

ANNEX

AMENDMENTS TO THE INTERNATIONAL CODE OF SAFETY FOR
HIGH-SPEED CRAFT (1994 HSC CODE)

ANNEX 1

Form of Safety Certificate for High-Speed Craft

In the form of the High-Speed Craft Safety Certificate, the following new section is inserted between the section commencing with the words “This certificate is valid until” and the section commencing with the words “Issued at”:

“Completion date of the survey on which this certificate is based:”
(dd/mm/yyyy)

第 9/2015 號行政長官公告

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

國際海事組織海上安全委員會於二零零零年十二月五日對公約第II-2章作出修正，將有關國際消防安全系統規則的規定作為公約的強制性規定，並透過第MSC.98(73)號決議通過了《國際消防安全系統規則》，該規則自二零零二年七月一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MSC.98(73)號決議的中文及英文文本。

二零一五年二月四日發佈。

行政長官 崔世安

Aviso do Chefe do Executivo n.º 9/2015

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

Considerando igualmente que, em 5 de Dezembro de 2000, o Comité de Segurança Marítima da Organização Marítima Internacional procedeu a emendas ao capítulo II-2 da Convenção para tornar as disposições do Código Internacional dos Sistemas de Segurança contra Incêndios obrigatórias nos termos da Convenção, e que, através da resolução MSC.98(73), adoptou o Código Internacional dos Sistemas de Segurança contra Incêndios e que tal Código entrou em vigor, em relação à Região Administrativa Especial de Macau, a partir de 1 de Julho de 2002;

O Chefe do Executivo manda publicar, nos termos do n.º 1 do artigo 6.º da Lei n.º 3/1999 da Região Administrativa Especial de Macau, a resolução MSC.98(73), que contém o referido Código, nos seus textos em línguas chinesa e inglesa.

Promulgado em 4 de Fevereiro de 2015.

O Chefe do Executivo, *Chui Sai On*.

第 MSC.98 (73) 號決議

(2000 年 12 月 5 日通過)

通過《國際消防安全系統規則》

海上安全委員會，

憶及《國際海事組織公約》關於本委員會職責的第 28 (b) 條，

注意到對《1974 年海上人命安全公約 (SOLAS)》(以下稱“本公約”) 第 II-2 章的修訂，

認識到繼續強制實施經修訂的公約第 II-2 章所要求的消防安全系統的必要性，

注意到第 MSC.99 (73) 號決議，海安會以其通過了特別是對公約第 II-2 章的修訂，使《國際消防安全系統規則》(FSS 規則) 的規定根據本公約具有強制性，

在其第七十三次會議上，審議了建議的《FSS 規則》文本，

1. 通過了《國際消防安全系統規則》(FSS 規則)，其文本載於本決議附件中；
2. 請本公約締約國政府注意，《FSS 規則》將在經修訂的本公約第 II-2 章生效後於 2002 年 7 月 1 日生效；
3. 要求秘書長將本決議及其附件中的《FSS 規則》的核證副本轉發給本公約的所有締約國政府；

4. 進一步要求秘書長將本決議及附件的副本轉發給非本公約締約國政府的本組織會員。

附件

國際消防安全系統規則

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國際消防安全系統規則

（消防安全系統規則）

序言

1 本規則的目的是為經修正的《1974 年國際海上人命安全公約》第 II - 2 章所要求的消防安全系統提供具體工程規範的國際標準。

2 在 2002 年 7 月 1 日或以後，本規則對於經修正的《1974 年國際海上人命安全公約》所要求的消防安全系統將具有強制性。本規則今後的任何修正案均必須按本公約第 VIII 條規定的程序予以通過和生效。

第 1 章 — 總則

1 適用範圍

1.1 本規則適用於經修正的《1974 年安全公約》第 II - 2 章所述消防安全系統。

1.2 除另有明文規定外，本規則適用於 2002 年 7 月 1 日或以後安放龍骨或處於相似建造階段的船舶的消防安全系統。

2 定義

2.1 主管機關係指船舶的船旗國政府。

2.2 公約係指經修正的《1974 年國際海上人命安全公約》。

2.3 消防安全系統規則係指經修正的《1974 年海上人命安全公約》第 II - 2 章中所定義的《國際消防安全系統規則》。

2.4 就本規則而言，本公約第 II-2 章規定的定義同樣適用。

3 等效物和現代技術的使用

為了給消防安全系統的現代技術和開發留有餘地，如能滿足本公約第 II - 2 章 F 部分的要求，主管機關可以認可本規則中未予規定的消防安全系統。

4 毒性滅火劑的使用

如果主管機關認為，無論其本身或者在某種可能條件下，某滅火劑的使用會釋放出對人體造成危害的數量的有毒氣體、液體和其他物質，則應禁止使用。

第 2 章－國際通岸接頭

1 適用範圍

本章詳細規定了本公約第 II-2 章所要求的國際通岸接頭的規範。

2 工程規範

2.1 標準尺寸

國際通岸接頭法蘭的標準尺寸應符合下表要求：

表 2.1－國際通岸接頭標準尺寸

名稱	尺寸
外徑	178 毫米
內徑	64 毫米
螺栓圓周直徑	132 毫米
法蘭槽口	直徑為 19 毫米的孔 4 個，等距離分佈在上述直徑的螺栓圓周上，開槽口至法蘭盤的外緣
法蘭厚度	至少為 14.5 毫米
螺栓和螺母	4 套、每套直徑為 16 毫米，長度為 50 毫米

2.2 材料和附件

國際通岸接頭應用鋼材或其他等效材料製成，並設計成能承受 1 牛頓/平方毫米的工作壓力。法蘭的一側應為平面，另一側應為永久附連於船上消防栓或消防水帶的對接口。國際通岸接頭應與適合承受 1 牛頓/平方毫米工作壓力的任何材料的墊片，連同直徑 16 毫米、長度為 50 毫米的 4 個螺栓，4 個 16 毫米的螺母和 8 個墊圈一起保存於船上。

第 3 章 — 人員保護

1 適用範圍

本章詳細規定了本公約第 II - 2 章所要求的人員保護的規範。

2 工程規範

2.1 消防員裝備

消防員裝備包括一套個人設備和一副呼吸器。

2.1.1 個人配備

個人配備應由下列各項組成：

- .1 防護服，其材料應能保護皮膚不受火焰的熱輻射和不受灼傷與蒸汽燙傷。其外表面應能防水；
- .2 長統靴，由橡膠或其他絕緣材料製成；
- .3 一頂能對撞擊提供有效保護的硬頭盔；
- .4 一盞認可型的安全電燈（手提燈），其照明時間至少為 3 小時。在液貨船上使用的和擬用於危險區域的安全電燈應為防爆型；和
- .5 一把能提供高壓絕緣保護的帶柄斧頭。

2.1.2 呼吸器

呼吸器應為瓶內空氣儲存量至少為 1,200 升的自給式壓縮空氣呼吸器，或可供使用至少 30 分鐘的其他自給式呼吸器。呼吸器的所有氣瓶都應能夠互換使用。

2.1.3 救生繩

每一呼吸器均應配有一根長度至少 30 米的耐火救生繩。救生繩應能夠成功通過 5 分鐘的 3.5 千牛頓靜荷載認可試驗而不損壞。救生繩應能夠用卡鉤繫在呼吸器的背帶上，或繫在一條單獨的繫帶上，以防止在使用救生繩時呼吸器脫開。

2.2 緊急脫險呼吸裝置（脫險呼吸裝置）

2.2.1 總則

2.2.1.1 脫險呼吸裝置是僅在逃離有毒氣體艙室時使用的空氣或氧氣供應裝置，並應為認可型。

2.2.1.2 脫險呼吸裝置應不用於消防員滅火、進入缺氧隔離空艙或艙室配帶。在這些情況下，應使用專門適合這些用途的自給式呼吸器。

2.2.2 定義

2.2.2.1 面罩係指被設計成將眼睛、鼻子和嘴的周圍全部封閉起來，並以適當的方式將其固定就位的面部遮蓋物。

2.2.2.2 頭罩係指能把頭、頸完全覆蓋，並可能覆蓋部分肩部的頭部遮蓋物。

2.2.2.3 有害氣體係指對於生命或健康有直接危害的任何氣體。

2.2.3 細節

2.2.3.1 脫險呼吸裝置至少應能使用 10 分鐘。

2.2.3.2 脫險呼吸裝置應視情包括一個頭罩或全臉面罩，以便在脫險時保護眼睛、鼻子和嘴。頭罩和面罩均應由耐火材料製成，並包括清晰的視孔。

2.2.3.3 未啟用的脫險呼吸裝置應不用手便能攜帶。

2.2.3.4 脫險呼吸裝置應儲存適當，以免受環境的影響。

2.2.3.5 脫險呼吸裝置上應清晰地印有簡要的使用說明或清晰的圖示。計及需在極短的時間即要安全地擺脫有害氣體的情況，配戴程序應迅速易行。

2.2.4 標誌

在每一個脫險呼吸裝置上應印有保養要求、廠家商標和序列號、儲藏期限及生產日期，以及認可當局的名稱。所有用於培訓的脫險呼吸裝置均須清楚地標示。

第 4 章 – 滅火器

1 適用範圍

本章詳細規定了本公約第 II – 2 章所要求的滅火器的規範。

2 型式認可

所有滅火器均應為根據本組織制定的指南認可的型式和設計。

3 工程規範

3.1 滅火器

3.1.1 滅火劑數量

3.1.1.1 每個乾粉或二氧化碳滅火器的容量至少應為 5 公斤，而每一泡沫滅火器的容量至少應為 9 升。所有手提式滅火器的質量應不超過 23 公斤，並且它們均須具有至少相當於 9 升的液體滅火器的滅火能力。

3.1.1.2 主管機關應確定滅火器的等效物。

3.1.2 充劑

只能使用經認可的滅火劑給相應的滅火器填充。

3.2 便攜式泡沫滅火器

便攜式泡沫滅火器應包括一隻能以消防水帶連接於消防總管的感應式泡沫槍，連同一隻至少能裝 20 升發泡液的可攜式容器和一隻備用發泡液體容器。泡沫槍每分鐘應至少能產生 1.5 立方米適合於撲滅油類火災的有效泡沫。

第 5 章－固定式氣體滅火系統

1 適用範圍

本章詳細規定了本公約第 II-2 章要求的固定式氣體滅火系統的規範。

2 工程規範

2.1 總則

2.1.1 滅火劑

2.1.1.1 若要求滅火劑的數量能保護一個以上處所，則可供使用的滅火劑數量不必超過所保護處所中需要量最大的處所所需的數量。

2.1.1.2 在計算所需滅火劑的數量時，應將起動空氣接收器的量轉換成自由空氣量，增加到機器處所的總量中去。或者，可以從安全閥接一根排放管並直接引向露天。

2.1.1.3 應為船員配備安全檢查滅火容器中滅火劑數量的設備。

2.1.1.4 存放滅火劑的容器及其受壓部件，應在考慮到其位置和使用中可能遇到的最大環境溫度的情況下，按照主管機關認為滿意的實用壓力規則加以設計。

2.1.2 安裝要求

2.1.2.1 滅火劑分流管的佈置和噴嘴的位置應能使滅火劑得以均勻釋放。

2.1.2.2 除主管機關另行准許外，用於儲存除蒸汽以外的滅火劑的壓力容器，應按本公約第 II-2/10.4.3 條規定置於被保護處所的外面。

2.1.2.3 系統的備件應儲存在船上並使主管機關滿意。

2.1.3 系統控制要求

2.1.3.1 向被保護處所輸送滅火劑所需的管路應裝有控制閥，並清楚地標明該管路所通往的處所。應作出適當佈置防止由於疏忽將滅火劑輸入該處所。如裝有氣體滅火系統的貨物處所被用作旅客處所時，在作此用處期間應切斷氣體的連接。管路可穿過起居處所，但其應有相當的厚度，並且其氣密性在安裝後要進行壓力試驗，試驗壓頭不低於 5 牛頓/厘米²。此外，穿過起居處所的管路只能焊接，並且不得在此類處所內開設排水口或其他開口。管路應不穿過冷藏處所。

2.1.3.2 應裝有自動聲響警報裝置，在向滾裝處所和通常有人工作或出入的其他處所釋放滅火劑時能自動報警。釋放前報警應自動啟動（例如，通過打開釋放箱的門）。警報鳴響時間的長短應根據撤離該處所需要時間的長短而定，但無論如何在滅火劑釋放前不得少於 20 秒鐘。在僅有就地釋放器的傳統貨物處所和小處所（諸如壓縮機房、油漆間等），無需裝設此種警報器。

2.1.3.3 固定式氣體滅火系統的控制裝置應易於接近，便於操作，並應成組地安裝在儘可能少的不會被受保護處所的火災所切斷的位置。考慮到人員的安全，應在每一位置備有關於系統操作的清楚說明。

2.1.3.4 除主管機關准許外，不得使用滅火劑自動釋放裝置。

2.2 二氧化碳系統

2.2.1 滅火劑的數量

2.2.1.1 除另有規定外，貨物處所可用的二氧化碳量應足以放出體積至少等於該船最大的裝貨處所總容積 30% 的自由氣體。

2.2.1.2 機器處所所備的二氧化碳量應足以放出體積至少等於下列兩者中較大者的自由氣體：

- .1 所保護的最大機器處所總容積的 40%，該容積不包括水平面以上機艙棚的這樣一個部分：從該水平面起算，該水平面的面積等於或小於從艙頂到艙棚最低部分的中點處的艙棚水平截面面積的 40%；或
- .2 所保護的最大機器處所包括艙棚在內的總容積的 35%。

2.2.1.3 對小於 2,000 總噸的貨船，如有兩個或更多的機器處所未完全隔開，它們應被視為一個處所，則上述第 2.2.1.2 款所述的兩個百分數可分別減至 35% 和 30%。

2.2.1.4 就本款而言，二氧化碳自由氣體的容積應以 0.56 米³/千克計算。

2.2.1.5 機器處所的固定管路系統應為能在 2 分鐘內將 85% 的氣體注入該處所。

2.2.2 控制裝置

二氧化碳系統應符合下列要求：

- .1 應設置兩套獨立的控制裝置，以將二氧化碳釋放至被保護處所，並確保警報裝置的啟動。一套控制裝置應用於開啟將氣體輸送到被保護處所的管路上的閥門，另一套控制裝置應用於將氣體從儲存的容器中放出；和
- .2 該兩套控制裝置應位於一個釋放箱內，標明其用於何具體處所。如果放置控制裝置的箱上加鎖，則一把鑰匙應置於與該箱相鄰的位置明顯的設有可擊碎玻璃罩的盒子裏。

2.3 蒸汽系統的要求

供給蒸汽的一個或數個鍋爐，應具有每小時能對最大一個被保護處所的總容積的每 0.75 米³ 至少供給 1 千克蒸汽的蒸汽量。除符合上述要求外，該系統在其他各方面應由主管機關確定並使其滿意。

2.4 使用燃料燃燒後的氣態產物的系統

2.4.1 總則

如船上產生除二氧化碳或第 2.3 款所准許蒸汽以外的氣體，並用作滅火劑，則該系統應符合第 2.4.2 款的要求。

2.4.2 系統的要求

2.4.2.1 氣態產物

氣體應是燃料燃燒後的氣態產物，其氧氣含量、一氧化碳含量、腐蝕成分以及任何固體可燃成分的含量均應降至准許的最小量。

2.4.2.2 滅火系統的能力

2.4.2.2.1 如在固定式滅火系統中使用此種氣體作為保護機器處所的滅火劑，它應與使用二氧化碳作為滅火劑的固定式系統提供等效的保護。

2.4.2.2.2 如在固定式滅火系統中使用此種氣體作為保護貨物處所的滅火劑，應備有足夠數量的此種氣體，使每小時能供給自由氣體的體積至少等於最大一個被保護處所總容積的 25%，並能連續供氣 72 小時。

2.5 機器處所和貨泵艙的等效固定式氣體滅火系統

等效於第 2.2 至 2.4 款中規定的固定式氣體滅火系統，應由主管機關根據本組織制定的指南予以認可。

第 6 章－固定式泡沫滅火系統

1 適用範圍

本章詳細規定了本公約第 II - 2 章所要求的固定式泡沫滅火系統的規範。

2 工程規範

2.1 總則

固定式泡沫滅火系統應產生適合於撲滅油火的泡沫。

2.2 固定式高倍泡沫滅火系統

2.2.1 泡沫液的數量和性能

2.2.1.1 高倍泡沫滅火系統的泡沫液應由主管機關依據本組織制定的指南予以認可。

2.2.1.2 機器處所所要求的任何固定式高倍泡沫滅火系統應能通過固定噴射口迅速噴出數量足以每分鐘向被保護的最大處所至少注入 1 米深的泡沫。儲備發泡液應足夠產生 5 倍於被保護的最大處所的容積的泡沫。泡沫膨脹率應不超過 1,000 比 1。

2.2.1.3 如主管機關確信能取得同等的保護效果，則可以准許採用替代裝置和噴射率。

2.2.2 安裝要求

2.2.2.1 輸送泡沫的供給管道、泡沫發生器的空氣入口和泡沫生產裝置的數量應為主管機關認為能有效地生產泡沫和予以分配者。

2.2.2.2 泡沫發生器輸送管道的佈置應為，被保護處所發生火災時，泡沫發生設備不受影響。如果泡沫發生器位於被保護處所鄰近，則泡沫輸送管道應安裝在發生器和被保護處所之間相隔至少 450 毫米處。輸送泡沫的管道應使用厚度不小於 5 毫米的鋼材製成。此外，應在泡沫發生器和被保護處所之間的限界艙壁或甲板的開口處安裝厚度不小於 3 毫米的不鏽鋼擋火閘（單片或多片）。擋火閘應通過與之相關的泡沫發生器遙控裝置自動操作（電動、氣動或液壓）。

2.2.2.3 泡沫發生器、其電源、發泡液和該系統的控制裝置，應易於接近和便於操作，並應成組地設置在儘可能少的位置，這些位置應不大可能被所保護處所的火災所切斷。

2.3 固定式低倍泡沫滅火系統

2.3.1 數量和泡沫液

2.3.1.1 低倍泡沫滅火系統的泡沫液應由主管機關依據本組織制定的指南予以認可。

2.3.1.2 該系統應能通過固定的噴射口在不超過 5 分鐘的時間內噴出數量足以在燃油所能散佈的最大單個面積上覆蓋 150 毫米深的泡沫。泡沫膨脹率應不超過 12 比 1。

2.3.2 安裝要求

2.3.2.1 應裝有通過固定管系和控制閥或栓塞有效地將泡沫分送到適當噴射口以及用固定噴射器有效地將泡沫注入被保護處所內其他主要火災危險處的裝置。有效分配泡沫的裝置應通過計算或試驗證明能為主管機關接受。

2.3.2.2 任何此類系統的控制裝置應易於接近和便於操作，並應成組地設置在儘可能少的位置，這些位置應不大可能被所保護處所的火災所切斷。

第 7 章—固定式壓力水霧和細水霧滅火系統

1 適用範圍

本章詳細規定了本公約第 II - 2 章所要求的固定式壓力水霧和細水霧滅火系統的規範。

2 工程規範

2.1 固定式壓力水霧滅火系統

2.1.1 噴嘴和水泵

2.1.1.1 機器處所中所要求的任何固定式壓力水霧滅火系統，均應配有認可型噴嘴。

2.1.1.2 噴嘴的數量和佈置應使主管機關滿意，並應確保有 5 升/米²/分鐘的水量在其所保護的處所有效均勻地分佈。如果認為有必要增加噴水率，則其應使主管機關滿意。

2.1.1.3 應採取預防措施，防止噴嘴被水中的雜質所阻塞或因管系、噴嘴、閥和泵的腐蝕而阻塞。

2.1.1.4 水泵應能同時向任一被保護艙室內該系統的所有分區以所需的壓力供水。

2.1.1.5 水泵可以用獨立的內燃機驅動，但如其需靠視情符合本公約第 II - 1/42 條或 II - 1/43 條規定安裝的應急發電機供電，則該發電機應佈置成在主電源失靈時能自動啟動，以便使第 2.1.1.4 款所要求的水泵立即獲得電力。驅動水泵的獨立內燃機的位置應為，在一個或多個被保護處所失火時，不會影響對該機器的空氣供應。

2.1.2 安裝要求

2.1.2.1 在機器處所的污水溝、艙櫃頂和燃油易於流散到的其他區域以及其他具有特殊失火危險處的上方，都應設置噴嘴。

2.1.2.2 該系統可以分成若干分區，其分配閥應能從被保護處所以外易於到達的部位進行操作，以便不大容易被所保護處所的火災所切斷。

2.1.2.3 水泵及其控制設備應裝於被保護處所以外。噴水系統所保護處所的失火應不可能使該系統失去作用。

2.1.3 系統控制要求

該系統應以必要的壓力保持充水，並且當該系統內的壓力下降時，水泵能自動向系統供水。

2.2 等效細水霧滅火系統

機器處所和貨泵艙的細水霧滅火系統應由主管機關依據本組織制定的指南予以認可。

第 8 章—自動噴水器、探火和失火警報系統

1 適用範圍

本章詳細規定了本公約第 II - 2 章所要求的自動噴水器、探火和失火警報系統的規範。

2 工程規範

2.1 總則

2.1.1 噴水器系統的型號

自動噴水器系統應為濕管型，但如果主管機關認為作為一項必要的預防措施，則小型暴露段亦可為乾管型。桑拿房應安裝乾管系統，噴頭的操作溫度可達 140°C。

2.1.2 與第 2.2 至 2.4 款的規定等效的噴水器系統

與第 2.2 至 2.4 款的規定等效的自動噴水器系統應由主管機關依據本組織制定的指南予以認可。

2.2 動力供應源

2.2.1 客船

海水泵與自動警報和探火系統應具有不少於兩套動力供應源。如泵的動力源為電力時，則其應為一套主發電機和一套應急電源。泵的供電應一路來自主配電板，另一路來自通過專用獨立饋線的應急配電板。

除為通達相應配電板所必需之外，饋線應佈置成避免穿過廚房、機器處所和其他具有高失火危險的圍蔽處所，並應接通至位於噴水器泵附近的自動轉換開關。只要主配電板有電，此開關應一直由主配電板供電，並應設計成當此路供電發生故障時，能自動轉換至由應急配電板供電。主配電板和應急配電板上的開關均應清楚標示，並通常保持閉合。上述饋線不得設有其他開關。警報和探火系統動力源中的一路應為應急電源。如果泵的動力源之一是內燃機，則除應符合第 2.4.3 款的規定外，其所在位置應為在任何被保護處所失火時不影響機器的空氣供給。

2.2.2 貨船

海水泵與自動警報和探火系統應具有不少於兩套動力供應源。如泵為電力驅動時，則其應與主電源連接，該電源應由至少兩台發電機供電。除為通達相應配電板所必需之外，饋線應佈置成避免穿過廚房、機器處所和其他具有高失火危險的圍蔽處所。警報和探火系統動力源中的一路應為應急電源。如果泵的動力源之一是內燃機，則除應符合第 2.4.3 款的規定外，其所在位置應為在任何被保護處所失火時不影響機器的空氣供給。

2.3 部件要求

2.3.1 噴水器

2.3.1.1 噴水器應能耐海上大氣腐蝕。在起居和服務處所中，噴水器應在 68℃ 至 79℃ 的溫度範圍內開始工作，但在例如乾燥室等可能出現較高環境溫度的處所除外，在這些處所內，噴水器的操作溫度可以增加至艙室頂部最高溫度以上加不超過 30℃。

2.3.1.2 應在船上備有各種型號和規格的備用噴頭，其數量如下：

噴頭總數	所需備件數
< 300	6
300 至 1000	12
> 1000	24

任一型號的備用噴頭數無需超過所安裝的該型號噴頭總數。

2.3.2 壓力櫃

2.3.2.1 應裝有容積至少等於本款所規定充注水量兩倍的壓力櫃。壓力櫃應儲存相當於第 2.3.3.2 款所述水泵一分鐘排量的常備充注淡水量，並應裝有能保持櫃內空氣壓力的裝置，當櫃內常備充注淡水被使用時，能確保櫃內的壓力不低於噴水器的工作壓力加上所測得的從櫃底至系統中最高位置噴水器的水頭的壓力。應裝設在壓力下補充空氣和補充櫃內淡水的適當設施。壓力櫃應裝設顯示櫃內正確水位的玻璃水位表。

2.3.2.2 應設有防止海水進入櫃內的設施。

2.3.3 噴水器水泵

2.3.3.1 應裝有一台專供噴水器自動連續噴水的獨立動力泵。該泵應在壓力櫃內常備淡水完全排乾之前由於該系統壓力的降低而自動開始工作。

2.3.3.2 泵和管系應能對在最高位置的噴水器保持所需的壓力，以確保其能按第 2.5.2.3 款規定的噴水量連續噴水，足以同時覆蓋至少 280 米²的面積。該系統的液壓能力應通過審查液壓計算加以確認，如果主管機關認為必要，還應對該系統進行試驗。

2.3.3.3 在泵的噴水一側，應安裝一個帶有末端開口的排水短管的測試閥。閥和短管的有效截面積應足以放出對該泵要求的水量，而同時又保持第 2.3.2.1 款所規定的該系統的壓力。

2.4 安裝要求

2.4.1 總則

對於該系統在服務中可能處於冰凍溫度的任何部件，應作適當的防凍保護。

2.4.2 管系佈置

2.4.2.1 噴水器應分組成若干獨立分區，每一分區內的噴水器應不多於 200 個。在客船上，任一噴水器分區內的噴水器所服務的處所應不多於兩層甲板，並應位於不多於一個主豎區內。但是如果主管機關確信不致因此而降低船舶的防火性能，可以准許一個噴水器分區所服務的處所多於兩層甲板或位於在一個以上的主豎區內。

2.4.2.2 每一噴水器分區只能用一個截止閥加以分隔。每一分區的截止閥應易於接近，位於相關分區的外面或梯道圍壁內的小盒裏。閥的位置應有清楚和固定的標誌，並應有防止任何未經許可的人員操作該截止閥的措施。

2.4.2.3 每一噴水器分區應設一個試驗閥，用以放出相當於一個噴水器工作時的水量來測試自動報警。每一分區的試驗閥應安裝在該分區的截止閥附近。

2.4.2.4 噴水器系統應與船上的消防總管相連接，在連接處裝設一個可鎖閉的螺旋止回閥，防止水從噴水器系統中倒流至消防總管。

2.4.2.5 在每一個分區的截止閥處和中心站內，均應裝設一個指示該系統中壓力的儀錶。

2.4.2.6 泵的海水入口應儘可能位於該泵所在處所，並應佈置成當船舶處於漂浮狀態時，除檢查或修理水泵外，不需因任何其他目的而切斷該泵的海水供給。

2.4.3 系統的位置

噴水器泵和壓力櫃應位於遠離任何 A 類機器處所的位置，且不應位於需要由該噴水器系統保護的任何處所內。

2.5 系統控制要求

2.5.1 即時可用性

2.5.1.1 所要求的任何自動噴水器、探火和失火警報系統應能在任何時立即啟動而不需依靠船員操作啟動。

2.5.1.2 自動噴水器系統應以必要的壓力保持充水，並應按本章要求具有連續供水的設備。

2.5.2 警報和指示

2.5.2.1 每一噴水器分區都應包括能在一個或幾個指示裝置中自動發出聲光信號的警報裝置，當任一噴水器工作時都會發出信號。此警報系統應能指示該系統中發生的任何故障。此種裝置應顯示出該系統所服務的哪個分區內已經發生火災，並應由駕駛室或連續有人值班的中央控制站集控，此外，該裝置的聲光警報器還應位於前述處所以外的位置，以確保火災信號能立即被船員收到。

2.5.2.2 在第 2.5.2.1 款中所述指示裝置的位置之一應設有能夠對每一噴水器分區的警報器和指示器進行試驗的開關。

2.5.2.3 噴水器應設置在被保護處所的頂部位置，並保持適當的間隔，以使噴水器所保護的額定面積，保持不少於 5 升/米²/分鐘的平均噴水量。但是，如果表明不比上述效果差並使主管機關滿意，主管機關也可以准許使用適當分佈的不同噴水量的噴水器。

2.5.2.4 在每一指示裝置處應有表或圖顯示該裝置所涉及的處所和有關每一分區的位置。應有試驗和保養的適當說明。

2.5.3 試驗

應設有降低該系統壓力來試驗水泵自動工作的裝置。

第 9 章 – 固定式探火和失火警報系統

1 適用範圍

本章詳細規定了本公約第 II - 2 章所要求的固定式探火和失火警報系統的規範。

2 工程規範

2.1 一般要求

2.1.1 所要求的任何具有手動操作呼叫點的固定式探火和失火警報系統應能在任何時間立即工作。

2.1.2 固定式探火和失火警報系統不得用於任何其他目的，但可准許在控制板上關閉防火門和作類似用途。

2.1.3 系統和設備應設計適當，以能經受船上通常遇到的供電電壓變化和瞬時波動、環境溫度變化、振動、潮濕、衝擊、碰撞和腐蝕。

2.1.4 區址識別能力

具有區址識別能力的固定式探火和失火警報系統應佈置成：

- .1 備有確保在環路中發生的任何故障（例如停電、短路、接地等）將不會導致整個環路失效的裝置；
- .2 作出在發生故障（例如電氣、電子、信息等）時能夠使該系統恢復到最初的配置狀態的所有安排；
- .3 最先發出的火災警報信號不會妨礙任何其他探測器發出另外的火災警報信號；和
- .4 環路不會穿過同一處所兩次。如果這樣做不切實際（例如對於大的公共處所），則確有必要第二次穿過該處所的那部分環路應儘可能遠離其他部分的環路。

2.2 供電源

供固定式探火和失火警報系統工作中使用的電氣設備的供電源應不少於兩套，其中一套為應急電源。應由專用的獨立饋線供給電力。這些饋線應接至位於或鄰近於探火系統配電板上的自動轉換開關。

2.3 部件要求

2.3.1 探測器

2.3.1.1 探測器應通過熱、煙或其他燃燒產物、火焰或這些因素的任何組合而動作。主管機關可以考慮採用根據其他能指示出初始火災的因素而動作的探測器，但其靈敏度應不低於此種探測器。感焰探測器只能作為感煙或感溫探測器的補充。

2.3.1.2 所有梯道、走廊和起居處所內的脫險通道要求的感煙探測器應經過驗證，在煙密度超過 12.5%每米減光率之前動作，但在煙密度超過 2%每米減光率之前不應動作。其他處所安裝的感煙探測器應在主管機關考慮到避免探測器不靈敏或過度靈敏的情況時認為滿意的靈敏度極限內動作。

2.3.1.3 感溫探測器應經過驗證，當溫度以每分鐘不超過 1°C 的速率升高時，在溫度超過 78°C 之前動作，但在溫度超過 54°C 之前不應動作。升溫率更大時，感溫探測器應在主管機關考慮到避免探測器不靈敏或過度靈敏的情況時認為滿意的溫度極限內動作。

2.3.1.4 乾燥室和通常環境溫度較高的類似處所的感溫探測器的動作溫度可至 130°C，在桑拿房至 140°C。

2.3.1.5 所有探測器的型式都應為能進行正確操作試驗，並且無需更換任何部件便能恢復到正常的監測狀態。

2.4 安裝要求

2.4.1 分區

2.4.1.1 探測器和手動操作呼叫點應以組分成若干分區。

2.4.1.2 服務於控制站、服務處所或起居處所的探測器分區，不應包括 A 類機器處所。對於配有遠距和單獨識別的火災探測器的固定式探火和失火警報系統，覆蓋起居處所、服務處所和控制站的探測器分區的循環電路，不應包括 A 類機器處所的探火器分區。

2.4.1.3 如果固定式探火和失火警報系統不包括遠距識別每一單獨探測器的裝置，則起居處所、服務處所和控制站內的分區通常應不准許覆蓋多於一層甲板，但包括圍蔽梯道的分區除外。為避免延誤識別火源，每一分區所覆蓋的圍蔽處所的數量應由主管機關限定。無論如何，不得准許一個分區內的圍蔽處所多於 50 個。如果該系統裝有遠距和單獨識別的探火器，則分區可覆蓋幾層甲板，並服務於任何數量的圍蔽處所。

2.4.1.4 在客船上，如果沒有能夠遠距和單獨識別每一個探測器的固定式探火和失火警報系統，則一個分區的探測器所服務的處所不得同時包括船舶兩舷，不得多於一層甲板，也不得位於超過一個主豎區，但是，如果這些處所位於船艙或船艙，或者所保護的是不同甲板上的同類處所（如風機房、廚房、公共處所等），探測器同一分區所服務的處所可多於一層甲板上的處所。在寬度小於 20 米的船上，探測器的同一分區可同時服務於船舶兩舷的處所。在裝有單獨識別的探火器的客船上，一個分區可為船舶兩舷上和多層甲板上的處所服務，但這些處所應位於一個主豎區內。

2.4.2 探測器的定位

2.4.2.1 探測器應安裝於能獲得最佳性能的位置。靠近橫樑和通風管道或氣流會影響探測器性能的其他位置或有可能產生衝擊或物理性損傷的位置都應予避開。位於頂部的探測器與艙壁的距離至少應有 0.5 米，但在走廊、儲藏間和梯道中除外。

2.4.2.2 探測器的最大間距應符合下表：

表 9.1 – 探測器的間距

探測器類型	每一探測器的 最大地板面積	中心點之間的 最大距離	離開艙壁的 最大距離
感溫	37 米 ²	9 米	4.5 米
感煙	74 米 ²	11 米	5.5 米

主管機關可以根據表現探測器特性的試驗數據，要求或准許與上表不同的間距。

2.4.3 電線的佈置

2.4.3.1 構成該系統一部分的電線應佈置成避開廚房、A 類機器處所以及具有高失火危險的其他圍蔽處所，但有必要在此類處所配備探火和失火警報裝置或連接適當的電源的情況除外。

2.4.3.2 帶有區址識別能力的探火系統的環路在火災時會被損壞的部位不得多於一個。

2.5 系統控制要求

2.5.1 聲光火災信號

2.5.1.1 任何探測器或手動操作呼叫點的動作應在控制板和指示裝置上引起聲光火災信號。如果該信號在兩分鐘內未能引起注意，則應自動向所有船員起居處所、服務處所、控制站和 A 類機器處所發出聲響警報。這一聲響警報系統無需作為探測系統的組成部分。

2.5.1.2 控制板應位於駕駛室或位於連續有人值班的中央控制站。

2.5.1.3 作為最低要求，指示裝置應能表明已經動作的探測器或手動操作呼叫點所在的分區。至少有一套指示裝置應位於負責船員隨時易

於接近的位置。如果控制板位於主消防控制站內，則應有一套指示裝置位於駕駛室內。

2.5.1.4 應在每一指示裝置上或其附近展示該裝置所保護處所和分區的位置的清楚信息。

2.5.1.5 應對該系統操作所必需的動力供應和電路的失電和故障情況予以適當監測。若有故障情況發生，應在控制板上發出有別於火警信號的聲光故障信號。

2.5.2 試驗

應提供試驗和維護所需的適當說明書和備件。

第 10 章－取樣探煙系統

1 適用範圍

本章詳細規定了本公約第 II - 2 章所要求的取樣探煙系統的規範。

2 工程規範

2.1 一般要求

2.1.1 本章中凡出現“系統”一詞時，係指“取樣探煙系統”。

2.1.2 所要求的任何系統應能在任何時候連續工作，但按程序掃描原理工作的系統可被接受，條件是掃描同一位置兩次之間的間隔所給出的總反應時間應使主管機關滿意。

2.1.3 該系統的設計、製造和安裝應能防止任何有毒或可燃物質或滅火劑漏進任何起居處所和服務處所、控制站或機器處所。

2.1.4 該系統和設備應設計適當，以能經受船上通常遇到的供電電壓變化和瞬時波動、環境溫度變化、振動、潮濕、衝擊、碰撞和腐蝕，並避免可燃氣體和空氣混合物着火的可能性。

2.1.5 該系統的类型應為能進行正確操作試驗，並能在無需更換任何部件的情況下恢復到正常的監測狀態。

2.1.6 應配有該系統工作中所用的電氣設備的替代電源。

2.2 部件要求

2.2.1 感應裝置應經驗證，以在感應室內的煙密度超過每米 6.65% 的減光率之前動作。

2.2.2 應裝有雙套取樣風機。在正常通風條件下，風機應具有足夠的容量在被保護區內進行工作，並且總的反應時間應使主管機關滿意。

2.2.3 控制板應能使在每一取樣管上都可觀察煙霧。

2.2.4 應裝有通過取樣管監測氣流的裝置，並設計成確保從每一個相互連接的集煙器中抽取的量儘可能相等。

2.2.5 取樣管的內徑至少應為 12 毫米，但與固定式氣體滅火系統連接的取樣管除外，此時管路的最小尺度應足以使得滅火氣體能在適當的時間內被排放出來。

2.2.6 取樣管應配備一個以壓縮空氣定期驅煙的裝置。

2.3 安裝要求

2.3.1 集煙器

2.3.1.1 在每一個需要探煙的圍蔽處所應至少設置一個集煙器。但是，如果某一處所設計成交替裝載油或冷藏貨與需要裝取樣探煙系統的貨物，則可為該系統裝設隔離此類處所內集煙器的設施。此種設施應使主管機關滿意。

2.3.1.2 集煙器應安裝在能達到最佳性能的位置，其間距應使任何部分的頂甲板區域離集煙器的水平距離不大於 12 米。如果在可以機械通風的處所內採用這種系統，則在考慮集煙器的位置時應計及通風的影響。

2.3.1.3 集煙器應置於不會受到碰撞或機械損傷的位置。

2.3.1.4 每一取樣點不應連接四個以上的集煙器。

2.3.1.5 不同圍蔽處所的集煙器應不連接到同一個取樣點上。

2.3.2 取樣管

2.3.2.1 取樣管應佈置在能易於識別失火的位置。

2.3.2.2 取樣管應是自泄式，並有適當的保護裝置以防止裝卸貨物時受到碰撞和損壞。

2.4 系統控制要求

2.4.1 聲光警報信號

2.4.1.1 控制板應位於駕駛室或連續有人值班的中央控制站。

2.4.1.2 應在控制板上或其附近展示該裝置所保護處所的清楚信息。

2.4.1.3 探測到煙火或其他燃燒產物時，應在控制板和駕駛室或連續有人值班的中央控制站發出聲光信號。

2.4.1.4 應對該系統作業所必需的電源的失電情況予以監測。任何失電情況均應在控制室和駕駛室內發出聲光信號，該信號應與煙火探測信號有所區別。

2.4.2 試驗

應提供該系統試驗和維護所需的適當說明書和備件。

第 11 章 — 低位照明系統

1 適用範圍

本章詳細規定了本公約第 II - 2 章所要求的低位照明系統的規範。

2 工程規範

2.1 一般要求

所要求的任何低位照明系統應由主管機關依據本組織制定的指南予以認可，或達到本組織可接受的國際標準。

第 12 章 — 固定式應急消防泵

1 適用範圍

本章詳細規定了本公約第 II - 2 章所要求的應急消防泵的規範。本章不適用於 1,000 總噸及以上的客船。對此類船舶的要求見本公約第 II - 2/10.2.2.3.1.1 條。

2 工程規範

2.1 總則

應急消防泵應為固定式獨立動力驅動的泵。

2.2 部件要求

2.2.1 應急消防泵

2.2.1.1 泵的排量

泵的排量應不低於本公約第 II - 2/10.2.2.4.1 條所要求的消防泵總排量的 40%，並且在任何情況下不低於下列排量：

- .1 對小於 1,000 總噸的客船和 2,000 總噸及以上的貨船；和 25 米³/小時
- .2 對小於 2,000 總噸的貨船 15 米³/小時。

2.2.1.2 消防栓壓力

當泵按第 2.2.1.1 款的要求供水時，消防栓處的壓力應不小於本公約第 II - 2 章所要求的最低壓力。

2.2.1.3 吸頭

泵的總吸頭和淨正吸頭的確定應考慮本公約和本章有關泵的排量和在營運中可能遇到的各種橫傾、縱傾、橫搖和縱搖狀況下消防栓的壓力。船舶在進出乾塢時的壓載狀況不必視為營運狀況。

2.2.2 柴油機和燃油櫃

2.2.2.1 柴油機的起動

泵的任何柴油驅動動力源應能在溫度降至 0℃ 時在其冷態下易於以人工（手動）曲柄起動。如果這樣做不可行，或如遇更低氣溫時，則可考慮主管機關可接受的加熱安排，以確保隨時起動。如人工（手動）起動不可行，則主管機關可准許其他起動方式。這些方式應能夠在

30 分鐘內至少使柴油驅動的動力源起動六次，並在前 10 分鐘內至少起動兩次。

2.2.2.2 燃油櫃容量

燃油供應櫃應能裝盛能使泵在全負荷下至少運行 3 小時的燃油，同時在 A 類機器處所外應儲備足以能使該泵在全負荷下再運行 15 小時的燃油。

第 13 章 — 脫險通道的安排

1 適用範圍

本章詳細規定了本公約第 II - 2 章所要求的脫險通道的規範。

2 客船

2.1 梯道的寬度

2.1.1 梯道寬度的基本要求

梯道的淨寬度應不小於 900 毫米。對於超過 90 人的情況，每超過 1 人時梯道的淨寬度應至少增加 10 毫米。經由此種梯道撤離的總人數應假定為此種梯道所服務區域內船員和旅客總人數的三分之二。梯道的寬度應不小於按第 2.1.2 款所確定寬度。

2.1.2 梯道寬度的計算方法

2.1.2.1 計算的基本原則

2.1.2.1.1 本計算方法確定每一層甲板上梯道的最小寬度，計及通向所考慮梯道的相鄰梯道。

2.1.2.1.2 基本思路是，計算方法應考慮到單獨從每一主豎區內的圍蔽處所的撤離，同時考慮到使用每一區域中梯道圍蔽的所有人員，即使他們從另一主豎區進入該梯道。

2.1.2.1.3 對於每一主豎區，應計算出夜間（第一種情況）和白天（第二種情況）和在兩種情況下用於確定所考慮的每一層甲板的梯道寬度的最大尺度。

2.1.2.1.4 梯道寬度的計算應依據每一層甲板上負載的船員和旅客而定。乘載負荷應由設計者按旅客和船員居住處所、服務處所、控制處所和機器處所的情況予以額定。就計算而言，公共處所的最大容量應按以下兩個數值來定：或者按座位數或類似佈置，或者按每人佔甲板表面面積 2 米² 計算所得的數。

2.1.2.2 最小值的計算方法

2.1.2.2.1 基本公式

在考慮每種情況下能容納及時從臨近的上、下甲板撤離到集合站的人流所用梯道寬度的設計時，應採用下列計算方法（見圖 1 和圖 2）：

當連接兩層甲板時： $W = (N_1 + N_2) \times 10$ 毫米；

當連接三層甲板時： $W = (N_1 + N_2 + 0.5N_3) \times 10$ 毫米；

當連接四層甲板時： $W = (N_1 + N_2 + 0.5N_3 + 0.25N_4) \times 10$ 毫米；和

當連接五層或更多甲板時，梯道寬度應通過對所考慮的甲板和相鄰甲板使用上述的連接四層甲板的公式來確定，

式中：

W = 所要求的梯道扶手間的行走寬度。

如果梯道在甲板層上設有面積為 S 的梯道平台，則 W 的計算值可以減少。這種減少通過在 Z 中減去 P 來實現，在此：

$$P = S \times 3 \text{ 人/米}^2; \quad \text{而 } P_{\max} = 0.25Z$$

式中：

Z = 預計在所考慮的甲板上要撤離的總人數

P = 暫時躲避在梯道平台上的人數，該人數可從 Z 中減去， P 的最大值為 $0.25Z$ （下捨取整至最接近的整數）

S = 平台面積（米²）減去開門所需要的面積，再減去人流接近梯道所需的面積（見圖 1）

N = 預計來自所考慮的每一相鄰甲板的需要使用該梯道的總人數； N_1 代表使用該梯道人數最多的甲板； N_2 代表人流直接進入該梯道人數次多的甲板；在確定每一層甲板的梯道寬度時， $N_1 > N_2 > N_3 > N_4$ （見圖 2）。這些甲板被假定為在所考慮的甲板上或其上游（即離開登乘甲板方向）。

圖 1

用於減小梯道寬度的平台計算

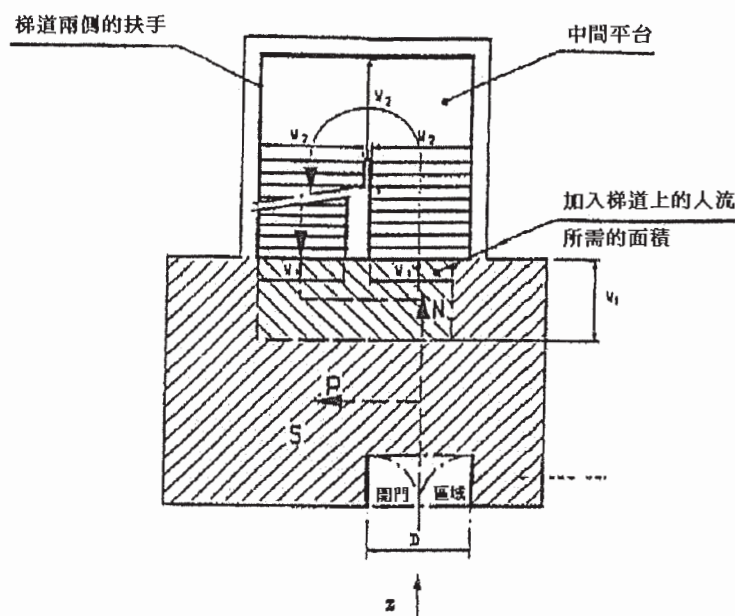
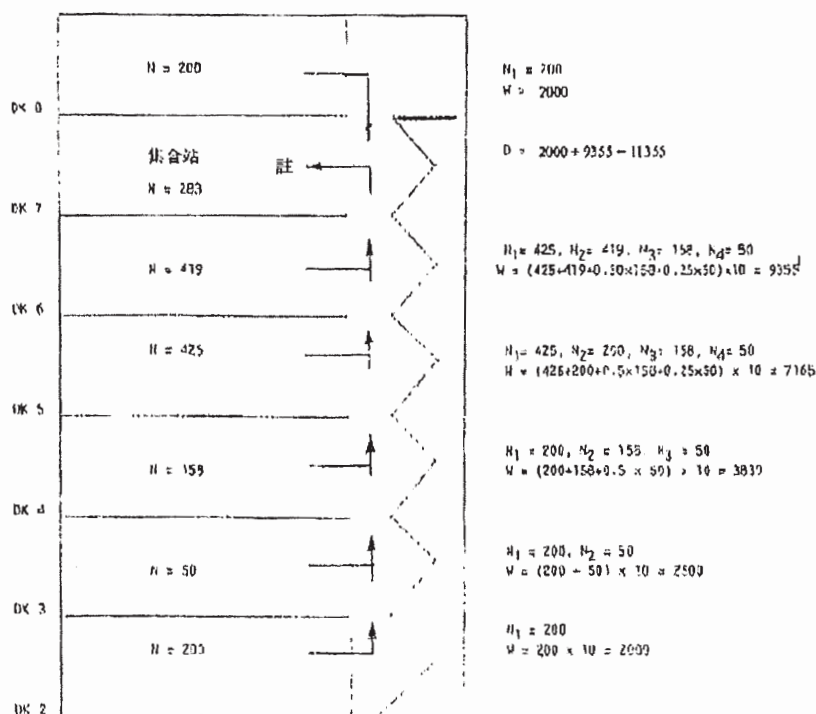


圖 2

最小梯道寬度（W）計算示例



Z = 預計通過梯道撤離的人數

N = 從某一甲板直接進入梯道的人數

W（毫米）= $(N_1 + N_2 + 0.5 \times N_3 + 0.25 \times N_4) \times 10$ = 計算出的梯道寬度

D（毫米）= 出口門寬度

$N_1 > N_2 > N_3 > N_4$ 其中：

N₁ = 直接進入梯道人數 N 最多的甲板

N₂ = 直接進入梯道人數 N 次多的甲板，等

註：集合站的門的合計寬度應為 10,255 毫米。

2.1.2.2.2 人員分流

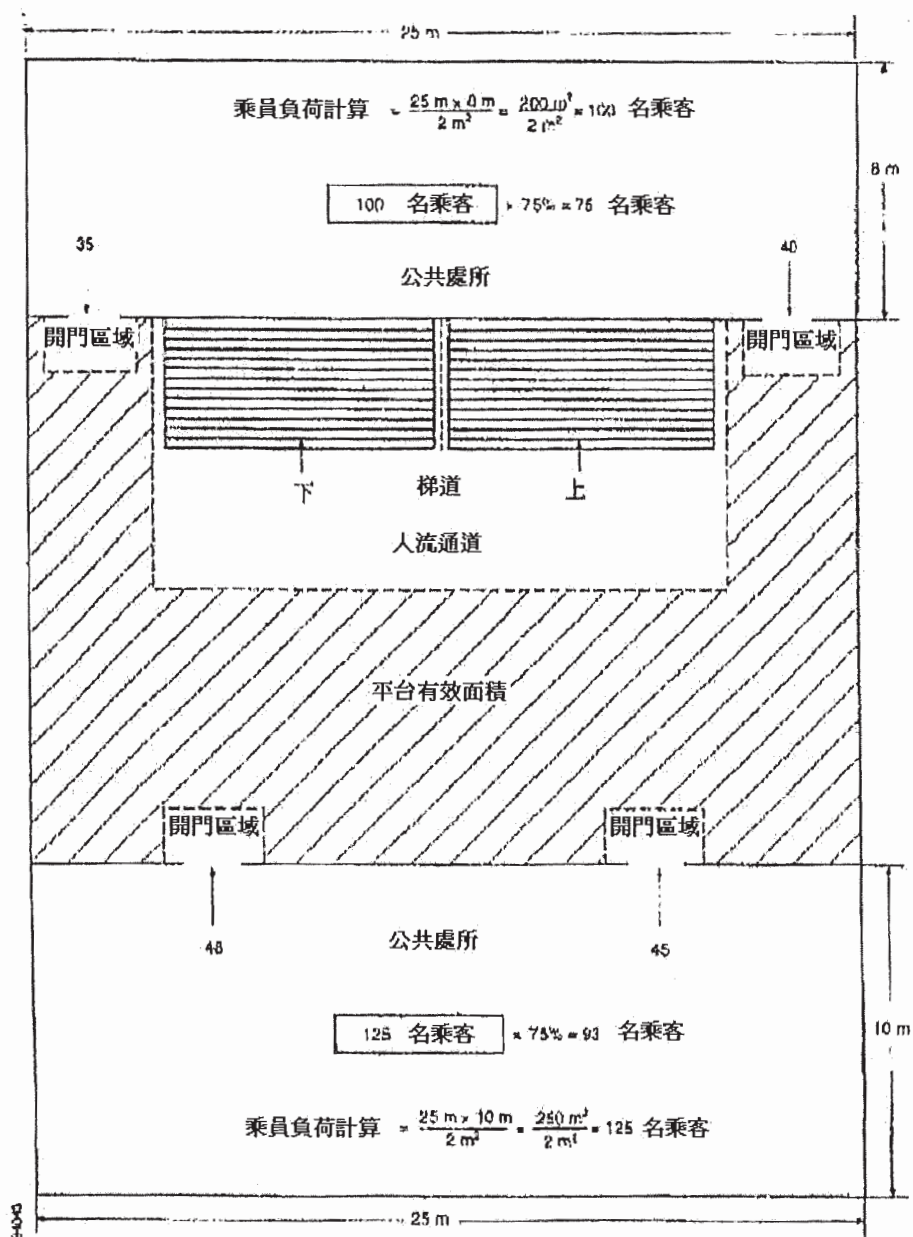
2.1.2.2.2.1 脫險通道的尺度應根據從梯道和通過門廳、走廊和梯道平台（見圖 3）逃生的預計總人數來計算。對於下述處所的兩種佔用情況應作分別計算。對於逃生路線的每一組成部分，所確定的尺度應不小於按每一種情況確定的最大尺度：

第一種情況：在鋪位容量最大的艙室中住滿旅客；在船員艙室的船員佔據最大鋪位容量的三分之二；以及服務處所有三分之一的船員。

第二種情況：公共處所中的旅客佔據最大容量的四分之三；公共處所中的船員佔據最大容量的三分之一；服務處所由三分之一的船員佔據；以及船員居住處所由三分之一的船員佔據。

圖 3

乘員負荷計算示例



2.1.2.2.2 在僅計算梯道寬度時，某一主豎區內容納的最大乘員數，包括從另一主豎區進入梯道的人員，不應假定為高於船舶的核定載客人數。

2.1.3 禁止減少通向集合站梯道的寬度

在向集合站撤離的方向的梯道寬度不得減少。如在一個主豎區內有幾個集合站時，向最遠的集合站方向撤離的梯道的寬度不得減少。

2.2 梯道的細節

2.2.1 扶手

梯道的兩側應安裝扶手。扶手間的最大淨寬度為 1,800 毫米。

2.2.2 梯道走向

所有尺度超過 90 人使用的梯道應為艏艉向梯道。

2.2.3 豎向高度和傾斜度

不帶樓梯平台的梯道的豎向高度不應超過 3.5 米，傾斜角不應大於 45 度。

2.2.4 平台

除了服務於公共處所直接通向梯道圍壁的梯道平台外，每一層甲板上的梯道平台的面積應不小於 2 米²，如果使用該平台的人數超過 20 人，每增加 10 人增加 1 平方米，但不必超過 16 米²。

2.3 門廳和走廊

2.3.1 門廳和走廊以及脫險通道內的中間平台的尺度應與梯道同法處理。

2.3.2 通向集合站的梯道出口門的合計寬度應不小於為該層甲板服務的梯道總寬度。

2.4 通向登乘甲板的撤離路線

2.4.1 集合站

應該認識到通向登乘甲板的撤離路線可包括一個集合站。在這種情況下，應考慮防火要求和從梯道圍壁到集合站和從集合站到登乘甲板的走廊和門的尺度，並注意到從集合站撤離人員至登乘位置將分成小的控制組進行。

2.4.2 從集合站到救生筏登乘位置的路線

如果旅客和船員被困在一個集合站，而該集合站卻不在救生筏登乘位置，則從集合站到登乘位置的梯道和門的寬度應按控制組的人數計算。除非在通常情況下從這些處所撤離需要更大的尺度，否則梯道和門的尺度不必超過 1,500 毫米。

2.5 脫險通道平面圖

2.5.1 應備有標明下列內容的脫險通道平面圖：

- .1 在所有通常有人的處所中船員和乘客的人數；
- .2 預計經梯道並通過門廳、走廊和平台逃生的船員和乘客的人數；
- .3 集合站和救生艇筏登乘位置；
- .4 主要和次要的脫險通道；和
- .5 梯道、門、走廊和平台區域寬度。

2.5.2 脫險通道平面圖應附有確定逃生梯道、門、走廊和平台區域寬度的詳細計算情況。

3 貨船

用作脫險通道的梯道和走廊的淨寬度應不小於 700 毫米，而且應在一側有扶手。淨寬在 1,800 毫米及以上的梯道和走廊應在兩側都有扶手。“淨寬”是指扶手與另一側艙壁之間或兩側扶手之間的距離。梯道的傾斜角一般為 45 度，但不大於 50 度，在機器處所和小處所則不應大於 60 度。通向梯道的門廳應與梯道寬度相同。

第 14 章—固定式甲板泡沫系統

1 適用範圍

本章詳細規定了本公約第 II - 2 章所要求的固定式甲板泡沫系統的規範。

2 工程規範

2.1 總則

2.1.1 提供泡沫的裝置應能將泡沫輸送到整個液貨甲板區域以及甲板已破損的任何液貨艙內。

2.1.2 甲板泡沫系統應能簡單而迅速地操作。

2.1.3 按所需輸出量操作甲板泡沫系統時，應允許同時從消防總管按所需壓力噴射所需最小數量的水柱。

2.2 部件要求

2.2.1 泡沫溶液和泡沫濃縮劑

2.2.1.1 泡沫溶液的供給率不得小於下列數值中的最大值：

- .1 按液貨甲板面積每平方米每分鐘 0.6 升，此處液貨甲板面積係指船舶最大寬度乘以全部液貨艙的縱向總長度；
- .2 按具有最大面積的單個液貨艙的水平截面面積計算，每平方米每分鐘 6 升；或
- .3 按最大噴射裝置保護並完全位於該裝置前方的面積計算，每平方米每分鐘 3 升，但不少於每分鐘 1,250 升。

2.2.1.2 應供應足量的泡沫濃縮劑，以保證在採用第 2.2.1.1 款所規定的泡沫溶液供給率中的最大值時，對裝設惰性氣體裝置的液貨船能產生泡沫至少 20 分鐘，或者，對沒有裝設惰性氣體裝置的液貨船能產生泡沫至少 30 分鐘，以大者為準。泡沫倍數（即所產生的泡沫體積與水和發泡濃縮劑混合物的體積之比）一般不超過 12 比 1。如果系統基本上產生低泡沫，但其倍數比稍稍超過 12 比 1，則所需的泡沫溶液的數量仍然按倍數比為 12 比 1 的系數計算。當採用中等倍數的泡沫時（倍數在 50 比 1 至 150 比 1 之間），泡沫的使用率和泡沫噴射裝置的能量應使主管機關滿意。

2.2.2 噴射裝置和泡沫槍

2.2.2.1 來自固定式泡沫系統的泡沫應用噴射裝置和泡沫槍來供應。每一噴射裝置應至少供給第 2.2.1.1.1 款和第 2.2.1.1.2 款所要求的泡沫溶液供給率的 50%。對載重量少於 4,000 載重噸的液貨船，主管機關可以不要求裝設噴射裝置，而只要求裝設泡沫槍。但在這種情況下，每一泡沫槍的能力至少應是第 2.2.1.1.1 款或第 2.2.1.1.2 款所要求的泡沫溶液供給率的 25%。

2.2.2.2 任一噴射裝置應對所保護的、完全位於它的前方的甲板區域至少能以每平方米每分鐘 3 升的能力噴射泡沫溶液。該能力不得低於每分鐘 1,250 升。

2.2.2.3 任一泡沫槍的能力應不小於每分鐘 400 升，其射程在靜止空氣中應不小於 15 米。

2.3 安裝要求

2.3.1 主控制站

該系統的主控制站應恰當地佈置在液貨艙區域以外，靠近起居處所，並位於在被保護區域萬一失火時易於接近和操作的地點。

2.3.2 噴射裝置

2.3.2.1 噴射裝置的數量和位置應符合第 2.1.1 款的要求。

2.3.2.2 從噴射裝置至其前方所保護區域最遠端的距離，應不大於該裝置在靜止空氣中射程的 75%。

2.3.2.3 應在尾樓或面向液貨艙甲板的起居處所的前端左右兩舷各裝設一具噴射裝置和用於泡沫槍的軟管接頭。對於載重量小於 4,000 總噸的液貨船，應在尾樓或面向液貨艙甲板的起居處所的前端左右兩舷各裝設一具供泡沫槍使用的軟管接頭。

2.3.3 泡沫槍

2.3.3.1 泡沫槍的配備數量應不少於 4 具。泡沫總管出口的數量和佈置應為能使至少 2 具泡沫槍將泡沫噴射到液貨船甲板區域的任何部位。

2.3.3.2 泡沫槍的裝設應保證在滅火操作中動作靈活，並覆蓋噴射裝置保護不到的區域。

2.3.4 隔離閥

在泡沫總管以及當與甲板泡沫系統構成一個整體時在消防總管上，緊靠噴射裝置前，應設有隔離閥，以隔離這些總管的損壞部分。

第 15 章 – 惰性氣體系統

1 適用範圍

本章詳細規定了本公約第 II - 2 章所要求的惰性氣體系統的規範。

2 工程規範

2.1 總則

2.1.1 整個本章中液貨艙一詞亦包括污油水艙。

2.1.2 本公約第 II - 2 章中所提到的惰性氣體系統的設計、建造和試驗均應使主管機關滿意。其設計與操作應能使得並保持液貨艙內的大氣在任何時候都不能燃燒，但當此種艙需要除氣時除外。萬一惰性氣體系統不能滿足上述操作要求，並估計維修不可行，則只有在其符合《惰性氣體系統指南》規定的“緊急情況”時，方可繼續進行卸貨、排除壓載和必要的貨艙清洗。

2.1.3 功能要求

該系統應能夠：

- .1 通過降低每一液貨艙大氣的含氧量使之達到不能支持燃燒的水平，而使空液貨艙惰化；

- .2 在港內和海上始終保持任何液貨艙內的任何部分的大氣含氧量按體積計不超過 8%並保持正壓，但當需要對此種艙除氣時除外；
- .3 在正常作業中空氣不得進入液貨艙，但當需要對此種艙除氣時除外；和
- .4 驅除空液貨艙內碳氫化合物氣體，以便隨後任何時候在艙內進行除氣作業都不會產生可燃氣體。

2.2 部件要求

2.2.1 惰性氣體的供應

2.2.1.1 惰性氣體的來源可以是主或輔助鍋爐經過處理的煙道氣體。主管機關也可以允許使用來自一個或多個各自獨立的惰性氣體發生器或其他來源或任何它們的混合氣體，但必須達到等效的安全標準。此種系統應儘可能符合本章要求。不准使用利用儲備的二氧化碳氣體的系統，除非主管機關認為系統本身所產生的靜電的着火危險降至最小程度。

2.2.1.2 該系統應能以船舶卸載能力的最大速率至少 125%的比率（按體積計算）向液貨艙輸送惰性氣體。

2.2.1.3 該系統以任何所需的流速向液貨艙輸送惰性氣體時，在惰性氣體供氣總管內的含氧量按體積計應不超過 5%。

2.2.1.4 惰性氣體發生器應裝有兩台燃油泵。但如果在船上備有燃油泵及其原動機的足夠備件，以便船員在燃油泵及其原動機發生故障時可以進行檢修，主管機關可允許只裝 1 台燃油泵。

2.2.2 清洗器

2.2.2.1 應裝設煙道氣體清洗器，使其有效冷卻第 2.2.1.2 款和第 2.2.1.3 款所規定的全部氣體並清除其中的固體顆粒和硫的燃燒產物。冷卻水系統的佈置應保證連續向惰性氣體系統供應足量的冷卻水而不妨礙船上任何其他重要用途的供水。此外還應有備用冷卻水供水裝置。

2.2.2.2 應裝設過濾器或等效設施，以儘量減少被帶到惰性氣體鼓風機裏的水量。

2.2.2.3 清洗器應位於所有液貨艙、液貨泵艙和將這些處所與 A 類機器處所隔開的隔離空艙的後方。

2.2.3 鼓風機

2.2.3.1 應至少裝設兩台鼓風機，並應能至少向液貨艙輸送第 2.2.1.2 款和第 2.2.1.3 款要求的氣體體積。如果帶有氣體發生器的系統能向被保護的液貨艙輸出第 2.2.1.2 款和第 2.2.1.3 款要求的氣體總量，則主管機關可允許只安裝一台鼓風機；但船上應備有鼓風機及其原動機的足夠備件，以便船員在鼓風機及其原動機發生故障時可以進行檢修。

2.2.3.2 惰性氣體系統的設計應為，其能作用在任一液貨艙的最大壓力將不超過該液貨艙的試驗壓力。在每台鼓風機的進、排氣連接管上應安裝截止閥。應裝設能使惰性氣體設備的功能在開始卸貨前達到穩定的裝置。如果將鼓風機用於除氣，則其空氣進口應裝有盲斷裝置。

2.2.3.3 鼓風機應位於所有液貨艙、液貨泵艙和將這些處所與 A 類機器處所隔開的隔離空艙的後方。

2.2.4 水封

2.2.4.1 第 2.3.1.4.1 款所述的水封應能由兩台獨立的泵供水，每台應能一直保持足夠的供水量。

2.2.4.2 水封和它的附屬裝置的佈置應能在各種工況下防止碳氫化合物氣體倒流，並保證起到正常的密封作用。

2.2.4.3 應有確保防止水封被冰凍的措施，該措施不會因過熱而有損於水封的完整性。

2.2.4.4 與水封有關的供水和排水管以及通往氣體安全處所的透氣管或壓力傳感管均應裝設環流水管或其他經認可的裝置。應有防止此種環流水管被真空吸空的措施。

2.2.4.5 甲板水封和環流裝置應能防止碳氫化合物氣體在其壓力等於液貨艙的試驗壓力時發生回流。

2.2.4.6 關於第 2.4.3.1.7 款，應使主管機關對於在所有時間維持充足水量以及在氣流停止時維持裝置的完整性以便能自動形成水封方面感到滿意。在得不到惰性氣體供應時，水封水低位的聲光警報應啟動。

2.3 安裝要求

2.3.1 系統中的安全措施

2.3.1.1 煙道氣體隔離閥

在鍋爐煙道與煙道氣體清洗器之間的惰性氣體供氣總管上應安裝煙道氣體隔離閥。這些隔離閥應設有表明閥是處於開啟或關閉狀態的指示器，並採取措施使其保持氣密和使閥座避免煙灰污染。應設有裝置用來保證當相應煙道氣體隔離閥開啟時鍋爐吹灰器不能操作。

2.3.1.2 防止煙道氣體泄漏

2.3.1.2.1 清洗器和鼓風機連同有關管系和附件的設計和佈置應予以特別考慮，以防止煙道氣體泄漏到圍蔽處所內。

2.3.1.2.2 為了安全維修，應在煙道氣體隔離閥與清洗器之間，或在清洗器的煙氣入口處，裝設一台附加水封裝置或有效防止煙氣滲漏的其他設備。

2.3.1.3 氣體調節閥

2.3.1.3.1 在惰性氣體供氣總管上應安裝一個氣體調節閥。按第 2.3.1.5 款的要求，該閥應能自動控制關閉。除非第 2.2.3 款中要求的惰性氣體鼓風機裝有自動控制轉速的設備，否則，它還應能自動調節通往液貨艙的惰性氣體的氣流。

2.3.1.3.2 第 2.3.1.3.1 款所述的氣體調節閥應裝在惰性氣體總管通過的最前面的氣體安全處所的前艙壁處。

2.3.1.4 煙道氣體止回裝置

2.3.1.4.1 在惰性氣體供氣總管上，應至少安裝兩個止回裝置，其中之一應為水封，以便在船舶所有正常的縱傾、橫傾以及運動的情況下，防止碳氫化合物氣體回流至機器處所的煙道或任何氣體安全處所。它們應位於第 2.3.1.3.1 款所要求的自動閥與通向液貨艙或液貨管路的最後一段連接管之間。

2.3.1.4.2 第 2.3.1.4.1 款所述的裝置應位於液貨艙區域的甲板面上。

2.3.1.4.3 第二個止回裝置應為能防止氣體或液體倒流的止回閥或等效設備，並安裝在第 2.3.1.4.1 款所要求的甲板水封的前方。它應裝有

可靠的關閉裝置。作為可靠關閉裝置的替代措施，可以在止回閥的前方裝設一個附加的具有此種關閉作用的閥，以便將甲板水封與通往各液貨艙的惰性氣體總管隔離開來。

2.3.1.4.4 作為防止從甲板總管倒流的碳氫化合物液體或氣體可能泄漏的一個附加措施，應在第 2.3.1.4.3 款所述的具有可靠關閉裝置的閥和第 2.3.1.3 款所述的閥之間的管段上備有設施，在前者所指的閥被關閉時，能安全地透氣。

2.3.1.5 自動關閉裝置

2.3.1.5.1 惰性氣體鼓風機和氣體調節閥的自動關閉裝置應按第 2.4.3.1.1、2.4.3.1.2 和 2.4.3.1.3 款規定的預定限值進行安排。

2.3.1.5.2 氣體調節閥的自動關閉裝置應按第 2.4.3.1.4 款的規定進行安排。

2.3.1.6 含氧多的氣體

按照第 2.4.3.1.5 款，當惰性氣體的含氧量以體積計超過 8%時，應立即採取措施改善氣體的質量。除非氣體的質量得到改善，否則所有液貨艙作業應予暫停，以避免空氣被吸入艙內，而且第 2.3.1.4.3 款所述的隔離閥也應關閉。

2.3.2 惰性氣體管線

2.3.2.1 在第 2.2.4 和 2.3.1.4 款所要求的止回裝置的前方，惰性氣體總管可以分成兩根或兩根以上的支管。

2.3.2.2 惰性氣體供氣總管應裝有通向每一個液貨艙的支管。惰性氣體支管應裝有截止閥或等效控制裝置，以將每一個液貨艙隔開。如果

裝的是截止閥，則應設有鎖閉裝置，由負責的高級船員控制。控制系統應提供此類閥的操作狀況的明確信息。

2.3.2.3 對於混裝船，用來將含有油或殘油的污油水艙與其他艙隔開的裝置，應由盲板法蘭組成，當載運油類以外貨物時，這種法蘭應一直保持在原來的位置上，但《惰性氣體系統指南》有關章節中另有規定者除外。

2.3.2.4 應設有保護液貨艙在與惰性氣體總管隔開時免受因溫度變化引起超壓或真空的影響的裝置。

2.3.2.5 管系應設計成在所有正常的情況下能防止液貨或水在管路內積聚。

2.3.2.6 應設有適當裝置使惰性氣體總管能與外部的惰性氣體供應管相連接。該裝置應包括 250 毫米標稱管材尺寸的螺栓法蘭，用閥將惰性氣體總管隔開，並位於第 2.3.1.4.3 款提到的止回閥的前方。法蘭的設計應符合在船舶貨物管系的其他外部連接的設計中所採用的標準中的適當等級。

2.3.2.7 如果在惰性氣體供氣總管與液貨管系之間裝有連接管，考慮到在兩個系統之間可能存在較大的壓力差，因此應設有保證有效隔離的裝置。該裝置應由兩個截止閥組成，並在兩閥之間裝有能使該處空間安全透氣的裝置，或者裝有帶盲板的短管組成的裝置。

2.3.2.8 位於液貨總管一側用來隔離惰性氣體供氣總管與液貨總管的閥，應為帶有可靠關閉裝置的止回閥。

2.4 操作與控制要求

2.4.1 指示裝置

在惰性氣體鼓風機進行工作的任何時候，應有設備用以連續指示鼓風機排氣端惰性氣體的溫度和壓力。

2.4.2 指示和記錄裝置

2.4.2.1 當供送惰性氣體時，應有儀錶連續指示和永久記錄：

- .1 第 2.3.1.4.1 款所述止回裝置前方惰性氣體供氣總管內的壓力；和
- .2 鼓風機排氣端的惰性氣體供氣總管內惰性氣體的含氧量。

2.4.2.2 第 2.4.2.1 款中所述的裝置應置於液貨控制室（如有此室）內。如果沒有液貨控制室，則應安裝在負責液貨作業的高級船員易於接近的位置。

2.4.2.3 此外，應在以下位置安裝儀錶：

- .1 在駕駛室內，在所有時間內指示第 2.4.2.1.1 款所述的壓力，並在混裝船上污水水艙與惰性氣體供氣總管隔離時，指示污水水艙內的壓力；和
- .2 在機器控制室或機器處所內，顯示第 2.4.2.1.2 款所述的含氧量。

2.4.2.4 應配備手提式儀器，用以測定氧氣和可燃氣體的濃度。此外，應對每個液貨艙作出適當佈置，以便能使用這些手提式儀器測定液貨艙內的大氣情況。

2.4.2.5 應配備適當裝置，用以校準第 2.4.2.1 至 2.4.2.4 款中所述的固定式和手提式氣體濃度測量儀錶的零位和刻度。

2.4.3 聲光警報裝置

2.4.3.1 對於煙道氣體型和惰性氣體發生器型的惰性氣體系統，均應裝設聲光警報裝置，以指示：

- .1 第 2.2.2.1 款所述的煙道氣體清洗器內的水壓和流量過低；
- .2 第 2.2.2.1 款所述的煙道氣體清洗器內的水位過高；
- .3 第 2.4.1 款所述的氣體溫度過高；
- .4 第 2.2.3 款所述的惰性氣體鼓風機失靈；
- .5 第 2.4.2.1.2 款所述的氣體含氧量按體積計超過 8%；
- .6 第 2.3.1.3 和 2.4.2.1 款所述的氣體調節閥自動控制系統和指示裝置失去動力供應；
- .7 第 2.3.1.4.1 款所述的水封中的水位過低；
- .8 第 2.4.2.1.1 款所述的氣體壓力低於 100 毫米水柱。警報裝置應保證混裝船的污水水艙內的壓力在所有時間都得到監測；和
- .9 第 2.4.2.1.1 款所述的氣體壓力過高。

2.4.3.2 對於惰性氣體發生器型的惰性氣體系統，應增設聲光警報裝置，以顯示：

- .1 燃油供應不足；

.2 發生器失去動力；和

.3 發生器自動控制系統失去動力。

2.4.3.3 第 2.4.3.1.5、2.4.3.1.6 和 2.4.3.1.8 款所要求的警報裝置應安裝在機器處所和液貨控制室（如有此室）之內，但在每一種情況下，所要求的警報裝置都應安裝在負責的船員能立即收到的位置。

2.4.3.4 應裝設一個獨立於第 2.4.3.1.8 款所要求的警報裝置的聲響警報系統或自動關閉液貨泵的裝置，它們在惰性氣體總管內達到預定的低壓限值時啟動。

2.4.4 使用說明書

船上應備有詳細的使用說明書，其內容包括操作方法、安全和維修要求以及有關惰性氣體系統及其在液貨艙系統中的應用對職業健康的危害。說明書應包括萬一惰性氣體系統發生故障或失效時所應遵循的程序指南。

RESOLUTION MSC.98(73)
(adopted on 5 December 2000)

ADOPTION OF THE INTERNATIONAL CODE FOR FIRE SAFETY SYSTEMS

THE MARITIME SAFETY COMMITTEE,

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

NOTING the revision of chapter II-2 of the International Convention for the Safety of Life at Sea (SOLAS), 1974 (hereinafter referred to as “the Convention”),

RECOGNIZING the need to continue the mandatory application of the fire safety systems required by the revised chapter II-2 of the Convention,

NOTING resolution MSC.99(73) by which it adopted, *inter alia*, the revised chapter II-2 of the Convention to make the provisions of the International Code for Fire Safety Systems (FSS Code) mandatory under the Convention,

HAVING CONSIDERED, at its seventy-third session, the text of the proposed FSS Code,

1. ADOPTS the International Code for Fire Safety Systems (FSS Code), the text of which is set out in the Annex to the present resolution;
2. INVITES Contracting Governments to the Convention to note that the FSS Code will take effect on 1 July 2002 upon the entry into force of the revised chapter II-2 of the Convention;
3. REQUESTS the Secretary-General to transmit certified copies of this resolution and the text of the FSS Code contained in the Annex to all Contracting Governments to the Convention;
4. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and the Annex to all Members of the Organization which are not Contracting Governments to the Convention.

ANNEX

INTERNATIONAL CODE FOR FIRE SAFETY SYSTEMS**Table of contents****Preamble**

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THE INTERNATIONAL CODE FOR FIRE SAFETY SYSTEMS **(Fire Safety Systems Code)**

PREAMBLE

1 The purpose of this Code is to provide international standards of specific engineering specifications for fire safety systems required by chapter II-2 of the International Convention for the Safety of Life at Sea, 1974, as amended.

2 On or after 1 July 2002, this Code will be mandatory for fire safety systems required by the International Convention for the Safety of Life at Sea, 1974, as amended. Any future amendment to the Code must be adopted and brought into force in accordance with the procedure laid down in article VIII of the Convention.

CHAPTER 1 - GENERAL

1 Application

1.1 This Code is applicable to fire safety systems as referred to in chapter II-2 of the International Convention for the Safety of Life at Sea, 1974, as amended.

1.2 Unless expressly provided otherwise, this Code is applicable for the fire safety systems of ships the keels of which are laid or which are at a similar stage of construction on or after 1 July 2002.

2 Definitions

2.1 *Administration* means the Government of the State whose flag the ship is entitled to fly.

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

2.3 *Fire Safety Systems Code* means the International Code for Fire Safety Systems as defined in chapter II-2 of the International Convention for the Safety of Life at Sea, 1974, as amended.

2.4 For the purpose of this Code, definitions provided in chapter II-2 of the Convention also apply.

3 Use of equivalents and modern technology

In order to allow modern technology and development of fire safety systems, the Administrations may approve fire safety systems which are not specified in this Code if the requirements of part F of chapter II-2 of the Convention are fulfilled.

4 Use of toxic extinguishing media

The use of a fire-extinguishing medium which, in the opinion of the Administration, either by itself or under expected conditions of use gives off toxic gases, liquids and other substances in such quantities as to endanger persons shall not be permitted.

CHAPTER 2 - INTERNATIONAL SHORE CONNECTIONS

1 Application

This chapter details the specifications for international shore connections as required by chapter II-2 of the Convention.

2 Engineering specifications

2.1 Standard dimensions

Standard dimensions of flanges for the international shore connection shall be in accordance with the following table:

Table 2.1 - Standard dimensions for international shore connections

Description	Dimension
Outside diameter	178 mm
Inside diameter	64 mm
Bolt circle diameter	132 mm
Slots in flange	4 holes 19 mm in diameter spaced equidistantly on a bolt circle of the above diameter, slotted to the flange periphery
Flange thickness	14.5 mm minimum
Bolts and nuts	4, each of 16 mm diameter, 50 mm in length

2.2 Materials and accessories

International shore connections shall be of steel or other equivalent material and shall be designed for 1 N/mm² services. The flange shall have a flat face on one side and, on the other side, it shall be permanently attached to a coupling that will fit the ship's hydrant and hose. The connection shall be kept aboard the ship together with a gasket of any material suitable for 1 N/mm² services, together with four bolts of 16 mm diameter and 50 mm in length, four 16 mm nuts, and eight washers.

CHAPTER 3 - PERSONNEL PROTECTION

1 Application

This chapter details the specifications for personnel protection as required by chapter II-2 of the Convention.

2 Engineering specifications

2.1 Fire-fighter's outfit

A fire-fighter's outfit shall consist of a set of personal equipment and a breathing apparatus.

2.1.1 Personal equipment

Personal equipment shall consist of the following:

- .1 protective clothing of material to protect the skin from the heat radiating from the fire and from burns and scalding by steam. The outer surface shall be water-resistant;
- .2 boots of rubber or other electrically non-conducting material;
- .3 rigid helmet providing effective protection against impact;

- .4 electric safety lamp (hand lantern) of an approved type with a minimum burning period of 3 h. Electric safety lamps on tankers and those intended to be used in hazardous areas shall be of an explosion-proof type; and
- .5 axe with a handle provided with high-voltage insulation.

2.1.2 Breathing apparatus

Breathing apparatus shall be a self-contained compressed air-operated breathing apparatus for which the volume of air contained in the cylinders shall be at least 1,200 l, or other self-contained breathing apparatus which shall be capable of functioning for at least 30 min. All air cylinders for breathing apparatus shall be interchangeable.

2.1.3 Lifeline

For each breathing apparatus a fireproof lifeline of at least 30 m in length shall be provided. The lifeline shall successfully pass an approval test by statical load of 3.5 kN for 5 min without failure. The lifeline shall be capable of being attached by means of a snap-hook to the harness of the apparatus or to a separate belt in order to prevent the breathing apparatus becoming detached when the lifeline is operated.

2.2 Emergency escape breathing devices (EEBD)

2.2.1 General

2.2.1.1 An EEBD is a supplied air or oxygen device only used for escape from a compartment that has a hazardous atmosphere and shall be of an approved type.

2.2.1.2 EEBDs shall not be used for fighting fires, entering oxygen deficient voids or tanks, or worn by fire-fighters. In these events, a self-contained breathing apparatus, which is specifically suited for such applications, shall be used.

2.2.2 Definitions

2.2.2.1 Face piece means a face covering that is designed to form a complete seal around the eyes, nose and mouth which is secured in position by a suitable means.

2.2.2.2 Hood means a head covering which completely covers the head, neck, and may cover portions of the shoulders.

2.2.2.3 Hazardous atmosphere means any atmosphere that is immediately dangerous to life or health.

2.2.3 Particulars

2.2.3.1 The EEBD shall have a service duration of at least 10 min.

2.2.3.2 The EEBD shall include a hood or full face piece, as appropriate, to protect the eyes, nose and mouth during escape. Hoods and face pieces shall be constructed of flame resistant materials and include a clear window for viewing.

2.2.3.3 An inactivated EEBD shall be capable of being carried hands-free.

2.2.3.4 An EEBD, when stored, shall be suitably protected from the environment.

2.2.3.5 Brief instructions or diagrams clearly illustrating their use shall be clearly printed on the EEBD. The donning procedures shall be quick and easy to allow for situations where there is little time to seek safety from a hazardous atmosphere.

2.2.4 Markings

Maintenance requirements, manufacturer's trademark and serial number, shelf life with accompanying manufacture date and name of the approving authority shall be printed on each EEBD. All EEBD training units shall be clearly marked.

CHAPTER 4 - FIRE EXTINGUISHERS

1 Application

This chapter details the specifications for fire extinguishers as required by chapter II-2 of the Convention.

2 Type approval

All fire extinguishers shall be of approved types and designs based on the guidelines developed by the Organization.

3 Engineering specifications

3.1 Fire extinguisher

3.1.1 Quantity of medium

3.1.1.1 Each powder or carbon dioxide extinguisher shall have a capacity of at least 5 kg and each foam extinguisher shall have a capacity of at least 9 l. The mass of all portable fire extinguishers shall not exceed 23 kg and they shall have a fire-extinguishing capability at least equivalent to that of a 9 l fluid extinguisher.

3.1.1.2 The Administration shall determine the equivalents of fire extinguishers.

3.1.2 Recharging

Only refills approved for the fire extinguisher in question shall be used for recharging.

3.2 Portable foam applicators

A portable foam applicator unit shall consist of a foam nozzle of an inductor type capable of being connected to the fire main by a fire hose, together with a portable tank containing at least 20 l of foam-forming liquid and one spare tank of foam-making liquid. The nozzle shall be capable of producing effective foam suitable for extinguishing an oil fire, at the rate of at least 1.5 m³/min.

CHAPTER 5 - FIXED GAS FIRE-EXTINGUISHING SYSTEMS

1 Application

This chapter details the specifications for fixed gas fire-extinguishing systems as required by chapter II-2 of the Convention.

2 Engineering specifications

2.1 General

2.1.1 Fire-extinguishing medium

2.1.1.1 Where the quantity of the fire-extinguishing medium is required to protect more than one space, the quantity of medium available need not be more than the largest quantity required for any one space so protected.

2.1.1.2 The volume of starting air receivers, converted to free air volume, shall be added to the gross volume of the machinery space when calculating the necessary quantity of the fire-extinguishing medium. Alternatively, a discharge pipe from the safety valves may be fitted and led directly to the open air.

2.1.1.3 Means shall be provided for the crew to safely check the quantity of the fire-extinguishing medium in the containers.

2.1.1.4 Containers for the storage of fire-extinguishing medium and associated pressure components shall be designed to pressure codes of practice to the satisfaction of the Administration having regard to their locations and maximum ambient temperatures expected in service.

2.1.2 Installation requirements

2.1.2.1 The piping for the distribution of fire-extinguishing medium shall be arranged and discharge nozzles so positioned that a uniform distribution of the medium is obtained.

2.1.2.2 Except as otherwise permitted by the Administration, pressure containers required for the storage of fire-extinguishing medium, other than steam, shall be located outside the protected spaces in accordance with regulation II-2/10.4.3 of the Convention.

2.1.2.3 Spare parts for the system shall be stored on board and be to the satisfaction of the Administration.

2.1.3 System control requirements

2.1.3.1 The necessary pipes for conveying fire-extinguishing medium into the protected spaces shall be provided with control valves so marked as to indicate clearly the spaces to which the pipes are led. Suitable provision shall be made to prevent inadvertent release of the medium into the space. Where a cargo space fitted with a gas fire-extinguishing system is used as a passenger space, the gas connection shall be blanked during such use. The pipes may pass through accommodations providing that they are of substantial thickness and that their tightness is verified with a pressure test, after their installation, at a pressure head not less than 5 N/mm². In addition, pipes passing through accommodation areas shall be joined only by welding and shall

not be fitted with drains or other openings within such spaces. The pipes shall not pass through refrigerated spaces.

2.1.3.2 Means shall be provided for automatically giving audible warning of the release of fire-extinguishing medium into any ro-ro spaces and other spaces in which personnel normally work or to which they have access. The pre-discharge alarm shall be automatically activated (e.g., by opening of the release cabinet door). The alarm shall operate for the length of time needed to evacuate the space, but in no case less than 20 s before the medium is released. Conventional cargo spaces and small spaces (such as compressor rooms, paint lockers, etc.) with only a local release need not be provided with such an alarm.

2.1.3.3 The means of control of any fixed gas fire-extinguishing system shall be readily accessible, simple to operate and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in a protected space. At each location there shall be clear instructions relating to the operation of the system having regard to the safety of personnel.

2.1.3.4 Automatic release of fire-extinguishing medium shall not be permitted, except as permitted by the Administration.

2.2 Carbon dioxide systems

2.2.1 Quantity of fire-extinguishing medium

2.2.1.1 For cargo spaces the quantity of carbon dioxide available shall, unless otherwise provided, be sufficient to give a minimum volume of free gas equal to 30% of the gross volume of the largest cargo space to be protected in the ship.

2.2.1.2 For machinery spaces the quantity of carbon dioxide carried shall be sufficient to give a minimum volume of free gas equal to the larger of the following volumes, either:

- .1 40% of the gross volume of the largest machinery space so protected, the volume to exclude that part of the casing above the level at which the horizontal area of the casing is 40% or less of the horizontal area of the space concerned taken midway between the tank top and the lowest part of the casing; or
- .2 35% of the gross volume of the largest machinery space protected, including the casing.

2.2.1.3 The percentages specified in paragraph 2.2.1.2 above may be reduced to 35% and 30%, respectively, for cargo ships of less than 2,000 gross tonnage provided that where two or more machinery spaces are not entirely separate, they shall be considered as forming one space.

2.2.1.4 For the purpose of this paragraph the volume of free carbon dioxide shall be calculated at 0.56 m³/kg.

2.2.1.5 For machinery spaces, the fixed piping system shall be such that 85% of the gas can be discharged into the space within 2 min.

2.2.2 Controls

Carbon dioxide systems shall comply with the following requirements:

- .1 two separate controls shall be provided for releasing carbon dioxide into a protected space and to ensure the activation of the alarm. One control shall be used for opening the valve of the piping which conveys the gas into the protected space and a second control shall be used to discharge the gas from its storage containers; and
- .2 the two controls shall be located inside a release box clearly identified for the particular space. If the box containing the controls is to be locked, a key to the box shall be in a break-glass-type enclosure conspicuously located adjacent to the box.

2.3 Requirements of steam systems

The boiler or boilers available for supplying steam shall have an evaporation of at least 1 kg of steam per hour for each 0.75 m³ of the gross volume of the largest space so protected. In addition to complying with the foregoing requirements, the systems in all respects shall be as determined by, and to the satisfaction of, the Administration.

2.4 Systems using gaseous products of fuel combustion

2.4.1 General

Where gas other than carbon dioxide or steam, as permitted by paragraph 2.3, is produced on the ship and is used as a fire-extinguishing medium, the system shall comply with the requirements in paragraph 2.4.2.

2.4.2 Requirements of the systems

2.4.2.1 Gaseous products

Gas shall be a gaseous product of fuel combustion in which the oxygen content, the carbon monoxide content, the corrosive elements and any solid combustible elements in a gaseous product shall have been reduced to a permissible minimum.

2.4.2.2 Capacity of fire-extinguishing systems

2.4.2.2.1 Where such gas is used as the fire-extinguishing medium in a fixed fire-extinguishing system for the protection of machinery spaces, it shall afford protection equivalent to that provided by a fixed system using carbon dioxide as the medium.

2.4.2.2.2 Where such gas is used as the fire-extinguishing medium in a fixed fire-extinguishing system for the protection of cargo spaces, a sufficient quantity of such gas shall be available to supply hourly a volume of free gas at least equal to 25 % of the gross volume of the largest space protected in this way for a period of 72 h.

2.5 Equivalent fixed gas fire-extinguishing systems for machinery spaces and cargo pump rooms

Fixed gas fire-extinguishing systems equivalent to those specified in paragraphs 2.2 to 2.4 shall be approved by the Administration based on the guidelines developed by the Organization.

CHAPTER 6 - FIXED FOAM FIRE-EXTINGUISHING SYSTEMS

1 Application

This chapter details the specifications for fixed foam fire-extinguishing systems as required by chapter II-2 of the Convention.

2 Engineering specifications

2.1 General

Fixed foam fire-extinguishing systems shall be capable of generating foam suitable for extinguishing oil fires.

2.2 Fixed high-expansion foam fire-extinguishing systems

2.2.1 Quantity and performance of foam concentrates

2.2.1.1 The foam concentrates of high-expansion foam fire-extinguishing systems shall be approved by the Administration based on the guidelines developed by the Organization.

2.2.1.2 Any required fixed high-expansion foam system in machinery spaces shall be capable of rapidly discharging through fixed discharge outlets a quantity of foam sufficient to fill the greatest space to be protected at a rate of at least 1 m in depth per minute. The quantity of foam-forming liquid available shall be sufficient to produce a volume of foam equal to five times the volume of the largest space to be protected. The expansion ratio of the foam shall not exceed 1,000 to 1.

2.2.1.3 The Administration may permit alternative arrangements and discharge rates provided that it is satisfied that equivalent protection is achieved.

2.2.2 Installation requirements

2.2.2.1 Supply ducts for delivering foam, air intakes to the foam generator and the number of foam-producing units shall in the opinion of the Administration be such as will provide effective foam production and distribution.

2.2.2.2 The arrangement of the foam generator delivery ducting shall be such that a fire in the protected space will not affect the foam generating equipment. If the foam generators are located adjacent to the protected space, foam delivery ducts shall be installed to allow at least 450 mm of separation between the generators and the protected space. The foam delivery ducts shall be constructed of steel having a thickness of not less than 5 mm. In addition, stainless steel dampers (single or multi-bladed) with a thickness of not less than 3 mm shall be installed at the openings in the boundary bulkheads or decks between the foam generators and the protected space. The dampers shall be automatically operated (electrically, pneumatically or hydraulically) by means of remote control of the foam generator related to them.

2.2.2.3 The foam generator, its sources of power supply, foam-forming liquid and means of controlling the system shall be readily accessible and simple to operate and shall be grouped in as few locations as possible at positions not likely to be cut off by a fire in the protected space.

2.3 Fixed low-expansion foam fire-extinguishing systems

2.3.1 Quantity and foam concentrates

2.3.1.1 The foam concentrates of low-expansion foam fire-extinguishing systems shall be approved by the Administration based on the guidelines developed by the Organization.

2.3.1.2 The system shall be capable of discharging through fixed discharge outlets in not more than 5 min a quantity of foam sufficient to cover to a depth of 150 mm the largest single area over which oil fuel is liable to spread. The expansion ratio of the foam shall not exceed 12 to 1.

2.3.2 Installation requirements

2.3.2.1 Means shall be provided for the effective distribution of the foam through a permanent system of piping and control valves or cocks to suitable discharge outlets, and for the foam to be effectively directed by fixed sprayers on other main fire hazards in the protected space. The means for effective distribution of the foam shall be proven acceptable to the Administration through calculation or by testing.

2.3.2.2 The means of control of any such systems shall be readily accessible and simple to operate and shall be grouped together in as few locations as possible at positions not likely to be cut off by a fire in the protected space.

CHAPTER 7 - FIXED PRESSURE WATER-SPRAYING AND WATER-MIST FIRE-EXTINGUISHING SYSTEMS

1 Application

This chapter details the specifications for fixed pressure water-spraying and water-mist fire-extinguishing systems as required by chapter II-2 of the Convention.

2 Engineering specifications

2.1 Fixed pressure water-spraying fire-extinguishing systems

2.1.1 Nozzles and pumps

2.1.1.1 Any required fixed pressure water-spraying fire-extinguishing system in machinery spaces shall be provided with spraying nozzles of an approved type.

2.1.1.2 The number and arrangement of the nozzles shall be to the satisfaction of the Administration and shall be such as to ensure an effective average distribution of water of at least 5 l/m²/min in the spaces to be protected. Where increased application rates are considered necessary, these shall be to the satisfaction of the Administration.

2.1.1.3 Precautions shall be taken to prevent the nozzles from becoming clogged by impurities in the water or corrosion of piping, nozzles, valves and pump.

2.1.1.4 The pump shall be capable of simultaneously supplying at the necessary pressure all sections of the system in any one compartment to be protected.

2.1.1.5 The pump may be driven by an independent internal combustion machinery, but, if it is dependent upon power being supplied from the emergency generator fitted in compliance with the provisions of regulation II-1/42 or regulation II-1/43 of the Convention, as appropriate, that generator shall be so arranged as to start automatically in case of main power failure so that power for the pump required by paragraph 2.1.1.4 is immediately available. The independent internal combustion machinery for driving the pump shall be so situated that a fire in the protected space or spaces will not affect the air supply to the machinery.

2.1.2 Installation requirements

2.1.2.1 Nozzles shall be fitted above bilges, tank tops and other areas over which oil fuel is liable to spread and also above other specific fire hazards in the machinery spaces.

2.1.2.2 The system may be divided into sections, the distribution valves of which shall be operated from easily accessible positions outside the spaces to be protected so as not to be readily cut off by a fire in the protected space.

2.1.2.3 The pump and its controls shall be installed outside the space or spaces to be protected. It shall not be possible for a fire in the space or spaces protected by the water-spraying system to put the system out of action.

2.1.3 System control requirements

The system shall be kept charged at the necessary pressure and the pump supplying the water for the system shall be put automatically into action by a pressure drop in the system.

2.2 Equivalent water-mist fire-extinguishing systems

Water-mist fire-extinguishing systems for machinery spaces and cargo pump-rooms shall be approved by the Administration based on the guidelines developed by the Organization.

CHAPTER 8 - AUTOMATIC SPRINKLER, FIRE DETECTION AND FIRE ALARM SYSTEMS

1 Application

This chapter details the specifications for automatic sprinkler, fire detection and fire alarm systems as required by chapter II-2 of the Convention.

2 Engineering specifications

2.1 General

2.1.1 Type of sprinkler systems

The automatic sprinkler systems shall be of the wet pipe type, but small exposed sections may be of the dry pipe type where, in the opinion of the Administration, this is a necessary precaution. Saunas shall be fitted with a dry pipe system, with sprinkler heads having an operating temperature up to 140°C.

2.1.2 Sprinkler systems equivalent to those specified in paragraphs 2.2 to 2.4

Automatic sprinkler systems equivalent to those specified in paragraphs 2.2 to 2.4 shall be approved by the Administration based on the guidelines developed by the Organization.

2.2 Sources of power supply

2.2.1 Passenger ships

There shall be not less than two sources of power supply for the sea water pump and automatic alarm and detection system. Where the sources of power for the pump are electrical, these shall be a main generator and an emergency source of power. One supply for the pump shall be taken from the main switchboard, and one from the emergency switchboard by separate feeders reserved solely for that purpose. The feeders shall be so arranged as to avoid galleys, machinery spaces and other enclosed spaces of high fire risk except in so far as it is necessary to reach the appropriate switchboards, and shall be run to an automatic changeover switch situated near the sprinkler pump. This switch shall permit the supply of power from the main switchboard so long as a supply is available therefrom, and be so designed that upon failure of that supply it will automatically change over to the supply from the emergency switchboard. The switches on the main switchboard and the emergency switchboard shall be clearly labelled and normally kept closed. No other switch shall be permitted in the feeders concerned. One of the sources of power supply for the alarm and detection system shall be an emergency source. Where one of the sources of power for the pump is an internal combustion engine it shall, in addition to complying with the provisions of paragraph 2.4.3, be so situated that a fire in any protected space will not affect the air supply to the machinery.

2.2.2 Cargo ships

There shall not be less than two sources of power supply for the sea water pump and automatic alarm and detection system. If the pump is electrically driven, it shall be connected to the main source of electrical power, which shall be capable of being supplied by at least two generators. The feeders shall be so arranged as to avoid galleys, machinery spaces and other enclosed spaces of high fire risk except in so far as it is necessary to reach the appropriate switchboards. One of the sources of power supply for the alarm and detection system shall be an emergency source. Where one of the sources of power for the pump is an internal combustion engine, it shall, in addition to complying with the provisions of paragraph 2.4.3, be so situated that a fire in any protected space will not affect the air supply to the machinery.

2.3 Component requirements

2.3.1 Sprinklers

2.3.1.1 The sprinklers shall be resistant to corrosion by the marine atmosphere. In accommodation and service spaces the sprinklers shall come into operation within the temperature range from 68°C to 79°C, except that in locations such as drying rooms, where high ambient temperatures might be expected, the operating temperature may be increased by not more than 30°C above the maximum deckhead temperature.

2.3.1.2 A quantity of spare sprinkler heads shall be provided for all types and ratings installed on the ship as follows:

Total number of heads	Required number of spares
<300	6
300 to 1000	12
>1000	24

The number of spare sprinkler heads of any type need not exceed the total number of heads installed of that type.

2.3.2 Pressure tanks

2.3.2.1 A pressure tank having a volume equal to at least twice that of the charge of water specified in this paragraph shall be provided. The tank shall contain a standing charge of fresh water, equivalent to the amount of water which would be discharged in 1 min by the pump referred to in paragraph 2.3.3.2, and the arrangements shall provide for maintaining an air pressure in the tank such as to ensure that where the standing charge of fresh water in the tank has been used the pressure will be not less than the working pressure of the sprinkler, plus the pressure exerted by a head of water measured from the bottom of the tank to the highest sprinkler in the system. Suitable means of replenishing the air under pressure and of replenishing the fresh water charge in the tank shall be provided. A glass gauge shall be provided to indicate the correct level of the water in the tank.

2.3.2.2 Means shall be provided to prevent the passage of sea water into the tank.

2.3.3 Sprinkler pumps

2.3.3.1 An independent power pump shall be provided solely for the purpose of continuing automatically the discharge of water from the sprinklers. The pump shall be brought into action automatically by the pressure drop in the system before the standing fresh water charge in the pressure tank is completely exhausted.

2.3.3.2 The pump and the piping system shall be capable of maintaining the necessary pressure at the level of the highest sprinkler to ensure a continuous output of water sufficient for the simultaneous coverage of a minimum area of 280 m² at the application rate specified in paragraph 2.5.2.3. The hydraulic capability of the system shall be confirmed by the review of hydraulic calculations, followed by a test of the system, if deemed necessary by the Administration.

2.3.3.3 The pump shall have fitted on the delivery side a test valve with a short open-ended discharge pipe. The effective area through the valve and pipe shall be adequate to permit the release of the required pump output while maintaining the pressure in the system specified in paragraph 2.3.2.1.

2.4 Installation requirements

2.4.1 General

Any parts of the system which may be subjected to freezing temperatures in service shall be suitably protected against freezing.

2.4.2 Piping arrangements

2.4.2.1 Sprinklers shall be grouped into separate sections, each of which shall contain not more than 200 sprinklers. In passenger ships any section of sprinklers shall not serve more than two decks and shall not be situated in more than one main vertical zone. However, the Administration may permit such a section of sprinklers to serve more than two decks or be situated in more than one main vertical zone, if it is satisfied that the protection of the ship against fire will not thereby be reduced.

2.4.2.2 Each section of sprinklers shall be capable of being isolated by one stop valve only. The stop valve in each section shall be readily accessible in a location outside of the associated section or in cabinets within stairway enclosures. The valve's location shall be clearly and permanently indicated. Means shall be provided to prevent the operation of the stop valves by any unauthorized person.

2.4.2.3 A test valve shall be provided for testing the automatic alarm for each section of sprinklers by a discharge of water equivalent to the operation of one sprinkler. The test valve for each section shall be situated near the stop valve for that section.

2.4.2.4 The sprinkler system shall have a connection from the ship's fire main by way of a lockable screw-down non-return valve at the connection which will prevent a backflow from the sprinkler system to the fire main.

2.4.2.5 A gauge indicating the pressure in the system shall be provided at each section stop valve and at a central station.

2.4.2.6 The sea inlet to the pump shall wherever possible be in the space containing the pump and shall be so arranged that when the ship is afloat it will not be necessary to shut off the supply of sea water to the pump for any purpose other than the inspection or repair of the pump.

2.4.3 Location of systems

The sprinkler pump and tank shall be situated in a position reasonably remote from any machinery space of category A and shall not be situated in any space required to be protected by the sprinkler system.

2.5 System control requirements

2.5.1 Ready availability

2.5.1.1 Any required automatic sprinkler, fire detection and fire alarm system shall be capable of immediate operation at all times and no action by the crew shall be necessary to set it in operation.

2.5.1.2 The automatic sprinkler system shall be kept charged at the necessary pressure and shall have provision for a continuous supply of water as required in this chapter.

2.5.2 Alarm and indication

2.5.2.1 Each section of sprinklers shall include means for giving a visual and audible alarm signal automatically at one or more indicating units whenever any sprinkler comes into operation. Such alarm systems shall be such as to indicate if any fault occurs in the system. Such units shall

indicate in which section served by the system a fire has occurred and shall be centralised on the navigation bridge or in the continuously manned central control station and, in addition, visible and audible alarms from the unit shall also be placed in a position other than on the aforementioned spaces to ensure that the indication of fire is immediately received by the crew.

2.5.2.2 Switches shall be provided at one of the indicating positions referred to in paragraph 2.5.2.1 which will enable the alarm and the indicators for each section of sprinklers to be tested.

2.5.2.3 Sprinklers shall be placed in an overhead position and spaced in a suitable pattern to maintain an average application rate of not less than 5 l/m²/min over the nominal area covered by the sprinklers. However, the Administration may permit the use of sprinklers providing such an alternative amount of water suitably distributed as has been shown to the satisfaction of the Administration to be not less effective.

2.5.2.4 A list or plan shall be displayed at each indicating unit showing the spaces covered and the location of the zone in respect of each section. Suitable instructions for testing and maintenance shall be available.

2.5.3 Testing

Means shall be provided for testing the automatic operation of the pump on reduction of pressure in the system.

CHAPTER 9 - FIXED FIRE DETECTION AND FIRE ALARM SYSTEMS

1 Application

This chapter details the specifications for fixed fire detection and fire alarm systems as required by chapter II-2 of the Convention.

2 Engineering specifications

2.1 General requirements

2.1.1 Any required fixed fire detection and fire alarm system with manually operated call points shall be capable of immediate operation at all times.

2.1.2 The fixed fire detection and fire alarm system shall not be used for any other purpose, except that closing of fire doors and similar functions may be permitted at the control panel.

2.1.3 The system and equipment shall be suitably designed to withstand supply voltage variation and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in ships.

2.1.4 Zone address identification capability

Fixed fire detection and fire alarm systems with a zone address identification capability shall be so arranged that:

- .1 means are provided to ensure that any fault (e.g. power break, short circuit, earth, etc.) occurring in the loop will not render the whole loop ineffective;

- .2 all arrangements are made to enable the initial configuration of the system to be restored in the event of failure (e.g. electrical, electronic, informatics, etc.);
- .3 the first initiated fire alarm will not prevent any other detector from initiating further fire alarms; and
- .4 no loop will pass through a space twice. When this is not practical (e.g. for large public spaces), the part of the loop which by necessity passes through the space for a second time shall be installed at the maximum possible distance from the other parts of the loop.

2.2 Sources of power supply

There shall be not less than two sources of power supply for the electrical equipment used in the operation of the fixed fire detection and fire alarm system, one of which shall be an emergency source. The supply shall be provided by separate feeders reserved solely for that purpose. Such feeders shall run to an automatic change-over switch situated in, or adjacent to, the control panel for the fire detection system.

2.3 Component requirements

2.3.1 Detectors

2.3.1.1 Detectors shall be operated by heat, smoke or other products of combustion, flame, or any combination of these factors. Detectors operated by other factors indicative of incipient fires may be considered by the Administration provided that they are no less sensitive than such detectors. Flame detectors shall only be used in addition to smoke or heat detectors.

2.3.1.2 Smoke detectors required in all stairways, corridors and escape routes within accommodation spaces shall be certified to operate before the smoke density exceeds 12.5% obscuration per metre, but not until the smoke density exceeds 2% obscuration per metre. Smoke detectors to be installed in other spaces shall operate within sensitivity limits to the satisfaction of the Administration having regard to the avoidance of detector insensitivity or oversensitivity.

2.3.1.3 Heat detectors shall be certified to operate before the temperature exceeds 78°C, but not until the temperature exceeds 54°C, when the temperature is raised to those limits at a rate less than 1°C per minute. At higher rates of temperature rise, the heat detector shall operate within temperature limits to the satisfaction of the Administration having regard to the avoidance of detector insensitivity or oversensitivity.

2.3.1.4 The operation temperature of heat detectors in drying rooms and similar spaces of a normal high ambient temperature may be up to 130°C, and up to 140°C in saunas.

2.3.1.5 All detectors shall be of a type such that they can be tested for correct operation and restored to normal surveillance without the renewal of any component.

2.4 Installation requirements

2.4.1 Sections

2.4.1.1 Detectors and manually operated call points shall be grouped into sections.

2.4.1.2 A section of fire detectors which covers a control station, a service space or an accommodation space shall not include a machinery space of category A. For fixed fire detection and fire alarm systems with remotely and individually identifiable fire detectors, a loop covering sections of fire detectors in accommodation, service spaces and control station shall not include sections of fire detectors in machinery spaces of category A.

2.4.1.3 Where the fixed fire detection and fire alarm system does not include means of remotely identifying each detector individually, no section covering more than one deck within accommodation spaces, service spaces and control stations shall normally be permitted except a section which covers an enclosed stairway. In order to avoid delay in identifying the source of fire, the number of enclosed spaces included in each section shall be limited as determined by the Administration. In no case shall more than 50 enclosed spaces be permitted in any section. If the system is fitted with remotely and individually identifiable fire detectors, the sections may cover several decks and serve any number of enclosed spaces.

2.4.1.4 In passenger ships, if there is no fixed fire detection and fire alarm system capable of remotely and individually identifying each detector, a section of detectors shall not serve spaces on both sides of the ship nor on more than one deck and neither shall it be situated in more than one main vertical zone except that the same section of detectors may serve spaces on more than one deck if those spaces are located in the fore or aft end of the ship or if they protect common spaces on different decks (e.g. fan rooms, galleys, public spaces, etc.). In ships of less than 20 m in breadth, the same section of detectors may serve spaces on both sides of the ship. In passenger ships fitted with individually identifiable fire detectors, a section may serve spaces on both sides of the ship and on several decks, but shall not be situated in more than one main vertical zone.

2.4.2 Positioning of detectors

2.4.2.1 Detectors shall be located for optimum performance. Positions near beams and ventilation ducts or other positions where patterns of air flow could adversely affect performance and positions where impact or physical damage is likely shall be avoided. Detectors which are located on the overhead shall be a minimum distance of 0.5 m away from bulkheads, except in corridors, lockers and stairways.

2.4.2.2 The maximum spacing of detectors shall be in accordance with the table below:

Table 9.1 - Spacing of detectors

Type of detector	Maximum floor area per detector	Maximum distance apart between centres	Maximum distance away from bulkheads
Heat	37 m ²	9 m	4.5 m
Smoke	74 m ²	11 m	5.5 m

The Administration may require or permit different spacing to that specified in the above table if based upon test data which demonstrate the characteristics of the detectors.

2.4.3 Arrangement of electric wiring

2.4.3.1 Electrical wiring which forms part of the system shall be so arranged as to avoid galleys, machinery spaces of category A, and other enclosed spaces of high fire risk except where it is necessary to provide for fire detection or fire alarm in such spaces or to connect to the appropriate power supply.

2.4.3.2 A loop of fire detection systems with a zone address identification capability shall not be damaged at more than one point by a fire.

2.5 System control requirements

2.5.1 Visual and audible fire signals

2.5.1.1 The activation of any detector or manually operated call point shall initiate a visual and audible fire signal at the control panel and indicating units. If the signals have not received attention within 2 min, an audible alarm shall be automatically sounded throughout the crew accommodation and service spaces, control stations and machinery spaces of category A. This alarm sounder system need not be an integral part of the detection system.

2.5.1.2 The control panel shall be located on the navigation bridge or in the continuously manned central control station.

2.5.1.3 Indicating units shall, as a minimum, denote the section in which a detector has been activated or manually operated call point has been operated. At least one unit shall be so located that it is easily accessible to responsible members of the crew at all times. One indicating unit shall be located on the navigation bridge if the control panel is located in the main fire control station.

2.5.1.4 Clear information shall be displayed on or adjacent to each indicating unit about the spaces covered and the location of the sections.

2.5.1.5 Power supplies and electric circuits necessary for the operation of the system shall be monitored for loss of power or fault conditions as appropriate. Occurrence of a fault condition shall initiate a visual and audible fault signal at the control panel which shall be distinct from a fire signal.

2.5.2 Testing

Suitable instructions and component spares for testing and maintenance shall be provided.

CHAPTER 10 - SAMPLE EXTRACTION SMOKE DETECTION SYSTEMS

1 Application

This chapter details the specifications for sample extraction smoke detection systems as required by chapter II-2 of the Convention.

2 Engineering specifications

2.1 General requirements

2.1.1 Wherever in the text of this chapter the word "system" appears, it shall mean "sample extraction smoke detection system".

2.1.2 Any required system shall be capable of continuous operation at all times except that systems operating on a sequential scanning principle may be accepted, provided that the interval between scanning the same position twice gives an overall response time to the satisfaction of the Administration.

2.1.3 The system shall be designed, constructed and installed so as to prevent the leakage of any toxic or flammable substances or fire-extinguishing media into any accommodation and service space, control station or machinery space.

2.1.4 The system and equipment shall be suitably designed to withstand supply voltage variations and transients, ambient temperature changes, vibration, humidity, shock, impact and corrosion normally encountered in ships and to avoid the possibility of ignition of a flammable gas air mixture.

2.1.5 The system shall be of a type that can be tested for correct operation and restored to normal surveillance without the renewal of any component.

2.1.6 An alternative power supply for the electrical equipment used in the operation of the system shall be provided.

2.2 Component requirements

2.2.1 The sensing unit shall be certified to operate before the smoke density within the sensing chamber exceeds 6.65% obscuration per metre.

2.2.2 Duplicate sample extraction fans shall be provided. The fans shall be of sufficient capacity to operate under normal ventilation conditions in the protected area and shall give an overall response time to the satisfaction of the Administration.

2.2.3 The control panel shall permit observation of smoke in the individual sampling pipe.

2.2.4 Means shall be provided to monitor the airflow through the sampling pipes so designed as to ensure that as far as practicable equal quantities are extracted from each interconnected accumulator.

2.2.5 Sampling pipes shall be a minimum of 12 mm internal diameter except when used in conjunction with fixed gas fire-extinguishing systems when the minimum size of pipe shall be sufficient to permit the fire-extinguishing gas to be discharged within the appropriate time.

2.2.6 Sampling pipes shall be provided with an arrangement for periodically purging with compressed air.

2.3 Installation requirements

2.3.1 Smoke accumulators

2.3.1.1 At least one smoke accumulator shall be located in every enclosed space for which smoke detection is required. However, where a space is designed to carry oil or refrigerated cargo alternatively with cargoes for which a smoke sampling system is required, means may be provided to isolate the smoke accumulators in such compartments for the system. Such means shall be to the satisfaction of the Administration.

2.3.1.2 Smoke accumulators shall be located for optimum performance and shall be spaced so that no part of the overhead deck area is more than 12 m measured horizontally from an accumulator. Where systems are used in spaces which may be mechanically ventilated, the position of the smoke accumulators shall be considered having regard to the effects of ventilation.

2.3.1.3 Smoke accumulators shall be positioned where impact or physical damage is unlikely to occur.

2.3.1.4 Not more than four accumulators shall be connected to each sampling point.

2.3.1.5 Smoke accumulators from more than one enclosed space shall not be connected to the same sampling point.

2.3.2 Sampling pipes

2.3.2.1 The sampling pipe arrangements shall be such that the location of the fire can be readily identified.

2.3.2.2 Sampling pipes shall be self-draining and suitably protected from impact or damage from cargo working.

2.4 System control requirements

2.4.1 Visual and audible fire signals

2.4.1.1 The control panel shall be located on the navigation bridge or in the continuously manned central control station.

2.4.1.2 Clear information shall be displayed on, or adjacent to, the control panel designating the spaces covered.

2.4.1.3 The detection of smoke or other products of combustion shall initiate a visual and audible signal at the control panel and the navigation bridge or continuously manned central control station.

2.4.1.4 Power supplies necessary for the operation of the system shall be monitored for loss of power. Any loss of power shall initiate a visual and audible signal at the control panel and the navigation bridge which shall be distinct from a signal indicating smoke detection.

2.4.2 Testing

Suitable instructions and component spares shall be provided for the testing and maintenance of the system.

CHAPTER 11 - LOW-LOCATION LIGHTING SYSTEMS

1 Application

This chapter details the specifications for low-location lighting systems as required by chapter II-2 of the Convention.

2 Engineering specifications

2.1 General requirements

Any required low-location lighting systems shall be approved by the Administration based on the guidelines developed by the Organization, or to an international standard acceptable to the Organization.

CHAPTER 12 - FIXED EMERGENCY FIRE PUMPS

1 Application

This chapter details the specifications for emergency fire pumps as required by chapter II-2 of the Convention. This chapter is not applicable to passenger ships of 1,000 gross tonnage and upwards. See regulation II-2/10.2.2.3.1.1 of the Convention for requirements for such ships.

2 Engineering specifications

2.1 General

The emergency fire pump shall be of a fixed independently driven power-operated pump.

2.2 Component requirements

2.2.1 Emergency fire pumps

2.2.1.1 Capacity of the pump

The capacity of the pump shall not be less than 40% of the total capacity of the fire pumps required by regulation II-2/10.2.2.4.1 of the Convention and in any case not less than the following:

- | | | |
|----|---|-----------------------|
| .1 | for passenger ships less than 1,000 gross tonnage and for cargo ships of 2,000 gross tonnage and upwards; and | 25 m ³ /h |
| .2 | for cargo ships less than 2,000 gross tonnage | 15 m ³ /h. |

2.2.1.2 Pressure at hydrants

When the pump is delivering the quantity of water required by paragraph 2.2.1.1, the pressure at any hydrants shall be not less than the minimum pressure required by chapter II-2 of the Convention.

2.2.1.3 Suction heads

The total suction head and the net positive suction head of the pump shall be determined having due regard to the requirements of the Convention and this chapter on the pump capacity and on the hydrant pressure under all conditions of list, trim, roll and pitch likely to be encountered in service. The ballast condition of a ship on entering or leaving a dry dock need not be considered a service condition.

2.2.2 Diesel engines and fuel tank

2.2.2.1 Starting of diesel engine

Any diesel-driven power source for the pump shall be capable of being readily started in its cold condition down to the temperature of 0°C by hand (manual) cranking. If this is impracticable, or if lower temperature are likely to be encountered, consideration shall be given to the provision and maintenance of the heating arrangement, acceptable to the Administration so that ready

starting will be assured. If hand (manual) starting is impracticable, the Administration may permit other means of starting. These means shall be such as to enable the diesel-driven power source to be started at least six times within a period of 30 min and at least twice within the first 10 min.

2.2.2.2 Fuel tank capacity

Any service fuel tank shall contain sufficient fuel to enable the pump to run on full load for at least 3 h and sufficient reserves of fuel shall be available outside the machinery space of category A to enable the pump to be run on full load for an additional 15 h.

CHAPTER 13 - ARRANGEMENT OF MEANS OF ESCAPE

1 Application

This chapter details the specifications for means of escape as required by chapter II-2 of the Convention.

2 Passenger ships

2.1 Width of stairways

2.1.1 Basic requirements for stairway width

Stairways shall not be less than 900 mm in clear width. The minimum clear width of stairways shall be increased by 10 mm for every one person provided for in excess of 90 persons. The total number of persons to be evacuated by such stairways shall be assumed to be two thirds of the crew and the total number of passengers in the areas served by such stairways. The width of the stairways shall not be inferior to those determined by paragraph 2.1.2.

2.1.2 Calculation method of stairway width

2.1.2.1 Basic principles of the calculation

2.1.2.1.1 This calculation method determines the minimum stairway width at each deck level, taking into account the consecutive stairways leading into the stairway under consideration.

2.1.2.1.2 It is the intention that the calculation method shall consider evacuation from enclosed spaces within each main vertical zone individually and take into account all of the persons using the stairway enclosures in each zone, even if they enter that stairway from another vertical zone.

2.1.2.1.3 For each main vertical zone the calculation shall be completed for the night time (case 1) and day time (case 2) and the largest dimension from either case used for determining the stairway width for each deck under consideration.

2.1.2.1.4 The calculation of stairway widths shall be based upon the crew and passenger load on each deck. Occupant loads shall be rated by the designer for passenger and crew accommodation spaces, service spaces, control spaces and machinery spaces. For the purpose of the calculation the maximum capacity of a public space shall be defined by either of the following two values: the number of seats or similar arrangements, or the number obtained by assigning 2 m² of gross deck surface area to each person.

2.1.2.2 Calculation method for minimum value

2.1.2.2.1 Basic formulae

In considering the design of stairway widths for each individual case which allow for the timely flow of persons evacuating to the assembly stations from adjacent decks above and below, the following calculation methods shall be used (see figures 1 and 2):

when joining two decks: $W=(N_1+N_2) 10\text{mm}$;
 when joining three decks: $W=(N_1+N_2+0.5N_3) 10\text{mm}$;
 when joining four decks: $W=(N_1+N_2+0.5N_3+0.25N_4) 10\text{mm}$; and
 when joining five decks or more decks, the width of the stairways shall be determined by applying the above formula for four decks to the deck under consideration and to the consecutive deck,

where:

W = the required tread width between handrails of the stairway.

The calculated value of W may be reduced where available landing area S is provided in stairways at the deck level defined by subtracting P from Z , such that:

$$P = S \times 3.0 \text{ persons/m}^2 ; \text{ and } P_{\text{max}} = 0.25Z$$

where:

- Z = the total number of persons expected to be evacuated on the deck being considered
- P = the number of persons taking temporary refuge on the stairway landing, which may be subtracted from Z to a maximum value of $P = 0.25Z$ (to be rounded down to the nearest whole number)
- S = the surface area (m^2) of the landing, minus the surface area necessary for the opening of doors and minus the surface area necessary for accessing the flow on stairs (see figure 1)
- N = the total number of persons expected to use the stairway from each consecutive deck under consideration; N_1 is for the deck with the largest number of persons using that stairway; N_2 is taken for the deck with the next highest number of persons directly entering the stairway flow such that, when sizing the stairway width as each deck level, $N_1 > N_2 > N_3 > N_4$ (see figure 2). These decks are assumed to be on or upstream (i.e., away from the embarkation deck) of the deck being considered.

Figure 1

LANDING CALCULATION FOR STAIRWAY WIDTH REDUCTION

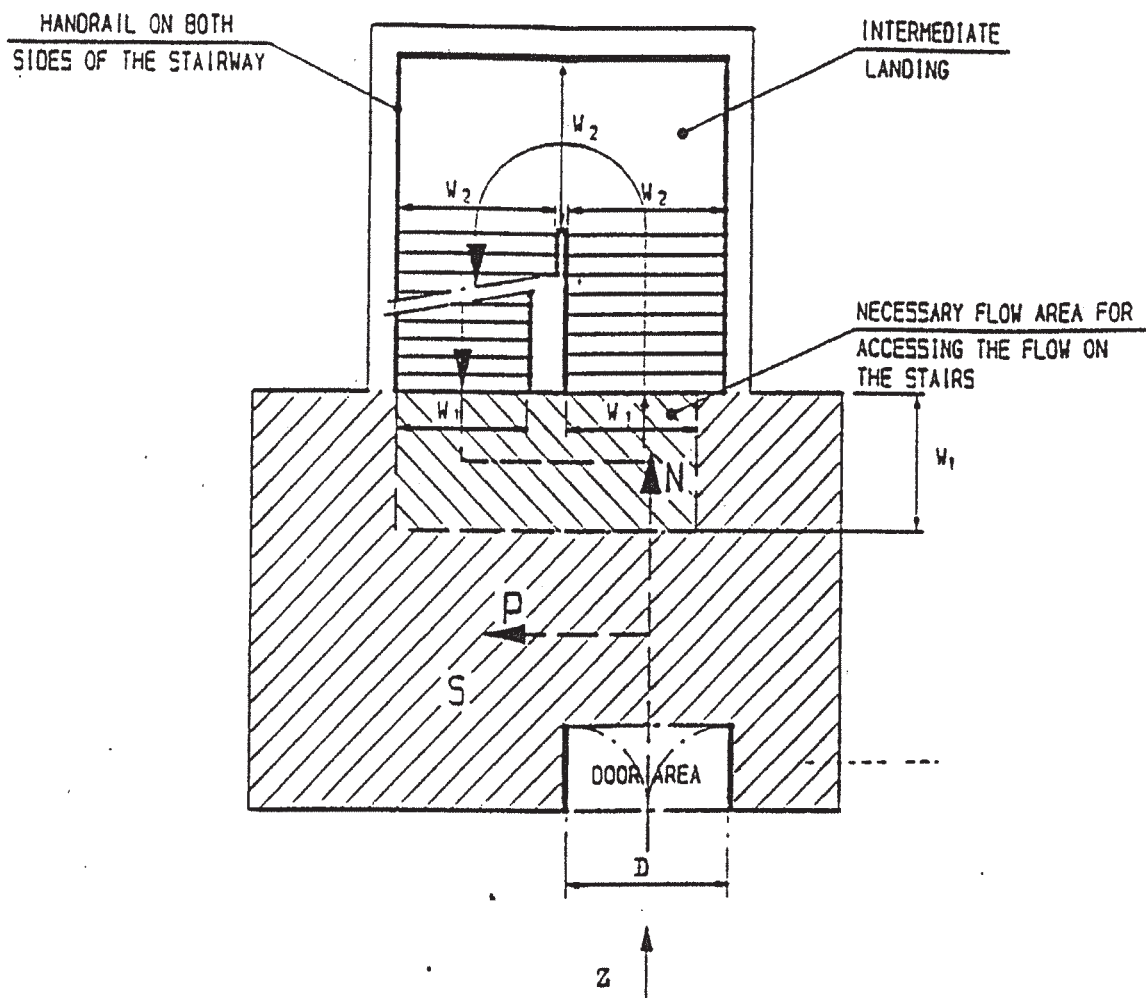
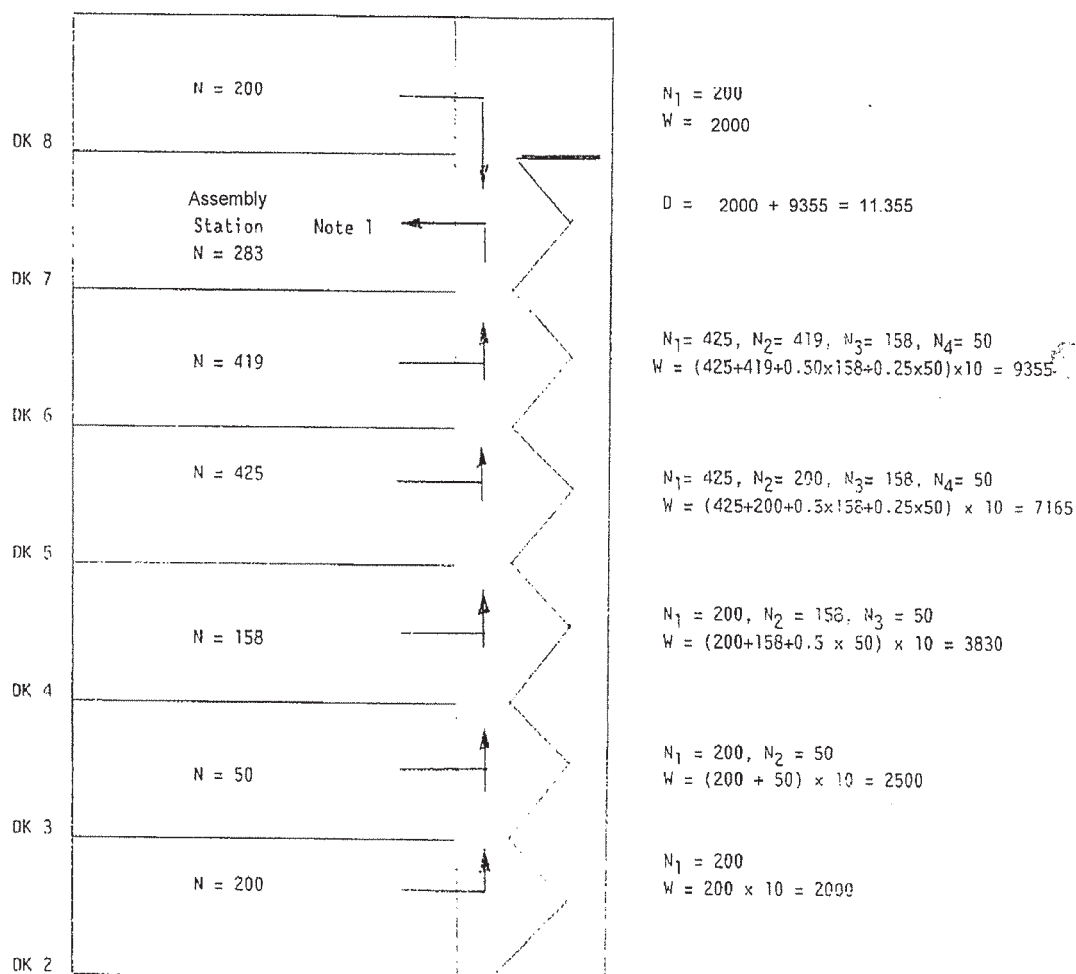


Figure 2

MINIMUM STAIRWAY WIDTH (W) CALCULATION EXAMPLE



Z = number of persons expected to evacuate through the stairway

N = number of persons directly entering the stairway flow from a given deck

W (mm) = $(N_1 + N_2 + 0.5 \times N_3 + 0.25 \times N_4) \times 10$ = calculated width of stairway

D (mm) = width of exit doors

$N_1 > N_2 > N_3 > N_4$ where:

N_1 = the deck with the largest number of persons N entering directly the stairway

N_2 = the deck with the next largest number of persons N entering directly the stairway, etc.

Note: The doors to the assembly station shall have aggregate width of 10,255 mm.

2.1.2.2.2 Distribution of persons

2.1.2.2.2.1 The dimension of the means of escape shall be calculated on the basis of the total number of persons expected to escape by the stairway and through doorways, corridors and landings (see figure 3). Calculations shall be made separately for the two cases of occupancy of the spaces specified below. For each component part of the escape route, the dimension taken shall not be less than the largest dimension determined for each case:

Case 1: Passengers in cabins with maximum berthing capacity fully occupied; members of the crew in cabins occupied to 2/3 of maximum berthing capacity; and service spaces occupied by 1/3 of the crew.

Case 2: Passengers in public spaces occupied to 3/4 of maximum capacity; members of the crew in public spaces occupied to 1/3 of the maximum capacity; service spaces occupied by 1/3 of the crew; and crew accommodation occupied by 1/3 of the crew.

2.1.2.2.2.2 The maximum number of persons contained in a main vertical zone, including persons entering stairways from another main vertical zone, shall not be assumed to be higher than the maximum number of persons authorized to be carried on board for the calculation of stairway width only.

2.1.3 Prohibition of decrease in width in the direction to the assembly station

The stairway shall not decrease in width in the direction of evacuation to the assembly station. Where several assembly stations are in one main vertical zone, the stairway width shall not decrease in the direction of the evacuation to the most distant assembly station.

2.2 Details of stairways

2.2.1 Handrails

Stairways shall be fitted with handrails on each side. The maximum clear width between handrails shall be 1,800 mm.

2.2.2 Alignment of stairways

All stairways sized for more than 90 persons shall be aligned fore and aft.

2.2.3 Vertical rise and inclination

Stairways shall not exceed 3.5 m in vertical rise without the provision of a landing and shall not have an angle of inclination greater than 45°.

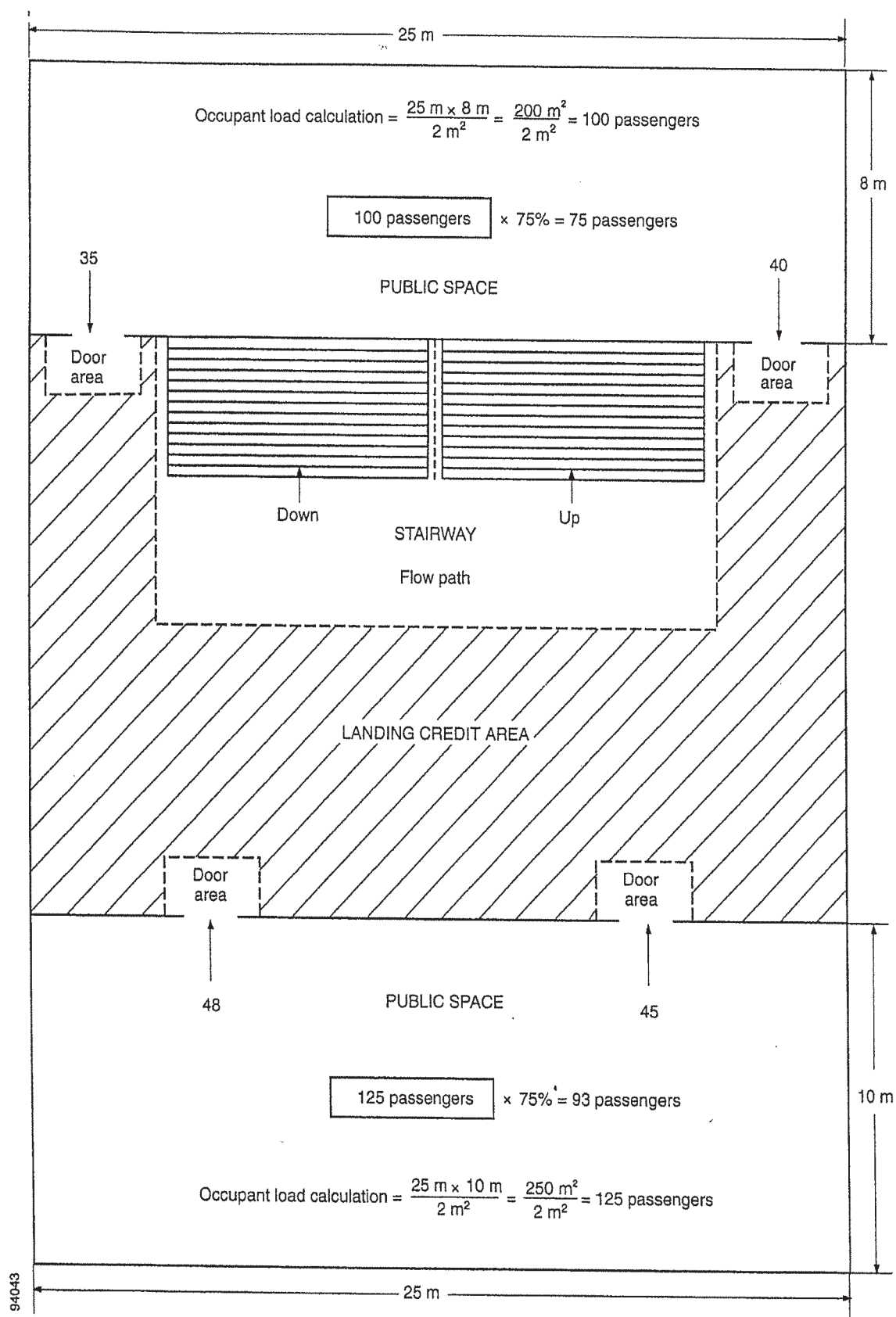


Figure 3 – Occupant loading calculation example

2.2.4 Landings

Landings at each deck level shall be not less than 2 m² in area and shall increase by 1 m² for every 10 persons provided for in excess of 20 persons, but need not exceed 16 m², except for those landings servicing public spaces having direct access onto the stairway enclosure.

2.3 Doorways and corridors

2.3.1 Doorways and corridors and intermediate landings included in means of escape shall be sized in the same manner as stairways.

2.3.2 The aggregate width of stairway exit doors to the assembly station shall not be less than the aggregate width of stairways serving this deck.

2.4 Evacuation routes to the embarkation deck

2.4.1 Assembly station

It shall be recognized that the evacuation routes to the embarkation deck may include an assembly station. In this case consideration shall be given to the fire protection requirements and sizing of corridors and doors from the stairway enclosure to the assembly station and from the assembly station to the embarkation deck, noting that evacuation of persons from assembly stations to embarkation positions will be carried out in small controlled groups.

2.4.2 Routes from the assembly station to the survival craft embarkation position

Where the passengers and crew are held at an assembly station which is not at the survival craft embarkation position, the dimension of stairway width and doors from the assembly station to this position shall be based on the number of persons in the controlled group. The width of these stairways and doors need not exceed 1,500 mm unless larger dimensions are required for evacuation of these spaces under normal conditions.

2.5 Means of escape plans

2.5.1 Means of escape plans shall be provided indicating the following:

- .1 the number of the crew and passengers in all normally occupied spaces;
- .2 the number of crew and passengers expected to escape by stairway and through doorways, corridors and landings;
- .3 assembly stations and survival craft embarkation positions;
- .4 primary and secondary means of escape; and
- .5 width of stairways, doors, corridors and landing areas.

2.5.2 Means of escape plans shall be accompanied by detailed calculation for determining the width of escape stairways, doors, corridors and landing areas.

3 Cargo ships

Stairways and corridors used as means of escape shall be not less than 700 mm in clear width and shall have a handrail on one side. Stairways and corridors with a clear width of 1,800 mm and over shall have handrails on both sides. "Clear width" is considered the distance between the handrail and the bulkhead on the other side or between the handrails. The angle of inclination of stairways should be, in general, 45°, but not greater than 50°, and in machinery spaces and small spaces not more than 60°. Doorways which give access to a stairway shall be of the same size as the stairway.

CHAPTER 14 - FIXED DECK FOAM SYSTEMS

1 Application

This chapter details the specifications for fixed deck foam systems which are required to be provided by chapter II-2 of the Convention.

2 Engineering specifications

2.1 General

2.1.1 The arrangements for providing foam shall be capable of delivering foam to the entire cargo tanks deck area as well as into any cargo tank the deck of which has been ruptured.

2.1.2 The deck foam system shall be capable of simple and rapid operation.

2.1.3 Operation of a deck foam system at its required output shall permit the simultaneous use of the minimum required number of jets of water at the required pressure from the fire main.

2.2 Component requirements

2.2.1 Foam solution and foam concentrate

2.2.1.1 The rate of supply of foam solution shall be not less than the greatest of the following:

- .1 0.6 l/min per square metre of cargo tanks deck area, where cargo tanks deck area means the maximum breadth of the ship multiplied by the total longitudinal extent of the cargo tank spaces;
- .2 6 l/min per square metre of the horizontal sectional area of the single tank having the largest such area; or
- .3 3 l/min per square metre of the area protected by the largest monitor, such area being entirely forward of the monitor, but not less than 1,250 l/min.

2.2.1.2 Sufficient foam concentrate shall be supplied to ensure at least 20 min of foam generation in tankers fitted with an inert gas installation or 30 min of foam generation in tankers not fitted with an inert gas installation when using solution rates stipulated in paragraph 2.2.1.1, as appropriate, whichever is the greatest. The foam expansion ratio (i.e., the ratio of the volume of foam produced to the volume of the mixture of water and foam-making concentrate supplied) shall not generally exceed 12 to 1. Where systems essentially produce low expansion foam, but an expansion ratio slightly in excess of 12 to 1, the quantity of foam solution available shall be

calculated as for 12 to 1 expansion ratio systems. When medium expansion ratio foam (between 50 to 1 and 150 to 1 expansion ratio) is employed, the application rate of the foam and the capacity of a monitor installation shall be to the satisfaction of the Administration.

2.2.2 Monitors and foam applicators

2.2.2.1 Foam from the fixed foam system shall be supplied by means of monitors and foam applicators. At least 50% of the foam solution supply rate required in paragraphs 2.2.1.1.1 and 2.2.1.1.2 shall be delivered from each monitor. On tankers of less than 4,000 tonnes deadweight the Administration may not require installation of monitors but only applicators. However, in such a case the capacity of each applicator shall be at least 25% of the foam solution supply rate required in paragraphs 2.2.1.1.1 or 2.2.1.1.2.

2.2.2.2 The capacity of any monitor shall be at least 3 l/min of foam solution per square metre of deck area protected by that monitor, such area being entirely forward of the monitor. Such capacity shall be not less than 1,250 l/min.

2.2.2.3 The capacity of any applicator shall be not less than 400 l/min and the applicator throw in still air conditions shall be not less than 15 m.

2.3 Installation requirements

2.3.1 Main control station

The main control station for the system shall be suitably located outside the cargo area, adjacent to the accommodation spaces and readily accessible and operable in the event of fire in the areas protected.

2.3.2 Monitors

2.3.2.1 The number and position of monitors shall be such as to comply with paragraph 2.1.1.

2.3.2.2 The distance from the monitor to the farthest extremity of the protected area forward of that monitor shall not be more than 75% of the monitor throw in still air conditions.

2.3.2.3 A monitor and hose connection for a foam applicator shall be situated both port and starboard at the front of the poop or accommodation spaces facing the cargo tanks deck. On tankers of less than 4,000 tonnes deadweight, a hose connection for a foam applicator shall be situated both port and starboard at the front of the poop or accommodation spaces facing the cargo tanks deck.

2.3.3 Applicators

2.3.3.1 The number of foam applicators provided shall be not less than four. The number and disposition of foam main outlets shall be such that foam from at least two applicators can be directed on to any part of the cargo tanks deck area.

2.3.3.2 Applicators shall be provided to ensure flexibility of action during fire-fighting operations and to cover areas screened from the monitors.

2.3.4 Isolation valves

Valves shall be provided in the foam main, and in the fire main when this is an integral part of the deck foam system, immediately forward of any monitor position to isolate damaged sections of those mains.

CHAPTER 15 - INERT GAS SYSTEMS

1 Application

This chapter details the specifications for inert gas systems as required by chapter II-2 of the Convention.

2 Engineering specifications

2.1 General

2.1.1 Throughout this chapter the term cargo tank includes also slop tanks.

2.1.2 The inert gas system referred to in chapter II-2 of the Convention shall be designed, constructed and tested to the satisfaction of the Administration. It shall be so designed and operated as to render and maintain the atmosphere of the cargo tanks non-flammable at all times, except when such tanks are required to be gas-free. In the event that the inert gas system is unable to meet the operational requirement set out above and it has been assessed that it is impracticable to effect a repair, then cargo discharge, deballasting and necessary tank cleaning shall only be resumed when the "emergency conditions" specified in the Guidelines on inert gas systems are complied with.

2.1.3 Required functions

The system shall be capable of:

- .1 inerting empty cargo tanks by reducing the oxygen content of the atmosphere in each tank to a level at which combustion cannot be supported;
- .2 maintaining the atmosphere in any part of any cargo tank with an oxygen content not exceeding 8% by volume and at a positive pressure at all times in port and at sea except when it is necessary for such a tank to be gas-free;
- .3 eliminating the need for air to enter a tank during normal operations except when it is necessary for such a tank to be gas-free; and
- .4 purging empty cargo tanks of a hydrocarbon gas, so that subsequent gas-freeing operations will at no time create a flammable atmosphere within the tank.

2.2 Component requirements

2.2.1 Supply of inert gas

2.2.1.1 The inert gas supply may be treated flue gas from main or auxiliary boilers. The Administration may accept systems using flue gases from one or more separate gas generators or other sources or any combination thereof, provided that an equivalent standard of safety is achieved. Such systems shall, as far as practicable, comply with the requirements of this chapter. Systems using stored carbon dioxide shall not be permitted unless the Administration is satisfied that the risk of ignition from generation of static electricity by the system itself is minimized.

2.2.1.2 The system shall be capable of delivering inert gas to the cargo tanks at a rate of at least 125% of the maximum rate of discharge capacity of the ship expressed as a volume.

2.2.1.3 The system shall be capable of delivering inert gas with an oxygen content of not more than 5 % by volume in the inert gas supply main to the cargo tanks at any required rate of flow.

2.2.1.4 Two fuel oil pumps shall be fitted to the inert gas generator. The Administration may permit only one fuel oil pump on condition that sufficient spares for the fuel oil pump and its prime mover are carried on board to enable any failure of the fuel oil pump and its prime mover to be rectified by the ship's crew.

2.2.2 Scrubbers

2.2.2.1 A flue gas scrubber shall be fitted which will effectively cool the volume of gas specified in paragraphs 2.2.1.2 and 2.2.1.3 and remove solids and sulphur combustion products. The cooling water arrangements shall be such that an adequate supply of water will always be available without interfering with any essential services on the ship. Provision shall also be made for an alternative supply of cooling water.

2.2.2.2 Filters or equivalent devices shall be fitted to minimize the amount of water carried over to the inert gas blowers.

2.2.2.3 The scrubber shall be located aft of all cargo tanks, cargo pump-rooms and cofferdams separating these spaces from machinery spaces of category A.

2.2.3 Blowers

2.2.3.1 At least two blowers shall be fitted and be capable of delivering to the cargo tanks at least the volume of gas required by paragraphs 2.2.1.2 and 2.2.1.3. For systems with gas generators the Administration may permit only one blower if that system is capable of delivering the total volume of gas required by paragraphs 2.2.1.2 and 2.2.1.3 to the protected cargo tanks, provided that sufficient spares for the blower and its prime mover are carried on board to enable any failure of the blower and its prime mover to be rectified by the ship's crew.

2.2.3.2 The inert gas system shall be so designed that the maximum pressure which it can exert on any cargo tank will not exceed the test pressure of any cargo tank. Suitable shutoff arrangements shall be provided on the suction and discharge connections of each blower. Arrangements shall be provided to enable the functioning of the inert gas plant to be stabilized before commencing cargo discharge. If the blowers are to be used for gas-freeing, their air inlets shall be provided with blanking arrangements.

2.2.3.3 The blowers shall be located aft of all cargo tanks, cargo pump-rooms and cofferdams separating these spaces from machinery spaces of category A.

2.2.4 Water seals

2.2.4.1 The water seal referred to in paragraph 2.3.1.4.1 shall be capable of being supplied by two separate pumps, each of which shall be capable of maintaining an adequate supply at all times.

2.2.4.2 The arrangement of the seal and its associated fittings shall be such that it will prevent backflow of hydrocarbon vapours and will ensure the proper functioning of the seal under operating conditions.

2.2.4.3 Provision shall be made to ensure that the water seal is protected against freezing, in such a way that the integrity of seal is not impaired by overheating.

2.2.4.4 A water loop or other approved arrangement shall also be fitted to each associated water supply and drain pipe and each venting or pressure-sensing pipe leading to gas-safe spaces. Means shall be provided to prevent such loops from being emptied by vacuum.

2.2.4.5 The deck water seal and loop arrangements shall be capable of preventing return of hydrocarbon vapours at a pressure equal to the test pressure of the cargo tanks.

2.2.4.6 In respect of paragraph 2.4.3.1.7, the Administration shall be satisfied as to the maintenance of an adequate reserve of water at all times and the integrity of the arrangements to permit the automatic formation of the water seal when the gas flow ceases. The audible and visual alarm on the low level of water in the water seal shall operate when the inert gas is not being supplied.

2.3 Installation requirements

2.3.1 Safety measures in the system

2.3.1.1 Flue gas isolating valves

Flue gas isolating valves shall be fitted in the inert gas supply mains between the boiler uptakes and the flue gas scrubber. These valves shall be provided with indicators to show whether they are open or shut, and precautions shall be taken to maintain them gas-tight and keep the seatings clear of soot. Arrangements shall be made to ensure that boiler soot blowers cannot be operated when the corresponding flue gas valve is open.

2.3.1.2 Prevention of flue gas leakage

2.3.1.2.1 Special consideration shall be given to the design and location of scrubber and blowers with relevant piping and fittings in order to prevent flue gas leakages into enclosed spaces.

2.3.1.2.2 To permit safe maintenance, an additional water seal or other effective means of preventing flue gas leakage shall be fitted between the flue gas isolating valves and scrubber or incorporated in the gas entry to the scrubber.

2.3.1.3 Gas regulating valves

2.3.1.3.1 A gas regulating valve shall be fitted in the inert gas supply main. This valve shall be automatically controlled to close as required in paragraph 2.3.1.5. It shall also be capable of automatically regulating the flow of inert gas to the cargo tanks unless means are provided to automatically control the speed of the inert gas blowers required in paragraph 2.2.3.

2.3.1.3.2 The valve referred to in paragraph 2.3.1.3.1 shall be located at the forward bulkhead of the forward most gas-safe space through which the inert gas supply main passes.

2.3.1.4 Non-return devices of flue gas

2.3.1.4.1 At least two non-return devices, one of which shall be a water seal, shall be fitted in the inert gas supply main, in order to prevent the return of hydrocarbon vapour to the machinery space uptakes or to any gas-safe spaces under all normal conditions of trim, list and motion of the ship. They shall be located between the automatic valve required by paragraph 2.3.1.3.1 and the aftermost connection to any cargo tank or cargo pipeline.

2.3.1.4.2 The devices referred to in paragraph 2.3.1.4.1 shall be located in the cargo area on deck.

2.3.1.4.3 The second device shall be a non-return valve or equivalent capable of preventing the return of vapours or liquids and fitted forward of the deck water seal required in paragraph 2.3.1.4.1. It shall be provided with positive means of closure. As an alternative to positive means of closure, an additional valve having such means of closure may be provided forward of the non-return valve to isolate the deck water seal from the inert gas main to the cargo tanks.

2.3.1.4.4 As an additional safeguard against the possible leakage of hydrocarbon liquids or vapours back from the deck main, means shall be provided to permit this section of the line between the valve having positive means of closure referred to in paragraph 2.3.1.4.3 and the valve referred to in paragraph 2.3.1.3 to be vented in a safe manner when the first of these valves is closed.

2.3.1.5 Automatic shutdown

2.3.1.5.1 Automatic shutdown of the inert gas blowers and gas regulating valve shall be arranged on predetermined limits being reached in respect of paragraphs 2.4.3.1.1, 2.4.3.1.2 and 2.4.3.1.3.

2.3.1.5.2 Automatic shutdown of the gas regulating valve shall be arranged in respect of paragraph 2.4.3.1.4.

2.3.1.6 Oxygen rich gas

In respect of paragraph 2.4.3.1.5, when the oxygen content of the inert gas exceeds 8% by volume, immediate action shall be taken to improve the gas quality. Unless the quality of the gas improves, all cargo tank operations shall be suspended so as to avoid air being drawn into the tanks and the isolation valve referred to in paragraph 2.3.1.4.3 shall be closed.

2.3.2 Inert gas lines

2.3.2.1 The inert gas main may be divided into two or more branches forward of the non-return devices required by paragraphs 2.2.4 and 2.3.1.4.

2.3.2.2 The inert gas supply main shall be fitted with branch piping leading to each cargo tank. Branch piping for inert gas shall be fitted with either stop valves or equivalent means of control for isolating each tank. Where stop valves are fitted, they shall be provided with locking arrangements, which shall be under the control of a responsible ship's officer. The control system shall provide unambiguous information of the operational status of such valves.

2.3.2.3 In combination carriers, the arrangement to isolate the slop tanks containing oil or oil residues from other tanks shall consist of blank flanges which will remain in position at all times

when cargoes other than oil are being carried except as provided for in the relevant section of the Guidelines on inert gas systems.

2.3.2.4 Means shall be provided to protect cargo tanks against the effect of overpressure or vacuum caused by thermal variations when the cargo tanks are isolated from the inert gas mains.

2.3.2.5 Piping systems shall be so designed as to prevent the accumulation of cargo or water in the pipelines under all normal conditions.

2.3.2.6 Arrangements shall be provided to enable the inert gas main to be connected to an external supply of inert gas. The arrangements shall consist of a 250 mm nominal pipe size bolted flange, isolated from the inert gas main by a valve and located forward of the non-return valve referred to in paragraph 2.3.1.4.3. The design of the flange should conform to the appropriate class in the standards adopted for the design of other external connections in the ship's cargo piping system.

2.3.2.7 If a connection is fitted between the inert gas supply main and the cargo piping system, arrangements shall be made to ensure an effective isolation having regard to the large pressure difference which may exist between the systems. This shall consist of two shutoff valves with an arrangement to vent the space between the valves in a safe manner or an arrangement consisting of a spool-piece with associated blanks.

2.3.2.8 The valve separating the inert gas supply main from the cargo main and which is on the cargo main side shall be a non-return valve with a positive means of closure.

2.4 Operation and control requirements

2.4.1 Indication devices

Means shall be provided for continuously indicating the temperature and pressure of the inert gas at the discharge side of the gas blowers, whenever the gas blowers are operating.

2.4.2 Indicating and recording devices

2.4.2.1 Instrumentation shall be fitted for continuously indicating and permanently recording, when inert gas is being supplied:

- .1 the pressure of the inert gas supply mains forward of the non-return devices required by paragraph 2.3.1.4.1; and
- .2 the oxygen content of the inert gas in the inert gas supply mains on the discharge side of the gas blowers.

2.4.2.2 The devices referred to in paragraph 2.4.2.1 shall be placed in the cargo control room where provided. But where no cargo control room is provided, they shall be placed in a position easily accessible to the officer in charge of cargo operations.

2.4.2.3 In addition, meters shall be fitted:

- .1 in the navigation bridge to indicate at all times the pressure referred to in paragraph 2.4.2.1.1 and the pressure in the slop tanks of combination carriers, whenever those tanks are isolated from the inert gas supply main; and

- .2 in the machinery control room or in the machinery space to indicate the oxygen content referred to in paragraph 2.4.2.1.2.

2.4.2.4 Portable instruments for measuring oxygen and flammable vapour concentration shall be provided. In addition, suitable arrangement shall be made on each cargo tank such that the condition of the tank atmosphere can be determined using these portable instruments.

2.4.2.5 Suitable means shall be provided for the zero and span calibration of both fixed and portable gas concentration measurement instruments, referred to in paragraphs 2.4.2.1 to 2.4.2.4.

2.4.3 Audible and visual alarms

2.4.3.1 For inert gas systems of both the flue gas type and the inert gas generator type, audible and visual alarms shall be provided to indicate:

- .1 low water pressure or low water flow rate to the flue gas scrubber as referred to in paragraph 2.2.2.1;
- .2 high water level in the flue gas scrubber as referred to in paragraph 2.2.2.1;
- .3 high gas temperature as referred to in paragraph 2.4.1;
- .4 failure of the inert gas blowers referred to in paragraph 2.2.3;
- .5 oxygen content in excess of 8% by volume as referred to in paragraph 2.4.2.1.2;
- .6 failure of the power supply to the automatic control system for the gas regulating valve and to the indicating devices as referred to in paragraphs 2.3.1.3 and 2.4.2.1;
- .7 low water level in the water seal as referred to in paragraph 2.3.1.4.1;
- .8 gas pressure less than 100 mm water gauge as referred to in paragraph 2.4.2.1.1. The alarm arrangement shall be such as to ensure that the pressure in slop tanks in combination carriers can be monitored at all times; and
- .9 high gas pressure as referred to in paragraph 2.4.2.1.1.

2.4.3.2 For inert gas systems of the inert gas generator type, additional audible and visual alarms shall be provided to indicate:

- .1 insufficient fuel oil supply;
- .2 failure of the power supply to the generator; and
- .3 failure of the power supply to the automatic control system for the generator.

2.4.3.3 The alarms required in paragraphs 2.4.3.1.5, 2.4.3.1.6 and 2.4.3.1.8 shall be fitted in the machinery space and cargo control room, where provided, but in each case in such a position that they are immediately received by responsible members of the crew.

2.4.3.4 An audible alarm system independent of that required in paragraph 2.4.3.1.8 or automatic shutdown of cargo pumps shall be provided to operate on predetermined limits of low pressure in the inert gas main being reached.

2.4.4 Instruction manuals

Detailed instruction manuals shall be provided on board, covering the operations, safety and maintenance requirements and occupational health hazards relevant to the inert gas system and its application to the cargo tank system. The manuals shall include guidance on procedures to be followed in the event of a fault or failure of the inert gas system.

第 10/2015 號行政長官公告

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

國際海事組織海上安全委員會於二零零五年五月二十日透過第MSC.196(80)號決議通過了《國際船舶和港口設施保安規則》（國際船港保安規則（ISPS））的修正案，該修正案自二零零九年一月一日起適用於澳門特別行政區；

基於此，行政長官根據澳門特別行政區第3/1999號法律第六條第一款的規定，命令公佈包含上指修正案的MSC.196(80)號決議的中文及英文文本。

二零一五年二月十六日發佈。

行政長官 崔世安

Aviso do Chefe do Executivo n.º 10/2015

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

Considerando igualmente que, em 20 de Maio de 2005, o Comité de Segurança Marítima da Organização Marítima Internacional, através da resolução MSC.196(80), adoptou emendas ao Código Internacional para a Protecção dos Navios e das Instalações Portuárias (Código ISPS), e que tais emendas são aplicáveis na Região Administrativa Especial de Macau, a partir de 1 de Janeiro de 2009;

O Chefe do Executivo manda publicar, nos termos do n.º 1 do artigo 6.º da Lei n.º 3/1999 da Região Administrativa Especial de Macau, a resolução MSC.196(80), que contém as referidas emendas, nos seus textos em línguas chinesa e inglesa.

Promulgado em 16 de Fevereiro de 2015.

O Chefe do Executivo, *Chui Sai On*.

MSC.196 (80) 號決議

(2005 年 5 月 20 日通過)

通過國際船舶和港口設施保安規則

(國際船港保安規則 (ISPS)) 的修正案

海上安全委員會，

憶及《國際海事組織公約》關於本委員會職能的第 28 (b) 條，

注意到 2002 年《海上安全公約》大會第 2 號決議：會議以該決議通過了《國際船舶和港口設施保安規則》(以下簡稱“船港保安規則”)，該規則根據《1974 年國際海上人命安全公約》(SOLAS)(以下簡稱《公約》)第 XI-2 章成為強制性規則，

還注意到有關《船港保安規則》A 部分的修正程序的《公約》第 VIII (b) 條和第 XI-2/1.1.12 條，

在其第八十次會議上，審議了按照第 VIII (b) (i) 條提出並散發的《船港保安規則》A 部分的修正案，

1. 按照《公約》第 VIII (b) (iv) 條，通過《船港保安規則》A 部分的修正案，其文本列於本決議的附件；