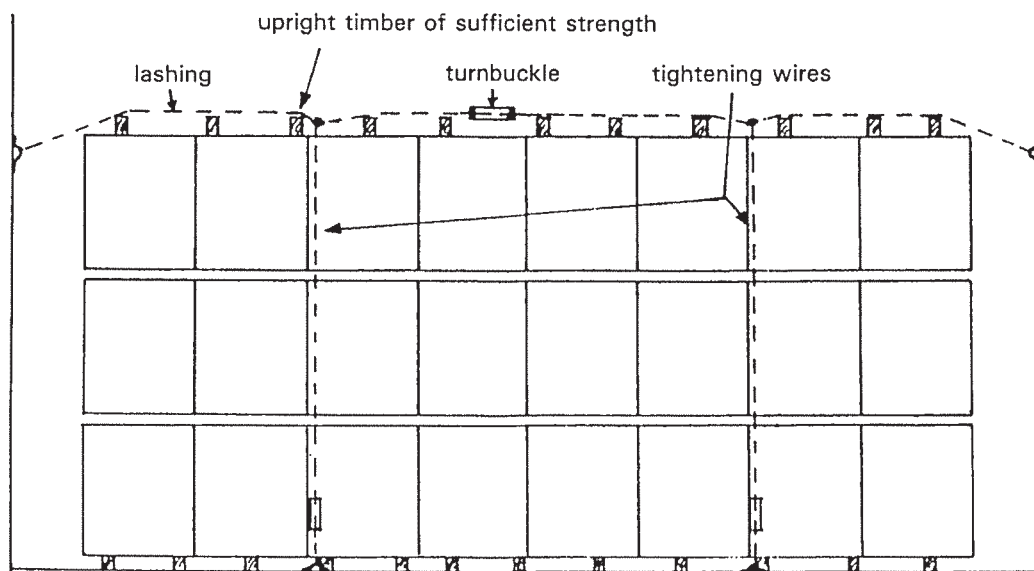


Figure 6 – Securing of end row in top tier against fore-and-aft shifting (view from top)

Annex 7

Safe stowage and securing of heavy metal products

1 GENERAL

1.1 Heavy metal products in the context of this Code include any heavy item made of metal, such as bars, pipes, rods, plates, wire coils, etc.

1.2 The transport of heavy metal products by sea exposes the ship to the following principal hazards:

- .1 overstressing of the ship's structure if the permissible hull stress or permissible deck loading is exceeded;
- .2 overstressing of the ship's structure as a result of a short roll period caused by excessive metacentric height; and
- .3 cargo shifting because of inadequate securing resulting in a loss of stability or damage to the hull or both.

2 RECOMMENDATIONS

2.1 The cargo spaces in which heavy metal products are to be stowed should be clean, dry and free from grease and oil.

2.2 The cargo should be so distributed as to avoid undue hull stress.

2.3 The permissible deck and tank top loading should not be exceeded.

2.4 The following measures should be taken when stowing and securing heavy metal products:

- .1 cargo items should be stowed compactly from one side of the ship to the other leaving no voids between them and using timber blocks between items if necessary;
- .2 cargo should be stowed level whenever possible and practicable;
- .3 the surface of the cargo should be secured; and
- .4 the shoring should be made of strong, non-splintering wood and adequately sized to withstand the acceleration forces. One shoring should be applied to every frame of the ship but at intervals of not less than 1 m.

2.5 In the case of thin plates and small parcels, alternate fore-and-aft and athwartships stowage has proved satisfactory. The friction should be increased by using sufficient dry dunnage or other material between the different layers.

2.6 Pipes, rails, rolled sections, billets, etc., should be stowed in the fore-and-aft direction to avoid damage to the sides of the ship if the cargo shifts.

2.7 The cargo, and especially the topmost layer, can be secured by:

- .1 having other cargo stowed on top of it; or
- .2 lashing by wire, chocking off or similar means.

2.8 Whenever heavy metal products are not stowed from side to side of the ship, special care should be taken to secure such stowages adequately.

2.9 Whenever the surface of the cargo is to be secured, the lashings should be independent of each other, exert vertical pressure on the surface of the cargo, and be so positioned that no part of the cargo is unsecured.

3 WIRE COILS

- 3.1** Wire coils should be stowed flat so that each coil rests against an adjacent coil. The coils in successive tiers should be stowed so that each coil overlaps the coils below.
- 3.2** Wire coils should be tightly stowed together and substantial securing arrangements should be used. Where voids between coils are unavoidable or where there are voids at the sides or ends of the cargo space, the stow should be adequately secured.
- 3.3** When securing wire coils stowed on their sides in several layers like barrels, it is essential to remember that, unless the top layer is secured, the coils lying in the stow can be forced out of the stow by the coils below on account of the ship's motions.

Annex 8

Safe stowage and securing of anchor chains

1 GENERAL

- 1.1** Anchor chains for ships and offshore structures are usually carried in bundles or in continuous lengths.
- 1.2** Provided certain safety measures are followed prior to, during, and after stowage, anchor chains may be lowered directly on to the place of stowage in bundles without further handling or stowed longitudinally either along the ship's entire cargo space or part thereof.
- 1.3** If the cargo plans given in the ship's documentation contain no specific requirements, the cargo should be distributed over the lower hold and 'tween-decks in such a way that stability values thus obtained will guarantee adequate stability.

2 RECOMMENDATIONS

- 2.1** Cargo spaces in which chains are stowed should be clean and free from oil and grease.
- 2.2** Chains should only be stowed on surfaces which are permanently covered either by wooden ceiling or by sufficient layers of dunnage or other suitable friction-increasing materials. Chains should never be stowed directly on metal surfaces.

3 STOWAGE AND SECURING OF CHAINS IN BUNDLES

- 3.1** Chains in bundles, which are lifted directly on to their place of stowage without further handling, should be left with their lifting wires attached and should preferably be provided with additional wires around the bundles for lashing purposes.
- 3.2** It is not necessary to separate layers of chain with friction-increasing material such as dunnage because chain bundles will grip each other. The top layer of chain bundles should be secured to both sides of the ship by suitable lashings. Bundles may be lashed independently or in a group, using the lifting wires.

4 STOWAGE AND SECURING OF CHAINS WHICH ARE STOWED LONGITUDINALLY

- 4.1** Stowage of each layer of chain should, whenever possible and practicable, commence and terminate close to the ship's side. Care should be taken to achieve a tight stow.
- 4.2** It is not necessary to separate layers of chain with friction-increasing material, such as dunnage because chain layers will grip each other.
- 4.3** Bearing in mind the expected weather and sea conditions, the length and nature of the voyage and the nature of the cargo to be stowed on top of the chain, the top layer of each stow should be secured by lashings of adequate strength crossing the stow at suitable intervals and thus holding down the entire stow.

Annex 9

Safe stowage and securing of anchor chains

1 INTRODUCTION

- 1.1** This annex deals with the stowage of metal scrap which is difficult to stow compactly because of its size, shape and mass, but does not apply to metal scrap such as metal borings, shavings or turnings, the carriage of which is addressed by the Code of Safe Practice for Solid Bulk Cargoes.
- 1.2** The hazards involved in transporting metal scrap include:
- .1 shifting of the stow which in turn can cause a list;
 - .2 shifting of individual heavy pieces which can rupture the side plating below the waterline and give rise to serious flooding;
 - .3 excessive loading on tank tops or 'tween-decks; and
 - .4 violent rolling caused by excessive metacentric height.

2 RECOMMENDATIONS

- 2.1** Before loading, the lower battens of the spar ceiling should be protected by substantial dunnage to reduce damage and to prevent heavy and sharp pieces of scrap coming in contact with the ship's side plating. Air and sounding pipes, and bilge and ballast lines protected only by wooden boards, should be similarly protected.
- 2.2** When loading, care should be taken to ensure that the first loads are not dropped from a height which could damage the tank tops.
- 2.3** If light and heavy scrap is to be stowed in the same cargo space, the heavy scrap should be loaded first. Scrap should never be stowed on top of metal turnings, or similar forms of waste metal.
- 2.4** Scrap should be compactly and evenly stowed with no voids or unsupported faces of loosely held scrap.
- 2.5** Heavy pieces of scrap, which could cause damage to the side plating or end bulkheads if they were to move, should be overstowed or secured by suitable lashings. The use of shoring is unlikely to be effective because of the nature of the scrap.
- 2.6** Care should be taken to avoid excessive loading on tank tops and decks.

Annex 10

Safe stowage and securing of flexible intermediate bulk containers

1 INTRODUCTION

1.1 A flexible intermediate bulk container (FIBC), in the context of these guidelines, means a flexible portable packaging to be used for the transport of solids with a capacity of not more than 3 m³ (3,000 l) designed for mechanical handling and tested for its satisfactory resistance to transport and transport stresses in a one-way type or multi-purpose design.

2 CARGO INFORMATION

The master should at least be provided with the following information:

- .1 the total number of FIBCs and the commodity to be loaded;
- .2 the dimensions of the FIBCs;
- .3 the total gross mass of the FIBCs;
- .4 one-way type or multi-purpose design; and
- .5 the kind of hoisting (one hook or more hooks to be used).

3 RECOMMENDATIONS

3.1 The ideal ship for the carriage of FIBCs is one with wide hatches so that the FIBCs can be landed directly in the stowage positions without the need for shifting.

3.2 The cargo spaces should, where practicable, be rectangular in shape and free of obstructions.

3.3 The stowage space should be clean, dry and free from oil and nails.

3.4 When FIBCs have to be stowed in deep hatch wings, easy access and sufficient manoeuvring space for suitably adapted fork-lift trucks should be available.

3.5 When FIBCs are stowed in the hatchway only, the space in the wings and the forward and aft end of the cargo space should be loaded with other suitable cargo or blocked off in such a way that the FIBCs are adequately supported.

4 STOWAGE

4.1 The typical distribution of the accelerations of the ship should be kept in mind when FIBCs are loaded.

4.2 The width of the ship divided by the width of the FIBC will give the number of FIBCs which can be stowed athwartships and the void space left. If there will be a void space, the stowage of the FIBCs should start from both sides to the centre, so that any void space will be in the centre of the hatchway.

4.3 FIBCs should be stowed as close as possible against each other and any void space should be chocked off.

4.4 The next layers should be stowed in a similar way so that the FIBCs fully cover the FIBCs underneath. If in this layer a void space is left, it should also be chocked off in the centre of the hatchway.

4.5 When there is sufficient room in the hatchway on top of the layers underneath to stow another layer, it should be established whether the coamings can be used as bulkheads. If not, measures should be taken to prevent the FIBCs shifting to the open space in the wings. Otherwise, the FIBCs should be stowed from one coaming to another. In both cases any void space should be in the centre and should be chocked off.

4.6 Chocking off is necessary in all cases to prevent shifting of the FIBCs to either side and to prevent a list of the ship developing in rough weather (figure 1).

5 SECURING

5.1 In cases where only a part of a 'tween-deck or lower hold is used for the stowage of FIBCs, measures should be taken to prevent the FIBCs from shifting. These measures should include sufficient gratings or plywood sheets placed against the FIBCs and the use of wire lashings from side to side to secure the FIBC cargo.

5.2 The wire lashings and plywood sheets used for securing should be regularly checked, in particular before and after rough weather, and retightened if necessary.

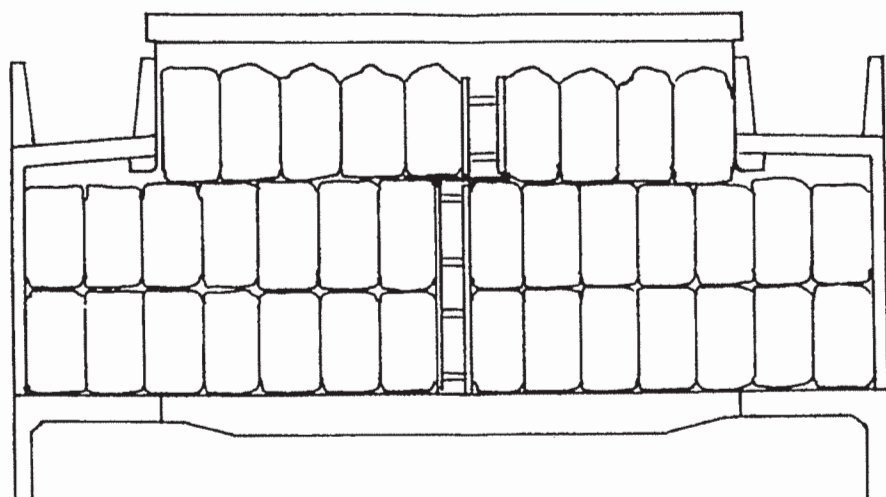


Figure 1 – Stowage of FIBCs with chocked void spaces in the centre of the stowage area

Annex 11

General guidelines for the under-deck stowage of logs

1 INTRODUCTION

The purpose of this annex is to recommend safe practices for the under-deck stowage of logs and other operational safety measures designed to ensure the safe transport of such cargoes.

2 Prior to loading:

- .1 each cargo space configuration (length, breadth and depth), the cubic bale capacity of the respective cargo spaces, the various lengths of logs to be loaded, the cubic volume (log average), and the capacity of the gear to be used to load the logs should be determined;

- .2 using the above information, a pre-stow plan should be developed to allow the maximum utilization of the available space; the better the under-deck stowage, the more cargo can safely be carried on deck;
 - .3 the cargo spaces and related equipment should be examined to determine whether the condition of structural members, framework and equipment could affect the safe carriage of the log cargo. Any damage discovered during such an examination should be repaired in an appropriate manner;
 - .4 the bilge suction screens should be examined to ensure they are clean, effective and properly maintained to prevent the admission of debris into the bilge piping system;
 - .5 the bilge wells should be free of extraneous material such as wood bark and wood splinters;
 - .6 the capacity of the bilge pumping system should be ascertained. A properly maintained and operating system is crucial for the safety of the ship. A portable dewatering pump of sufficient capacity and lift will provide additional insurance against a clogged bilge line;
 - .7 side sparring, pipe guards, etc., designed to protect internal hull members should be in place; and
 - .8 the master should ensure that the opening and closing of any high ballast dump valves are properly recorded in the ship's log. Given that such high ballast tanks are necessary to facilitate loading and bearing in mind regulation 22(1) of the International Convention on Load Lines, 1966, which requires a screw-down valve fitted in gravity overboard drain lines, the master should ensure that the dump valves are properly monitored to preclude the accidental readmission of water into these tanks. Leaving these tanks open to the sea, could lead to an apparently inexplicable list, a shift of deck cargo, and potential capsizes.
- 3 During loading operations:
- .1 each lift of logs should be hoisted aboard the ship in close proximity to the ship to minimize any potential swinging of the lift;
 - .2 the possibility of damage to the ship and the safety of those who work in the cargo spaces should be considered. The logs should not be swinging when lowered into the space. The hatch coaming should be used, as necessary, to eliminate any swinging of the logs by gently resting the load against the inside of the coaming, or on it, prior to lowering;
 - .3 the logs should be stowed compactly, thereby eliminating as many voids as is practicable. The amount and the vertical centre of gravity of the logs stowed under deck will govern the amount of cargo that can be safely stowed on deck. In considering this principle, the heaviest logs should be loaded first into the cargo spaces;
 - .4 logs should generally be stowed compactly in a fore and aft direction, with the longer lengths towards the forward and aft areas of the space. If there is a void in the space between the fore and aft lengths, it should be filled with logs stowed athwartships so as to fill in the void across the breadth of the spaces as completely as the length of the logs permits;
 - .5 where the logs in the spaces can only be stowed fore and aft in one length, any remaining void forward or aft should be filled with logs stowed athwartships so as to fill in the void across the breadth of the space as completely as the length of the logs permits;
 - .6 athwartship voids should be filled tier by tier as loading progresses;
 - .7 butt ends of the logs should be alternately reversed to achieve a more level stowage, except where excess sheer on the inner bottom is encountered;
 - .8 extreme pyramiding of logs should be avoided to the greatest extent possible. If the breadth of the space is greater than the breadth of the hatch opening, pyramiding may be avoided by sliding fore and aft loaded logs into the ends of the port and starboard sides of the space. This sliding of logs into the ends of the port and starboard sides of the space should

- commence early in the loading process (after reaching a height of approximately 2 m above the inner bottom) and should continue throughout the loading process;
- .9 it may be necessary to use loose tackle to manoeuvre heavy logs into the under-deck areas clear of the hatchways. Blocks, purchases and other loose tackle should be attached to suitably reinforced fixtures such as eyebolts or padeyes provided for this purpose. However, if this procedure is followed, care should be taken to avoid overloading the gear;
 - .10 a careful watch by ship's personnel should be maintained throughout the loading to ensure no structural damage occurs. Any damage which affects the seaworthiness of the ship should be repaired;
 - .11 when the logs are stowed to a height of about 1 m below the forward or aft athwartship hatch coaming, the size of the lift of logs should be reduced to facilitate stowing of the remaining area; and
 - .12 logs in the hatch coaming area should be stowed as compactly as possible to maximum capacity.
- 4 After loading, the ship should be thoroughly examined to ascertain its structural condition. Bilges should be sounded to verify the ship's watertight integrity.
- 5 During the voyage:
- .1 the ship's heeling angle and rolling period should be checked, in a seaway, on a regular basis;
 - .2 wedges, wastes, hammers and portable pump, if provided, should be stored in an easily accessible place; and
 - .3 the master or a responsible officer should ensure that it is safe to enter an enclosed cargo space by:
 - .3.1 ensuring that the space has been thoroughly ventilated by natural or mechanical means;
 - .3.2 testing the atmosphere of the space at different levels for oxygen deficiency and harmful vapour where suitable instruments are available; and
 - .3.3 requiring self-contained breathing apparatus to be worn by all persons entering the space where there is any doubt as to the adequacy of ventilation or testing before entry.

Annex 12

Safe stowage and securing of unit loads

1 INTRODUCTION

Unit load for the purposes of this annex means that a number of packages are either:

- .1 placed or stacked, and secured by strapping, shrink-wrapping or other suitable means, on a load board such as a pallet; or
- .2 placed in a protective outer packaging such as a pallet box; or
- .3 permanently secured together in a sling.

Note: A single large package such as a portable tank or receptacle, intermediate bulk container or freight container is excluded from the recommendations of this annex.

2 CARGO INFORMATION

The master should be provided with at least the following information:

- .1 the total number of unit loads and commodity to be loaded;
- .2 the type of strapping or wrapping used;
- .3 the dimensions of a unit load in metres; and
- .4 the gross mass of a unit load in kilogrammes.

3 RECOMMENDATIONS

3.1 The cargo spaces of the ship in which unit loads will be stowed should be clean, dry and free from oil and grease.

3.2 The decks, including the tank top, should be flush all over.

3.3 The cargo spaces should preferably be of a rectangular shape, horizontally and vertically. Cargo spaces of another shape in forward holds or in 'tweendecks should be transformed into a rectangular shape both athwartships and longitudinally by the use of suitable timber (figure 1).

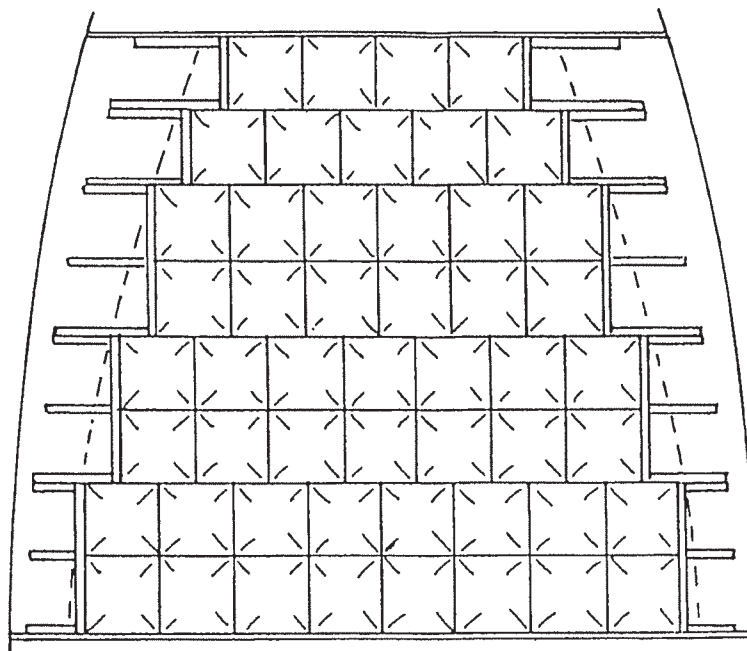


Figure 1 – Stowage and chocking of unit loads in a tapered stowage area (view from top)

4 STOWAGE

4.1 The unit loads should be stowed in such a way that securing, if needed, can be performed on all sides of the stow.

4.2 The unit loads should be stowed without any void space between the loads and the ship's sides to prevent the unit loads from racking.

4.3 When unit loads have to be stowed on top of each other, attention should be paid to the strength of pallets and the shape and the condition of the unit loads.

4.4 Precautions should be taken when unit loads are mechanically handled to avoid damaging the unit loads.

5 SECURING

Block stowage should be ensured and no void space be left between the unit loads.

6 SECURING WHEN STOWED ATHWARTSHIPS

6.1 When unit loads are stowed in a lower hold or in a 'tween-deck against a bulkhead from side to side, gratings or plywood sheets should be positioned vertically against the stack of the unit loads. Wire lashings should be fitted from side to side keeping the gratings or plywood sheets tight against the stow.

6.2 Additionally, lashing wires can be fitted at different spacing from the bulkhead over the stow to the horizontally placed wire lashings in order to further tighten the stow.

7 STOWAGE IN A WING OF A CARGO SPACE AND FREE AT TWO SIDES

When unit loads are stowed in the forward or after end of a cargo space and the possibility of shifting in two directions exists, gratings or plywood sheets should be positioned vertically to the stack faces of the unit loads of the non-secured sides of the stow. Wire lashings should be taken around the stow from the wings to the bulkhead. Where the wires can damage the unit loads (particularly on the corners of the stow), gratings or plywood sheets should be positioned in such a way that no damage can occur on corners.

8 STOWAGE FREE AT THREE SIDES

When unit loads are stowed against the ship's sides in such a way that shifting is possible from three sides, gratings or plywood sheets should be positioned vertically against the stack faces of the unit loads. Special attention should be paid to the corners of the stow to prevent damage to the unit loads by the wire lashings. Wire lashing at different heights should tighten the stow together with the gratings or plywood sheets at the sides (figure 2).

9 GENERAL

9.1 Instead of gratings or plywood sheets, other possibilities are the use of aluminium stanchions or battens of sufficient strength.

9.2 During the voyage the wire lashings should be regularly inspected and slack wires should be retightened if necessary. In particular, after rough weather, wire lashings should be checked and retightened if necessary.

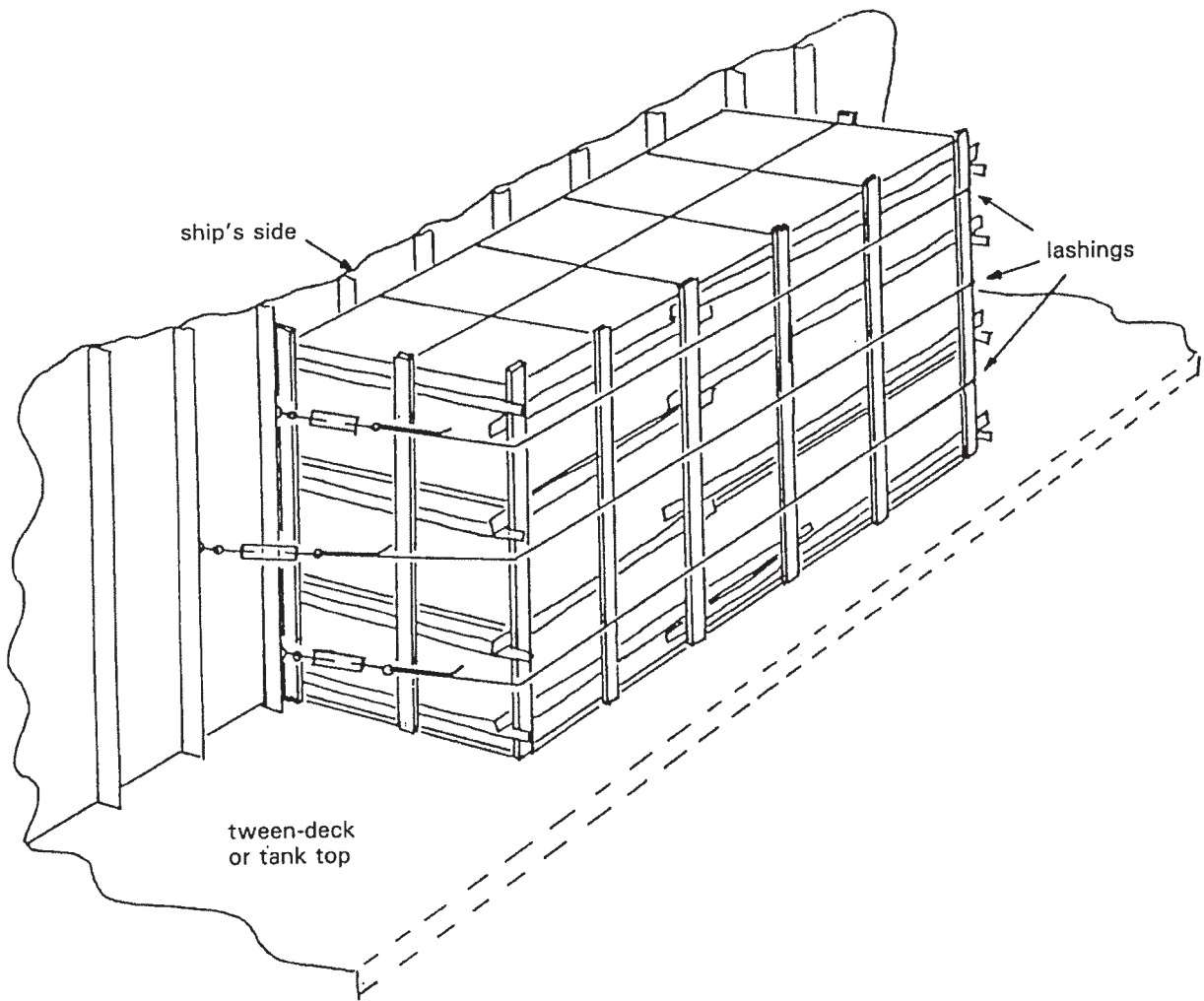


Figure 2 – Securing of units stowed at the ship's side