

## 第 32/2014 號行政長官公告

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

國際海事組織海上安全委員會於一九八一年十一月二十日透過第MSC.1 (XLV) 號決議通過了公約的修正案；

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；

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.1 (XLV) 號決議的中文及英文正式文本。

公約英文正式文本及葡文譯本已刊登於一九九九年十二月六日《澳門特別行政區公報》第四十九期第一組。

二零一四年八月八日發佈。

行政長官 崔世安

## Aviso do Chefe do Executivo n.º 32/2014

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

Considerando igualmente que, em 20 de Novembro de 1981, o Comité de Segurança Marítima da Organização Marítima Internacional, através da sua resolução MSC.1(XLV), adoptou emendas à Convenção;

Considerando ainda 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, tal como emendada, na Região Administrativa Especial de Macau, a partir de 20 de Dezembro de 1999;

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

O texto autêntico da Convenção em língua inglesa, acompanhado da tradução para a língua portuguesa, encontra-se publicado no *Boletim Oficial* da Região Administrativa Especial de Macau n.º 49, I Série, de 6 de Dezembro de 1999.

Promulgado em 8 de Agosto de 2014.

O Chefe do Executivo, *Chui Sai On*.

# 1974年國際海上人命安全公約修正案

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### 構造 — 分艙與穩性、機電設備

第II-1章的現有文本用下文代替：

#### 第一節 — 通則

##### 規則 1

##### 適用範圍

1.1 除另有明文規定外，本章適用於1984年9月1日或以後安放龍骨或處於相應建造階段的船舶。

1.2 在本章內，術語“處於相應建造階段”，係指：

.1 可看作與特定船舶開始建造的相同階段；

.2 業已開始安裝的船舶不少於50噸，或為所有結構材料估量的百分之一，視何者小而定。

1.3 在本章範圍內：

.1 “建造船舶”指“安放龍骨或處於相應建造階段的船舶”；

.2 “所有船舶”指“在1984年9月1日之前、之日或之後建造的船舶”；

.3 無論何時建造的貨船，一經改裝成客船後，就於開始改裝之日起作為建造客船看待；

2 除另有明文規定外：

.1 在1984年9月1日之前建造的船舶，主管機關應保證在滿足2.2款規定的條件下，使之符合1974年國際海上人命安全公約第II-1章\*定義為新船或現有船舶所適用的各項要求；

.2 在1984年9月1日之前建造的船舶，主管機關應保證使之符合有關1981年修正的1974年國際海上人命安全公約1978年議定書附件的第II-1章中定義為新船或現有船舶所適用的各項要求。

3 所有船舶在進行修理、改裝、改建以及與之有關的艙裝時，至少應繼續符合這些船舶原先適用的要求。上述船舶如在1984年9月1日之前建造，一般至少應在其修理、改裝、改建或艙裝之前原來的程度上符合在該日或以後建造船舶的要求。重大的修理、改裝、改建以及與之有關的艙裝在主管機關認為合理和可行的範圍內，應滿足對在1984年9月1日或以後建造船舶的要求。

4 主管機關如考慮到航程的遮蔽性及其條件，認為引用本章的某些特殊要求為不合理或不必要時，可對其懸掛該國國旗的在航程中距最近陸地不超過20 海哩的個別船舶或某類船舶免除這些要求。

5 根據規則III/27 (c) 准予搭載的人數超過其所備救生艇容量的任何客船，應符合規則6.5所載的分艙特種標準以及規則5.4關於滲透率的特種規定，除非主管機關根據航程的自然條件及情況認為該船僅需符合本章其他各條規則和第II-2章的規定時，可作例外。

6 客船用於載運大量特種業務如朝山進香的旅客時，該船有權懸掛國旗的國家主管機關如認為實施本章要求為不切實際時，可對此類船舶免除這些要求，但此類船舶應完全符合下列規定：

- .1 1971 年特種業務客船協定所附的規則；和
- .2 1973 年特種業務客船艙室要求議定書所附的規則。

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\* 1974 年國際海上人命安全會議通過的文本。



## 規則2

### 定義

除另有明文規定外，就本章來說：

- 1.1 “分艙載重線”是指用以決定船舶分艙的吃水線。
- 1.2 “最深分艙載重線”是指相當於適用的分艙要求所允許的最大吃水線。
- 2 “船長”是指在最深分艙載重線兩端的垂線間量得的長度。
- 3 “船寬”是指在最深分艙載重線處或其下，由一舷肋骨外緣至另一舷肋骨外緣間的最大寬度。
- 4 “吃水”是指在船長的中點由船型基線至有關分艙載重線間的垂直距離。
- 5 “艙壁甲板”是指橫向水密艙壁所到達的最高一層甲板。
- 6 “限界線”是指在船側由艙壁甲板上表面以下至少76毫米處所繪的線。
- 7 “某一處所的滲透率”是指該處所能被水浸佔的百分比。某一處所體積伸展至限界線以上時，僅應量至該線高度為止。
- 8 “機器處所”是指由船型基線至限界線並介於兩端主橫向水密艙壁間供安置主輔推進機械及推進所需的鍋爐和一切固定煤艙的處所。對於特殊佈置的船舶，機器處所的範圍可由主管機關確定之。
- 9 “旅客處所”是指供旅客起居和使用的處所，不包括行李室、儲藏室、食品庫及郵件艙。對於規則5和6來說，在限界線以下供船員起居和使用的處所，亦應認作旅客處所。
- 10 在一切情況下，容積與面積均應計至船型線為止。
- 11 “風雨密”是指在任何海洋條件下，水不應滲入船內。

### 規則3

#### 有關第三、四和五節的定義

除另有明文規定外，對於第三、四和五節來說：

1 “操舵裝置的控制系統”是指用以將舵令由駕駛台傳至操舵裝置動力設備的設備。操舵裝置控制系統由發送器、接收器、液壓控制泵和它們的聯結電動機、電動機控制器、管系和電纜等組成。

2 “主操舵裝置”是指舵機、舵傳動裝置、操舵裝置動力設備，如有的話，和輔助設備以及將正常營運情況下為操縱船舶而運轉舵所必需的扭矩作用在舵桿（例如舵柄或舵扇）上的設備。

3 “操舵裝置動力設備”是指：

.1 在電動操舵裝置情況下，電動機和其隨同電器設備；

.2 在電動液壓操舵裝置情況下，電動機和其隨同電器設備與聯結的泵；

.3 在其他液壓操舵裝置情況下，驅動機械和聯結的泵。

4 “輔助操舵裝置”是指主操舵裝置發生故障情況下，操縱船舶必須有的設備，但不包括除舵桿、舵扇或同樣用途的部件以外的主操舵裝置的任何部分。

5 “正常操作和居住情況”是指船舶作為一個整體、機器、維修設施、保證推進的設備和輔助設備、操舵能力、安全航行、消防和抗沉性、內外通訊和信號、脫險通道和應急救生艇絞車以及所設計的舒適居住條件處於工作秩序和正常作用的情況。

6 “應急情況”是指由於主電源發生故障以致正常操作和居住條件所需的任何業務均不處於工作秩序的情況。

7 “主電源”是指向主配電板供電以分配給保持船舶正常操作和居住條件所必須的一切用途的電源。

8 “死船狀態”是指由於缺少動力，主推進裝置、鍋爐和副機不能運轉的情況。

9 “主發電站”是指主電源所在處所。

10 “主配電板”是指由主電源直接供電並用來將電能分配給船上各種用途的配電板。

11 “應急配電板”是指主電源供電系統發生故障情況下，由應急電源或過渡應急電源直接供電，並用來將電能分配給應急用途的配電板。

12 “應急電源”是指主電源的供電發生故障情況下用來向應急配電板供電的電源。

13 “動力傳動系統”是指提供動力以轉舵的液壓設備，由一個或若干個操舵裝置動力設備，連同所附管系和屬具以及舵傳動裝置所組成。動力傳動系統可共有若干機械部件，即舵柄、舵扇和舵桿或同樣用途的部件。

14 “最大營運前進航速”是指船舶在最大航海吃水情況下從事海上航行的設計最大航速。

15 “最大後退速度”是指船舶在最大航海吃水情況下應用設計最大後退動力預計能夠達到的速度。

16 “機器處所”是指一切A類機器處所和一切包括推進機械、鍋爐、燃油裝置、蒸汽機和內燃機、發電機和主要電動機、加油站、冷藏機、防搖裝置、通風機和空氣調節機械在內的其他處所，以及類似處所；連同通往這些處所的圍壁通道。

17 “A類機器處所”是具有下列設施的處所，連同通往這些處所的圍壁通道：

- .1 用作主推進的內燃機；或
- .2 非主推進用的合計總輸出功率不小於375千瓦的內燃機；或
- .3 任何燃油鍋爐或燃油裝置。

18 “控制站”是船舶無線電設備、主要航行設備或應急電源所在的處所，或者火警指示器或火災控制設備集中的處所。

19 “化學品船”係指建造或改建的並用於散裝載運任何液化產品的貨船，而這些產品已列入本組織大會490（XII）號決議同意授權海安會通過、並可能由本組織修改的關於散裝載運危險化學品船舶的構造和設備規則的最低要求摘要（以下簡稱“散裝化學品規則”）之中，或散裝載運任何液體物質，而這些物質已列入或臨時確定屬於現行有效的國際防止船舶造成污染公約附件I附錄II的A、B或C類。

20 “氣體運載船”係指建造或改建的用於散裝載運任何液化氣體或其他物質，這些氣體或物質已列入本組織大會通過的大會328（IX）決議，並已經本組織修訂或可能修訂的散裝液態氣體運載船構造和設備規則（以下簡稱“氣體運載船規則”）第XIX章。

21 “載重量”係指船舶在比重為1.025的海水中，相應於所勘劃的夏季載重線的排水量與該船空船排水量之差，以噸計。

22 “空載排水量”是指船舶在艙內沒有貨物、燃油、潤滑油、壓載水、淡水、給水和易耗物料，且無旅客、船員及其財物時的排水量，以噸計。

## 第二節 一分艙和穩性\*

(第二節適用於客船，如規則中指明的，也適用於貨船)

### 規則4

#### 客船可浸長度

1 船長中任何一點的可浸長度，應由計及該船船型、吃水及其他特徵的一種計算方法來確定。

2 對有連續艙壁甲板的船舶，在船長中某一點的可浸長度，是以該點為中心的最大限度的一段船長，在按規則5限定的假設條件下浸水時，船舶不致淹過限界線。

3.1 對無連續艙壁甲板的船舶，船長中任何一點的可浸長度，可按假定的連續限界線來確定；此線的任何點均須在該甲板上表面（船側）以下至少76毫米，而通至該甲板的有關艙壁及船體均須為水密。

3.2 當假定的限界線有一部分低於艙壁所通達的甲板相當距離時，則對該艙壁在高出限界線而直接位於較高層甲板以下的部分，主管機關可有限度地放寬其水密程度。

### 規則5

#### 客船滲透率

1 規則4所指限定的假設條件，是指限界線以下處所的滲透率。

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\* 本組織通過的大會 265 ( VIII ) 號決議，作為 1960 年國際海上人命安全公約第 II 章第 B 節等效規則的客船分艙和穩性規則，如適用，可全部用來代替本節要求。

在決定可浸長度時，對限界線以下的下列船舶各部分的整個長度範圍內，應使用同一平均滲透率：

- .1 規則2定義所指的機器處所；
- .2 機器處所以前部分；和
- .3 機器處所以後部分。

2.1 整個機器處所內的同一平均滲透率應按下列公式確定：

$$85 + 10 \left( \frac{a-c}{v} \right)$$

式中：a — 在限界線以下位於機器處所範圍內按規則2定義所指的旅客處所容積；

c — 在限界線以下位於機器處所範圍內專供貨物、煤或物料儲藏用的甲板間處所容積；

v — 限界線以下機器處所的總容積。

2.2 如用詳細計算法求得的平均滲透率小於上列公式所得的數值，而主管機關認為滿意時，則可採用詳細計算求得的數值。在此種計算中，按規則2定義所指的旅客處所的滲透率應為95；一切貨物、煤及物料儲藏處所應為60；雙層底。燃油艙柜及其他艙櫃應分別根據情況採用認可的數值。

3 除第4款的規定外，位於機器處所以前（或以後）的整個部分的同一平均滲透率，應按下列公式確定：

$$63 + 35 \frac{a}{v}$$

式中：a — 在限界線以下位於機器處所以前或以後按規則2定義所指旅客處所的容積；

v — 在限界線以下位於機器處所以前或以後部分的總容積。

4 若船舶根據規則III/27 (c) 准予搭載超過其所備救生艇容量的人數，並按規則1.5要求符合特種規定者，其位於機器處所以前或以後的整個部分的同一平均滲透率應按下列公式確定：

$$95-35 \frac{b}{v}$$

式中：b — 位於機器處所以前或以後限界線以下以及按各個情況如肋板頂部、內底或尖艙以上，專供作裝貨處所、煤或燃油艙、物料儲藏室、行李室及郵件艙、錨鏈艙及淡水艙櫃的容積。

v — 限界線以下位於機器處所以前或以後部分的總容積；

如按照船舶業務，其貨艙通常並不裝載任何大宗貨物，則在計算“b”時，裝貨處所的任何部分均不包括在內。

5 對特殊佈置的船舶，主管機關可允許或要求對位於機器處所以前或以後部分的平均滲透率作詳細的計算。在此種計算中，按規則2定義所指旅客處所的滲透率應為95；安置機器的處所為85；一切貨物、煤及物料儲藏處所為60；雙層底、燃油艙櫃及其他艙櫃的滲透率應分別根據情況採用認可的數值。

6 在兩水密橫艙壁間的甲板間艙內沒有任何旅客或船員處所時，除完全包圍於固定鋼質艙壁內並作其他用途的處所外，整個甲板間艙應視作旅客處所。若所述旅客或船員處所完全包圍在固定的鋼質艙壁以內，則僅需將被包圍部分視作旅客處所。



## 規則6

### 客船許可艙長

1 船舶應按其預定的用途儘可能作有效的分艙。分艙的程度應視船舶的長度與業務而定，即船長最大而以載客為主的船舶的分艙程度為最高。

2 分艙因數。

2.1 以船長中任何點為中心的最大許可艙長是以適當的因數乘其可浸長度求得之，此因數稱為分艙因數。

2.2 分艙因數隨船舶的長度而定，在一定長度下，又視船舶預定的用途而變化。此因數按下列情況順次連續遞減：

.1 當船長增加時，和

.2 從適用於運貨為主的船舶的因數A至適用於載客為主的船舶的因數B。

2.3 因數A和B的變動應用下列公式（1）和（2）來表示，式中L即規則2定義所指的船長：

$$A = \frac{58.2}{L-60} + 0.18 \quad (L = 131 \text{米及以上}) \dots\dots\dots$$

(1)

$$B = \frac{30.3}{L-42} + 0.18 \quad (L = 79 \text{米及以上}) \dots\dots\dots$$

(2)

3 業務的衡準。

3.1 一定長度的船舶，其適用的分艙因數，應由下列公式（3）及（4）所求得的業務衡準數（以下簡稱衡準數）來確定，式中：

$C_s$  — 衡準數；



L — 規則2定義所指的船長（米）；

M — 規則2定義所指機器處所的容積（立方米），加上位於內底以上機器處所以前或以後的任何固定燃油艙的容積；

P — 規則2定義所指的限界線以下旅客處所的總容積（米）；

V — 限界線以下的船舶總容積（立方米）；

P<sub>1</sub> — KN，其中：

N — 核准該船搭載的旅客數，和

K — 0.056 L

3.2 如KN的數值大於P與限界線以上的實際旅客處所總容積的和，則P<sub>1</sub>應採用上述的和或三分之二KN，視何者為大而定。

當P<sub>1</sub>大於P時：

$$C_s = 72 \frac{M+2P_1}{V+P_1-P} \dots\dots\dots (3)$$

在其他情況時：

$$C_s = 72 \frac{M+2P}{V} \dots\dots\dots (4)$$

3.3 對無連續艙壁甲板的船舶，各容積應計算到決定可浸長度時所用的實際限界線。

4 第5款所述以外的船舶分艙規則。

4.1 長度在131m及以上的船舶，如衡準數為23或以下者，前尖艙以後的分艙，取分艙因數A，由公式（1）求得；如衡準數為123或以上者，取分艙因數B，由公式（2）求得；如衡準數在23與123之間，則分艙因數為F，按下列公式在因數A與B之間用直線內插法求得：

$$F = A - \frac{(A-B) (C_s - 23)}{100} \dots\dots\dots$$

(5)

但衡準數如等於或大於45，同時用公式（5）求得的分艙因數等於或小於0.65而大於0.50時，則前尖艙以後的分艙因數應取0.5。

4.2 如求得的因數F小於0.40，並經主管機關同意，此數值不能在該船機艙內適用，則此艙的分艙，可取較大的因數，但該因數不應超過0.40。

4.3 長度小於131m，但不小於79米的船舶，當其衡準數等於S時，分艙因數應取1，其中：

$$S = \frac{3574 - 25L}{13}$$

如衡準數為123或以上者，取分艙因數B，由公式（2）求得；如衡準數在S和123之間時，則分艙因數為F，按下列公式在1與因數B之間用直線內插法求得：

$$F = 1 - \frac{(1-B) (C_s - S)}{123 - S} \dots\dots\dots$$

(6)

4.4 長度在131米以下但不小於79米，且衡準數小於S的船舶，以及一切長度小於79米的船舶，前尖艙以後的分艙，取分艙因數1；但在上述任何一種情況中，如主管機關同意此因數在該船的任何部分不實用時，則主管機關在考慮了一切情況後，可給與適當的放寬。

4.5 第4.4款的規定，也適用於任何長度的船舶，如其核准搭載的乘客數額在12人以上，但不超過

$$\frac{L^2}{650} \text{ 或 } 50, \text{ 視何者為小而定。}$$

5 根據規則 III/27 (c) 准予搭載人數超過其所備救生艇容量和按規則 1.5應符合特種規定的船舶的分艙特種標準。

5.1.1 以載客為主的船舶，其前尖艙以後的分艙應取因數0.50；如按第3和4款計算所得的因數小於0.50時，則用計算所得的數值。

5.1.2 當此種船舶的長度小於91.5米時，如經主管機關同意，認為對某一艙採用上述因數為不實用時，可允許對該艙的長度採用較大的分艙因數，但所有因數應是在此情況下實際可行和合理的最小數值。

5.2 不論船長是否小於91.5米，如因需要裝載相當數量的貨物致使前尖艙以後的分艙不可能採用0.50以下的因數時，則該船所採用的分艙標準應按照下列第.1至.5目的規定選取，但如主管機關同意，認為從任何方面強求嚴格遵守均屬不合理時，可准其對水密艙壁作變通的佈置，然而此種佈置就其功能來說，應為不減低整個分艙效用者為限。

.1 第3款關於衡準數的規定仍然適用，但計算 $P_1$ 值時，對有鋪位的旅客， $K$ 應取第3款所確定的數值或取3.5立方米，視何者為大而定；對無鋪位的旅客， $K$ 值應取3.5立方米。

.2 第2款內的因數 $B$ 應以按下列公式計算求得的因數 $BB$ 來代替：

$$BB = \frac{17.6}{L-33} + 0.20 \quad (L = 55 \text{ 米及以上})$$

.3 長度在131米及以上的船舶，如衡準數為23或以下者，前尖艙以後的分艙，取分艙因數 $A$ ，由第2.3款公式(1)求得；如衡準數為123或以上者，則分艙因數取 $BB$ ，由第5.2.2款的公式求得；如衡準數在23與123之間，則分艙因數為 $F$ ，按下列公式在 $A$ 與 $BB$ 之間用直線內插法求得：

$$F = A - \frac{(A-BB)(C_S-23)}{100}$$

但是，如求得的因數 $F$ 小於0.50時，則分艙因數應取0.50或按第4.1款規定求得的因數，視何者為小而定。

.4 長度在131米以下但不小於55米的船舶，當衡準數等於 $S_1$ 時，前尖艙以後的分艙，取分艙因數1，其中：

$$S_1 = \frac{3.712 - 25L}{19}$$

如衡準數為123或以上者，則分艙因數取BB值，由第5.2.2款的公式求得；如衡準數在 $S_1$ 與123之間，則分艙因數為F，按下列公式在1與BB之間用直線內插法求得：

$$F = 1 - \frac{(1-BB)(C_2 - S_1)}{123 - S_1}$$

但在上述後兩種情況中的任何一種時，如求得的因數小於0.50時，分艙因數可取為不超過0.50。

.5 長度在131米以下，但不小於55米，且衡準數小於 $S_1$ 的船舶，以及一切長度在55米以下的船舶，前尖艙以後的分艙，取分艙因數1；但是，若主管機關同意，認為此項分艙因數對某些個別艙為不實用時，則主管機關在考慮了一切情況後可對這些艙給與適當的放寬，但尾部最後一個艙與儘可能多的前部各艙（在前尖艙與機器處所後端艙壁之間者）的長度，均不得大於可浸長度。

## 規則7

### 關於客船分艙的特殊規則

1 在船舶的一部分或數部分，如其水密艙壁通至比其他部分為高的一層甲板，而在計算可浸長度時又要利用這種艙壁的升高部分時，則各該部分可採用分別的限界線，但需符合下列規定：

.1 整個船長度兩側船殼板均延伸至相當於較高限界線的甲板，且在整個船長內，此甲板下的船殼開口均應按規則17作為限界線以下的開口；

.2 艙壁甲板或階層處的相鄰兩艙，應各不超過其相應限界線的許可長度，且相鄰兩艙的總長不超過以較低限界線為基礎的許可長度的兩倍；

2.1 某艙的長度可以超過按規則6所求得的許可艙長，但該艙與其相鄰的前艙或後艙加在一起的總長均不應超過許可艙長的兩倍或可浸長度，視何者為小而定。

2.2 如果相鄰兩艙之一位於機器處所內，而另一艙在機器處所以外，且後者所在部分的平均滲透率與機器處所的不同，則此相鄰兩艙的總長應予調整，使其適應兩艙所在部分平均滲透率的平均值。

2.3 如相鄰兩艙的分艙因數不同時，此兩艙的總長應按此例來確定。

3 長度為100米及以上的船舶，其前尖艙以後的主橫艙壁之一應設置在距首垂線不大於許可艙長之處。

4 主橫艙壁可以凹折，但整個凹折部分應處於在船內距外殼板五分之一船寬的兩側垂直面之間，船寬按規則2定義所指並在最深分艙載重線的水平面上自船側向垂直於縱中剖面的方向量取。位於上述範圍以外的任何凹折部分，應按照第5款作為階層處理。

5 主橫艙壁可作階層狀，但應符合下列條件之一：

.1 此艙壁所分隔的兩艙總長度不超過可浸長度的百分之90或許可艙長的兩倍，但是如果船舶的分艙因數大於0.9者，此兩艙的總長度不應超過其許可艙長；

.2 在階層處另加分艙設置，以保持與用平面艙壁時有同等的安全程度；

.3 被此階層向上延伸所超過的艙，其長度不超過相當於在此階層下面76毫米所作限界線的許可艙長。

6 主橫艙壁有凹折或階層者，應採用一等效的平面艙壁來確定其分艙。

7 若相鄰兩主橫艙壁間的距離，或其等效平面艙壁間的距離，或通過相鄰兩主橫艙壁的最近階層部分的橫向平面間的距離，小於3.0米加船長

的百分之三或11米，視何者為小而定，則只應將上述艙壁之一視為是按照規則6規定形成船舶分艙的部分。

8 當在一個主橫水密艙內包含有局部分艙，而在任何假定的船側破損長度達3米加船長的百分之三或11米時，視何者為小而定，此時主水密艙的全部容積並未被水浸滿，則經主管機關同意，可對此船按通常所要求的許可艙長，按比例予以放長。在此情況下，對未破損一側所假定的有效浮力容積不得大於對破損一側所假定的數值。

9 當所要求的分艙因數為0.50或以下者，任何相鄰兩艙的總長不應超過可浸長度。

## 規則8

### 客船破艙穩性

1.1 在所有營運狀態下，船舶應具有足夠的完整穩性，以能支持其任一不超過可浸長度的主艙浸水至最後階段。

1.2 當相鄰兩主艙由按規則7.5.1條件的階層艙壁所分隔，則船舶的完整穩性應足以支持此相鄰兩主艙的浸水。

1.3 當所要求的分艙因數為0.50或以下，但大於0.33者，其完整穩性應足以支持任意相鄰兩主艙的浸水。

1.4 當所要求的分艙因數為0.33或以下者，其完整穩性應足以支持任意相鄰三主艙的浸水。

2.1 第1款的要求，應按照第3、4和6款並顧及船舶的尺度比例與設計特性以及受損艙的佈置與形狀以計算決定之。作此項計算時，應假定船舶的穩性處於最惡劣的預計營運狀態。

2.2 凡擬裝設足夠嚴密的甲板、內殼板或縱艙壁以嚴格限制水的流動者，在計算中對此類限制所作的適當考慮，應經主管機關同意。

2.3 當主管機關對破損情況下的穩性有懷疑時，可以要求對其進行核查。

3 為計算破艙穩性，容積和表面滲透率一般應按以下規定：

處所	滲透率
貨物、煤或物料儲藏專用處所	60
起居設備佔用處所	95
機器佔用處所	85
供裝載液體的處所	0 或 95*

\* 視何者造成較嚴重的後果而定。

對處於破損水面附近並未包容相當數量的起居設備或機器的處所，以及經常並未被相當數量的貨物或物料佔用的處所，均應假定有較高的表面滲透率。

4 假定的破損範圍應如下：

.1 縱向範圍：3.0米加船長的百分之三或11.0米，視何者為小而定。如所要求的分艙因數為0.33或以下，則假定的縱向破損範圍應按需要增加，以使其包括任何兩個依次排列的主橫水密艙壁；

.2 橫向範圍（在船內於最深分艙載重線水平面上自船側向垂直於縱中剖面的方向量計）：為規則2定義所指船寬的五分之一距離；和

.3 豎向範圍：自基線向上，無限制；

.4 如任何小於第4.1、4.2和4.3款所指的破損，會使傾斜或初穩性高度的損失更為嚴重，則在計算中應對此種破損情況作出假定。



5 應作有效佈置使不對稱浸水降至最小程度。如必須校正大傾斜角時，所採用的方法，應盡可能是自動的；但在任何情況下當橫貫浸水裝置設有控制設備時，此項設備應能在艙壁甲板以上操作。這種裝置及其控制設備連同平衡前的最大傾角，均應是主管機關所能接受的。如需設有橫貫浸水裝置時，平衡所需時間應不超過15分鐘。關於使用橫貫浸水裝置的相應資料應提供給該船船長\*。

6 船舶破損後以及不對稱浸水情況下經採取平衡措施後，其最終狀態應如下：

.1 在對稱浸水情況下，當採用固定排水量法計算時，應至少有50毫米的正值剩餘穩性高度。

.2 在不對稱浸水情況下，其總橫傾角不得超過7°，但在特殊情況下，主管機關可允許放寬由於不對稱力矩而產生的較大橫傾角，可是在任何情況下，其最終橫傾角不應超過15°。

.3 在任何情況下，船舶浸水的終了階段不得淹沒限界線。如認為在浸水的某一中間階段可能淹沒限界線時，主管機關可要求作船舶安全所必需的研究與佈置。

7 應將各種營運情況下為保持船舶具有足夠的完整穩性以經受得住危害性破損所需的資料提供給船長。對需用橫貫浸水裝置的船舶，其傾斜計算所依據的穩性情況應通知船長，並警告船長若該船在不利情況下受損時，可能發生過度的傾斜。

8.1 除證明在任何營運狀態下為滿足上述要求所需的完整穩性高度超過計劃營運狀態的要求者外，主管機關不得考慮放寬對破艙穩性的要求。

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\* 參閱本組織通過的 A.266 (VIII) 號決議“關於為適應客船橫貫浸水裝置的要求而制定的標準方法的建議案”。



8.2 只是在特殊情況下，經主管機關同意，認為船舶的尺度比例、佈置及其他性能對破艙後的穩性最為有利，而在該特殊情況下採用這種破艙範圍是合理和可行時，方准放寬對破艙穩性的要求。

## 規則9

### 客船的壓載

1 壓載水一般不得裝於計劃裝載燃油的艙內。如實際上不能避免將水裝入燃油艙的船舶，則應設置經主管機關同意的油水分離裝置，或為主管機關所接受的處理帶油壓載水的其他設施，如向岸上排放的設施。

2 本規則的規定並不影響現行有效的國際防止船舶造成污染公約的規定。

## 規則10

### 客船尖艙及機器處所的艙壁、軸隧等

1 應設有水密高達艙壁甲板的前尖艙艙壁或防撞艙壁。此艙壁須裝設於距首垂線不少於船長的百分之五而不大於3米加船長的百分之五的處所。

2 當水線以下船舶的任何部分自首垂線向前延伸，例如球鼻艙，第1款規定的距離應自下列各點之一來量計：

- .1 這類延伸部分的長度中點；或
- .2 首垂線以前船長的百分之1.5處；或
- .3 首垂線以前3米處；

視何者為小而定。

3 當設有長的前部上層建築，則前尖艙艙壁或防撞艙壁應風雨密地延伸至艙壁甲板的上一層甲板。此延伸部分不必直接設於下面艙壁之上，但除第4款允許免除者外應位於第1或2款規定的限度內，並且形成階層部分的艙壁甲板應有效地作成風雨密。

4 當設有首開門和傾斜裝卸跳板組成艙壁甲板以上的防撞艙壁延伸部分，在艙壁甲板以上多於2.3米的跳板部分可自第1和2款規定限度向前延伸。在整個長度內跳板應為風雨密。

5 後尖艙艙壁，以及將規則2定義所指機器處所與前後客貨處所隔開的艙壁，均應設置並做成水密，直至艙壁甲板。但是，如果不致減低船舶分艙的安全程度時，則後尖艙艙壁可在艙壁甲板下方作成階層狀。

6 在一切情況下，尾軸管均應封閉於具有適度容積的水密處所內。尾軸填料函壓蓋須裝設於水密尾軸隧內或與尾軸管室分開的其他水密處所內，而該處所的容積，在尾軸填料函壓蓋滲漏而浸水時，將不致淹沒限界線。

## 規則11

### 貨船的防撞艙壁

1 就本條規則來說，“乾舷甲板”、“船長”和“首垂線”的意義按現行國際船舶載重線公約定義所指。

2 應設置防撞艙壁，並應為水密高達乾舷甲板。此艙壁應位於離首垂線不小於船長百分之五或10米，視何者為小而定，經主管機關允許，可不大於船長的百分之八。

3 如水線以下的船舶任何部分自首垂線向前延伸，例如球鼻艙，第2款規定的距離應自下列各點之一來量計：

- .1 這類延伸部分的長度中點；或
- .2 首垂線以前船長的百分之1.5處；或
- .3 首垂線以前3 米處；

視何者為小而定。

4 此艙壁在第2或3款所述限度之內可有階層或凹折。穿過防撞艙壁的管子應裝有在乾舷甲板以上操作的適宜的閘，閘箱應位於首尖艙內，固定在艙壁上。如在一切營運情況下閘均能到達，且閘所在的處所不是裝貨處所，閘可安裝在防撞艙壁的後側。所有閘應為鋼質、青銅或其他認可的延性材質。普通鑄鐵或類似材質的閘不能採用。此艙壁上不應設門、人孔、通風管道或任何其他開口。

5 當設有長的前部上層建築，則防撞艙壁應風雨密地延伸至乾舷甲板的上一層甲板。此延伸部分不必直接設於下面艙壁之上，但除第6款允許免除者外應位於第2或3款規定的限度內，並且形成階層部分的甲板應有效地作成風雨密。

6 當設有首門和裝貨斜坡道形成乾舷甲板以上的防撞艙壁延伸部分時，高出乾舷甲板2.3m的坡道部分可從上述2和3規定的限度向前延伸。坡道全長範圍內都應風雨密。

7 乾舷甲板以上防撞艙壁延伸處的開口數應在適合船舶設計和正常作業情況下減至最小。這類開口均應能夠作風雨密關閉。

## 規則12

### 客船雙層底

1 雙層底的設置應在適合於船舶設計及船舶正常作業要求的情況下儘量自前尖艙艙壁延伸至後尖艙艙壁。

.1 長度在50米以上、61米以下的船舶，至少應自機器處所至前尖艙艙壁或儘可能接近該處之間設置雙層底。

.2 長度在61米以上、76米以下的船舶，至少應在機器處所以外設置雙層底，並應延伸至前、後尖艙艙壁，或儘可能接近該處。

.3 長度在76米及以上的船舶，應在船中部設置雙層底，並應延伸至前、後尖艙艙壁，或儘可能接近該處。

2 凡需設置雙層底時，其高度應經主管機關同意，其內底應延伸至船的兩側，以保護船底至舳部彎曲處。此項保護如能使內底邊板的外緣與舳部殼板的交線，在任何部分都不低於一個在基線上距中線為型寬一半處與基線成 $25^\circ$ 角的橫斜線與在船中處的肋骨線相交之點的水平面，即認為滿意。

3 設於雙層底內與貨艙等排水裝置有關的小阱等等，不應向下延伸至超過所需的深度。此阱的深度，在任何情況下不得大於中線處雙層底高度減460毫米，也不得延伸至第2款所述的水平面以下。但在螺旋槳船上，准許其軸隧後端的污水阱延伸至外底。其他的阱（如主機下的潤滑油阱），如其佈置與符合本條規則的雙層底具有同等的保護作用時，經主管機關同意亦可設置。

4 專供裝載液體而大小適度的水密艙，如主管機關認為當該艙的船底或船側破損時不致因此妨礙船舶的安全者，可不設雙層底。

5 適用規則1.5規定並在規則III/2定義所指的短程國際航行範圍內營運的班輪，如因在其分艙因數不超過0.50的任一部分設置雙層底將對該船的設計與船舶正常作業不相適應時，主管機關可准予在該部分免設雙層底。

### 規則13

#### 客船分艙載重線的勘定、勘劃與記載

1 為了保持所要求的分艙程度，應在船舶兩舷勘定並勘劃相當於所核准分艙吃水的載重線。若船內有專供交替載客和載貨的處所者，經船舶所有人請求，可勘定和勘劃一個或數個相當於主管機關核准的交替營運狀態分艙吃水的附加載重線。

2 所勘定和勘劃的分艙載重線應載入客船安全證書，並以C.1表示主要載客情況，C.2、C.3等分別表示交替載客和載貨情況。

3 相應於每一載重線的乾舷，應與按現行國際船舶載重線公約確定的乾舷在同一位置上並從同一甲板線進行測量。

4 相應於每一經核准載重線的乾舷以及對其所核准的營運條件，均應清楚地載明於客船安全證書內。

5 在任何情況下，任何分艙載重線均不得勘劃於按船舶強度或現行國際船舶載重線公約所確定的海水中最深載重線以上。

6 無論分艙載重線標誌的位置如何，船舶裝載概不得使按現行國際船舶載重線公約所確定的適合於所在季節和區域的載重線標誌淹沒於水中。

7 船舶的裝載，當其在海水中時，概不得將適合於該航次及營運狀態的分艙載重線淹沒於水中。

## 規則14

### 客船和貨船的水密艙壁等的構造與初次試驗

1 無論橫向或縱向的每一水密分艙艙壁，其構造應能以適當的抗強裕度支持船舶在破損時可能遭受的最大水頭的壓力，但至少須能支持高達限界線的水頭壓力。此等艙壁的構造應經主管機關同意。

2.1 艙壁上的階層及凹折均應水密，並與其所在處所的艙壁具有同等強度。

2.2 如肋骨或橫樑穿過水密甲板或艙壁時，此甲板或艙壁應在不用木材或水泥的情況下做成結構上的水密。

3.3 對各主要艙室並不強制進行灌水試驗。但如不進行該項灌水試驗，則必須進行沖水試驗，此試驗應在船舶進行艙裝的最後階段進行。在任何情況下，都應對水密艙壁進行全面的檢查。

4 前尖艙、雙層底（包括箱形龍骨）及內側殼板均應以相當於第1款要求的水頭作試驗。

5 供裝載液體並形成船舶分艙部分的艙櫃，應以高達最深分艙載重線或相當於該艙所在處由龍骨上面至限界線高度三分之二的水頭，視何者為大而定，試驗其密性；但在任何情況下，試驗水頭不得低於該艙艙頂以上0.90米。

6 第4和5款所述的試驗，其目的在於確保分艙結構佈置的水密，並非作為該艙用作裝載燃油或其他特殊用途的適應性試驗；對此項適應性試驗，可按照液體進入艙內或其連接部分的高度，要求作更嚴格的試驗。



## 規則15

### 客船水密艙壁上的開口

1 水密艙壁上的開口，應在適合船舶設計及船舶正常作業的情況下減至最少數量；此等開口均應備有經認可的關閉設備。

2.1 凡管子、流水口和電纜等通過水密分艙艙壁時，應設有保證該艙壁水密完整性的裝置。

2.2 不構成管系組成部分的閘不准設在水密分艙艙壁上。

2.3 鉛或其他易熔材料，不得用於穿過水密分艙艙壁的管系上，該處在發生火災時此等管系的損壞將會損害艙壁的水密完整性。

3.1 下列各處不准設門、人孔或出入口：

.1 限界線以下的防撞艙壁；

.2 分隔相鄰貨艙之間，或貨艙與固定或備用煤艙之間的水密橫艙壁，但第12款和規則16規定者除外。

3.2 除第3.3款所規定者外，在限界線以下的防撞艙壁上僅可通過一根管子，以處理前尖艙內的液體，但該管應裝有能在艙壁甲板上方操作的截止閘，其閘箱應設於前尖艙內並裝在防撞艙壁上。

3.3 如前尖艙分隔成裝載兩種不同的液體，經主管機關同意，除裝設第二根管子外無其他切實辦法可以代替，且考慮在前尖艙內增加分隔仍保持船舶安全時，則主管機關可允許在限界線以下的防撞艙壁上穿過二根管子；每根管子均應按第3.2款的要求進行裝設。

4.1 裝於固定和備用煤艙之間艙壁上的水密門，應是隨時可以通達的，但第11.2款所規定的甲板間煤艙門除外。

4.2 應以屏隔或其他措施作成適當的佈置，以防煤炭阻礙煤艙水密門的關閉。

5 在主副推進機械包括推進所需的鍋爐及一切固定煤艙的處所內，其每一主橫艙壁上，除通往煤艙及軸隧的門外，不得設置多於一扇的門。如裝有二根或更多的軸，其軸隧之間應設有一個互通的連接過道。若裝設二根軸者，在機器處所與軸隧間僅准設一扇門；如裝設二根以上軸者，則僅准設二扇門。所有此種門均須為滑動式，且應裝置於使其門檻儘可能高之處。由艙壁甲板操縱這些門的手動裝置，如能妥善佈置其必要的傳動系統時，應設於機器處所以外。

6.1 水密門應為滑動門或鉸鏈門或其他等效型式的門。僅以螺栓緊固的平板門和需借墜落或重物墜落作用關閉的門都不允許使用。

6.2 滑動門可為單一手動式的，或動力和手動式的。

6.3 因此，許可採用的水密門可分為三級：

一級 – 鉸鏈門

二級 – 手動式滑動門

三級 – 動力和手動式滑動門。

6.4 任何水密門的操作裝置，無論是否動力操作，均須於船舶向左或向右傾斜至 $15^\circ$ 時能將門關閉。

6.5 對各級水密門，在看不見門的所有操作站處，均應設有顯示該門處於開啟或關閉位置的指示器。不能由總控制站關閉的任何水密門，不論其屬於哪一級，應備有機械的、電動的、電話的或其他適宜的直接通信裝置，使值班駕駛員能根據事先的命令與負責關閉各該水密門的人員迅速聯繫。

7 鉸鏈門（一級）應裝有能由艙壁兩側都能操作的速閉裝置，諸如搭扣之類。

8 手動式滑動門（二級）可為橫動式或豎動式。此門應能在門所在處的兩側操作其機構，此外，並能在艙壁甲板上方可到達之處用全周旋轉



動作或其他同樣安全可靠並經認可的動作方式來進行操作。如因空間的限制，不可能從兩側操作時，則此項要求可予放寬。當船舶在正浮位置時，用手動裝置將門完全關閉所需的時間應不超過90秒。

9.1 動力式滑動門（三級）可為豎動式或橫動式。如要求由總控制站以動力操作的門，其傳動裝置的佈置也應能在門所在處的兩側用動力操作。此裝置應使該門於總控制站加以關閉後，如由就地控制裝置開啟，仍能自動關閉；也使任一門能由就地控制系統保持關閉，以防止被上方的控制系統開啟。在艙壁的兩側應設置與動力控制裝置相連的就地控制手柄，其佈置應使經過此門的人，能把持兩側的手柄，使之處於開啟位置，以免關閉機械突然動作。動力式滑動門應備有可在門的兩側操作的手動裝置，並須在艙壁甲板上方可到達之處用全周旋轉動作或其他同樣安全可靠並經認可的動作方式來進行操作。應設有音響信號裝置，在此門開始關閉、繼續移動直至完全關閉為止的期間發出警報。門的關閉應有充分時間以保證安全。

9.2 至少應有兩組獨立的動力源以開關所有由其控制的門，每一動力源應能同時對各門進行操作。此兩動力源應由駕駛室的總控制站進行控制，並應備有用以校驗每一動力源能圓滿工作的一切必要指示器。

9.3 如用液壓操作時，每一動力源應包括一個能在60秒鐘以內關閉所有各門的泵。此外，用於整個裝置的液體貯存器，應有足夠操作所有各門至少3次，即關閉 - 開啟 - 關閉的容量。所用的液體應在船舶營運中可能遇到的任何溫度下不致凍結。

10.1 旅客、船員及工作處所的鉸鏈水密門（一級），僅准設置於下述甲板以上，即此甲板的底面在船側的最低點，至少應高出最深分艙載重線2.0米。

10.2 凡水密門的門檻在最深載重線以上但在第10.1款規定的線以下者，應為滑動式，並可為手動式的（二級）；但對於分艙因數小於0.50的從事短程國際航行的船舶，此種門應為動力式。連通冷藏貨物及通風或強制通風管道的圍壁通道，當穿過多於一主水密分艙艙壁時，艙壁上開口的門應為動力式。

11.1 有時需在航海中開啟的水密門，且其門檻在最深分艙載重線以下者，應為滑動式，並應符合下列規定：

.1 當此類門的數量（不計軸隧入口處的門）超過5扇時，所有這些門及軸隧入口處或通風或強制通風管道的門，應為動力式的（三級），並應能由駕駛室的總控制站同時予以關閉；

.2 當此類門的數量（不計軸隧入口處的門）多於1扇，但不超過5扇；

.2.1 在艙壁甲板以下未設旅客處所的船舶，所有上述的門可為手動式的（二級）；

.2.2 在艙壁甲板以下設有旅客處所的船舶，所有上述的門應為動力式的（三級），並應能由駕駛室的總控制站同時予以關閉；

.3 如船舶上僅有兩扇此類水密門，且是位於機器處所或這種處所周圍的艙壁內，則主管機關可准許此兩門僅為手動式的（二級）。

11.2 裝於艙壁甲板以下甲板間內煤艙之間的滑動水密門，有時因整理燃煤須在航海中開啟者，此門應由動力操作。此類門的開啟及關閉應記入主管機關所規定的航海日誌中。

12.1 如主管機關認為是必需的，則在甲板間內分隔貨艙的水密艙壁上可裝設適當構造的水密門。此類門可為鉸鏈式、滾動式或滑動式，但不應為遙控的。此類門應裝在最高處並儘可能遠離船殼板，但在任何情況下，其垂直外邊概不得位於距船殼板少於規則 2 定義所指船寬的五分之一，此距離在最深分艙載重線水平面上向垂直於縱中剖面的方向量計。

12.2 此類門應在開航前關妥，並應在航行中保持關閉；此類門在港內開啟及船舶離港前關閉的時間應記入航海日誌中。此類門如在航程中是可以到達的，應裝有防止任意開啟的裝置。在提出設置此類門時，其數量及佈置均應經主管機關特殊考慮。

13 可移式板門不應用於艙壁上，但在機器處所內除外。此種門應在船舶離港前裝在原位，在航行中除緊急情況外不得取下。裝復此種板門時必須審慎，以確保其接縫水密。

14 所有水密門均應在航行中保持關閉，因船舶的操作而必需開啟者除外，但在這種情況下應做到隨時可以關閉。

15.1 凡由船員艙室通至鍋爐艙、用作裝設管子及任何其他用途的圍壁通道或隧道，如穿過主橫水密艙壁者，應為水密，並應符合規則19的要求。在航行中用作通路的每一圍壁通道或隧道，至少其一端的出入口須通過一水密保持到足夠高度的圍壁通道，使能由限界線以上處所出入。圍壁通道或隧道的另一端出入口，可經過一水密門，其型式按所在位置決定。此類圍壁通道或隧道不得通過在防撞艙壁之後的第一個分艙艙壁。

15.2 如提出需裝設穿過主橫水密艙壁的強制通風隧道或圍壁通道時，應經主管機關特殊考慮。

## 規則16

### 載運貨車和伴同人的客船

1 本規則適用於為載運貨車和伴同人員而設計或改建的客船，不論其建造日期如何，但船上人員總數，除規則I/2 (e) (i) 和 (ii) 規定的那些人員外，超過12人者。

2 若這類船上的旅客總數，包括伴同車輛的人員在內，不超過  $N=12+\frac{A}{25}$  其中 A=能用於裝載貨車處所的甲板總面積平方米，而裝載車輛處和這類處所出入口的淨空高度不小於4米，關於水密門適用規則15.12的規定，除非這些門可設置在分隔裝貨處所艙壁的任何水平上。此外，要求在駕駛台設置指示器以自動指示每扇門的關閉和所有門的安全緊固情況。

3 對這類船舶應用本章的規定時，N應取按本規則所核准的船舶可載最大旅客數。

4 對最惡劣營運情況應用規則8時，預計裝載貨車和集裝箱的裝貨處所的滲透率應用計算來確定，在這類計算中貨車和集裝箱應假設為非水密，它們的滲透率取65。從事專門業務的船舶，可應用貨車或集裝箱的實際滲透率。在任何情況下，裝載貨車和集裝箱的裝貨處所的透滲率應不小於60。

## 規則17

### 限界線以下客船船殼板上的開口

1 船殼板上的開口數應在適合船舶設計及船舶正常作業的情況下減至最小。

2 任何船殼板開口的關閉設備的佈置及效用，應與其預定的用途及裝設的位置相適應，一般應經主管機關同意。

3.1 根據現行國際船舶載重線公約要求，舷窗不應設在這樣的位置，以致其窗檻低於平行於艙壁甲板邊線所繪的線，此線的最低點在最深分艙載重線以上百分之2.5船寬或500毫米，視何者為大而定。

3.2 第3.1款所准許的所有舷窗，凡窗檻低於限界線者，其構造應能有效地防止任何人未經船長許可而開啟。

3.3.1 平行於艙壁甲板邊線繪一線，其最低點在船舶離開任何港口時的水面以上1.40米加百分之2.5船寬，當第3.2款所述的任何舷窗的窗檻低於此線時，則此甲板間的所有舷窗在船舶離港前應關閉水密並加鎖，此等舷窗在船舶到達下一個港口前不得開啟。在引用本款時，如適用，則可計入適量的淡水寬限。

3.3.2 此類舷窗在港內開啟的時間及船舶離港前將其關閉和加鎖的時間，均應記入主管機關規定的航海日誌中。

3.3.3 當任何船舶浮置於其最深分艙載重線，而有一或數個舷窗位置適用第3.3.1款要求時，主管機關可指明其限制平均吃水，在此吃水時若此等舷窗窗檻將高出平行於艙壁甲板邊線所繪的線，其最低點在此限制平均吃水的相應水線以上1.4米加百分之2.5船寬，則在此限制平均吃水的情況下，可准許該船離港而不必事先將這類舷窗關閉和加鎖，而在開往下一港口的航程中，由船長負責可准許在海上開啟該窗。在現行國際船舶載重線公約定義所指的熱帶地區內，此限制吃水可增加0.3米。

4 所有舷窗均應裝設有效的內部鉸鏈舷窗蓋，其佈置應能方便和有效地關閉及緊固成水密；但在距首垂線八分之一船長以後，且在平行於艙壁甲板邊線，而其最低點在最深分艙載重線以上3.7米加百分之2.5船寬所繪的線以上者，則除統艙外的旅客艙室的舷窗蓋可為可移式的，但按現行國際船舶載重線公約要求永久附着於其應在位置者除外。此類可移式舷窗蓋應存放於其所屬的舷窗附近。

5 航行時不能到達的舷窗及其舷窗蓋，應在離港前關閉並扣緊。

6.1 凡專供載貨或裝煤的處所不得裝設舷窗。



6.2 供交替載貨或載客的處所，可裝設舷窗，但其構造須能有效地防止任何人未經船長許可而開啟舷窗或舷窗蓋。

6.3 如在此類處所裝貨時，舷窗及其舷窗蓋應在裝貨前關閉水密和加鎖，而此項關閉和加鎖應記入主管機關規定的航海日誌中。

7 除經主管機關特准外，不應在限界線下的船殼板上裝設自動通風舷窗。

8 船殼板上的流水口、衛生水排泄孔及其他同類開口，應減至最少數量，或採取每個排水口供儘可能多的衛生水管及其他管道共用，或採用其他適當的辦法。

9.1 船殼板上的所有進水孔及排水孔，均應裝設防止海水意外進入船內的有效並可到達的裝置。

9.2.1 根據現行國際船舶載重線公約要求和除了第9.3款規定以外，凡穿過船殼板而來自限界線以下處所的每一獨立排水孔，應設有一個自動止回閥，此閥應具有由艙壁甲板以上將其關閉的可靠裝置，或者代以兩個無此項關閉裝置的自動止回閥，其較高者應設於最深分艙載重線以上，以便在營運狀態下能隨時到達查驗，此閥並應為經常關閉的型式。如設置具有可靠關閉裝置的閥，其在艙壁甲板以上的操作位置應隨時易於到達，並應備有表明閥門開啟或關閉的指示裝置。

9.2.2 現行國際船舶載重線公約的要求應適用於穿過船殼板而來自限界線以上處所的排水孔。

9.3 與操作機器有關的機器處所主、輔海水進水孔和排水孔，應在管系與船殼板間或管系與附着於船殼板的組合箱之間裝設易於到達的閥門。閥門可在當地控制，並應備有表明閥門開啟或關閉的指示器。

9.4 所有本規則要求的船殼配件和閘門應為鋼質、青銅或其他經認可的延性材質。普通鑄鐵或類似材質的閘不能採用。本規則所指的所有管子應為鋼質或主管機關認為滿意的其他等效材質。

10.1 設於限界線以下的舷門、裝貨門及裝煤門，均應具有足夠的強度。此類門須於船舶離港以前切實關閉和緊固成水密，並應在航行中保持關閉。

10.2 此類門的最低點一概不得低於最深分艙載重線。

11.1 每一出灰管、垃圾管等等的船內開口，均應裝以有效的蓋子。

11.2 如船內開口位於限界線以下，此蓋應為水密的，並應在最深分艙載重線以上易於到達處所，在管內增設自動止回閘。當此管不使用時，其蓋及閘均應保持關閉並扣緊。

## 規則18

### 客船和貨船的水密門、舷窗等的構造和初次試驗

#### 1 客船：

.1 本規則所述的一切水密門、舷窗、舷門、裝貨門、裝煤門、閘門、管子、出灰管及垃圾管的設計、材料及構造，均應經主管機關同意。

.2 豎動式水密門的門框，其底部不得有可能積聚污穢的槽，以免妨礙門的正常關閉。

2 客船和貨船的每扇水密門應作水頭分別高達艙壁甲板或乾舷甲板的水壓試驗。此試驗應在船舶投入營運之前，於該門安裝前或裝妥後進行。



## 規則19

### 客船和貨船的水密甲板、圍壁通道等的構造和初次試驗

1 水密甲板、圍壁通道、隧道、箱形龍骨及通風管道，均應與在同一高度的水密艙壁具有同等的強度。作成水密的措施與關閉其開口的裝置，均須經主管機關同意。水密通風管道及圍壁通道在客船上應至少向上延伸到艙壁甲板，在貨船上應至少向上延伸到乾舷甲板。

2 在完工以後，水密甲板應作沖水或灌水試驗，而水密圍壁通道、隧道和通風管道則應作沖水試驗。

## 規則20

### 限界線以上的客船水密完整性

1 主管機關可要求採取一切合理和可行的措施，以限制海水在艙壁甲板以上浸入及漫流。此類措施可包括裝設局部艙壁或桁材。當局部水密艙壁或桁材裝於主分艙艙壁上方或緊靠其附近的艙壁甲板上時，應與艙壁甲板及船殼板水密連接，以使在船舶破損傾斜的情況下限制海水沿甲板漫流。如局部水密艙壁與其下方的艙壁錯開，則兩者間的艙壁甲板應作成有效的水密。

2 艙壁甲板或其上一層甲板應為風雨密。露天甲板上的所有開口，應設有足夠高度和強度的圍板，並須設有能迅速關閉成風雨密的有效設備。應按需要，裝設排水口、欄杆及流水口，以便在任何天氣情況下能迅速排除露天甲板上的積水。

3 在限界線以上船殼板上的舷窗、舷門、裝貨門和裝煤門以及關閉開口的其他裝置，應就其所裝設的處所及其相對於最深分艙載重線的位置，作有效的設計與構造，並應具有足夠的強度。

4 在艙壁甲板以上第一層甲板以下處所內的所有舷窗，應備有有效的內側舷窗蓋，其佈置須能使之易於有效地關閉，並緊固成水密。

## 規則21

### 艙底排水設備

#### 1 客船和貨船

1.1 應備有有效的艙底排水設備，以能抽除及排於任何水密艙，固定用來裝載淡水、壓載水、燃油或液體貨物，並在所有實際情況下備有其他有效抽除措施的處所除外。冷藏艙應設置有效的排水裝置。

1.2 衛生泵、壓載泵及通用泵，如與艙底排水系統有必要的連接者，均可作為獨立的動力艙底泵。

1.3 所有用於煤艙或燃油貯存艙櫃內及其在下方處所，或用於鍋爐艙或機器處所內，包括設置於澄油櫃或燃油泵所在處所內的艙底水管，應為鋼質或其他認可的材質。

1.4 艙底及壓載管系的佈置，應能防止水自海上或自壓載水艙進入貨艙及機器處所，或自一艙進入另一艙的可能性。對於連接艙底排水管及壓載管的任何深艙，應設有設施以防在裝有貨物時不慎灌入海水，或在裝有壓載水時由艙底排水管抽出壓載水。

1.5 所有與艙底排水設備有關的分配箱和手動閥，應設在通常情況下可以到達之處。

## 2 客船

2.1 第1.1款要求的艙底排水設備，在海事後所有實際可能的情況下，無論船舶正浮或傾斜，應能操作。為此，通常應設側吸水管，除非在船舶兩端的狹窄艙室內，設一根吸水管可能已足夠。對形狀特殊的艙可要求增設吸水管。艙內佈置應使水能流至吸水管。對於某些個別艙室，主管機關認為不一定需要設置排水設備時，如按規則8.2.1至8.2.3規定的條件計算證明無損於船舶安全者，得免予設置。

2.2 至少應有三台與艙底總管連接的動力泵，其中一台可為推進機械帶動的。如其衡準數為30或以上，則應增設一台獨立動力泵。

2.3 如實際可行時，動力艙底泵應置於分開的水密艙內，其佈置或位置應使這些艙室不致因同一破損而浸水。如主推進機械、副機和鍋爐置於兩個或兩個以上的水密艙內，則用作艙底排水的各泵應儘可能遠離地分佈於這些艙內。

2.4 長度為91.5米和以上或衡準數為30或以上的船舶，當處於船舶應當經受住的一切情況下其抽水佈置應至少有一台動力泵可供使用，按下列要求佈置即可滿足要求：

.1 所需各泵中的一台是可靠的可潛式應急泵，其動力源位於艙壁甲板以上；或

.2 艙底水泵及其動力源要在整個船長內分佈，在未破損的一艙內至少有一台泵可供使用。

2.5 除僅供尖艙專用的附加泵外，所需的每一艙底泵的佈置應能從第1.1款所要求的任何處所抽水。

2.6 每一動力艙底水泵應能通過所需的排水總管用不小於2米/秒的速度抽水。位於機器處所內的獨立動力艙底泵應有自各該處所的直接吸水管，但此種吸水管在任一處所內應不多於2根。如設有2根或以上的此種

吸水管，則船舶的每舷應有1根。主管機關可要求在其他處所內的各獨立動力艙底泵備有單獨的直接吸水管。各直接吸水管應適宜地佈置，而在機器處所內的直接吸水管的直徑，不應小於對艙底排水總管所要求的直徑。

2.7.1 除直接艙底吸水管或第2.6款要求的吸水管外，在機器處所內應增設1根自主循環水泵引至機器處所排水水準面的直接吸水管，此管應裝有止回閥。此直接吸水管的直徑，對蒸汽機船至少應為循環水泵進口直徑的三分之二，對柴油機船則與循環水泵進口的直徑相等。

2.7.2 如主管機關認為主循環水泵不適宜作此用途時，則應自可用的最大獨立動力泵引一根直接應急艙底吸水管至機器處所排水水準面；此管的直徑應與所用泵的主進水管口相同。如此連接的泵的排量應超過所要求艙底泵的排量，其超過量應經主管機關同意。

2.7.3 海水進水閥及直接吸水管閥的閥杆，應延伸至機艙平台以上相當高度處。

2.8 所有艙底吸水管系，直至與泵連接為止，應與其他管系獨立。

2.9 艙底水總管的直徑d應按下列公式計算。但是艙底水總管的實際內徑可按主管機關所能接受的最接近標準尺寸取整：

$$d = 25 + 1.68 \sqrt{L (B + D)}$$

式中d 是艙底總管的內徑毫米；

L和B是規則2定義所指的船長和船寬米；和

D是至艙壁甲板的型深米。

艙底支管的直徑應符合主管機關的要求。

2.10 應設有設施以防裝有任何艙底吸水管的艙室因管子被截斷或因碰撞或擱淺而使其他任何艙室內管子受損時，使此艙浸水。為此，凡此水管的任何部分位於距船側不足（規則2定義所指在最深分艙載重線水平面

上向垂直於縱中剖面的方向量計的) 船寬的五分之一或在箱形龍骨內者，應在其開口端所在艙室內管子上裝有止回閥。

2.11 與艙底排水設備有關的分配箱、旋塞及閥門應佈置成浸水時艙底水泵之一能用於任何艙室；此外，在距船側五分之一船寬所繪一線以外的艙底泵或其與艙底水總管連接的管子損壞時，不應使艙底水系統喪失作用。如僅有一組管子為各泵共用時，則控制艙底吸水管所必需的閥，須能自艙壁甲板以上操作。若設有應急艙底排水系統以補充主艙底排水系統，則該應急系統應獨立於主系統，並按2.1段的規定佈置成浸水時有一泵能用於任一艙室；在此情況下，只有操作應急系統所需的閥需要能在艙壁甲板以上操作。

2.12 第2.11款所述的能自艙壁甲板以上操作的一切旋塞和閥門，在它們的操作處所應有明顯標誌的控制器，並應備有指示其開啟或關閉的裝置。

### 3 貨船

至少應備有與主艙底排水系統連結的兩台動力泵，其中一台可由推進機械帶動。如主管機關認為不損害船舶的安全，特殊的艙室可免掉艙底排水設備。

## 規則 22

### 客船和貨船的穩性資料\*

1 每艘客船，不論其大小如何，和按現行國際船舶載重線公約的規定船長為24米和以上的每艘貨船，應在完工時作傾斜試驗，並確定其穩性

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\* 參閱本組織通過的大會 167 (ES IV) 號決議關於船長不足 100 米的客船和貨船完整穩性的建議案以及本組織通過的大會 206 (VII) 號決議對此建議案的修正。

要素。應將主管機關同意的這類資料給船長，這是使船長在各種營運狀態下能以迅速而簡便的方法獲得有關船舶穩性的正確指導所必需者。應將穩性資料的副本一份提供給主管機關。

2 如船舶作某種改建以致對供給船長的穩性資料有實質性影響時，應提供修正的穩性資料。必要時，船舶應重作傾斜試驗。

3 主管機關得准許某一船舶免作傾斜試驗，但須具有由其姐妹船作傾斜試驗所得的基本穩性數據，且經主管機關同意認為可由此基本數據求得所免除船舶的可靠穩性資料。

4 如參考類似船舶的已有數據，能明顯表示由於該船的尺度比例及佈置，在一切可能的裝載情況下，具有大於足夠的初穩心高度時，主管機關也可准許某一船舶或某一類船舶免作傾斜試驗，特別是專門設計用來載運散裝液體貨或礦石的船舶。

### 規則 23

#### 客船破損控制示意圖

船上須固定展示表明各層甲板及貨艙的水密艙室界限、界限上的開口及其關閉方法與控制位置，以及用於校正浸水傾斜的裝置的示意圖，以供值班高級船員參考。此外，應供給船上高級船員以載有上述資料的小冊子。

### 規則 24

#### 客船水密門等的標誌、定期操作及檢查

1 本條規則適用於所有船舶



2.1 水密門、舷窗、閘門以及流水口、出灰管與垃圾管的關閉機械的操作演習，應每周舉行一次。對航期超過一周的船舶，在離港前應舉行一次全面演習，此後在航行中至少每周舉行一次。

2.2 在所有船舶的主橫艙壁上的一切水密門，不論是動力操作的還是鉸鏈操作的，凡需在航海中使用者，應每天進行操作。

3.1 水密門及與其連接的所有機械與指示器、為使艙室水密所必需關閉的一切閘門及為海損控制橫貫連通所必需操作的一切閘門，應在航行中定期檢查，每周至少一次。

3.2 這類閘門、門及機械裝置，應作適當的標誌，以保證其正確使用而策最大安全。

## 規則 25

### 客船航海日誌的記載

1 本條規則適用於所有船舶。

2 本規則要求在航行中保持關閉的鉸鏈門、可移式板門、舷窗、舷門、裝貨門、裝煤門及其他開口，均應在船舶離港前關閉。關閉的時間及開啟的時間（如本規則所准許者），應記入主管機關所規定的航海日誌中。

3 規則24所要求的一切演習和檢查的記錄，均應記入航海日誌中，並明確記載所發現的任何缺點。



### 第三節 — 機器設備

(除另有明文規定之處外第三節適用於客船和貨船)

#### 規則 26

##### 通則

1 機器、鍋爐和其他受壓容器，連帶的管系和屬具等設計和構造應適合於它們的用途，並在充分注意到運動部件、熱表面和其他危險情況下，應如此安裝和保護以使對船上人員的任何危險減至最小。設計應注意到結構所用材料，設備的用途，會遇到的工作條件和船上環境條件。

2 主管機關應特別關心單一的重要推進部件的可靠性，並可要求，特別是在非常規佈置情況下，備有足以使船舶保持航行速度的獨立推進動力源。

3 應備有措施以使即使必須的輔機之一損壞的情況下推進機械的正常操作能夠維持或恢復。應特別注意下列設備的故障：

- .1 作為主電源的發電機組；
- .2 蒸汽供應源；
- .3 鍋爐供水系統；
- .4 鍋爐或機器的燃油供應系統；
- .5 潤滑油壓力源；
- .6 水壓源；
- .7 凝水泵和保持冷凝器真空的裝置；
- .8 鍋爐的機械供氣；
- .9 空氣壓縮機和起動或控制用空氣瓶櫃；

.10 主推進機械，包括可控螺距推進器的液壓、氣動或電動控制裝置。

但是，經考慮到全面安全情況後，主管機關可同意將推進能力較之正常操作作部分降低。

4 應提供措施以保證在沒有外來幫助情況下使機器從死船狀態運轉起來。

5 所有鍋爐、機器的所有部分、所有蒸汽、液壓、氣動和其他系統，以及經受內部壓力的它們的連帶屬具，在首次投入使用前，應經受包括壓力試驗在內的相應試驗。

6 主推進機械和對船舶推進和安全必須的一切輔機，應配合船舶設計成在下述情況下能運轉，即當船舶正浮時和當船舶在靜止情況下向任一舷傾斜直至 $15^\circ$ 和在運動情況下（橫搖）向任一舷橫傾 $22.5^\circ$ 和同時向艏或艉縱傾（縱搖） $7.5^\circ$ 。主管機關經顧及船舶的型式、尺度和營運條件可允許偏離這些角度。

7 應作出規定以利對主推進機械和輔機，包括鍋爐和受壓容器的清潔、檢查和維修保養。

8 應特別注意推進機械系統的設計、構造和安裝，以使在正常運轉範圍內機械的任何振動狀態不應在機器內部起過度應力。

## 規則 27

### 機器

1 當機器存在超速的危險時，應提供措施以保證不超過安全速度。

2 當主機或輔機，包括受壓容器或這類機器的任何部分經受內部壓力或可能經受危險的超壓時，應提供措施以實際防止這類過分的壓力。

3 所有齒輪裝置和每根軸與軸承，用以將動力傳輸至對於船舶推進、船舶安全和船上人員安全必須的機器者，其設計和構造應經得住一切作業情況下會產生的最大工作應力，並應充分考慮驅動它們或由它們所組成的機器型式。

4 缸徑為200毫米或曲柄箱容積為0.6立方米或以上的內燃機，應備有適當型式和足夠卸壓面積的曲柄箱爆炸卸壓閥。卸壓閥的佈置或提供的措施應保證閥中的排出物對人員傷害的可能性降至最小。

5 主渦輪推進機械和，如適用時，主內燃推進機械和輔機，應備有發生故障時能自動關閉的裝置。這類故障，諸如燃油供應故障等，可能導致機械的整個破壞，嚴重損傷或爆炸。主管機關可允許採用快速自動關閉裝置。

## 規則28

### 後退措施

1 船舶應備有足夠的後退能力，以保證在一切正常情況下能適當控制船舶。

2 在一定時間內使推進器換向和在合理的距離內使船舶從最大營運前進速度到停止的機器能力，應作試驗並記錄。\*

3 航行試驗中記錄在案的停船時間、船舶航向和距離，連同多推進器船舶在一個或多個推進器不工作情況下所作的航行和操縱試驗測定的船舶能力的結果，應備在船上以供船長或指派的人員使用。\*

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\* 參閱本組織通過的大會 209 (VII) 號決議關於應納入操縱手冊的資料的建議。

4 具有操縱或停船補充措施的船舶，應按第2和3款所述對這些措施作試驗並記錄。

## 規則29

### 操舵裝置

1 除另有明文規定外，每艘船舶應配備主管機關認為滿意的主操舵裝置和輔助操舵裝置。主操舵裝置和輔助操舵裝置的安排應使即使兩者之一發生故障也不致導至另一裝置不能工作。

2.1 操舵裝置的部件和舵桿應為主管機關認為滿意的合理和可靠的構造。對於不是雙套的任何重要部件的適用性應特別注意。任何這類部件，如合適時，應採用減摩軸承，諸如滾珠軸承、滾柱軸承或持久潤滑或備有潤滑屬具的套筒軸承。

2.2 通過計算以確定承受內部液壓的管系和其他操舵裝置部件尺度的設計壓力應不小於第3.2款所指操作情況下可預期的最大工作壓力的1.25倍，同時要考慮在該系統低壓一側可能存在的壓力。根據主管機關的意見，考慮到動力負荷所產生的抖動壓力，管系和部件的設計應採用疲勞衡準。

2.3 在液壓系統中能夠隔斷的和由於動力源或外力作用能形成壓力的任何部位，應設置卸壓閥。卸壓閥應調整成不超過設計壓力。卸壓閥應有足夠尺度和佈置成能夠防止超過設計壓力的過分壓力升高。

3 主操舵裝置和舵桿應：

.1 有足夠強度，並能在應用試驗證明的最大營運前進航速情況下操縱船舶；

.2 能在船舶最深航海吃水和以最大營運前進航速前進時將舵自一舷35°轉至另一舷35°，以及於相同條件下在不超過28秒鐘內將舵自一舷35°轉至另一舷30°；

.3 當為滿足第3.2款要求有需要時和除了在冰中航行要加強以外，在主管機關要求舵柄處舵桿直徑大於120毫米的任何情況下由動力操作；

.4 設計成在最大後退航速時不致損壞；但是這個設計要求不需要用最大後退航速和最大舵角的試驗來證明。

#### 4 輔助操舵裝置應：

.1 有足夠強度和足以在可駕駛的航速下操縱船舶，並能於緊急時迅速投入行動；

.2 能在船舶最深航海吃水和以最大營運前進航速的一半或7節前進時，視何者為大而定，在不超過60秒鐘內將舵自一舷15°轉至另一舷15°；

.3 當為滿足第4.2款要求有需要時和在主管機關要求舵柄處舵桿直徑大於230毫米的任何情況下，除了在冰中航行要加強以外，由動力操作。

#### 5 主操舵裝置和輔助操舵裝置動力設備應：

.1 佈置成動力發生故障後經修復時能自動再啟動；

.2 能從駕駛台使之投入運行。任何一台操舵裝置動力設備發生動力故障時，在駕駛台應發出能視聽的警報。

6.1 主操舵裝置包含兩台或更多台同一的動力設備，不需設置輔助操舵裝置，如果：

.1 在客船上，當任一台動力設備不能運轉時，主操舵裝置能按第3.2款所要求操縱舵；

.2 在貨船上，當所有動力設備都運轉時，主操舵裝置能按第3.2款所要求操縱舵；

.3 主操舵裝置佈置成當其管系或一台動力設備發生單一故障時，缺陷能加以隔離，從而保持或迅速再次獲得操舵能力。

6.2 直至1986年9月1日為止，主管機關可同意設置具有可靠性記錄但不符合第6.1.3款對液壓系統要求的操舵裝置。

6.3 非液壓型式的操舵裝置應達到本款的同等標準，並經主管機關同意。

7 操舵裝置的控制應：

.1 對於主操舵裝置，在駕駛台和操舵裝置室等兩個地點均能進行；

.2 當主操舵裝置按照第6款佈置，由兩個均能在駕駛台操作的獨立控制系統來控制。這並不要求設兩套舵輪或操舵桿。控制系統由液壓舵機傳動裝置組成時，除了一萬總噸和以上的油船、化學品船或氣體運載船外，不必設置第二個獨立控制系統；

.3 對於輔助操舵裝置，在操舵裝置室進行，如係動力操縱，也應能在駕駛台進行，並應獨立於主操舵裝置的控制系統。

8 能從駕駛台操作的任何主操舵裝置和輔助操舵裝置的控制系統應符合下列要求：

.1 如係電動者，應由操舵裝置電力網在操舵裝置室內的一點供電的該系統自己的獨立電路來供電或者由配電板上鄰近於操舵裝置電力網供電處的一點直接從配電板匯流排來供電；

.2 應在操舵裝置室內備有將駕駛台操作的任何控制系統與它服務的操舵裝置斷開的裝置；

.3 此系統應能由駕駛台使之投入操作。

.4 當控制系統的電源供應發生故障時，應在駕駛台發出能視聽的警報。

.5 只應對操舵裝置的控制供電線路配備短路保護。



9 本條規則和規則30要求的電力網和操舵裝置控制系統及其附帶部件、電纜和管子應在它們的整個長度範圍內儘可能地分離。

10 駕駛台與操舵裝置之間應備有通訊手段。

11 舵角位置應：

.1 當主操舵裝置係動力操作者，在駕駛台顯示。舵角的指示應與操舵裝置控制系統獨立；

.2 能在操舵裝置室內辨認出來。

12 液力操作的操舵裝置應備有：

.1 參照液壓系統的形式和設計，保持液體清潔的裝置；

.2 每個液體貯存器的低位警報器，以便實際上儘早地指示液體的洩漏。在很快能夠發現洩漏的駕駛台和機器處所，發出聲響和能見的警報；和

.3 當主操舵裝置要求動力操縱時，容量足以至少再次為一個動力傳動裝置包括儲存器充液的固定儲存櫃。儲存櫃應用管系固定聯結以使能從操舵裝置室內一處很快地再次為液壓系統充液，並應備有容量表。

13 操舵裝置室應：

.1 能迅速到達，並實際可行地遠離機器處所；和

.2 備有適當裝置以保證通到操舵機械和控制器的通道。這些裝置包括扶手欄桿和格子板或其他防滑面板以保證液體洩漏時的適宜工作條件。

14 除了在冰中航行要加強以外，舵柄處舵桿直徑要求大於230毫米，應備有由應急電源或位於操舵裝置室內的獨立動力源在45秒內自動供電的備用動力，其容量應至少足以供應符合第4.2款要求的操舵裝置動力設備以及其聯帶控制系統和舵角指示器。此獨立動力源應為此目的專用。



每艘一萬總噸和以上的船舶，備用動力應具有至少連續運轉30分鐘的功率，在任何其他船舶上則至少10分鐘。

15 一萬總噸和以上的每艘油船、化學品船或氣體運載船和七萬總噸和以上的每艘其他船舶，主操舵裝置應由符合第6款規定的兩個或更多個同一的動力設備組成。

16 一萬總噸和以上的每艘油船、化學品船或氣體運載船應除第17款外符合下述要求：

.1 主操舵裝置應這樣佈置，即由於主操舵裝置某個動力傳動系統的任何部分，除了舵柄、舵扇或為同樣目的服務的部件以外，發生單一故障或舵傳動裝置損壞以致喪失操舵能力，在這個動力傳動系統喪失工作能力後不超過45秒鐘內能夠重新獲得操舵能力。

.2 主操舵裝置應包括：

.2.1 兩個獨立和單獨的動力傳動系統，每個系統均能滿足第3.2款的要求；或

.2.2 至少兩個同一的動力傳動系統，在正常運轉中能同時工作者，應能滿足第3.2款的要求。當需要符合此要求時，液力傳動系統應備有交叉聯結。一個系統中液體的流失應能發現，有缺陷的系統應能自動隔離以使一個或多個其他傳動系統能保持全面運轉。

.3 非液壓型式的操舵裝置應能達到同等標準。

17 一萬總噸和以上，但小於十萬載重噸的油船、化學品船或氣體運載船，對於舵的一個或多個傳動裝置不適用單一故障衡準者，如果能夠達到同等安全標準和符合下列條件，則可允許採用不同於第16款規定的其他解決辦法：

.1 由於管系或一個動力裝置的任何部分發生單一故障而喪失了操舵能力，在45秒鐘內應能重新獲得操舵能力；和

.2 操舵裝置只包含單一的舵傳動裝置，應特別注意對使用的材料，密封裝置的安裝、試驗檢查和有效的維護規定作設計的應力分析，包括疲勞分析和破斷力學分析，如適當的話。在考慮上述各點時，主管機關應採用包括本組織通過的一萬總噸和以上但小於十萬載重噸油船非雙套舵傳動裝置驗收原則的規定在內的各條規則。\*

18 對於一萬總噸和以上但小於七萬載重噸的油船、化學品船或氣體運載船，直至1986年9月1日為止，主管機關可接受具有可靠性記錄但不符合第16款對液壓系統所要求單一故障衡準的操舵裝置系統。

19 1984年9月1日以前建造的一萬總噸和以上的每艘油船、化學品船或氣體運載船應在1986年9月1日以前符合下列要求：

.1 第7.1、8.2、8.4、10、11、12.2、12.3 和13.2等款的要求；

.2 兩個獨立操舵裝置控制系統，每個系統應能由駕駛台操作。這點並不要求雙套舵輪或操舵桿；

.3 如正在操作的操舵裝置控制系統發生損壞，第二個系統應能由駕駛台立刻投入操作；和

.4 每個操舵裝置控制系統，如係電動者，應由操舵裝置電力網供電的該系統自己的獨立電路或者由鄰近於操舵裝置電力網供電處的一點直接從配電板匯流排來供電。

20 作為第19款要求的補充，1984年9月1日以前建造的四萬總噸和以上的每艘油船、化學品船或氣體運載船，在不晚於1988年9月1日，其操舵裝置應佈置成管系或一台動力設備發生單一故障，操舵能力能夠保持或舵的運動能加以限制以使操舵能力能迅速重新獲得。這點應由下列方式來實現：

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\* 參閱本組織通過的大會 467 (XII) 號決議，關於接受一萬總噸和以上但小於十萬載重噸油船、化學品船和氣體運載船非雙套舵傳動裝置驗收原則。

- .1 管束舵的獨立設備；或
- .2 速動閥，可用人力操作將一個或多個傳動裝置與外部液壓管系隔離開，連同用固定的獨立動力操作泵和管系來直接補充傳動裝置的設備；或
- .3 液壓動力系統交叉聯結時，能使一個系統中液體的流失即能發現和有缺陷的系統能自動或由駕駛台加以隔離以使其他系統能保持全面運轉的安排。

### 規則30

#### 電動和電動液壓操舵裝置的補充要求

- 1 指示電動和電動液壓操舵裝置的電動機正在運轉的設備應設置在駕駛台和適當的主機控制位置。
- 2 由一或更多的動力設備組成的每一電動或電動液壓操舵裝置至少要由主配電板直接供給的兩個專用電路來供電；但是，其中之一可以由應急配電板供電。與電動或電動液壓操舵裝置聯合的輔助電動或電動液壓操舵裝置可與供給此主操舵裝置電力的電路之一接通。供給電動或電動液壓操舵裝置的電路應有足夠容量以向能夠同時與它接通和要求同時工作的所有電動機供電。
- 3 這類電路和電動機應備有短路保護和過載報警裝置。包括起動電流（如有時）在內的過量電流保護，應不小於所保護電路或電動機全負荷電流的兩倍，並應佈置成能允許適當的起動電流通過。如採用三相供電，應備有能指示任一相發生故障的報警裝置。本項所要求的警報應既是聲響的又是能見的，並應按規則51的要求和位於主機處所或通常控制主機的控制室內顯著位置。

4 在小於1,600噸的船上，按規則29.4.3要求為動力操縱的輔助操舵裝置不是電動的或由原來用作其他目的的電動機來操作者，主操舵裝置可由來自主配電板的一路電路供電。當這類原來用作其他目的的電動機作為這種輔助操舵裝置的動力，如主管機關對於適用於輔助操舵裝置的規則29.5.1和.2以及29.7.3的要求與保護裝置認為滿意時，可免除第3款的要求。

### 規則31

#### 機器的控制

- 1 主機和對船舶推進和安全必須的輔機應有有效的操縱和控制裝置。
- 2 如備有推進機械的遙控裝置的駕駛台和機器處所有人值班，則應適用下列各點：
  - .1 在一切航海情況包括操縱情況下，速度、推力方向，如適用時還有推進器的螺距應能由駕駛台完全控制。
  - .2 每一獨立推進器的遙控應由一個設計和構造成操作時不需對機器的操作細節給予特別注意的控制裝置來執行。如多個推進器按設計為同時操作，可以由一個控制裝置來控制。
  - .3 主機應配備能自駕駛台操作的、獨立於駕駛台控制系統的緊急停機裝置。
  - .4 來自駕駛台的推進機械指令應在主機控制室或適當的操縱平台指示出來。
  - .5 推進機械只能在一個時間由一處進行遙控；在這類處所可允許內連控制位置。每一處所應有指示何處在控制推進機械的指示器。

在駕駛台和機器處所之間的控制轉換，應只能在主機器處所或主機控制室來進行。此系統應包含由一處將控制轉換到另一處時防止推進器推力發生極大變更的裝置。

.6 即使遙控系統的任何一部分發生故障，推進機械應能在當地進行控制。

.7 遙控系統的設計應在發生故障時能給出警報。除非主管機關認為不可行以外，在當地控制進入操作以前預定的推進器速度和推力方向仍應保持。

.8 駕駛台應設置指示器以指示；

.8.1 固定螺距推進器時，推進器速度和轉動方向；

.8.2 可控螺距推進器時，推進器速度和螺距狀態；

.9 在駕駛台和機器處所應備有報警裝置以指出能再次起動主機的起動空氣的低壓。如推進機械的遙控系統設計成自動起動，起動失敗的自動連續嘗試數應加限制，以使當地起動時能有足夠的起動空氣壓力。

3 當主推進機械和連同的機械，包括主電源在內，其自動化或遙控的程度不同，並在控制室內有連續的人員監控，這種佈置和控制應設計、配備和安裝成機器的運輸具有同樣的安全和可靠程度如同處於直接監控之下，為此應適當應用規則46到50。對於這類處所的防火和浸水應給予特別注意。

4 總的來說，自動起動、操縱和控制系統應包括人力能替代自動控制的裝置。這類系統的任何部分發生故障應不致妨礙使用人力替代裝置。

## 規則 32

### 蒸汽鍋爐和蒸汽供給系統

1 每台蒸汽鍋爐和每一非燃燒蒸汽發生器應備有至少兩個足夠容量的安全閥。但是，經考慮任何鍋爐或非燃燒蒸汽發生器的產汽量或任何其他特性，如主管機關認為過壓已得到充分保護，可允許只設一個安全閥。

2 預定為無人監控的每台燃油鍋爐，應有水位過低、空氣供給發生故障或燃燒發生故障時能關閉燃油供應和發出警報的安全裝置。

3 為渦輪推進機械服務的水管鍋爐應安設高水位報警裝置。

4 提供對船舶安全所必須的服務或由於其供水故障可能導致危險的每一蒸汽發生系統，應備有不少於兩個來自供給泵並包括供給泵在內的獨立供水系統，但單一的貫穿汽鼓是可以接受的。除非泵的特性能防止超壓，應備有裝置以防止此系統的任何部分超壓。

5 鍋爐應備有監視和控制供水質量的裝置。應有適當佈置儘實際可行地阻止嚴重影響鍋爐的油或其他污物進入鍋爐。

6 對船舶安全所必須並設計成含有特定水位的水的每台鍋爐，應備有至少兩個指示水位的裝置，至少其一應是直接讀數的玻璃管水位表。

## 規則33

### 蒸汽管系

1 每一蒸汽管和蒸汽可能通過的管系上每一屬件應設計、構造和安裝成能承受它們可能遭到的最大工作應力。

2 可能不同程度地發生危險性水擊的每一蒸汽管應備有洩水裝置。



3 可能自任何來源接受較其設計壓力為高的蒸汽管或屬件，應安設適當的減壓閥、釋放閥和壓力錶。

### 規則34

#### 空氣壓力系統

1 在每艘船上，壓縮空氣系統的任何部分和由於承受空氣壓力部分的洩漏會導致危險超壓的空壓機和空冷機水套或水箱處應備有防止超壓裝置。所有系統應備有適當的壓力釋放裝置。

2 主推進內燃機的主起動空氣裝置應有防護起動空氣管中背火和內部爆炸影響的足夠保護。

3 起動空壓機的所有排放管應直接通至起動空氣儲存器，由空氣儲存器通至主機或輔機的所有起動空氣管應完全與壓縮機的排放管系隔開。

4 應採取措施以使進入空氣壓力系統的油降至最少，並為這些系統洩油。

### 規則35

#### 機器處所的通風系統

1 A類機器處所應有足夠的通風，以保證其中的機器或鍋爐在所有氣候包括惡劣氣候條件下全功率運轉時，該處所保持對人員安全和舒適以及機器運轉來說充足的空氣供應。任何其他機器處所應有適合於該機器處所目的的充足通風。



### 規則36

#### 噪音的防護\*

應採取措施將機器處所的機器噪音減至主管機關確定的允許強度。如噪音不能充分地降低，過度的噪音源應適當地隔離或隔絕，或者如該處所有人值班應配備噪音隔音裝置。如需要，進入這類處所的人員應配備護耳器。

### 規則37

#### 駕駛台與機器處所之間的通信

至少應配備兩個獨立裝置以自駕駛台將車鈴傳遞至機器處所或控制室內通常控制機器的位置：其一應為在機器處所和駕駛台等兩處均能將車鈴和複述用能見的信號指示出來的機艙車鐘。應配備通向可能控制機器的任何其他位置的適當通信裝置。

### 規則38

#### 輪機員的警報裝置

應配備能由機器控制室或操縱平台（如適當時）來操作的輪機員警報裝置，並能在輪機員艙室中清晰地聽到。

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\* 參閱本組織通過的大會 468 (XII) 號決議關於船上噪音強度規則。

## 規則39

### 客船應急裝置的位置

電力的應急電源、消防泵、除了防撞艙壁以前處所專用艙底泵以外的艙底泵、第II-2章要求的任何固定滅火系統和對船舶安全所必須的其他應急裝置，除了錨機以外，不應安裝在防撞艙壁以前。

## 第四節 — 電氣裝置

(除另有明文規定者外，第四節適用於客船和貨船)

## 規則40

### 通則

1 電氣設備應是：

.1 保持船舶處於正常操作和可居住情況下所必需的所有輔助用電得以保證而不求助於應急電源；

.2 在各種應急情況下，能保證對安全所必需的用途供電；

.3 能確保旅客、船員和船舶的安全，免受電氣事故的危害。

2 主管機關應採取相應步驟，以保證本節關於電氣裝置的各項規定能得到統一的執行和應用。\*

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\* 參閱國際電工委員會公佈的建議案，特別是第 92 號出版物 — 船舶電氣裝置。

## 規則41

### 主電源和照明系統

1.1 應配備其功率足以供給規則40.1.1所述所有用途的主電源。主電源應至少由兩套發電機組所組成。

1.2 這些發電機組的功率，應是當任一發電機組停止供電時，應仍能保證正常推進和安全所必須用途的供電。最低舒適居住條件，至少包括烹調、取暖、生活冷凍、機械通風、衛生和淡水等充分用途，也應保證。

1.3 船舶主電源的佈置應是：不管推進機械或軸系的速度和方向如何，規則40.1.1所指的那些用途能得到維持。

1.4 此外，發電機組應保證任一發電機或初級電源損壞，其餘發電機組應能向使主推進裝置自死船狀態起動所必須的用途供電。如應急電源單獨或與任何其他電源組合的功率足以同時向規則42.2.1至42.2.3或43.2.1至43.2.4所需用途供電，則此應急電源可用作自死船狀態起動的目標的。

1.5 如變壓器組成本款所要求供電系統的必要部分，此系統應佈置成保證本款所述的同樣供電連貫性。

2.1 向旅客或船員通常到達和使用的船舶各個部分提供照明的主電力照明系統應由主電源供電。

2.2 主電力照明系統的佈置應是：主電源、隨同變壓設備，如有，主配電板和主照明配電板所在處所發生火災或其他事故，不應使規則42.2.1和42.2.2或43.2.1、43.2.2和43.2.3所要求的應急電力照明系統失效。

2.3 應急電力照明系統的佈置應是：應急電源、隨同變壓設備（如有的話）、應急配電板和應急照明配電板所在處所發生火災或其他事故，不應使本條規則所要求的主電力照明系統失效。

3 主配電板應儘可能遠離一個主發電站，以使只是在一個處所內發生的火災或其他事故才可影響正常供電的完整性。主配電板的環境圍爐，例如位於一個處所的主界限以內的機器控制室，不能視作將配電板與發電機離開。

4 如主發電機組的總安裝功率超過3 MW，主匯流排應至少分成兩部分，通常應由移動連接件或其他經認可的裝置來連接；如實際可行，發電機組之間的連接和任何其他複式設備應在這兩部分中平均分配。經主管機關同意，可准許採用等效裝置。

## 規則42

### 客船應急電源

1.1 應備有一個獨立應急電源。

1.2 應急電源、隨同變壓設備（如有的話）、過渡應急電源、應急配電板和應急照明配電板應置於最高連續甲板之上，並應自露天甲板易於到達。它們不應置於防撞艙壁的前面。

1.3 應急電源和隨同變壓設備（如有的話），過渡應急電源、應急配電板和應急照明配電板，與主電源、隨同變壓設備（如有的話）、和主配電板的相對位置應經主管機關同意，以使主電源、隨同變壓設備（如有的話）、和主配電板所在處所或任何A類機器處所發生火災或其他事故，不應妨礙應急電源的供電、控制和配電。如實際可行，應急電源、隨同變壓設備（如有的話）、過渡應急電源和應急配電板所在處所不應

毗連於A類機器處所或主電源、隨同變壓設備（如有的話）、或主配電板所在處所的界面。

1.4 如採取適當措施保證在各種環境下的獨立應急作業，應急發電機可短時間例外地用來向非應急電路供電。

2 可用的電源功率應足夠向緊急情況下安全所必須的用途供電，同時適當地考慮到這些用途可能同時存在。應急電源應足以同時至少在下述期限內向以下用途供電，如這些用途依靠電力，同時考慮到起動電流和某些載荷的過渡性質：

2.1 供下列處所應急照明36小時之用：

- .1 規則III/19和III/30所要求的每一登艇站處的甲板和舷外；
- .2 所有服務和居住艙室的走廊、梯道、出入口、人員升降車；
- .3 機器處所和主發電站，包括它們的控制站；
- .4 所有控制站、機器控制室和每一主配電板和應急配電板處；
- .5 儲藏消防員裝備的所有處所；
- .6 操舵裝置處；和
- .7 消防泵、灑水式消防泵和2.4段所指的應急艙底泵處和它們的發動機起動位置。

2.2 供給現行國際海上避碰規則所要求航行燈和其他燈36小時之用。

2.3 供下列設備36小時之用：

- .1 應急情況下所要求的所有內部通信設備；
- .2 規則V/12所要求的助航設備；當此項規定為不合理或不可行時，主管機關可對小於5,000總噸的船舶免除此要求；
- .3 探頭和火災報警系統，和防火門的固定和釋放系統；和
- .4 斷續操作白晝信號燈、船舶號笛、人力火災警報和緊急時需要的所有船內信號；

除非這類用途能由位於緊急時適於使用處所的蓄電池組獨立供電36小時。

2.4 供下列設備36小時之用：

- .1 規則II-2/4.3.1和4.3.3要求的消防泵之一；
- .2 自動灑水泵，如有的話；和
- .3 應急艙底泵和操作電動遙控艙底閥所必須的一切設備。

2.5 如規則29.14要求供電，則按該規則要求的時間向操舵裝置供電。

2.6 供下列設備半小時之用：

.1 規則15所要求的任何動力操作水平門，連同它們的指示器和警報信號。如規則15.9.2的要求得到執行，在所有的門能在60秒內關閉的情況下，可允許繼續操縱這些門。

.2 將升降車提升至甲板高度以便人員脫逃的應急佈置，在緊急情況下旅客用升降車可順序提升到甲板高度。

2.7 固定從事短途航行的船舶，如充分的安全標準得到滿足，主管機關可接受比第2.1至2.5款所指36小時為短的期限，但不短於12小時。

3 應急電源可以是一台發電機或一組蓄電池，它們應符合下列要求：

3.1 當應急電源為發電機時，它應是：

.1 由適當的原動機驅動，獨立供給燃油，燃油閃點（閉杯試驗）不小於43°C；

.2 主電源供電發生故障時能自動起動，並應自動與應急配電板接通；第4款所指用途也應自動轉由應急發電機組供電。自動起動系統和原動機的特性應是在最多45秒內能使應急發電機儘快地安全和實際可行地承擔其預定的全部任務；除非備有應急發電機組的第二套獨立起動裝置，所貯備的單一能源應加保護，以免為自動起動系統全部耗盡；和

.3 備有第4款規定的過渡應急電源。

3.2 當應急電源為蓄電池組時，它應能：

.1 承擔應急負荷而在整個供電階段保持電池的電壓在其正常電壓的上下12%之內無須再充電；

.2 主電源發生故障時自動與應急配電板接通；和

.3 立即向至少是第4款所指的那些用途供電。

4 第3.1.3款要求的過渡應急電源應由位於緊急時適於使用處所的蓄電池組來組成，這個蓄電池組應在整個供電階段保持電池的電壓在其正常電壓的上下12%之內無須再充電，並具有足夠的能量和佈置成主電源或應急電源發生故障時能自動地至少向下列用途供電，當這些用途依靠電力時：

4.1 供下列用途半小時之用：

.1 第2.1和2.2款要求的照明；

.2 第2.3.1、2.3.3和2.3.4款要求的所有用途，除非這些用途是由位於緊急時適於使用處所的蓄電池組在指定期間獨立供電。

4.2 關閉第2.6.1款要求的水密門連同其指示器和報警信號的動力，但不必同時關閉所有門。

5.1 應急配電板應儘實際可能裝設在靠近應急電源之處。

5.2 當應急電源為發電機時，應急配電板應與應急電源設置在同一處所，除非因此會妨礙應急配電板的操作。

5.3 按本條規則裝備的蓄電池組不得與應急配電板設置在同一處所。在主配電板或機器控制室的適當位置應安裝一指示器，以指示蓄電池正在代替應急電源或第3.1.3或4款所指的過渡應急電源進行供電。

5.4 在正常工作情況下，應急配電板應用內連鎖線由主配電板供電，此內連鎖線應足以保護主配電板，免於過載和短路，並能在主電源發生



故障時自動在應急配電板處斷開。當此系統採用反饋操作，內連饋線也應在應急配電板處得到保護，至少免於短路。

5.5 為了保證應急電源迅速可用，應作出安排當必要時將非應急電路從應急配電板自動斷開，以保證向應急電路供電。

6 應急發電機和原動機與任何應急蓄電池組應設計和佈置成，當船舶正浮時和傾斜至橫傾達 $22.5^\circ$ 的任何角度與向艏或艉縱傾達 $10^\circ$ 或在這些範圍內的任何組合角度時，它們的全部預計功率得以發揮作用。

7 應作出規定對整個應急系統進行定期試驗，並應包括自動起動裝置的試驗。

### 規則43

#### 貨船應急電源

1.1 應備有一個獨立應急電源。

1.2 應急電源、隨同變壓設備（如有的話）、過渡應急電源、應急配電板和應急照明配電板應置於最高連續甲板之上，並應自露天甲板易於到達。除在例外情況下經主管機關允許外，它們不應置於防撞艙壁的前面。

1.3 應急電源，隨同變壓設備（如有的話）、過渡應急電源、應急配電板和應急照明配電板，與主電源、隨同變壓設備（如有的話）、和主配電板的相對位置應經主管機關同意，以使主電源、隨同變壓設備（如有的話）、和主配電板所在處所或任何A類機器處所發生火災或其他事故，不應妨礙應急電源的供電、控制和配電，如實際可行，應急電源、隨同變壓設備（如有的話）、過渡應急電源和應急配電板所在處所不應

毗連於A類機器處所或主電源、隨同變壓設備（如有的話）、或主配電板所在處所的限界面。

1.4 如採取適當措施保證在各種環境下的獨立應急作業，應急發電機可短時間例外地用來向非應急電路供電。

2 可用的電源功率應足夠向緊急情況下安全所必須的用途供電，同時適當地考慮到這些用途可能必須同時使用。應急電源應足以同時至少在下述期限內向以下用途供電，如這些用途依靠電力，同時考慮到起動電流和某些載荷的過渡性質：

2.1 規則III/19和III/38所要求的每一登艇站處甲板和舷外約3小時應急照明。

2.2 下列處所的18小時應急照明：

.1 所有服務和居住艙室的走廊、梯道和出入口、人員升降車和人員升降圍阱；

.2 機器處所和主發電站，包括它們的控制站；

.3 所有控制站、機器控制室和每一主配電板和應急配電板處；

.4 儲藏消防員裝備的所有處所；

.5 操舵裝置處；和

.6 第2.5款所指消防泵、灑水式消防泵（如有的話）和應急艙底泵（如有的話）和它們的發動機起動位置。

2.3 供給現行國際海上避碰規則所要求的航行燈和其他燈18小時之用。

2.4 供下列設備18小時之用：

.1 應急情況下所要求的所有內部通信設備；

.2 規則V/12所要求的助航設備；當此項規定為不合理或不可行時，主管機關可對小於5,000總噸的船舶免除此要求；

.3 探火和火災報警系統；和

.4 斷續操作白晝信號燈、船舶號笛、人力火災警報和緊急時需要的所有船內信號；

除非這類用途能由位於緊急時適於使用處所的蓄電池組獨立供電18小時。

2.5 如應急發電機是消防泵之一的動力源，則供規則II-2/4.3.1和4.3.3所要求的此消防泵18小時之用。

2.6.1 如規則29.14要求供電，則按該規則要求的時間向操舵裝置供電。

2.6.2 固定從事短途航行的船舶，如充分的安全標準得到滿足，主管機關可接受比第2.2至2.5款所指18小時為短的期限，但不短於12小時。

3 應急電源可以是一台發電機或一組蓄電池，它們應符合下列要求：

3.1 當應急電源為發電機，它應是：

.1 由適當的原動機驅動，獨立供給燃油，燃油閃點（閉杯試驗）不小於43°C；

.2 除非根據第3.1.3款備有過渡應急電源，否則在主電源發生故障時自動起動；當應急發電機是自動起動的，它應自動與應急配電板接通；應急發電機因此要自動與第4款所指的那些用途接通；除非備有應急發電機的第二套獨立起動裝置，所貯備的單一能源應加保護，以免為自動起動系統全部耗盡；和

.3 除非備有應急發電機，既能向第4款所指的用途供電，又能在最多45秒內儘快地安全和實際可行地自動起動和供給所需的電荷，否則應配備該款所指的過渡應急電源。

3.2 當應急電源為蓄電池組，它應能：

.1 承擔應急負荷而在整個供電階段保持電池的電壓在其正常電壓的上下12%之內無須再充電；

.2 主電源發生故障時自動與應急配電板接通；和

.3 立即向至少是第4款所指的那些用途供電。

4 第3.1.3款要求的過渡應急電源應由位於緊急時適於使用處所的蓄電池組來組成，這個蓄電池組應在整個供電階段保持電池的電壓在其正常電壓的12%左右之內無須再充電，並具有足夠的能量和佈置成主電源或應急電源發生故障時能自動地至少向下列用途供電，當這些用途依靠電力時：

4.1 第2.1、2.2和2.3款要求的照明。對於過渡階段，就機器處所、居住和服務艙室來說，所要求的應急電力照明可以用固定安裝的、單個的、自動充電的、用繼電器操作的電池燈；和

4.2 第2.4.1、2.4.3和2.4.4款要求的所有用途，除非這些用途是由位於緊急時適於使用處所的蓄電池組在指定期間獨立供電。

5.1 應急配電板應儘實際可能裝設在靠近應急電源之處。

5.2 當應急電源為發電機時，應急配電板應與應急電源設置在同一處所，除非因此會妨礙應急配電板的操作。

5.3 按本條規則裝備的蓄電池組不得與應急配電板設置在同一處所。在主配電板或機器控制室的適當位置應安裝一指示器，以指示蓄電池正在代替應急電源或第3.2或4款所指的過渡應急電源進行供電。

5.4 在正常工作情況下，應急配電板應用內連鎖線由主配電板供電，此內連鎖線應足以保護主配電板，免於過載和短路，並能在主電源發生故障時自動在應急配電板處斷開。當此系統採用反饋操作，內連鎖線也應在應急配電板處得到保護，至少免於短路。

5.5 為了保證應急電源迅速可用，應作出安排當必要時將非應急電路從應急配電板自動斷開，以保證向應急電路供電。

6 應急發電機和原動機與任何應急蓄電池組應設計和佈置成，當船舶正浮時和傾斜至橫傾達 $22.5^{\circ}$ 的任何角度與向艏和艉縱傾達 $10^{\circ}$ 或在這些範圍內的任何組合角度時，它們的全部預計功率得以發揮作用。

7 應作出規定對整個應急系統進行定期試驗，並應包括自動起動裝置的試驗。

#### 規則44

#### 應急發電機組的起動裝置

1 應急發電機組應能在溫度為 $0^{\circ}\text{C}$ 的冷態下迅速起動。如這是實際上不可行或者不會遇到這種較低的溫度，應作出主管機關能夠接受的維護加熱裝置的規定，以保證發電機組的迅速起動。

2 佈置成自動起動的每台應急發電機組應配備帶有至少三次連續起動的能源並經主管機關認可的起動裝置。還應配備在30分鐘內另加三次起動的能源，除非人力起動經演習證明是有效的。

3 貯備的能源應在全部時間內保持如下：

.1 電力和液壓起動系統應由應急配電板來保持；

.2 壓縮空氣起動系統可用通過適當止回閥的主或副壓縮空氣儲存器或應急空氣壓縮機來保持，如此應急空氣壓縮機是電力驅動的，則由應急配電板供電；

.3 所有這些起動、充電和能源貯存裝置應設置在應急發電機處所；這些裝置除操作應急發電機組外不作其他目的之用。這並不排除由設置在

應急發電機處所內的主壓縮空氣系統或副壓縮空氣系統通過止回閥向空氣儲存器供氣。

4.1 當不要求自動起動時，可允許用人力起動，例如人力曲柄、慣性起動器、人力充液液壓蓄能器，或火藥填充筒，當能用演習證明是有效者。

4.2 當人力起動不實際時，應符合第2和3款的要求，但開始時可由人工起動。

## 規則45

### 觸電、電氣火災及其他電氣災害的預防措施

1.1 電機或電器設備的裸露金屬部分，原來不擬通電但在漏電情況下易於變為通電者，應接地，除非這些電機或設備：

.1 所用電的電壓，直流不超過55 V或導體間均方根不超過55 V；不應應用自耦變壓器來實現這個電壓；

.2 由安全絕緣的變壓器供電，電壓不超過250 V，同時這種變壓器只向一個耗電裝置供電；或

.3 是根據雙層絕緣原理構造的。

1.2 用於行動受限制或特別潮濕處所的可移動電器設備，而這些處所由於導電可能產生特殊危險者，主管機關可要求額外的預防措施。

1.3 一切電器的構造和安裝，應在正常使用或接觸時不致造成傷害。

2 主配電板和應急配電板的佈置，應使需要時易於到達電器和設備，而對人員無危險。配電板的側面、後面和前面，如有必要，均應作適當的防護。裸露帶電部分的對地電壓超過主管機關規定電壓者不應裝在這類配電板的板面上。



3.1 船體回路配電系統不得用於油船上的任何目的或1,600總噸及以上任何其他船上的動力、加熱取暖或照明等。

3.2 第3.1款的要求並不排除經主管機關批准後用於：

- .1 外加電流陰極保護系統，
- .2 有限的和局部的接地系統，或
- .3 在最不利條件下不超過30 mA電流循環用的絕緣程度監控裝置。

3.3 當使用船殼回路系統，所有終端分支電路，即最末保護裝置以後的所有電路應為雙導線的，並採取主管機關同意的預防措施。

4.1 油船上不得使用接地配電系統。主管機關可例外地允許在油船上採用3,000 V（線對線）及以上交流電力網的中線接地，如果由此可能形成的任何電流並不直接流過任何危險處所的話。

4.2 當動力、加熱取暖或照明配電系統，不論是初級的還是次級的，不接地時，應備有能不斷監控對地絕緣程度和絕緣值異常低時能發生能視聽的信號的裝置。

5.1 除在例外情況下經主管機關許可者外，電纜的所有金屬護套和鎧裝應為連續導電，並應接地。

5.2 設備外面的所有電纜和電線應至少為滯燃式，並應在敷設時不損傷它們原來的滯燃性能。當時特殊申請有需要時，主管機關可允許使用不符合前述要求的專用電纜，例射頻電纜。

5.3 為了安全和應急所需的動力、照明、內部通信或信號的電纜和電線應儘實際可行地遠離廚房、洗衣房、A類機器處所和其圍壁以及其他有高度失火危險的地區。連接消防泵與應急配電板的電纜，當通過有高度失火危險地區時，應為耐火型的。當實際可行時，所有這類電纜的敷設，要使它們不因相鄰處所失火所致的艙壁變熱而導致不適用。



5.4 當敷設在危險區域的電纜因這類區域內的電器故障會引起火災或爆炸危險時，應採取主管機關同意的防止這類危險的專門預防措施。

5.5 電纜和電線的敷設和支承，應避免擦傷或其他損害。

5.6 所有導線的終端和接頭，應保持它們原來的電氣、機械、滯燃以及需要時的耐火性能。

6.1 除規則29和30許可者或主管機關例外允許者外，所有獨立饋電線路應加保護以免短路和過載。

6.2 每一饋電線路過載保護裝置的定額或相應的調定，應固定標示在保護裝置所在位置。

7 照明裝置的佈置，應能防止其溫度升高而損傷電纜和電線，並能防止其周圍的物料過熱。

8 在煤艙或貨艙內終止的所有照明和動力饋電線路應在該處所以外備有切斷這些饋電線路的多極開關。

9.1 蓄電池組應作適當的保護，主要用作存放蓄電池組的艙室應有適當的構造和足夠的通風。

9.2 除第10款許可者外，可能形成可燃氣體點燃源的電器或其他設備不應存放在這些艙室內。

9.3 除主管機關同意的密封者外，蓄電池組不應放在臥室內。

10 電器設備不應安放在任何可燃混合氣體易於積聚的處所，包括油船船上的這類處所或專門用來存放蓄電池的艙室、油漆間、乙炔貯藏室或類似處所，除非主管機關認為這些設備是：

- .1 操作所必需的；
- .2 不致點燃這類混合氣體的型式；
- .3 適合於有關處所；和
- .4 經適當證明能在多半會遇到的灰塵、蒸汽或氣體中安全使用者。

11 在客船上，配電系統的佈置應使規則II-2/3.9所規定的任何主豎區內發生的火災不致妨礙任何其他主豎區內必需用途的供電。如主饋電線路及應急饋電線路通過任何主豎區時，在垂直和水平方向儘可能遠離，此項要求即可滿足。

### 第五節 — 周期性無人值班機器處所的補充要求 (除規則54關係到客船外，第五節適用於貨船)

#### 規則46

##### 總則

- 1 所作佈置應保證在所有航海情況包括操縱情況下與有人值班機器處所的船舶具有同樣的安全程度。
- 2 應採取主管機關同意的措施以保證設備可靠運行和作出滿意的佈置進行定期檢查和循回測試以確保持續可靠操作。
- 3 每艘船舶應備有主管機關同意的證明文件，說明它適合於在周期性無人值班機器處所從事運行。

#### 規則47

##### 防火措施

- 1 鍋爐供氣和排氣管（煙囪）的失火應能探知和報警，除非主管機關認為在特殊情況下為不必要者。
- 2 推進機械的掃氣道的失火應在初始階段即能探知和報警，除非主管機關認為特殊情況下為不必要者。

3 2250 KW 及以上的內燃機或汽缸內徑大於300毫米的內燃機，應備有曲柄箱油霧探測器或機器軸承溫度監測器或等效裝置。

### **規則48**

#### **防止浸水**

1 周期性無人值班機器處所的艙底污水阱的位置和監測，應使液體的積聚在正常縱傾和橫傾角度時能夠探知；並應大得足以易於容納無人照管期間的正常洩水量。

2 當艙底泵能夠自動起動，應備有裝置以指示注入的液體大於泵的能量或泵比正常預計的更頻繁地工作。在這些情況下，可以允許採用足以支持一個合理時間的較小的艙底污水阱。當備有自動控制艙底泵時，應特別注意防止油污的要求。

3 海水進口、水線下排水或艙底噴射系統等任何閥門的控制設備所在位置應是當水注入該處所時能有足夠時間來操作，並要顧及到達和操縱這些控制設備所需的時間。如所要求的位置可能於船舶滿載情況下被水所浸，則應作出安排能在該位置以上地點操作這些控制裝置。

### **規則49**

#### **推進機械的駕駛台操縱**

1 在所有航海情況，包括操縱情況下，速度、推力方向和（如適用的話）推進器的螺矩應完全由駕駛台控制。

1.1 對於每一獨立推進器，這類遙控應由一個單一的控制裝置來執行，連同自動操作所有附帶服務裝置，必需時包括防止推進機械超負荷的裝置。

1.2 主推進機械應備有駕駛台緊急停機裝置，並應與駕駛台控制系統相獨立。

2 來自駕駛台的推進機械車令應在主機控制室或適當的推進機械控制位置指示出來。

3 推進機械的遙控在一個時間應只能在一處進行；在這些地點允許互連控制狀態。在每一控制地點應有指示器指明那個控制地點正在控制推進機械。在駕駛台和機器處所之間的控制轉換應只能在機器處所或機器控制室進行。這個系統應包含當由一個控制地點將控制轉換到另一地點時防止發生推力嚴重改向的裝置。

4 對於安全操作船舶所必須的所有機器，即使自動或遙控系統的任何部分發生故障，應能在當地進行控制。

5 自動遙控系統的設計應使其發生故障時能發出警報。除非主管機關認為實際上不可行，否則直到進行當地控制時，預定的速度和推力方向應該保持。

6 駕駛台應安裝指示器，以指示：

- .1 固定螺矩推進器時，推進器速度和轉動方向，或
- .2 可變螺矩推進器時，推進器速度和螺矩狀態。

7 起動失敗的連續自動起動次數應加限制，以維護足夠的起動空氣壓力。

應備有報警裝置以指示仍然能進行推進機械起動操作的最低起動空氣壓力。

## 規則50

### 通信

主機器控制室或相應的推進機械控制位置、駕駛台和輪機員居住艙室之間應備有可靠的聲響通信裝置。

## 規則51

### 警報系統

- 1 應備有警報系統以指示任何需要注意的故障，此警報系統應：
  - .1 能在主機器控制室或推進機械控制位置發出聲響警報和能在適當位置能見地指示每個獨立的警報職能；
  - .2 與輪機員公用艙室和通過選擇開關與每一個輪機員居室有聯繫，以保證至少與這些居室的一個有聯繫。主管機關可准許採用等效的佈置；
  - .3 在要求值班駕駛員採取行動或加以注意的任何情況下，於駕駛台發出可視聽的警報；
  - .4 儘實際可行地按自動防止故障原理來設計；
  - .5 如果一個警報在一定時間內於當地未得到注意，能按規則38要求向輪機員發出警報。
- 2.1 警報系統應不斷地取得動力，並在失去正常動力供應情況下應自動地由備用動力來提供。
- 2.2 警報系統的正常動力供應發生故障時應發出警報。
- 3.1 警報系統應能在同一時間表示一個以上的故障，並在接受任何報警時，應不抑制接受其他報警。

3.2 在第1款所指的位置接受了任何警報，應在顯示這種警報的其餘位置也指示出來。警報應保持到它們被接受，個別警報的能見標誌應保持到故障被排除，此時警報系統應自動地復位到正常操作狀態。

## 規則52

### 安全系統

應備有安全系統，以保證機器或鍋爐在運行中發生會造成即刻危險的嚴重故障時能自動關閉該裝置的這一部分，並應發出警報。除了會導致嚴重損壞、完全破壞或爆炸的情況以外，推進系統的關停不應自動進行。當主推進機械安裝有快速關停裝置時，應防止無意中的操作導致其動作。當動用快速關停裝置時，應有能見的指示裝置加以指示。

## 規則53

### 機器、鍋爐和電氣裝置的特殊要求

1 對機器、鍋爐和電氣裝置的特殊要求應經主管機關同意，並應至少包括本條規則的要求。

2 主電源應符合下列要求：

2.1 當電力通常由一台發電機供應時，應備有適當的負荷分配裝置以保證推進操舵所要求各種用途的供電完整性和船舶的安全。在處於運行中的發電機損壞時，應有充分的措施自動起動備用發電機，並與主配電板接通，此備用發電機應有足夠的功率從事推進和操舵，並能自動再起動必須的副機，包括需要時的繼續運行，以保證船舶的安全。如主管機關認為實際不可行時，可對小於1,600總噸的船舶免除這項要求。

2.2 如電力通常由一台以上的發電機平行操作同時供應時，應有措施，例如負荷分配措施，以保證其中一台發電機組損壞時，其餘的各台能繼續運行從事推進和操舵而不超負荷，並保證船舶安全。

3 當推進所必須的其他副機也需要備用機器時，應備有自動轉換裝置。

#### 4 自動控制和警報系統

4.1 控制系統應使操縱主推進機械和其副機所需的各種服務均通過必須的自動裝置來保證。

4.2 自動轉換時應發出警報。

4.3 符合規則51的警報系統應供所有重要的壓力、溫度和液面與其他必須的儀錶之用。

4.4 應安排一個帶有必須的警報控制板和指示各種警報的檢測儀錶的集中控制點。

5 當主推進使用內燃機時，應備有將起動空氣壓力保持在要求水平的裝置。

### 規則54

#### 關於客船的特殊考慮

客船應經主管機關特殊考慮，它們的機器處所可否周期無人值班，如可以，則對本規則所規定的那些要求是否需要補充，以達到與有人值班機器處所相同的安全程度。



## 第II-2章

### 構造 — 防火、探火和滅火

第II-2章的現有文本用下文代替：

#### 第一節 — 通則

##### 規則1

##### 適用範圍

1.1 除另有明文規定外，本章適用於1984年9月1日或以後安放龍骨或處於相應建造階段的船舶。

1.2 在本章內，術語“處於相應建造階段”，係指：

- .1 可看作與特定船舶開始建造的相同階段；
- .2 業已開始安裝的船舶至少為50噸，或為所有結構材料估量的百分之一，視何者小而定。

1.3 在本章範圍內：

- .1 “建造船舶”指“安放龍骨或處於相應建造階段的船舶”；
- .2 “所有船舶”指“在1984年9月1日之前、之日或之後建造的船舶”；
- .3 無論何時建造的貨船，一經改裝成客船後，就於開始改裝之日起作為建造客船看待。

2 除另有明文規定外：

.1 在1984年9月1日之前建造的船舶，主管機關應保證在滿足2.2款規定的條件下，使之符合1974年國際海上人命安全公約第II-2章\*中定義為新船或現有船舶所適用的各項要求；

.2 在1984年9月1日之前建造的船舶，主管機關應保證使之符合有關1974年國際海上人命安全公約1978年議定書附件的第II-2章中定義為新船或現有船舶所適用的各項要求。

3 所有船舶在進行修理、改裝、改建以及與之有關的艙裝時，至少應繼續符合這些船舶原先適用的要求。上述船舶如在1984年9月1日之前建造，一般至少應在其修理、改裝、改建或艙裝之前原來的程度上符合在該日或以後建造船舶的要求。重大的修理、改裝、改建以及與之有關的艙裝在主管機關認為合理和可行的範圍內，應滿足對在1984年9月1日或以後建造船舶的要求。

4.1 主管機關如考慮到航程的遮蔽性及其條件，認為引用本章的某些特殊要求為不合理或不必要時，可對其懸掛該國國旗的在航程中距最近陸地不超過20海哩的個別船舶或某類船舶免除這些要求。

4.2 客船用於載運大量特種業務如朝山進香的旅客時，該船有權懸掛國旗的國家主管機關如認為實施本章要求為不切實際時，可對此類船舶免除這些要求，但此類船舶應完全符合下列規定：

.1 1971年特種業務客船協定所附的規則；

.2 1973年特種業務客船艙室要求議定書所附的規則。

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\* 1974年國際海上人命安全會議通過的文本。

## 規則2

### 基本原則

1 本章的目的是要求船舶的防火、探火和滅火達到最充分可行的程度。

2 考慮到船舶的類型和所涉及潛在火災的危險，下列基本原則是本章各條款的基礎，並體現在相應的條文中：

- .1 用耐熱與結構性限界面，將船舶劃分為若干主豎區；
- .2 用耐熱與結構性限界面將起居處所與船舶其他處所隔開；
- .3 限制使用可燃材料；
- .4 探知火源區域內的任何火災；
- .5 抑制和撲滅火源處所內的任何火災；
- .6 保護脫險通道或滅火出入口；
- .7 滅火設備的即刻可用性；
- .8 易燃貨物蒸發氣體着火的可能性減至最低限度。

## 規則3

### 定義

除另有明文規定外，在本章範圍內：

1 “不燃材料”，係指某種材料加熱至約750°C時，既不燃燒，亦不發出足量的造成自燃的易燃蒸發氣體；此係通過既定的試驗程序確定，並取得主管機關的同意。除此以外的任何其他材料，皆為“可燃材料”。\*

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\* 參看本組織通過的大會 472 (XII) 號決議“關於鑑定船用結構材料為不燃性的試驗方法的改進建議案”。

2 “標準耐滅試驗”係指將需要試驗的艙壁或甲板的試樣置於試驗爐內，加溫到大致相當於下列標準時間-溫度曲線的一種試驗，試樣暴露表面面積應不少於4.65平方米，其高度（或甲板長度）應不少於2.44米，試樣應儘可能與所設計的構件近似，並在相當位置包括至少一個接頭。標準時間-溫度曲線應是連接下列按起始爐溫以上測量的各溫度點的一條光滑曲線：

自開始至滿 5分鐘時 — 556°C

自開始至滿10分鐘時 — 659°C

自開始至滿15分鐘時 — 718°C

自開始至滿30分鐘時 — 821°C

自開始至滿60分鐘時 — 925°C

3 “A 級分隔”是由符合下列要求的艙壁與甲板所組成的分隔：

.1 它們應以鋼或其他等效的材料製造；

.2 它們應為適當的防撓加強；

.3 它們的構造，應在一小時的標準耐火試驗結束時能防止煙及火焰通過；

.4 它們應用經認可的不燃材料隔熱，使在下列時間內，其背火一面的平均溫度，較原溫度增高不超過139°C，且在任何一點包括任何接頭在內的溫度較原溫度增高不超過180°C：

“A-60” 級            60分鐘

“A-30” 級            30分鐘

“A-15” 級            15分鐘

“A-0” 級             0分鐘

.5 主管機關可以要求將原型的艙壁或甲板進行一次試驗，以保證滿足上述完整性及溫升的要求。\*

4 “B級分隔”是由符合下列要求的艙壁、甲板、天花板或襯板所組成的分隔：

.1 它們的構造應在最初半小時的標準耐火試驗至結束時，能防止火焰通過；

.2 它們應具有這樣的隔熱值，使在下列時間內，其背火一面的平均溫度，較原溫度增高不超過139°C，且在包括任何接頭在內的任何一點的溫度，較原溫度增高不超過225°C：

“B-15”級 15分鐘

“B-0”級 0分鐘

.3 它們應以經認可的不燃材料製成，“B級分隔”的結構和裝配所用的一切材料應為不燃材料，但是，並不排除可燃鑲片的使用，只要這些材料符合本章的其他要求；

.4 主管機關可要求將原型分隔進行一次試驗，以保證滿足上述完整性和溫升的要求。\*

5 “C級分隔”係以經認可的不燃材料製成，它們既不需要滿足有關防止煙和火焰通過的要求，也勿需限制溫升。可使用可燃鑲片，只要這些材料符合本章的其他要求。

6 “連續B級天花板或襯板”係指“B”級天花板或襯板只在一個“A或B級分隔”終止者。

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\* 參閱本組織通過的大會 163 (特 IV) 號及大會 215 (VII) 號決議 “關於‘A’級和‘B’級分隔耐火試驗程序的建議案”。

\* 參閱本組織通過的大會 163(特 IV)號及大會 215(VII)號決議 “關於‘A’級和‘B’級分隔耐火試驗程序的建議案”。

7 “鋼或其他等效材料”，凡遇有“鋼或其他等效材料”的字樣，“等效材料”係指任何不可燃材料本身或由於所設隔熱物，當經過標準耐火試驗的相應曝火時間後，在結構性和完整性上與鋼具有同等的性能（例如設有適當隔熱材料的鋁合金）。

8 “低播焰性”係指所述表面能有效地限制火焰的蔓延，此係通過既定的試驗程序確定，並取得主管機關的同意。

9 “主豎區”係指船體、上層建築和甲板室以“A級分隔”分成的各段，它在任何一層甲板上的平均長度一般不超過40米。

10 “起居處所”係指用作公共處所、走廊、盥洗室、住室、辦公室、醫務室、影院、娛樂室、理髮室、無烹調設備的配膳室，以及類似的處所。

11 “公共處所”係指起居所中用作大廳、餐室、休息室以及類似的固定圍蔽處所的部分。

12 “服務處所”係指用作廚房、具有烹調設備的配膳室、櫥櫃、郵件艙及貴重物品室、儲藏室、組成機器處所的部分以外的車間，以及類似處所和通往這些處所的圍壁通道。

13 “裝貨處所”係指一切用作裝載貨物的處所（包括貨油艙）以及通往這些處所的圍壁通道。

14 “滾裝裝貨處所”係指非正常分隔的並延伸至船舶的大部分長度或整個長度的處所，該處所能以水平方向正常裝卸貨物（包裝或散裝、公路或鐵路用車、車輛（包括公路或鐵路油車）、拖車、集裝箱、貨板、可拆箱櫃、類似裝載裝置或其他容器）。

15 “開式滾裝裝貨處所”係指二端開口或一端開口的滾裝裝貨處所，該處所通過側壁或天花板上的固定開口，具有有效地遍及整個長度的適當的自然通風，並使主管機關滿意。

16 “閉式滾裝裝貨處所”係指既不是開口的滾裝裝貨處所也不是露天甲板的滾裝裝貨處所。

17 “露天甲板”係指在上方並至少有二側完全暴露在外的甲板。

18 “特種處所”係指在艙壁甲板以上或以下用作裝載在油箱內備有自用燃油的機動車輛的圍蔽處所，此處所能讓上述車輛駕駛進出，並有旅客進入的通路。

19 “A類機器處所”係指具有下列設施和通往這些處所的圍壁通道的那些處所：

- .1 用作主推進的內燃機；
- .2 用作主推進以外用途的合計總輸出功率不小於373千瓦的內燃機；
- .3 任何燃油鍋爐或燃油裝置。

20 “機器處所”係指一切A類機器處所和一切其他包括推進機械、鍋爐、燃油裝置、蒸汽機和內燃機、發電機和主要電動機、加油站、冷藏機、防搖裝置、通風機和空氣調節機械的處所，以及類似處所；連同通往這些處所的圍壁通道。

21 “燃油裝置”係指準備為燃油鍋爐輸送燃油的設備或準備為內燃機輸送加熱燃油的設備，並包括用於處理壓力超過0.18牛頓/毫米<sup>2</sup>油類的任何壓力油泵過濾器 and 加熱器。

22 “控制站”係指船舶無線電設備，主要航行設備或應急電源所在的處所，或者是指火警指示器或失火控制設備集中的處所。

23 “設有限制失火危險的家具和設備的房間”，在規則26內，設有限制失火危險的家具和裝備的房間（無論住室、公共處所、辦公室或其他類型的起居處所），應為：

- .1 一切框架式家具，如書桌、衣櫥、梳粧檯、書櫃、餐具櫃，除其使用表面可用不超過2毫米的可燃鑲片外，完全由經認可的不燃材料製成；



.2 一切可移動的家具，如椅子、沙發、桌子，其骨架由不燃材料製成；

.3 一切帷幔、窗簾及其他懸掛的紡織品材料，其阻止火焰蔓延的性能應不差於每平方米重0.8公斤\*的毛織品，並取得主管機關的同意；

.4 一切地板覆蓋物，其阻止火焰蔓延的性能應不差於用於同一目的的等效的毛料，並取得主管機關的同意；

.5 一切艙壁、襯板及天花板的外露表面，應具有低播焰性；

.6 所有棕簧墊套家具，其阻止火焰着火和蔓延的性能應取得主管機關的同意。

24 “艙壁甲板”係指橫向水密艙壁所到達的最高一層甲板。

25 “載重量”係指船舶在比重為1.025的海水中，相應於所勘劃的夏季載重線的排水量與該船空船排水量之差，以噸計。

26 “空載排水量”係指船舶在艙內沒有貨物、燃油、潤滑油、壓載水、淡水、給水和易耗物料，且無旅客、船員及其財物時的排水量，以噸計。

27 “油類/散貨兩用船”係指設計用來裝油，並能交替裝載散裝固體貨物的油船。

28 “原油”係指自然存在於地下的可能未予處理的適於運輸的任何油類，並包括下列情況：

.1 可能業經去掉某些餾出物的原油；

.2 可能已經加了某些餾出物的原油。

29 “危險貨物”係指規則VII/2中所稱的那些貨物。

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\* 參閱本組織通過的大會 471 (XII) 號決議“關於決定垂直懸掛的紡織品和薄膜阻止火焰的試驗方法的建議案”。

30 “化學品船”係指建造或改建的並用於散裝載運任何易燃性液化產品的船舶，而這些產品已列入本組織大會490（XII）號決議同意授權海安會通過、並可能由本組織修改的“關於散裝載運危險化學品船舶的構造和設備規則的最低要求摘要”（以下簡稱“散裝化學品規則”）之中。

31 “氣體運輸船”係指建造或改建的並用於散裝載運任何液化氣體的其他易燃性物質，這些氣體或物質已列入本組織大會328（IX）號決議通過並業經或可能由本組織修改的“關於散裝載運液化氣體船舶的構造和設備規則”（以下簡稱“氣體運輸船規則”）第XIX章。

#### 規則4

#### 消防泵、消防總管、消防栓和消防水帶

1 每條船舶應設有符合適用於本規則要求的消防泵、消防總管、消防栓和消防水帶。

##### 2 消防泵的排量

2.1 所需的全部消防泵，應能按下述4款規定的壓力供給消防用水：

.1 在客船上，泵的出水量應不少於指定供艙底抽輪的全部艙底泵所需出水量的 $\frac{2}{3}$ ；

.2 出貨船上，除任何應急泵以外的泵，其出水量應不少於按規則II-1/21關於同樣大小的客船指定供艙底抽輪的每一獨立艙底水泵所需出水量的 $\frac{4}{3}$ ，但貨船所需各消防泵總排量不需超過180立方米/小時。

2.2 所需的每一消防泵（除在貨船3.3.2款中所需的任何應急泵以外），其排量應不少於所需總排量的80%除以所需的最少消防泵數，但不得少於25立方米/小時，並在任何情況下，每一個這樣的消防泵至少應能

維持兩股所需的水柱。這些消防泵應能按所需的條件向消防總管系統供水。如設置泵數多於所需的最低數量，則這些增加的泵的排量應取得主管機關的同意。

### 3 消防泵和消防總管的佈置

3.1 所有船舶應設置如下獨立驅動的消防泵：

.1 4,000總噸及4,000總噸以上的客船……至少三台

.2 4,000總噸以下的客船以及

1,000總噸及1,000總噸以上的貨船……至少二台

.3 1,000總噸以下的貨船……應取得主管機關同意。

3.2 衛生泵、壓載泵、艙底泵或通用泵，如非經常用來抽輸油類者，均可作為消防泵；如它們偶爾用於移注燃油，則要裝設適宜的轉換裝置。

3.3 通海接頭、消防泵及其動力源的佈置，應保證：

.1 1,000總噸及1,000總噸以上的客船，當任何一艙失火時不使所有的消防泵同時失去作用；

.2 2,000總噸及2,000總噸以上的貨船，如任何一艙失火時使所有的消防泵失去作用，作為替代措施的固定獨立驅動應急消防泵，應能供給兩股水柱，並為主管機關所滿意。該泵及其位置應符合下列要求：

.2.1 應急消防泵的排量應不少於本規則所要求的消防泵總排量的40%，且不得少於25立方米/小時。

.2.2 當應急消防泵按3.3.2.1款所要求的水量排出時，在任何消火栓處的水壓應不少於4.2款中所規定的最低壓力。

.2.3 作為應急消防泵驅動動力的任何柴油機，應在溫度降至0°C時的冷態下能用人工隨時起動。若屬不可能，或可能遇到較低氣溫時，則應考慮到加熱裝置措施及其維修，並取得主管機關的認可，以便確保隨時

起動。如不可能人工起動，主管機關可允許採用其他起動設施。這些起動裝置，應在30分鐘內至少起動驅動動力的柴油機6次，並在前10分鐘內至少起動2次。

.2.4 任何燃油供給櫃所裝盛的燃油，應能使該泵在全負荷下至少運行3小時，在主機艙以外獲得的儲備燃油，亦應能使該泵在全負荷下再運行15小時。

.2.5 應急消防泵的總吸頭，應在船舶營運中的航行條件下不超過4.5米，同時吸入管的設計應使吸入損失減至最少。

.2.6 存放消防泵處所的限界面，應隔熱至相當於規則44“控制室”所要求的等效防火構造標準。

.2.7 在機器處所和應急消防泵及其動力源處所之間，不允許有直接入口。若屬不可能，主管機關可以認可一個採用氣鎖措施的入口佈置，該入口的二個門均應為自閉式門，或一個通過由機器處所和設置應急消防泵處所遙控的並在這些處所失火時不易被切斷的某一處所操縱的水密門。在此種情況下，設置應急消防泵及其動力源的處所應設有第二個入口設施。

.2.8 設置應急消防泵獨立動力源處所的通風，應佈置成儘可能排除可能由機器處所進入或抽入該處所的煙氣。

.3 1,000總噸以下的客船和2,000總噸以下的貨船，若任何一艙失火時可能使所有的消防泵均失去作用，則供給消防用水的替代措施，應取得主管機關的同意。

.4 此外，在貨船上機器處所內所設置的通用泵、壓載泵和艙底泵等其他泵，其佈置應確保在這些泵中至少有一台能具有2.2和4.2款中所要求的排量和壓力向消防總管供水。

### 3.4 為隨時獲得供水，應佈置成：

.1 1,000總噸及1,000總噸以上的客船，至少以內部位置的任何消火栓上能立即獲得一股有效的水柱，以便保證自動起動所需的消防泵能持續出水；

.2 1,000總噸以下的客船和貨船，應取得主管機關的同意。

.3 具有周期無人照管機器處所或僅需一人值班的貨船，消防總管系統應在適當壓力下立即排水，排水控制可以從駕駛室和消防控制站遙控起動的主消防泵之一遙控起動（若設有時），或消防總管系統的固定壓力輸送，應由主消防泵之一加以控制。但對1,600總噸以下的貨船，如進入在機器處所的佈置不需要時，主管機關可以免除本要求。

.4 客船上若按規則II-1/54設有周期無人照管機器處所時，對上述處所，主管機關應按相當通常有人照管機器處所的規定確定固定式水霧滅火系統。

3.5 如消防泵的壓力可能超過消防水管、消火栓和消防水帶的設計壓力，則應在全部消防泵裝設溢流閥。這些閥應恰當分佈和調節，以防止消防總管系統內任何部分發生超壓。

3.6 對於油船，應在船舶尾樓前端防護位置處和橫向不大於40米的艙櫃甲板的消防總管上設置隔離閥，以便在失火或爆炸時能維護消防總管系統的完整性。

### 4 消防總管的直徑和壓力

4.1 消防總管和消防水管的直徑應足夠有效地從兩個同時工作的消防泵傳輸所需的最大出水量；但貨船例外，其消防總管的直徑僅需足以出水140立方米/小時。

4.2 在兩泵同時工作並通過8款規定的水槍從任何相鄰的消火栓傳輸4.1款所確定的水量時，在一切消火栓上應維持下述最低壓力：

客船：

4,000總噸及4,000總噸以上 0.31牛頓/毫米<sup>2</sup>

1,000總噸及1,000總噸以上

但小於4,000總噸 0.27牛頓/毫米<sup>2</sup>

1,000總噸以下 應取得主管機關的

同意

貨船：

6,000總噸及6,000總噸以上 0.27牛頓/毫米<sup>2</sup>

1,000總噸及1,000總噸以上

但小於6,000總噸 0.25牛頓/毫米<sup>2</sup>

1,000總噸以下 應取得主管機關的

同意

4.3 於任何消火栓處的最大壓力，均不得超過所能證明的消防水帶有效控制。

## 5 消火栓的數目和位置

5.1 消火栓的數目和位置，應至少能將兩股不是由同一消火栓發出的水柱，射至船舶在航行時旅客或船員經常到達的任何部分，而其中一股應僅用1根消防水帶。而對任何裝貨處所空艙時的任何部分、任何滾裝裝貨處所或任何特種處所的後者情況，兩股水柱中每股應用1根消防水帶射至上述處所的任何部分。此外，上述消火栓應位於靠近被保護處所的出口。

5.2 對於客船的起居處所、服務處所和機器處所，當主豎區艙壁上的所有水密門和門均關閉時，消火栓的數目和位置可以符合5.1款的要求。

5.3 對於客船，A類機器處所鄰近於軸隧的下層應設有通道，並在該機器處所出入口的附近外面設置二隻消火栓。如在其他處所也設有上述



通道，則應在那些處所之一靠近A類機器處所的出入口設置二隻消防栓。若軸隧或相鄰處所非係脫險通道的部分，則無須考慮上述措施。

## 6 管子及消防栓

6.1 在熱力作用下易於失效的材料，除非有充分的保護，不得用作消防總管和消防栓。管子及消防栓的位置應使消防水帶易於與之連接。管子及消防栓應佈置成能免於可能的凍結。在可能裝運甲板貨物的船上，消防栓的地位應隨時易於到達，消防管的佈置應儘可能避免被此項貨物所損壞。各消防水帶接頭與各水槍應能完全互換使用，除非船上對每一消防栓備有1根消防水帶和1支水槍。

6.2 應設有一旋塞或閥門供每一消防水帶使用，在消防泵工作時可以拆卸任何消防水帶。

6.3 為分開設置主消防泵或消防總管其餘各泵的機器處所內的消防總管部分，應在該機器處所外面易於到達的可靠位置上設置隔離閥。消防總管應佈置成當隔離閥關閉船上除上述機器處所內以外的所有消防栓時，上述機器處所內的消防栓能由置於該機器處所外的一台消防泵通過未經該處所的管子供給消防用水。但下列情況例外，即不方便從該機器處所外面通過時，主管機關可允許應急消防泵的吸入管和排泄管短途穿越該處所，並用堅固的鋼質罩殼覆蓋管子，以使之維持消防總管的完整性。

## 7 消防水帶

7.1 消防水帶應為主管機關認可的材料，並具備足夠的長度射出一股水柱至可能需要使用的一處所。其最大長度應取得主管機關的同意。每1根消防水帶應配有一支水槍和必需的接頭。按本章指定為“消防水帶”的水帶應與其必要的配件及工具，存放於供水消防栓或接頭附近顯著的部



位，以備隨時取用。此外，在載客超過36人客船的各內部處所，消防水帶應一直保持與消火栓相連接。

7.2 船舶應設有其數目和直徑取得主管機關同意的消防水帶。

7.3 對於客船，5款中所要求的每隻消火栓應至少備有1根消防水帶，這些消防水帶僅供滅火或在消防訓練和檢驗時試驗滅火設備之用。

7.4.1 1,000總噸及1,000總噸以上的貨船，所需的消防水帶數目應為每30米船長設1根，備用1根，但總數不得少於5根。此數目不包括任何機艙或鍋爐艙所需的任何消防水帶。主管機關顧及到船舶類型和該船所從事的貿易性質，可以增加所需的消防水帶數目，以便保證能隨時獲得足夠數目的消防水帶。

7.4.2 1,000總噸以下的貨船，所需消防水帶的數目，應取得主管機關的同意。

## 8 水槍

8.1 在本章範圍內，標準水槍的尺寸應為12毫米、16毫米和19毫米，或儘可能與之相近。如經主管機關同意，可准許使用較大直徑的水槍。

8.2 在起居和服務處所內，不必使用大於12毫米的水槍。

8.3 在機器處所和各外部處所，水槍的尺寸應能從最小的泵在4款所述的壓力下，從兩股水柱上獲得最大限度的出水量，但不必使用大於19毫米的水槍。

8.4 設有轉換裝置的所有水槍應為經認可的兩用型式（即水霧/水柱型）。

## 9 其他滅火系統的水泵等的位置和佈置

本章其他滅火系統所需的消防水泵，其動力源和控制位置應安裝在由本系統所防護的處所或各個處所之外，並應佈置成在其所防護的處所或各個處所失火時，不使該系統的任何部分失去作用。

## 規則5

### 固定式氣體滅火系統

#### 1 通則

1.1 所採用的滅火劑，主管機關認為其本身或在預期使用條件下，將發生一定數量有毒氣體足以危害人身者，不准使用。

1.2 輸送滅火劑至所防護處所的管子應設有控制閥，並應清楚地標明這些管子通往的處所。應有適當的措施以防止滅火劑因疏忽而注入任何處所。設有氣體滅火系統的貨艙如用作旅客處所時，在運客期間，氣體的管子接頭應予以封閉。

1.3 滅火劑的分配管的佈置以及噴嘴的設置應能均佈所得的滅火劑。

1.4 應採取措施，以便能夠關閉可能使空氣或氣體從所防護處所逃出的所有開口。

1.5 在任何處所中，空氣瓶內含有的自由空氣量如因失火而在該處所內施放時，會嚴重影響固定滅火系統的有效性者，主管機關應要求額外增加滅火劑的數量。

1.6 向任何經常有人員工作或出入的處所施放滅火劑時，應有自動聲響警報的設施。此項警報應在滅火劑施放前報警一段適當的時間。

1.7 任何固定式氣體滅火系統的控制設施，應能易於到達和操作簡便，且應成組地分裝於儘可能少的處所；其所在位置應不致為被保護處所的火災所切斷。在每一位置的明顯部位上，應備有關於該系統的工作人員安全操作說明書。

1.8 不許自動釋放滅火劑，但對3.3.5款所允許的以及3.4和3.5款所指的局部自動操作裝置例外。

1.9 若要求滅火劑數重保護一個處所以上，則可能得到的滅火劑數量不必大於上述被保護的任一處所中所需的最大數量。

1.10 除 3.3、3.4或3.5各款所准許的以外，儲存蒸汽以外的滅火劑所需的受壓容器，應按1.13款置於所被保護處所的外面。

1.11 應備有安全設施，以便船員安全地檢查容器內的滅火劑數量。

1.12 存放滅火劑的容器及其受壓部件，應設計成使其壓力操作規則就其位置和營運中外部的最大環境溫度，取得主管機關的同意。

1.13 當滅火劑需要儲存在被保護處所外面時，該儲存室應位於安全和隨時可到達的地方，並應有經主管機關滿意的有效通風。這種儲存室的任何進口最好應開向開敞甲板，且在任何情況下應與被保護處所分開。出入口的門應為向外開啟，並在這種儲存室和毗連圍閉處所之間構成限界面的艙壁和甲板包括門和關閉其上任何開口的其他設施，均應為氣密。為了執行規則26、27、44和58的各表，上述儲存室應作為控制站看待。

1.14 船上應設有該系統的備件，並取得主管機關的同意。

## 2 二氧化碳系統

2.1 除裝貨處所另有規定外，所備二氧化碳的數量應足以發出體積至少等於該船能密封的最大貨艙總容積30%的自由氣體。

2.2 對於機器處所，所攜二氧化碳的數量應足以發出至少等於下列兩者中較大值的自由氣體：

.1 最大處所總容積的40%；此容積不包括機艙棚一個水平面積以上的機艙棚部分，在這個水平面上，機艙棚的水平面積等於或小於從雙層底頂至機艙棚最低部分的中點處水平面積的40%；

.2 所保護的最大機器處所包括機艙棚在內的全部容積的35%；

但在小於2,000總噸的貨船上，上述各百分數可分別減為35%與30%；再者，兩個或兩個以上的機器處所未完全隔開者，應作為一個處所看待。

2.3 本款內所指的二氧化碳自由氣體的容積應以每公斤相當於0.56立方米計算。

2.4 機器處所的固定管系應能使85%的氣體在兩分鐘內注入該處所。

### 3 鹵化烴系統

3.1 鹵化烴滅火劑，只能用於機器處所、泵艙以及僅用於裝載沒有載運任何貨物的車輛的裝貨處所。

3.2 全浸沒系統所使用的鹵化烴滅火劑應：

.1 該系統應佈置成使其動力僅由人工方可開始釋放；

.2 若鹵化烴的容量需要供給一個以上處所時，其儲存和釋放的佈置應分別按照3.2.9或3.2.10款的要求；

.3 應設有適當設施，以便在釋放該滅火劑之前，能自動停止被保護處所內的所有風機；

.4 應設有適當設施，以便人工關閉被保護處所的通風系統中的所有擋火閘；

.5 釋放裝置的設計，應使裝貨處所或機器處所分別按照3.2.9或3.2.10款所需的最小滅火劑量，確實能夠在20秒或以內排出液態滅火劑；

.6 本系統應設計成使其在主管機關所同意的溫度範圍內易於操作；

.7 滅火劑釋放時應不能危害從事維修設備或使用正常出入口梯道和為該處所服務的脫險口的工作人員；

.8 應設有裝置能使船員安全地檢驗容器內的壓力；

.9 僅用於裝載不裝運任何貨物的車輛的裝貨處所，其所需的滅火劑數量應按表5.1計算。該數量應根據所保護處所的總容積來計算。鹵化烴

1301和1211的數量應按體積濃度為基礎加以計算，而鹵化氫2402則以單位容積的重量為基礎進行計算。

**表 5.1**

鹵化氫	最小	最大
1301	5%	7%
1211	5%	5.5%
2402	0.23公斤/立米	0.30公斤/立米

.10 機器處所的滅火劑數量應按表5.2進行計算。關於最小濃度的量是以包括艙棚空間的總容積來計算，最大濃度的量是以包括艙棚空間的淨容積來計算。鹵化氫1301和1211的數量應按體積濃度為基礎加以計算，而鹵化氫 2402則以單位容積的重量為基礎進行計算。

**表 5.2**

鹵化氫	最小	最大
1301	4.25%	7%
1211	4.25%	5.5%
2402	0.20公斤/立米	0.30公斤/立米

.11 在3.2.9和3.2.10二款範圍內，鹵化氫1301的容積應以0.16立米/公斤予以計算，而鹵化氫1211的容積應以0.14立米/公斤予以計算。

3.3 只有鹵化氫1301才可儲存在所保護的機器處所內。此容器應單獨地遍佈在該處所內，並應符合下列要求：

.1 用於人力啟動位於被保護處所外的動力施放，應在被保護處所外設有雙套動力源，並除機器處所外應即刻可用，其中一套動力源可設在被保護處所內。

.2 與滅火劑容器相連接的電力線路應設有可視聽警報，以監控故障情況及動力消失。

.3 與滅火劑容器相連接的氣動或液壓動力線路應設置雙套。氣動或液壓的壓力源應設有可視聽警報，以監控其失壓。

.4 敷設在所保護處所內用於該系統釋放所需的電力線路，應能抗熱，即為礦物絕緣電纜或等效物。用於該系統釋放所需的管束，若設計成液壓或風動操縱，應用鋼或主管機關滿意的其他等效抗熱材料製成。

.5 每一個受壓容器應裝有一個自動超壓釋放裝置，以便在容器暴露在火的影響下且系統未動作時，能使容器安全地向所保護處所放出氣體。

.6 滅火劑容器的佈置以及用於任何系統釋放所需的電力線路和管束，應在所保護處所內發生火災或爆炸致使損壞任何一條動力釋放線路的情況下，即單一故障概念，至少有按該處所的3.2.9或3.2.10款所要求的滅火劑量的三分之二，仍能按滅火劑均勻遍佈整個處所的要求進行釋放。對僅需一個或二個容器的處所系統，其佈置應取得主管機關的同意。

.7 任何受壓容器最多配置二隻噴嘴，每一容器的最大劑量，應取得主管機關關於滅火劑均勻遍佈整個處所的滿意要求。

.8 應在被保護區域和駕駛室或在消防控制設備集中的處所設置可視聽警報，以監控容器由於漏氣和釋放而減壓，但對裝貨處所，僅需在駕駛室或消防控制設備集中的處所設置警報。

3.4 具有鹵化烴1301或1211的局部自動操縱的固定式滅火裝置，除設於機器處所內高度失火危險的圍蔽區域外，且又與任何所需的固定式滅火系統相獨立的，但凡符合下列規定者均可接受：

.1 凡設有此種附加局部保護的處所，最好設在一個工作平面上和在同一平面上作為出入口的地方。假如在每一平面上均設有出入口，則可根據主管機關的意見允許多於一個平面。

.2 處所的大小及其出入口與機械的佈置，應能在不超過10秒時間內從該處所的任何地方達到脫險目的。



.3 應在機器處所的每一出入口外面和在駕駛室或消防控制設備集中的處所設有可視聽信號，以指示任何裝置的動作。

.4 應在處所的每一出入口的外面展示一指示牌，以指明該處所具有一個或幾個自動操縱的滅火裝置及其所用的滅火劑種類。

.5 噴嘴應佈置成，使滅火劑的釋放不致危害使用正常出入口梯道和服務於該工作艙室要脫險的人員。為防止滅火劑的誤釋放，也應有措施以保護正常從事維護機械的工作人員。

.6 滅火裝置應設計成能在主管機關同意的溫度範圍內予以操縱。

.7 應設有裝置能使船員安全地校驗容器內的壓力。

.8 局部自動操縱裝置所備的滅火劑總量，是以圍閉處所的淨容積為基礎，在20°C時的濃度，鹵化烴1301不超過7%，鹵化烴1211不超過5.5%。此項要求既適用於業已動作的局部自動操縱裝置，也適用於業已動作的符合3.2款所設的固定式系統，但二者同時操作時不適用。鹵化烴1301的容積應以0.16立米/公斤計算，鹵化烴1211的容積應以0.14立米/公斤計算。

.9 以液態釋放為基礎，滅火裝置的釋放時間應不超過10秒。

.10 局部自動操縱滅火裝置的佈置，應使其釋放不致引起電力損失或降低船舶的操縱性。

3.5 3.4款所述的自動操縱滅火裝置，除裝於機器處所內具有高度失火危險的設備上以外，還獨立於任何所需的固定式滅火系統，但凡符合3.4.3至3.4.6、3.4.9和3.4.10各款以及下列要求者，均可接受：

.1 局部自動操縱滅火裝置所備的滅火劑量，應以機器處所的總容積為基礎，在其同時發生操作的情況下，於20°C時在空氣中所能得到的滅火劑蒸發氣體的濃度，不得大於1.25%。



.2 鹵化烴1301的容積應以0.16立米/公斤計算，鹵化烴1211的容積應以0.14立米/公斤計算。

#### 4 蒸汽系統

一般情況下，在新船的固定式滅火系統中，主管機關應不准使用蒸汽作為滅火劑。如主管機關允許使用蒸汽，則應僅用在一些限定的區域作為所需滅火劑的額外滅火劑，其條件是供給蒸汽的一個或數個鍋爐的蒸發量，應對該船用蒸汽保護的最大處所的總容積每0.75立方米每小時能提供至少應為1公斤的蒸汽。除了符合上面所提到的要求之外，該系統在其他各方面應由主管機關確定和同意。

#### 5 其他氣體系統

5.1 除二氧化碳或鹵化烴或4款許可的蒸汽外，如在船上生產的氣體作為滅火劑時，它應是燃油燃燒的氣態產物，在此產物中氧氣含量、一氧化碳含量、腐蝕元素以及任何固體可燃元素均需降低到容許的最少量。

5.2 如在固定式滅火系統中使用這種氣體作為滅火劑來保護機器處所時，它應與使用二氧化碳作為滅火劑的固定式系統具有等效的保護作用。

5.3 如在固定式滅火系統中使用這種氣體作為滅火劑來保護裝貨處所時，應備有足夠的數量，使每小時能供給自由氣體的容積至少等於最大一個被保護處所總容積的25%，並可連續供給72小時。

### 規則6

#### 滅火機

1 所有滅火機應為經認可的型式和設計。

1.1 所需手提式液體滅火機的容量應不大於13.5升，且不少於9升。其他滅火機應至少與13.5升液體滅火機的可攜性等同，並應具有至少相當於9升液體滅火機的滅火性能。

1.2 主管機關應確定滅火機的等同物。

2 應按照主管機關規定的要求配足備用藥劑。

3 滅火機所盛的滅火劑，倘主管機關認為其本身或在預期使用條件下，將發出一定數量的毒氣足以危害人身者，不准使用。

4 可攜式泡沫器裝置應包括一隻能以消防水帶連接於消防總管的收入式空氣泡沫槍，連同一隻至少能盛裝20升發泡液的可攜式容器和一隻備用容器。泡沫槍應能每分鐘至少產生1.5立方米適合於撲滅油類火災的有效泡沫。

5 滅火機應定期進行檢驗，並按主管機關的要求進行試驗。

6 用於任何處所的手提滅火機，其中應有一隻存放在該處所的入口附近。

7 起居處所、服務處所和控制站內應配備經主管機關認為合適和足量的經認可的手提式滅火機。1,000總噸及1,000總噸以上的船舶，應至少備有五隻手提式滅火機。

## 規則7

### 機器處所的滅火設備

1 設有燃油鍋爐或燃油裝置的處所

1.1 設有燃油鍋爐或燃油裝置的A類機器處所，應有下列固定式滅火系統的任何一種：

.1 符合規則5規定的氣體系統；

.2 符合規則9規定的高膨脹泡沫系統；

.3 符合規則10規定的壓力式水霧系統；

在每一情況下，若機艙和鍋爐艙沒有完全分隔，或燃油能從鍋爐艙流入機艙，則機艙和鍋爐艙應作為一個艙室看待。

1.2 每一鍋爐艙內至少應設一套符合規則6.4規定的可攜式空氣泡沫裝置。

1.3 在每一鍋爐艙的每一生火處所和燃油裝置的某一部分所在的每一處所，至少應設置泡沫型或其等效物的手提式滅火機兩具。在每一鍋爐艙內應設置容量至少為135升的經認可的泡沫型或與之等效的滅火機一具。此項滅火機應備有繞在捲筒上的足以到達鍋爐艙的任何部位的軟管。貨船上小於175千瓦的日用鍋爐，主管機關可考慮放寬本款的要求。

1.4 每一生火處所應有按主管機關所要求容量的容器1具，內裝砂子、浸透蘇打的鋸木屑或其他認可的乾燥物。此項設備亦可由1具經認可的手提式滅火機代替之。

## 2 設有內燃機的處所

設有內燃機的A類機器處所應設有下列裝置：

.1 1.1款所要求的各滅火系統中的一種。

.2 符合規則6.4規定的可攜式空氣泡沫設備至少1套。

.3 在每一此種處所內，每隻容量至少為45升的經認可的泡沫滅火機或等效設備，其數目足以使泡沫或等效物能射到燃油和滑油壓力系統、傳動裝置和其他有失火危險的任何部分。此外，還應設有足夠數量的手提式泡沫滅火機或等效設備，其佈置應使該處所內任何一點到達一具滅火器的步行距離不大於10米，同時每一此種處所內應至少設有此種滅火機兩具。

對於貨船的較小處所，主管機關可考慮放寬本要求。

### 3 設有汽輪機或閉式蒸汽機的所在處所

設有汽輪機或閉式蒸汽機的處所，不論此項機器用於主推進或用於其他目的，如其總輸出功率不少於375千瓦者，應設有下列裝置：

.1 每隻容量至少有45升的經認可的泡沫滅火機或等效設備，其數目足以使泡沫（或等效物）能射到壓力滑油系統的任何部分，射到汽輪機、蒸汽機或附屬傳動裝置的壓力潤滑部分的封閉罩殼以及其他有失火危險的任何部分。此種處所，如果設有符合1.1款的固定式滅火系統，並具有至少等效於本項所需的保護，則不再要求設置此項滅火機。

.2 足夠數量的手提式泡沫滅火機或等效設備，其佈置應使該處所內任何一點到達一具滅火器的步行距離不大於10米，同時每一此種處所內應至少設有此種滅火機兩具；除非在符合1.3款所規定的數之外不要求再增設此項滅火機。

.3 上述處所若係周期無人照管者，則設1.1款所需的滅火系統中的一種。

### 4 其他機器處所的滅火設備

如主管機關認為有失火危險的任何機器處所，其滅火設備在1、2和3款無明確規定者，應在該處所內或其相鄰處設置主管機關認為足夠數量的經認可的手提式滅火機或其他滅火設備。

### 5 本章未作要求的固定式滅火系統

若設有本章未作要求的固定式滅火系統時，則該系統應取得主管機關同意。

### 6 客船的A類機器處所

對於載客超過36人的客船，其每一A類機器處所至少應設有兩隻適宜的水霧器。<sup>\*</sup>

## 規則8

### 機器處所的固定式低膨脹泡沫滅火系統

1 如在任何機器處所內設置固定式低膨脹泡沫滅火系統，則該系統除應符合規則7的要求以外，還應能使在不超過五分鐘的時間內通過固定的噴射口噴出的泡沫量足以覆蓋燃油所能散佈的最大單個面積達150毫米厚度。該系統所產生的泡沫應能適宜於撲滅油類火災。應設有通過固定管系和控制閥或旋塞有效地分配泡沫至適當噴射口的設施。並應設有用固定式噴射器將泡沫有效地射到被保護處所內其他主要火災危險處的設施。泡沫膨脹率應不超過12：1。

2 任何這種系統的控制設施應易於到達和操作簡便，且應成組地分裝於儘可能少的處所，其所在位置應不致為被保護處所的火災所切斷。

## 規則9

### 機器處所的固定式高膨脹泡沫滅火系統

1.1 機器處所所需的任何固定式高膨脹泡沫系統應能使通過固定噴射口迅速噴出的泡沫量足以按每分鐘至少1米的厚度注入最大一個被保護處所。所備發泡液的數量，應足夠產生5倍於最大一個被保護處所容積的泡沫容積。泡沫膨脹率應不超過1,000：1。

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<sup>\*</sup> 水霧器可為一“L”形金屬管組成，其長肢長約 2 米能與消防水帶連接，其短肢長約 250 毫米。其上裝有固定噴霧水槍或能接上一隻噴霧水槍。

1.2 主管機關可以允許變更設備及噴出速度，但應獲得等效的保護效果。

2 輸送泡沫的供給管道，泡沫發生器的空氣進口以及泡沫產生裝置的數量，應根據主管機關的意見，使之有效地生產和分配泡沫。

3 泡沫發生器輸送管道的佈置，在被保護處所發生火災時，應使泡沫發生設備不受影響。

4 泡沫發生器、發生器的動力源、發泡液以及控制這個系統的設施，應易於到達和操作簡便，且應成組地設在儘可能少的處所，其所在位置，應不致為被保護處所的火災所切斷。

## 規則10

### 機器處所的固定式壓力水霧滅火系統

1 機器處所所需的任何固定式壓力水霧滅火系統應備有經認可的水霧噴嘴。

2 噴嘴的數目和佈置應取得主管機關的同意，並應保證使水按每分鐘每一平方米至少5升的水量在其被保護的處所作有效而平均的分佈。如認為需要增加出水率時，應取得主管機關的同意。在污水溝、艙櫃頂部和燃油易於流佈的其他處所，以及在機器處所內其他具有特殊失火危險處的上方，都應設置噴嘴。

3 該系統可以分成若干區域，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，且不致因保護處所失火而被立即切斷。

4 該系統應以必要的壓力保持充水，並應於該系統內壓力降低時，供水泵即自動向系統供水。



5 水泵應能同時向任一被保護艙室內該系統的所有區域以必要的壓力供水。水泵及其控制設備應裝於被保護處所以外。水泵應不致因水霧系統所保護處所失火而使該系統失去作用。

6 水泵可以為獨立內燃機驅動；但如由符合規則II-1/44或規則II-1/45規定的應急發電機供給動力，則該發電機的佈置應在主動力損壞時，能自動起動，以使5款所要求的水泵立刻獲得動力。如水泵由獨立內燃機驅動，其所在位置應在被保護艙室失火時，不會影響對該機器的空氣供應。

7 應採取措施以防止噴嘴被水中的雜質或管系、噴嘴、閥門和水泵的銹蝕所阻塞。

## 規則11

### 機器處所內的特別佈置

1 本規則規定適用於A類機器處所以及主管機關認為需要的其他機器處所。

2.1 天窗、門、通風筒、供排氣通風的煙囪開口以及機器處所的其他開口，其數量應減低到符合船舶通風以及正常、安全運行所需要的最少量。

2.2 天窗應為鋼質，但不包括玻璃板。應採取適當的措施，以便在發生火災時使煙氣能從被保護處所釋放。

2.3 在客船上，除動力操縱的水密門外，上述門的佈置應能在所在處所失火時，由動力操縱的關閉裝置，或由設置在向關閉方向反向傾斜3.5°時能關閉的自閉式門來保證其確實關閉，該門具有由遙控操縱脫開裝置操作的保安型的門背鉤裝置。



3 機器處所的限界面上不應設窗，但並不排除在機器處所內的控制室上使用玻璃。

4 下列各項應裝有控制設施：

.1 天窗的開啟和關閉、正常供排氣通風的煙囪開口的關閉及通風筒擋火閘的關閉；

.2 釋放煙氣；

.3 動力操縱門的關閉或門的驅動脫開機構，但動力操縱水密門除外；

.4 停止通風機；

.5 停止強力送風和抽風機，停止燃油駁運泵、燃油裝置泵及其他類似的燃油泵。

5 4款和規則15.2.4所需的控制設施應位於有關處所的外面，並在它們所服務的處所內失火時不致被切斷。在客船上，此種控制設施和任何規定的滅火系統控制設施，應儘可能置於一個控制位置上或集中於少數幾個位置上，並應取得主管機關的同意。上述位置應具有開向開敞甲板的安全出入口。

6 在相鄰於軸隧的低層上設置任何A類機器處所出入口時，在水密門附近的軸隧內應設有每側均可操縱的輕型鋼質防火門。

7 對貨船上的周期無人照管機器處所，主管機關應對保持機器處所的耐火完整性、滅火系統控制的位置和集中性、所需的關閉裝置（如通風、燃油泵等）以及可能要求的附加滅火設施和其他消防設備與呼吸器等，予以特別考慮。在客船上，這些要求應至少相當於有人照管機器處所的規定。

8 應於任何機器處所內設置符合規定14要求的經認可的自動探火與報警系統：

- .1 安裝業經認可的自動和遙控系統和設備，以代替該處所的連續人工操縱；
- .2 主推進及其附屬機械包括主電源應設有不同程度的自動或遙控，並應在連續操縱下能從控制室予以監督。

## 規則12

### 自動噴水器、探火和失火報警系統

1.1 任何所需的自動噴水器、探火和失火報警系統應能在任何時間立即進入工作，而不需依靠船員的操作。該系統應為濕管式，但對少量暴露管段可採用乾管式，如主管機關認為這是一項必要的預防措施的話。該系統的任何部位，如在使用中可能承受冰凍溫度時，應有適宜的防凍措施。該系統應以必要的壓力保持充水，且應按本規則要求具有連續供水的設施。

1.2 每一噴水器分區應有可視聽信號報警設施，當任一噴水器動作時，能在一個或數個指示裝置中自動發出信號。這種報警系統應能顯示出該系統本身發生的任何故障。

1.2.1 在客船上，這種裝置應顯示出該系統所服務的任一處所發生的任何火災徵兆及其位置，並應集中於駕駛室或主消防控制站內，該處應配備一定的人員或設備，以保證該系統發出的任何警報可立刻被負責船員收到。

1.2.2 在貨船上，這種裝置應能顯示出該系統所服務的分區內業已發生火災徵兆，並應集中於駕駛室內，而且，該裝置的可視聽報警設施應位於駕駛室以外的位置上，以保證火災信號可立刻被船員收到。

2.1 噴水器應分組成若干分區，每一分區的噴水器不應多於200隻。在客船上，任一噴水器分區所服務的處所不得多於兩層甲板，且只能佈置在一個主豎區範圍內，但如主管機關認為不致因此而降低船舶的防火性能者，可以允許一個噴水器分區所服務的處所多於兩層甲板或其佈置範圍超過一個主豎區。

2.2 每一噴水器分區只能用一個截止閥加以分隔。每一噴水器分區的這種停止閥應易於到達，其位置應有清楚的固定標誌，並應有防止任何未經許可的人員操作這種停止閥的措施。

2.3 在每一分區的截止閥處和中心站內，均應設有指示此系統中壓力的儀錶。

2.4 噴水器應為耐海上大氣腐蝕的。在起居和服務處所中，噴水器應在68°C至79°C的溫度範圍內進入工作，但在例如乾燥室等可能發生較高環境溫度的處所除外，在這些處所內，噴水器的工作溫度可以增加至不大於甲板頂最高溫度加30°C。

2.5 在每一指示裝置處應設有圖或表，表示該裝置所涉及的處所和有關每一分區的區段位置，並應有試驗和保養的適當說明。

3 噴水器應設於頂部位置，並間隔成合適的格局，使噴水器所保護的標稱面積，保持每分鐘每平方米不少於5升的平均出水量。但是，主管機關也可以准許使用能提供作適當散佈的此種可能出水量的噴水器，其出水量業經使主管機關滿意，表明其效能並不較上述為低。

4.1 應設有壓力櫃，其容積至少等於本款所述的充注水量的兩倍。壓力櫃貯存的常備充注淡水量應等於5.2款所述水泵的一分鐘排量，並應設有保持櫃內空氣壓力的設備，當櫃內常備充注淡水量被使用時，櫃內壓力的安排應能例如保證不低於噴水器的工作壓力加上從櫃底量至系統中

最高位置噴水器的水頭壓力。應有在壓力下補充空氣和補充櫃內充注淡水的適當設施。壓力櫃應設有顯示櫃內正確水位的玻璃水位表。

4.2 應有防止海水進入櫃內的設施。

5.1 應設有1台專供噴水器自動連續噴水的獨立動力泵。此泵應在壓力櫃內常備淡水完全排乾之前，由於系統中壓力降低而能自動進入工作。

5.2 泵和管系應能維持在最高位置的噴水器所必需的壓力，以保證按3款規定的出水量連續噴水，並足以同時覆蓋280平方米的最小面積。

5.3 泵的輸出端，應裝有一隻試驗閥連同1根開口的排水短管。該閥和管子的有效截面積，應在系統內保持4.1款所規定的壓力時，足以放出該泵所要求的出水量。

5.4 泵的海水進口，應儘可能位於該泵所在處所，其佈置應在船舶漂浮時，除檢查或修理水泵外，不需因任何目的而切斷水泵的海水供給。

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

7.1 在客船上，海水泵及自動失火報警和探火系統應有不少於兩套的動力源。若泵的動力源為電力時，則應一為主發電機，另一為應急電源。泵的供電，應通過專設的單獨饋電線，一路來自主配電板，另一路來自應急配電板。饋電線應避免佈置在廚房、機器處所和有高度失火危險的其他圍閉處所，但為了通達相應的配電板而必需者除外；該線路應接通至設在噴水器泵附近的一隻自動轉換開關。在正常供電情況下，此開關應一直由主配電板供電，並設計成當此路供電發生故障時，即能自動轉換至由應急配電板供電。主配電板和應急配電板的開關均應有清楚的標記，並在正常情況下保持閉合狀態。上述饋電線上不允許設有其他開關。報警和探火系統動力源中的一路應是應急電源。如果泵的動力源

之一是內燃機時，則除應符合6款規定外，該機所在位置應在任何被保護處所失火時不影響對機器的空氣供給。

7.2 在貨船上，海水泵及自動探火和失火報警系統的動力源應不少於兩套。若泵為電力驅動時，應與主電源連接，該電源至少應有兩台發電機供電。饋電線應避免佈置在廚房、機器處所和有高度失火危險的其他圍蔽處所，但為了通達相應的配電板而必需者除外。探火和報警系統動力源中的一路應是應急電源。如果泵的動力源之一是內燃機時，則除應符合6款規定外，該機所在位置應在任何被保護處所失火時不影響對機器的空氣供給。

8 噴水器系統和船上消防總管間應有連接，在連接處應設一隻可鎖閉的截止止回閥，以防止水從噴水器系統中倒流至消防總管。

9.1 每一噴水器分區應設有試驗閥，用以通過放出相當於一隻噴水器工作時的排水以便進行自動報警的試驗；每一分區的試驗閥應裝在該分區的停止閥附近。

9.2 應設有降低系統中壓力來試驗水泵自動工作的設施。

9.3 在1.2款所述的指示裝置位置之一，應設有能試驗每一噴水器分區的報警和指示器的開關。

10 每一噴水器分區應備有備用噴水器頭，其數量應取得主管機關的同意。

### 規則13

#### 固定式探火和失火報警系統

##### 1 一般要求

1.1 任何具有手動報警按鈕的自動探火和失火報警系統應能在任何時候立即工作。

1.2 應對操縱系統所必需的電源和電路在斷電或故障上作適當的監控。故障的發生應在控制板上啟動以區別於火災信號的聲、光故障信號。

1.3 應具備至少兩個電源，以供自動探火和失火報警系統電器設備的工作使用。其中一個電源應為應急電源。為此目的，應由分開的供電設備單獨提供電源。這些供電設備應引向位於或鄰近於自動探火系統的控制板上的自動轉換開關上。

1.4 探測器和手動報警按鈕應被分組成若干分區。任何探測器或手動報警按鈕工作時，應在控制板和指示裝置上啟動聲、光火警信號。如果在兩分鐘內信號未得到注意，應自動發出聲響報警，且遍達船員起居處所和服務處所、控制站以及A類機器處所。這一聲響報警系統無須為探測系統總體的組成部分。

1.5 控制板應位於駕駛室或主防火控制站內。

1.6 指示裝置應表明已經動作的探測器或手動報警按鈕所在的區域。至少有一套裝置應位於負責船員在航行中或在港內任何時候都容易到達的地點，船舶於非營運狀態時除外。如果控制板位於主防火控制站內，一套指示裝置應位於駕駛室內。

1.7 應在每一指示裝置上或附近清楚地表示其所保護的處所和所在的分區的位置。

1.8 一般不允許在起居處所、服務處所和控制站內的一個分區超過一層甲板，但包含圍蔽梯道的區域除外。為了避免延遲識別火源，包括每一分區內的圍蔽處的數量限額，應由主管機關決定。任何情況下，不允許任何一個分區內有多於50個圍蔽處所。



1.9 對於客船，一個分區的探測器所服務的處所不得同時包括船舶的兩舷，不得超過一層甲板，也不得超過一個主豎區，但是，如果主管機關認為船舶防火並不因此而減弱，可以允許這種分區的探測器服務於船舶的兩舷並超過一層甲板。

1.10 服務於控制站、服務處所或起居處所的探測器分區，不得將A類機器處所包括在內。

1.11 探測器應根據熱、煙或其他燃燒產物、火焰或這些因素的任何組合而動作。主管機關可以考慮認可根據其他因素而動作並顯示出早期火災的探測器，但是，其靈敏度不能低於上述那些探測器。火焰探測器只能用作煙或熱探測器的額外探測器。

1.12 應提供適當的說明書以及用於試驗和維護的組成備件。

1.13 應定期試驗探測系統的功能，使主管機關認為滿意，試驗方法是用設備產生為探測器的設計所規定要作出反應的適當溫度的熱空氣或煙，或具有適當密度範圍或顆粒大小的空氣懸浮微粒，或其他與早期火災有關聯的現象。所有探測器應是這樣一種類型，使其正確動作試驗後，而恢復到正常工作狀態又無須更換任何部件。

1.14 除了可以允許在控制板關閉防火門和類似功能外，自動探火系統不得用於其他任何目的。

## 2 安裝要求

2.1 手動報警按鈕應遍佈於起居處所、服務處所和控制站。每一通道出口應裝有一個手動報警按鈕。在每一層甲板的走廊內，手動報警按鈕應便於到達，並使走廊任何部分與手動報警按鈕的距離不大於20米。

2.2 應在所有梯道、走廊和起居處所的逃口安裝煙探測器。應考慮在通風管道內安裝特殊用途的煙探測器。



2.3 如果要求在2.2款明確規定以外的其他處所安裝一個固定式自動探火和失火報警系統，在每一此類處所內應至少有一個符合1.11款規定的探測器。

2.4 探測器的安裝部位應能取得最佳功能。靠近橫樑和通風管道的位置，或氣流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壞的位置都應予避開。一般來說，位於頂部的探測器與艙壁的距離至少為0.5米。

2.5 探測器的最大間距應符合下表：

探測器類型	每一探測器的最大地板面積	兩個中心之間的最大距離	與艙壁的最大距離
熱	37米 <sup>2</sup>	9米	4.5米
煙	74米 <sup>2</sup>	11米	5.5米

基於證實探測器特性的試驗資料，主管機關可以規定或允許其他間距。

2.6 系統的電線應避免佈置在廚房、A類機器處所以及具有高度失火危險的其他圍蔽處所，但有必要在此類處所配備探火或火災報警的或通達相應的電源者除外。

### 3 系統設計要求

3.1 系統和設備應作適當設計以能承受一般在船上出現的電壓變動和瞬時變動、環境溫度的變化、振動、潮濕、顛振、衝擊和腐蝕。

3.2 2.2款所要求的煙探測器應被證明，在煙密度未超過每米2%的減光率之前不動作，但未超過每米12.5%的減光率前就動作。安裝於其他處所之內的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下而認為滿意的靈敏度極限內進行動作。

3.3 熱探測器在溫度以每分鐘不大於1°C的速率向下述溫度界限升高時，在空氣溫度低於54°C時不應動作，而在空氣溫度超過78°C之前即應動作。溫升率更大時，熱探測器應在主管機關考慮到避探測器不靈敏或過度靈敏的情況下而認為滿意的溫度極限內動作。

3.4 由主管機關考慮決定，在環境溫度一般偏高的乾燥室或類似的高溫處所內，熱探測器動作的許可溫度可以較該類處所的甲板頂最高溫度增加30°C。

#### 規則14

##### 周期性無人照管機器處所的自動深火和失火報警系統

1 周期性無人照管機器處所應安裝以自控原理為基礎的探火系統，並包括定期試驗的設備。

2 這種探火系統的設計和探測器的安置，應在上述處所的任何部位剛開始發生火災徵兆時以及在機器操作的任何正常狀況和環境溫度的可能範圍內所需的通風變化下，能迅速地探出火災徵兆來。除高度限制的處所及其使用特別適宜者外，不許設置僅使用感溫探測器的探火系統。該探火系統將從任何其他系統不能顯示火災徵兆的二個方面清楚地引進了可視聽報警裝置，並設於足量的處所，以保證駕駛室和負責輪機的高級船員聽到和看到該報警信號。當駕駛室不在操縱時，應能在負責值班船員的處所發出警報。

3 探測器安裝以後應能在機器運轉以及通風的變化情況下進行試驗。探火系統在主動力源發生故障時，應能通過由專設的單獨饋電線的應急動力源自動供電。

## 規則15

### 燃油、潤滑油和其他易燃油類的佈置

#### 1 燃油使用規定

燃油使用應符合下列限定：

.1 除本款另有許可外，燃油的閃點低於60°C者，概不得使用。

.2 對於應急發電機，其燃油閃點不低於43°C者，可以使用。

.3 只要採取認為必要的附加措施，並符合下述條件，即此類燃油的貯藏或使用處所的温度不允許升高至低於該燃油閃點的10°C之內，主管機關可以允許普遍使用閃點低於60°C 但不低於43°C的燃油。

.4 對於貨船，可准許使用閃點低於本款規定以外的燃油如原油，只要此種燃油並不貯藏在任何機器處所內，且整套裝置經主管機關認可。

燃油的閃點應由經認可的閉杯法測定。

#### 2 燃油的佈置

使用燃油的船舶，其燃油的貯藏、分配和使用的佈置應能保證船舶和船上人員的安全，並應至少符合下列規定：

.1 在燃油系統中凡包含壓力超過0.18牛頓/毫米<sup>2</sup>的加熱燃油的任何部分，應儘實際可能不被隱蔽，以免不易觀察其缺陷和洩漏。在機器處所內燃油系統的此種部分應有足夠的照明。

.2 在所有正常情況下，機器處所應有足夠的通風，以防止油氣聚集。

.3 燃油艙（櫃）應儘實際可能是船體結構的一部分，並位於A類機器處所之外。除雙層底櫃外，其他燃油艙（櫃）如必須鄰接或位於A類機器處所時，其垂直面中至少有一面應與該機器處所的限界面相鄰接，並最好與雙層底櫃具有共同的限界面，而使與機器處所的共同限界面的面積

減至最小程度。若此種燃油艙（櫃）位於A類機器處所的限界面之內時，它們不得貯存閃點低於60°C的燃油。

一般應避免使用孤立架設的燃油櫃，但如使用這種油櫃時，在客船上應禁止在A類機器處所內使用。倘若准許使用時，該油櫃應置於足夠大小的油密溢油盤內，此盤設備有能導致適當尺寸溢油櫃的適當排泄管。

.4 從燃油艙（櫃）溢出或滲漏的燃油可能落於熱表面而構成危險的地方，不得設燃油艙（櫃）。應採取預防措施，防止任何油在壓力下可能從油泵、濾器或加熱器溢出而與熱表面相接觸。

.5 每一燃油管如其損壞後會使燃油從設在雙層底上方的貯油櫃、澄油櫃和日用油櫃溢出，則應在這些油櫃上裝設當油櫃所在處所失火時，能在此處所之外的安全地點加以關閉的旋塞或閥門。如在深油艙位於任何軸隧、管隧內或類似處所內的特殊情況下，這些深油艙上應裝設閥門，但可在隧道或類似處所之外的管路上加裝閥門，以便在失火時加以控制。如在機器處所內加裝上述閥門，此閥應於該處所外面操縱。

.6 應設有安全和有效的設施，以確定任何油艙（櫃）內的存油量。

測量管不得伸延至有點燃測量管溢油危險的任何處所，尤其不得伸延至客艙或船員所在的處所。其他確定任何燃油艙（櫃）存油量的設施，如符合下列要求者，亦可允許採用：

.6.1 在客船上，如這種設施不需在櫃頂以下穿孔，且在其損壞或艙（櫃）注油過量時不致因此而溢出燃油者。

.6.2 在貨船上，此種設施在其損壞或艙（櫃）注油過量時不致因此而溢出燃油者。禁止使用圓形玻璃測量表。主管機關可允許使用具有扁形玻璃且在表和油櫃之間設有自閉閥的油位測量表。

主管當局將接受其他這類設施，它們應處於良好狀況，以保證其不斷正確地發揮作用。

.7 任一油艙（櫃）或燃油系統的任一部分，包括注入管在內，應有防止超壓的設施。任何溢流閥，以及空氣管或溢流管，應引至主管機關認為安全的處所。

.8 燃油管及其閥件和附件須用鋼材或其他經認可材料建造，但主管機關認為確是必要的地方，可允許有限制地使用撓性管。這種撓性管及其端部附件應為具有足夠強度的經認可的耐火材料，且其結構應取得主管機關的同意。

### 3 滑油的佈置

用於壓力潤滑系統的滑油的貯藏、分配和使用，其佈置應保證船舶和船上人員的安全。在A類機器處所以及每當實際可行時在其他機器處所，此項佈置應至少符合2.1、2.4、2.5、2.6、2.7和2.8各款的規定，但並不排除在滑油系統中使用窺流鏡，只要它們經試驗顯示出具有適當的耐火度。

### 4 其他易燃油類的佈置

在壓力下使用於動力傳動系統、控制和驅動系統以及加熱系統中的其他易燃油類，其貯藏、分配和使用的佈置應保證船舶和船上人員的安全。在含有點火設施的處所，此項佈置至少須符合2.4款和2.6款的規定，以及符合2.7款和2.8款有關強度和結構的規定。

### 5 周期性無人照管的機器處所

燃油和滑油系統除應符合1至4款的要求外，尚應符合下列規定：

.1 燃油和滑油管路應被遮護，或採取其他適當保護，以儘可能避免油類噴在或漏在熱表面上或進入機器的進氣口。上述管系的接頭數目應保持最少，如屬可能，應收集來自高壓燃油管的漏油，並設有發出警報的裝置。

.2 若日用燃油櫃為自動注油式或遙控式，應設有裝置以防溢油。自動處理易燃液體的其他設備如燃油淨化器，應設有裝置以防溢油，可能時，這些設備應置於專供儲存淨化器及其加熱器的處所內。

.3 若日用燃油櫃或沉澱櫃設有加熱裝置時，應設置高溫警報，以防可能超過燃油閃點。

## 規則16

### 載客超過36人客船以外船舶的通風系統

1 通風導管應為不燃材料製成。但對長度一般不超過2米，橫截面積不超過0.02平方米的短節導管，如其符合下列條件，則不需使用不燃材料：

.1 這些導管是用經主管機關同意的具有低失火危險的材料製成；

.2 這些導管只可用作通風裝置的末端；

.3 這些導管的位置，從“A”或“B”級分隔包括“B”級連續天花板的開口處沿着導管量起，不小於600毫米。

2 若通風導管通過“A”級艙壁和甲板的淨截面積超過0.02平方米時，除非通過艙壁或甲板的導管在通過甲板或艙壁的鄰近處為鋼質，否則其開口應裝有鋼質套管。本節的導管和套管應符合下列要求：

.1 套管的壁厚至少為3毫米，長度至少為900毫米。當通過艙壁時，該長度最好分成在艙壁的兩側各為450毫米。這些導管或裝在這些導管上的套管應具有耐火隔熱性，該隔熱性應至少同導管通過的艙壁或甲板的耐火完整性一樣。經主管機關同意，可以設有等效的貫穿保護。

.2 淨橫截面積超過0.075平方米的導管，除應符合2.1款的要求外，還應設置擋火閘。擋火閘應能自動操縱，也能在艙壁或甲板的兩側人工關



閉。擋火閘上應裝有指示器，以指明其是否打開或關閉。但如導管通過被“A”級分隔包圍的無須服務的處所時，只是那些導管同其穿過的分隔具有一樣的耐火完整性，則無需設置擋火閘。

3 A類機器處所、廚房、汽車甲板處所、滾裝裝貨處所或特種處所的通風導管，均不得通過起居處所、服務處所或控制站，但下列情況者除外：

.1.1 導管的寬度或直徑分別為300毫米和760毫米及300毫米和760毫米以上者，其製造用鋼板的厚度至少為3毫米和5毫米，而對寬度或直徑在300毫米和760毫米之間的導管，其製造用鋼板的厚度應用內插法求得；

.1.2 受到適當支承和加強者；

.1.3 接近穿過限界面處設有自動擋火閘；

.1.4 從機器處所、廚房、汽車甲板處所、滾裝裝貨處所或特種處所到每一擋火閘以外至少5米處隔熱至“A-60”級標準；

或：

.2.1 導管製造用鋼符合3.1.1和3.1.2款的規定；

.2.2 所有起居處所、服務處所或控制站均隔熱至“A-60”級標準。

但對符合8款要求的主區分隔的穿越者除外。

4 起居處所、服務處所或控制站的通風導管，均不得通過A類機器處所、廚房、汽車甲板處所、滾裝裝貨處所或特種處所，但下列情況者除外：

.1.1 製造通過A類機器處所、廚房、汽車甲板處所、滾裝裝貨處所或特種處所導管的鋼材，符合3.1.1和3.1.2款的規定；

.1.2 靠近穿過限界面處設有自動擋火閘；

.1.3 保持機器處所、廚房、汽車甲板處所、滾裝裝貨處所或特種處所的限界面在穿越處的完整性；

或：

.2.1 製造通過A類機器處所、廚房、汽車甲板處所、滾裝裝貨處所或特種處所導管的鋼材，符合3.1.1和3.1.2款的規定；

.2.2 在機器處所、廚房或汽車甲板處所、滾裝裝貨處所或特種處所內隔熱至“A-60”級標準；

但對也符合8款要求的主區分隔的穿越者除外。

5 通過“B”級艙壁的淨橫截面積超過0.02平方米的通風導管，應裝有長度為900毫米的鋼質套管，該套管最好分成在艙壁的兩側各為450毫米，但該長度導管為鋼質時除外。

6 對機器處所外面的控制站，應採取實際可行的措施來保證使通風、能見度和煙氣排除得以保持，以便在失火時，位於其中的機械和設備可以受到監管並繼續有效地運轉。應設有交替的和分開的供氣設施；兩個供氣源的空氣吸口，其分佈應使兩個吸口同時吸進煙氣的危險性減至最小。主管機關可決定上述要求不必適用於位在開敞甲板和開口通向開敞甲板的控制站，或在具有同等效用的局部關閉裝置的處所。

7 廚房爐灶的排氣管道，在其通過起居處所或內含可燃材料的處所的地方，應按“A級分隔”建造。每一排氣管道應設有：

- .1 一隻易於拆下的集油器，以便於清潔；
- .2 一個擋火閘，位於導管的下端；
- .3 能在廚房內操縱的關閉抽風機的裝置；
- .4 在管道內進行滅火用的固定設施。

8 在客船上，凡必需穿過主豎區艙壁的通風導管，應在艙壁鄰近裝設保安型的自動關閉擋火閘，此種擋火閘還應能從艙壁的每一面都可用手

關閉。其操縱位置應易於到達，並用能反光的紅色標誌之。艙壁與擋火閘之間的導管應為鋼質或其他等效材料，必要時並應符合規則18.1.1的要求。擋火閘應至少在艙壁的一側裝設可見的指示器，以表示擋火閘是否處於開啟位置。

9 一切通風系統的主要進風口及出風口應能在被通風處所的外部加以關閉。

10 起居處所、服務處所、裝貨處所、控制站和機器處所的動力通風，均能從其服務處所外面的易於到達之處將其停止。此位置在其服務處所失火時須不易被切斷。機器處所內動力通風的停止裝置，應同其他處所內通風的停止裝置完全分開。

## 規則17

### 消防員裝備

1 消防員裝備的組成：

1.1 個人配備包括：

.1 防護服，其材料應能保護皮膚不受火焰的熱輻射，並不受蒸汽的灼傷和燙傷。衣服的外表應是防水的。

.2 長統靴和手套，由橡膠或其他絕緣材料製成。

.3 一頂能對撞擊提供有效防護的硬頭盔。

.4 一盞型式業經認可的電安全燈（手提燈），其照明時間至少為3小時。

.5 一把主管機關同意的太平斧。

1.2 一具業經認可的呼吸器，其型式可為下列之一：

.1 一具裝有適宜空氣泵和一段空氣管的防煙盔或防煙罩，其空氣管的長度應足夠從開敞甲板到達貨艙或機器處所的任一部分，且不受艙口或門口的妨礙。為符合本款要求，如空氣管所需的長度超過36米時，應按主管機關的決定用儲壓式呼吸器代替防煙盔或防煙罩或增設儲壓式呼吸器1具。

.2 一具儲壓式壓縮空氣呼吸器，筒內空氣儲存量至少應有1,200升，或一具儲壓式呼吸器，其可供使用的時限至少為30分鐘。船上還應備有一些為主管機關所滿意的、對所用呼吸器合用的備用充氣器。

2 每一呼吸器應有足夠長度與強度的耐火救生繩1根，此繩應能用彈條卡鉤繫在呼吸器的背帶上，或繫在一條獨立的腰帶上，使在拉曳救生繩時防止呼吸器脫開。

3 所有船舶至少應備有兩套符合1款要求的消防員裝備。

3.1 此外：

.1 凡在客船上於所有旅客處所和服務處所所在甲板的總長度中，或在具有一層以上的上述長度總計最大的此種甲板中，每80米或其部分，應設兩套消防員裝備和兩套個人配備，而每套應包括1.1.1、1.1.2和1.2.3款中規定的各項。

.2 油船應設兩套消防員裝備。

3.2 在載客超過36人的客船上，每副呼吸器應設有一隻水霧器，水霧器應置於該呼吸器相鄰之處。

3.3 主管機關考慮到船舶的大小和類型可要求附加數套個人配備和呼吸器。

4 消防員裝備或數套個人配備，應儲存在易於到達和即刻可用之處，如所備消防員裝備或個人配備多於一套時，它們的儲存位置應盡量遠

離。在客船上，至少應在任一位置上可以獲得兩套消防員裝備和一套個人配備。

## 規則18

### 雜項

1.1 若電纜、管路、幹線、導管等或者桁材、橫樑或其他結構件穿過“A”級分隔時，在符合規則30.5規定的條件下，應設有裝置以保證不致消弱耐火性能。

1.2 若電纜、管路、幹線、導管等或者通風裝置末端附件、照明夾具或類似裝置穿過“B”級分隔時，應設有裝置以保證不致削弱耐火性能。

2.1 穿過“A”級或“B”級分隔的管子，應為主管機關經考慮該分隔所需經受的溫度而認可的材料。

2.2 若主管機關可准許輸送油類和可燃液體通過起居處所和服務處所時，輸送油類或可燃液體的管子，應為主管機關經考慮失火危險而認可的材料。

2.3 在熱力作用下易於失效的材料，不應用作舷邊流水管、污水排泄管及其他靠近水線和因失火時該材料失效後將會造成浸水危險的部位的出水口。

3 如使用電力取暖器，應於裝設位置加以固定，其構造應能使失火危險減至最低程度。凡取暖器的電熱絲暴露到可能因其熱度而將衣服、帷幔或其他類似的物件燒焦或着火者，概不得設置。

4 硝酸纖維素基膠片不得用於電影設備。

5 所有廢物箱應以不燃材料製成，四周和底部不得有開口。

6 凡油類產品可能滲透的處所，其表面隔熱應防止油類或油氣的滲透。

### 規則19

#### 國際通岸接頭\*

1 500總噸及500總噸以上的船舶，至少應設有1隻符合3款規定的國家通岸接頭。

2 應備有使此項接頭能用於船的任何一舷的設施。

3 國際通岸接頭的法蘭的標準尺寸，應符合下表所列要求：

名稱	尺寸
外徑	178毫米
內徑	64毫米
螺栓圈直徑	132毫米
法蘭槽口	直徑為19毫米的螺栓孔4個，等距離間隔於上述直徑的螺栓圈上，並開槽至法蘭邊緣
法蘭厚度	最少為14.5毫米
螺栓及螺母	4副，每隻直徑16毫米，長度50毫米

4 國際通岸接頭應用鋼材或其他合適的材料製成並設計成能承受1.0牛頓/毫米<sup>2</sup>工作壓力。其一端應為平面法蘭，另一端則有永久附連於適合船上消火栓或消防水帶的接頭。國際通岸接頭應與能承受1.0牛頓/毫米<sup>2</sup>工作壓力的任何材料的墊片1隻，及長度為50毫米、直徑為16毫米螺栓4隻和墊圈8隻，一同保存於船上。

\* 參閱本組織通過的大會 470 (XII) 號決議中的建議案“國際通岸接頭(岸邊)”



## 規則20

### 防火控制圖

1 在所有船舶上應有固定展示的總佈置圖供船員參考。圖上應清楚地標明：每層甲板的各控制站，“A級分隔”圍閉的各防火區域，“B級分隔”圍閉的各區域，連同探火和失火報警系統、噴水器裝置、滅火設備、各艙室和甲板等出入通道設施的細目，以及通風系統，包括風機控制位置、擋火閘位置和服務於每一區域通風機識別號碼的細目。或經主管機關決定，上述細目可記入一小冊子，每一高級船員一本，並應有一份放於船上易於到達的地方可隨時取用。控制圖和小冊子應擁有最新資料，如有改動，應儘可能立即加以更正。控制圖和小冊子的說明應為本國文字，如該文字既不是英文也不是法文，則應譯成其中的一種。此外，船上滅火和抑制火災用的所有設備和裝置的保養和操作說明，應保存在一個封套內，並放在易於到達的地方，以便隨時取用。

2 在所有船上，應有一套防火控制圖或具有該圖的小冊子的複製品，永久性地置於甲板室外面顯著標示的風雨密的盒子裏，以有助於岸上的消防人員。

## 規則21

### 滅火設備的即刻可用性

在一切船舶中，滅火設備應保持良好狀況，並在船舶整個航程期間能立刻使用。

## 規則22

### 代用品的採用

1 本條適用於所有船舶。

2 本章內對任何船舶所規定的任何特定型式的設備、用具、滅火劑或裝置，在主管機關認為不降低效能的情況下，可允許用其他型式的設備來代替。

## 第二節 — 客船的消防措施

## 規則23

### 結構

1 船體、上層建築、結構性艙壁、甲板及甲板室應以鋼材或其他等效材料建造。為運用規則3.7款所指的鋼或其他等效材料的定義，“相應曝火時間”應按規則26和27表列的完整性及隔熱性標準來確定。例如當各種分隔諸如甲板或甲板室的兩側和兩端，允許為“B-0”級耐火完整性時，則“相應曝火時間”應為半小時。

2 如結構的任何部分為鋁合金時，則應符合下列要求：

.1 “A”或“B”級分隔的鋁合金部件，除由主管機關認為是無負荷的結構外，在標準耐火試驗的任何相應曝火時間內，其隔熱層應能使結構心材的溫度升高不超過其環境溫度200°C。

.2 應特別注意用於支承救生艇、筏的存放、降落和登乘區域以及支承“A”和“B”級分隔的鋁合金圓柱、支柱和其他結構部件的隔熱要求，以保證：

.2.1 對用於支承救生艇、筏區域以及“A”級分隔的部件，在標準耐火試驗的一小時之末，應適用本規則2.1款規定的溫升限度。

.2.2 對用於支承“B”級分隔的部件，在標準耐火試驗的半小時之末，應適用本規則2.1款規定的溫升限度。

3 A類機器處所的頂蓋及艙棚，應為足夠隔熱的鋼結構；其上的任何開口（如有時），均應適當佈置和保護，以防止火災蔓延。

## 規則24

### 主豎區和水平區

1.1 載客超過36人的客船，其船體、上層建築及甲板室應以“A”級分隔分為若干主豎區。階層和壁凹應減至最小量，但如屬必需者，則亦應為“A”級分隔。此分隔的隔熱值，應符合規則26中相應的表列規定。

1.2 載客不超過36人的客船，在居住處所和服務處所的船體、上層建築及甲板室應以“A”級分隔分為若干主豎區。此分隔的隔熱值，應符合規則27中相應的表列規定。

2 艙壁甲板以上的形成主豎區限界面艙壁，只要實際可行，應與直接在艙壁甲板以下的水密分艙艙壁位於同一直線上。

3 這種艙壁應由甲板延伸至甲板，並延伸至船殼或其他限界面。

4 如某一主豎區內以水平“A”級分隔再分為水平區，用以對船上噴水器系統區域與非噴水器系統區域之間提供一適當的屏障時，此項水平分隔應延伸至相鄰兩個主豎區艙壁，並延伸至該船的船殼或外部限界面，並應按表26.3或表27.2所列的耐火隔熱性和完整性的數值予以隔熱。

5.1 為特殊用途而設計的船舶，例如汽車或鐵路車輛渡船，如設置主豎區艙壁將影響船舶所預定的用途時，應以能控制和限制火災的等效設施代替，並應由主管機關特殊認可。

5.2 倘若船上有特種類別的處所，則任何這種處所應符合規則37的相應規定，且此規定與本節的其他要求有矛盾時應以規則37的要求為準。

## 規則25

### 主豎區內的艙壁

1.1 載客超過36人的客船，不要求為“A”級分隔的一切艙壁，應至少為規則26表列的“B”級或“C”級分隔。

1.2 載客不超過36人的客船，不要求為“A”級分隔的在起居處所和服務處所的一切艙壁，應至少為規則27表列的“B”級或“C”級分隔。

1.3 一切這種分隔可按規則34的規定，在其表面覆以可燃材料。

2 一切走廊艙壁，當不要求為“A”級分隔時，應為從甲板延伸至甲板的“B”級分隔，但下列者除外：

.1 當在艙壁的兩側設置連續“B”級天花板或襯板時，連續天花板或襯板後面的艙壁部分，其所用材料應為“B”級分隔結構所允許的厚度和成分，但在主管機關認為合理和可行的範圍內，這種艙壁部分只需滿足“B”級完整性標準的要求；

.2 在具有符合規則12規定的自動噴水器系統所保護的船舶上，以“B”級材料建造的走廊艙壁可在走廊內天花板處終止，但此項天花板應為“B”級分隔結構所允許的厚度和成分。儘管有規則26和27的要求，在主管機關認為合理和可行的範圍內，上述艙壁和天花板只需滿足“B”級

完整性標準的要求。上述艙壁上的一切門和門框，應為不燃材料，其構造和安裝應能提供可靠的耐火性能，並取得主管機關的同意。

3 除走廊艙壁外，一切要求為“B”級分隔的艙壁，應由甲板延伸至甲板，並延伸至船殼或其他限界面；但如在艙壁的兩側均設有連續“B”級天花板或襯板時，此艙壁可終止於連續的天花板或襯板。

## 規則26

### 載客超過36人的客船艙壁及甲板的耐火完整性

1 除應符合本節其他規則關於艙壁及甲板耐火完整性的明確規定外，一切艙壁及甲板的最低耐火完整性應按表26.1至表26.4辦理。如因船舶的任何特殊結構佈置，致使任何分隔的最低的耐火完整性數值難於從這些表中確定時，則該數值的確定應取得主管機關的同意。

2 下列要求應作為運用各表的指導原則：

.1 表26.1適用於作為主豎區或水平區限界面的艙壁。

表26.2適用於不作為主豎區或水平區限界面的艙壁。

表26.3適用於在主豎區內形成階層的甲板或作為水平區限界面的甲板。

表26.4適用於在主豎區內不形成階層的甲板也不作為水平區限界面的甲板。

.2 為了確定應用於相鄰處所的限界面相應的耐火完整性標準，這些處所應按其失火危險程度分為下列（1）至（4）類。如因某一處所的內容和用途，在按本規則規定進行分類存在疑問時，則此處所應按具有最嚴格的限界面要求的有關類別中的某一處所來處理。每類的名稱只是舉

例，而不是限制。每類前面括號內的數字是指表內相應的“列”或“行”數。

(1) 控制站

設有應急電源和應急照明電源的處所。

操舵室和海圖室。

設有船舶無線電報設備的處所。

滅火室、失火控制站和失火記錄站。

位於推進機械處所外面的推進機械控制室。

設有集中失火報警設備的處所。

設有集中應急廣播系統站和設備的處所。

(2) 梯道

旅客和船員用的內部梯道、升降機、自動扶梯（完全設在機器處所內者除外）以及通往上述梯道等的環圍。

至於僅環圍於一層甲板的梯道，應作為未被防火門隔開的處所的一部分。

(3) 走廊

旅客及船員的走廊和休息室。

(4) 救生艇與救生筏的操作及登乘地點

作為救生艇、筏登乘與降落地點的開敞甲板處所和圍蔽散步甲板處所。

(5) 開敞甲板處所

救生艇、筏登乘與降落地點以外的開敞甲板處所和圍蔽散步甲板處所。

露天處所（上層建築及甲板室外面的處所）。

(6) 失火危險較小的起居處所



設有限制失火危險的家具和裝備的住室。

設有限制失火危險的家具和裝備的辦公室及診療室。

設有限制失火危險的家具和裝備的公共處所，且其甲板面積少於50平方米者。

(7) 中等失火危險的起居處所

與上述(6)同，但設有非限制性失火危險的家具和裝備。

設有限制性失火危險的家具及裝備的公共處所，但甲板面積等於或大於50平方米者。

起居處所內單獨的櫥櫃及小儲物間。

小賣部

電影放映室及影片儲藏室。

食物廚房(沒有明火者)。

清潔用具櫥櫃(櫃內不放可燃液體)。

實驗室(室內不放可燃液體)。

藥房。

小乾燥間，且其甲板面積等於或少於4平方米者。

貴重物品保管室。

(8) 失火危險較大的起居處所

設有非限制失火危險的家具和裝備的公共處所，且其甲板面積等於或大於50平方米者。

理髮室及美容室。

(9) 盥洗室及類似處所

公共盥洗設施、淋浴室、洗澡室、廁所等。

小洗衣間。

室內游泳池場所。

手術室。

起居處所內沒有廚房設備的單獨配膳室。

個人盥洗設施應作為其所在處所的一部分。

(10) 極少或沒有失火危險的艙（櫃）、空室及輔機處所

構成船體結構部分的水艙。

空室及隔離空艙。

不設置具有壓力潤滑系統的機器的輔機處所，且在該處所內禁止儲藏可燃物體，例如：

通風機及空氣調節機間、錨機室、舵機室、減搖裝置機室、電力推進電動機間、分區配電報間及浸油式電力變壓器（10千伏安以上）以外的純電氣設備間、軸隧及管隧、泵及冷藏機（可抽送或使用可燃液體）的處所。

為上述處所服務的封閉圍壁通道。

其他封閉圍壁通道，例如管子及電纜的圍壁通道。

(11) 具有中等失火危險的輔機處所、裝貨處所、特種處所、貨油艙與其他油艙（櫃），以及其他類似處所

貨油艙。

貨艙、圍壁通道及艙口。

冷藏艙。

燃油艙（櫃）（設在沒有機器的單獨處所內者。）

允許儲藏可燃物體的軸隧及管隧。

在（10）類中所述的輔機處所，且在該處所內允許設置壓力潤滑系統的機器或儲藏可燃物體者。

燃油加油站。

設有浸油式電力變壓器（10千伏安以上）的處所。

設有由汽輪機及往復式蒸汽機驅動的輔發電機處所，以及功率為110千瓦和110千瓦以下小內燃機驅動的應急發電機、噴水器、灑水器或消防泵、艙底泵等。

特種處所（僅表26.1及表26.3所適用者）。

為用於上述處所的封閉圍壁通道。

(12) 機器處所及主廚房

主推進機械艙（電力推進電動機艙除外）及鍋爐艙。

除前述（10）及（11）類的輔機處所外，設有內燃機或其他燃油、加熱或泵裝置的輔機處所。

主廚房及其附屬設施。

上述處所的圍壁通道及艙棚。

(13) 儲藏室、車間、配膳室等

不附屬於廚房的主配膳室等。

主洗衣間。

大乾燥間（甲板面積大於4平方米者）。

雜物間。

郵件艙及行李室。

垃圾間。

車間（不屬於機器處所、廚房等的一部分者）。

(14) 貯藏易燃液體的其他處所

燈間。

油漆間。

內裝易燃液體的儲藏室（包括儲藏染料、藥品等）。

實驗室（室內放置易燃液體）。

.3 如果以一個數值表明兩個處所之間的限界面的耐火完整性時，則此數值應適用於各種情況。

.4 凡未設有符合規則12規定的自動噴水器系統的某一主豎區或水平區內的兩個處所之間，或兩個均未被此種自動噴水器系統保護的主豎區或水平區之間的限界面，在確定其所適用的耐火完整性標準時，應採用表列兩個數值中的較高值。

.5 凡設有符合規則12規定的自動噴水器系統的某一主豎區或水平區內的兩個處所之間，或兩個均由此種自動噴水器系統保護的主豎區或水平區之間的限界面，在確定其所適用的耐火完整性標準時，應採用表列兩個數值中的較低值。當一個噴水器系統區域和一個非噴水器系統區域在起居處所及服務處所內相遇時，此兩區域之間的分隔應採用表列兩個數值中的較高值。

.6 儘管規則25有所規定，當在表中只標有一長劃時，則對限界面的材料或完整性不作特殊要求。

.7 關於（5）類處所，主管機關應確定表26.1或26.2中的隔熱值適用於甲板室及上層建築的末端，以及表26.3或26.4中的隔熱值適用於露天甲板。如主管機關認為不必環圍時，表26.1至26.4的（5）類處所就不一定要環圍。

3 連續“B”級天花板或襯板連同其甲板或艙壁可以認為全部或部分地起到分隔所要求的隔熱性和完整性的作用。

4 在批准結構的防火細節時，主管機關應考慮所要求的隔熱層在交接點和終止點導熱的危險。

表 26.1 作為主豎區或水平區限界面的艙壁

處所	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
控制站	A-60	A-30	A-30	A-0	A-0	A-60	A-60	A-60	A-0	A-0	A-60	A-60	A-60	A-60
梯道		A-0	A-0	A-0	A-0	A-15 A-0	A-30 A-0	A-60 A-15	A-0	A-0	A-30	A-60	A-15 A-0	A-60
走廊			A-0	A-0	A-0	A-0	A-30 A-0	A-30 A-0	A-0	A-0	A-30	A-60	A-15 A-0	A-60
救生艇與救生筏操作及 登乘地點				-	-	A-0	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-60
開啟甲板處所					-	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
較小失火危險的起居處 所						A-15 A-0	A-30 A-0	A-30 A-0	A-0	A-0	A-15 A-0	A-30	A-15 A-0	A-30
中等失火危險的起居處 所							A-30 A-0	A-60 A-15	A-0	A-0	A-30 A-0	A-60	A-30 A-0	A-60
較大失火危險的起居處 所								A-60 A-15	A-0	A-0	A-60 A-15	A-60	A-30 A-0	A-60
盥洗室及類似處所									A-0	A-0	A-0	A-0	A-0	A-0

極少失火危險的艙 (櫃)、空室及輔機處 所 (10)					A-0									A-0	A-0	A-0	A-0
具有中等失火危險的輔 機處所、裝貨處所、特 種處所、貨油艙與其他 油艙 (櫃)，以及其他 類似處所 (11)															A-0	A-60	A-60
機器處所及主廚房 (12)														A-30 <sup>b</sup>	A-60	A-15	A-60
儲藏室、車間、配膳間 等 (13)														A-0	A-0	A-30	A-60
貯藏易燃液體的其他處 所 (14)																	A-60



表 26.2 不作為主豎區或水平區限界面的艙壁

處所	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
控制站	B-0 <sup>a</sup>	A-0	A-0	A-0	A-0 B-0	A-60	A-60	A-60	A-0	A-0	A-60	A-60	A-60	A-60
梯道		A-0 <sup>a</sup>	A-0	A-0	A-0	A-0	A-15 A-0	A-30 A-0	A-0	A-0	A-15	A-30	A-15 A-0	A-30
走廊			C	A-0	A-0 B-0	B-0	B-15 B-0	B-15 B-0	B-0	A-0	A-15	A-30	A-0	A-30 A-0
救生艇與救生筏操作及 登乘地點				-	-	A-0	A-0	A-0	A-0	A-0	A-0	A-15	A-0	A-15 A-0
開啟甲板處所					-	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0	A-0	A-0	A-0 B-0	A-0 B-0
較小失火危險的起居處 所						B-0 C	B-15 C	B-15 C	B-0 C	A-0	A-15 A-0	A-30	A-0	A-30 A-0
中等失火危險的起居處 所							B-15 C	B-15 C	B-0 C	A-0	A-15 A-0	A-60	A-15 A-0	A-60 A-15
較大失火危險的起居處 所								B-15 C	B-0 C	A-0	A-30 A-0	A-60	A-15 A-0	A-60 A-15
盥洗室及類似處所									C	A-0	A-0	A-0	A-0	A-0

極少失火危險的艙 (櫃)、空室及輔機處 所 (10)																																																																																																																																																																																																																																																																																																																																																																																																																																																																																					
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表 26.4 在主豎區內不形成階層的甲板也不作為水平區限界面的甲板

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
甲板下處所														
甲板上處所														
控制站	A-30 A-0	A-30 A-0	A-15 A-0	A-0	A-0 B-0	A-0 A-0	A-15 A-0	A-30 A-0	A-0	A-0	A-0	A-60 A-15	A-0	A-60 A-15
梯道	A-0	A-0	A-0	A-0	A-0 B-0	A-0 A-0	A-0	A-0	A-0	A-0	A-0	A-30	A-0	A-30 A-0
走廊	A-15 A-0	A-0 A-0	A-0 <sup>a</sup> B-0 <sup>a</sup>	A-0	A-0 B-0	A-0 B-0	A-15 B-0	A-15 B-0	A-0	A-0	A-0	A-30	A-0	A-30 A-0
救生艇與救生筏操作及 登乘地點	A-0	A-0	A-0	A-0	—	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0	A-0	A-0	A-0	A-0
開敞甲板處所	A-0	A-0	A-0 B-0	A-0	—	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0	A-0	A-0	A-0 B-0	A-0
較小失火危險的起居處 所	A-60	A-15 A-0	A-0 A-0	A-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0	A-0	A-15 A-0	A-0	A-15 A-0
中等失火危險的起居處 所	A-60	A-30 A-15	A-15 A-0	A-15 A-0	A-0 B-0	A-0 B-0	A-15 B-0	A-30 B-0	A-0 B-0	A-0	A-15 A-0	A-30 A-0	A-0	A-30 A-0
較大失火危險的起居處 所	A-60	A-60 A-15	A-60 A-0	A-30 A-0	A-0 B-0	A-15 B-0	A-30 B-0	A-60 B-0	A-0 B-0	A-0	A-30 A-0	A-30 A-0	A-0	A-30 A-0



- a. 當相鄰處所在相同的數字類別及右上角註1時，若主管機關認為沒有必要時，則在此類處所之間不必設置艙壁或甲板。例如，在（12）類內廚房及其所屬的配膳室之間，如配膳室的艙壁和甲板能保持廚房限界面的完整性時，則不要求設置艙壁。但是，廚房和機器處所之間要求有一艙壁，即使這兩個處所都屬於（12）類。
- b. 只有當兩相連處所中至少有一個受符合規則12規定的自動噴水器系統保護時可以允許有較小的絕緣值。



## 規則27

### 載客不超過36人的客船艙壁及甲板的耐火完整性

1 除應符合本節其他規則關於艙壁及甲板耐火完整性的明確規定外，艙壁及甲板的最低耐火完整性應按表27.1及表27.2辦理。

2 下列要求應作為運用各表的指導原則：

.1 表27.1和27.2分別適用於作為分隔相鄰處所的艙壁和甲板。

.2 為了確定應用於相鄰處所之間的隔壁的適當耐火完整性標準，這些處所按其失火危險程度分為下列（I）至（II）類。每類的名稱只是舉例，而不是限制。每類前面括號內的數字是指表內相應的“列”或“行”數。

#### （1）控制站

設有應急電源和應急照明源的處所。

操舵室和海圖室。

設有船舶無線電報設備的處所。

滅火室、失火控制站和失火記錄站。

位於機器處所外面的推進機械控制室。

設有集中失火報警設備的處所。

#### （2）走廊

旅客及船員的走廊和休息室。

#### （3）起居處所

如規則3.10款所規定的除走廊外的處所。

#### （4）梯道

內部梯道、升降機、自動扶梯（完全設在機器處所內者除外）以及通往上述梯道的環圍。

至於僅環圍於一層甲板的梯道，應作為未被防火門隔開的處所的一部分。

(5) 失火危險較小的服務處所

面積小於2平方米的櫥櫃及儲藏室、乾燥間及洗衣間。

(6) A類機器處所

規則3.19規定的各處所。

(7) 其他機器處所

除了A類機器處所之外規則3.20中規定的各處所。

(8) 裝貨處所

所有裝貨的處所（包括貨油艙）以及通往這些處所的圍壁通道和艙口，特種處所除外。

(9) 失火危險較大的服務處所

廚房、有烹調設備的配膳室、油漆間和燈間、具有面積2平方米或2平方米以上的櫥櫃和儲藏室，不屬於機器處所的組成部分的工場。

(10) 開敞甲板處所

開敞甲板處所和沒有失火危險的圍蔽的散步甲板處所。  
露天處所（上層建築及甲板室外面的處所）。

(11) 特種處所

規則3.18規定的處所。

.3 凡未設有符合規則12規定的自動噴水器系統的某一主豎區或水平區內的兩個處所之間，或兩個均無此種自動噴水器系統保護的主豎區或水

平區之間的限界面，在確定其所適用的耐火完整性標準時，應錄用表列兩個數值中的較高值。

.4 凡設有符合規則12規定的自動噴水器系統的某一主豎區或水平區的兩個處所之間，或兩個均有此種自動噴水器系統保護的主豎區或水平區之間的限界面，在確定其所適用的耐火完整性標準時，應採用表列兩個數值中的較低值。當一個噴水器系統區域和一個非噴水器系統區域在起居處所及服務處所內相遇時，此兩區域之間的分隔應採用表列兩個數值中的較高值。

3 連續“B”級天花板或襯板連同其甲板或艙壁可以認為全部或部分地起到分隔所要求的隔熱性和完整性的作用。

4 如在本章其他規則對此類限界面不要求有“A”級完整性時，則為了安裝窗和舷窗，在規則23.1款要求為鋼質或其他等效材料的外部限界面可以是拼接而成的。同樣，在沒有要求有“A”級完整性的此類限界面，門可以用主管機關認為滿意的材料。



表 27.2 分隔相鄰處所甲板的耐火完整性

甲板上處所	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
甲板下處所											
控制站	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0	*	A-30
走廊	A-0	*	*	A-0	*	A-60	A-0	A-0	A-0	*	A-0
起居處所	A-60	A-0	*	A-0	*	A-60	A-0	A-0	A-0	*	A-30 A-0 <sup>d/</sup>
梯道	A-0	A-0	A-0	*	A-0	A-60	A-0	A-0	A-0	*	A-0
較小失火危險的服務處所	A-15	A-0	A-0	A-0	*	A-60	A-0	A-0	A-0	*	A-0
A 類機器處所	A-60	A-60	A-60	A-60	A-60	*	A-60 <sup>e/</sup>	A-30	A-60	*	A-60
其他機器處所	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*	A-0
裝貨處所	A-60	A-0	A-0	A-0	A-0	A-0	A-0	*	A-0	*	A-0
較高失火危險的服務處所	A-60	A-30 A-0 <sup>d/</sup>	A-30 A-0 <sup>d/</sup>	A-30 A-0 <sup>d/</sup>	A-0	A-60	A-0	A-0	A-0	*	A-30
開敞甲板處所	*	*	*	*	*	*	*	*	*	-	A-0
特種處所	A-60	A-15	A-30 A-0 <sup>d/</sup>	A-15	A-0	A-30	A-0	A-0	A-30	A-0	A-0

註：當適合時應適用於表27.1及表27.2。

a/ 要弄清哪一個適用，參見規則25及規則29。

b/ 當處所在相同的數字類別並出現註角b時，只有當採用不同用途的相鄰處所時才要求參閱表中所列級別或甲板，例如在（9）類。在兩個廚房間不要求有艙壁分隔，但油漆間和廚房之間要求有“A-0”級艙壁。

c/ 分隔操舵室和海圖室的艙壁可以為“B-0”級。

d/ 參見本規則2.3及2.4。

e/ 當應用規則24.1.2時，在表27.1中的“B-0”和“C”級應為“A-0”級。

f/ 若（7）類機器處所經主管機關審查，認為很少危險或沒有失火危險，則不必設置防火隔熱層。

\* 表中有\*號者時，該分隔應為鋼質或其他等效材料，但並不要求為“A”級標準。當應用規則24.1.2時27.2中的\*號為“A-0”級，（8）類和（10）的除外。

## 規則28

### 脫險通道

1 除機器處所外，一切旅客及船員出入處所及在船員經常使用的處所內，應佈置有梯道與梯子，以提供到達救生艇、筏登乘甲板的方便的脫險通道，特別應符合下列規定：

.1 在艙壁甲板以下，從每一水密艙或類似限界的處所或處所群，應有兩個脫險通道，其中至少一個不得利用水密門。但主管機關對有關處所的性質和部位以及對經常居住或使用這些處所的人數經過恰當的考慮後，可以免除其中一個脫險通道。

.2 在艙壁甲板以上，從每一主豎區或類似限定的處所或處所群，至少應有兩個脫險通道，其中至少應有一個能通達形成垂直脫險的梯道。

.3 如無線電台設有直接通往開敞甲板的出口，則該台應有兩個出口或入口，其一可為足夠尺寸的舷窗或窗或主管機關同意的其他設施。

.4 只有一條脫險通道的走廊或部分走廊的長度應不超過：

載客超過36人的客船為13米；

載客不超過36人的客船為7米。

.5 按照1.1款及1.2款要求的脫險通道應至少有一個是利用易於到達的環圍的梯道，此梯道應提供連續的防火遮蔽，自其起點的一層起到達適當的救生艇、筏的登乘甲板，或到達此梯道所至的最高層，以何者為高而定。如果主管機關根據1.1款的規定允准免除時，則僅有一個脫險通道應能提供為主管機關滿意的安全通路。梯道的寬度、數目及連續性應取得主管機關的同意。



.6 自梯道環圍至救生艇、筏登乘區域的出入口保護，應取得主管機關的同意。

.7 僅用於一個處所及此處所內陽台的梯道，不得視為構成所要求的脫險通道之一。

2.1 在特種處所內，艙壁甲板以上或以下的脫險通道的數目及佈置應取得主管機關的同意，其到達登乘甲板的通道的安全性一般應至少等效於1.1、1.2、1.5及1.6款的規定。

2.2 船員經常使用的機器處所的脫險通道之一應避免直接進入任何特種處所。

3.1 每一機器處所應設置兩個脫險通道。特別應符合下列規定：

.1 位於艙壁甲板以下的處所，其兩個脫險通道應由下列情況之一所組成；

.1.1 儘可能遠離的兩部鋼質梯子引向該處所上部同樣遠離的門，並從該門設有通道通往適當的救生艇、筏的登乘甲板。其中一部梯子從該處所的下部起至該處所外面的一個安全地點，應能提供連續的防火遮蔽；

.1.2 一個鋼質梯子引向該處所上部的一扇門，並從該門可以進到登乘甲板；以及在該處所下部完全與前述鋼梯分開的一扇能由每一面開關的鋼質門，該門設有從該處所下部通往登乘甲板的安全脫險通道。

.2 如該處所不位於艙壁甲板以上，則應設有儘可能遠離的兩個脫險通道，而上述通道的門應位於從該處所能通往適當的救生艇、筏登乘甲板的地方。這些通道如需要使用梯子時，應為鋼質梯。

3.2 但是，對不滿1,000總噸的船舶，主管機關經考慮了每一處所上部的寬度及佈置後，可免除其中的一個脫險通道；而對1,000總噸或以上的船舶，若任一處所有一扇門或一部鋼梯即可提供抵達登乘甲板的安全通

道，則主管機關經考慮了這一處所的性质、位置以及該處所是否經常有人使用後，可免除其中的一個脫險通道。

4 升降機不得視為構成所要求的脫險通道之一。

## 規則29

### 起居處所與服務處所內梯道與升降機的保護

1 除主管機關特准使用其他等效材料者外，一切梯道應為鋼質結構，並應環圍在“A”級分隔之內，還應在一切開口處具有有效的關閉裝置，但下列者除外：

.1 僅連接兩層甲板的梯道，若在一個甲板間具有適當的艙壁或門以保持甲板的完整性者，則不需環圍。當梯道在一個甲板間被封閉時，其梯道環圍應按照規則26或27表列對甲板的要求加以保護。

.2 完全位於公共處所內的梯道，可裝於該處所的開敞部位。

2 梯道環圍應直接通至走廊，並考慮到緊急時可能使用該處的人數而應具有足夠的面積以免擁擠。如屬可行，梯道環圍不得直接通往住室、生活用櫥（櫃）或其他存有可燃物品可能起火的環圍處所。

3 升降機圍壁通道的裝設，應能防止煙及火焰從一個甲板間通至另一個甲板間，並應設置關閉裝置以控制氣流及煙氣的流通。

### 規則30

#### “A”級分隔上的開口

1 除裝貨處所之間、特種處所之間、儲藏室之間與行李室之間的艙口以及這些處所與露天甲板之間的艙口外，一切開口應設有永久附連於其上的關閉裝置，其耐火效能至少應與其所在的分隔相等。

2 “A”級分隔上的所有門、門框及其在關閉時的制牢裝置，其構造應儘實際可行提供等效於其所在艙壁的耐火性以及阻止煙和火焰穿過的效能，這些門及門框應由鋼材或其他等效材料建造。水密門則不需隔熱。

3 每個門應能在艙壁的每一面僅需一人即能將其開啟及關閉。

4 主豎區艙壁及梯道圍壁上的防火門，除動力操縱的水密門及經常鎖閉的水密門外，應為在向關閉方向反向傾斜 $3.5^\circ$ 時仍能將門關閉的自閉式門。門的關閉速度，需要時應能控制，以防止對人身發生不應有的危險。所有這種自閉式防火門，除經常關閉者外，應能同時地或成組地將門由控制站予以脫開，也應能個別地在門的位置處就地脫開。脫開機構的設計，應在控制系統萬一損壞時，此門能自動關閉；但如採用經認可的動力操縱水密門，可以認為達到這一目的。不能由控制站脫開的門背鉤，不允許使用。當允許使用雙擺動門時，它們應具有受防火門脫開系統控制的自動插上的插銷裝置。

5 如某一處所由符合規則12規定的自動噴水器系統保護或設有連續的“B”級天花板，則在主豎區內未形成階層亦不作為水平區限界面的甲板上的開口應能適度地緊密關閉，並且在主管機關認為合理和實際可行的範圍內，這類甲板應滿足“A”級完整性的要求。

6 對船舶外部限界面的“**A**”級完整性的要求不適用於玻璃隔板、窗及舷窗。同樣，對“**A**”級完整性的要求也不適用於上層建築及甲板室的外門。

### 規則31

#### “**B**”級分隔上的開口

1 “**B**”級分隔的門及門框以及它們的制牢裝置，除在這些門的下部可以允許設置通風開口外，應提供儘可能等效於此分隔耐火性能的關閉方法。如果這種通風開口係開在門上或在門以下時，則一個或幾個這種開口的總淨面積不得超過0.05平方米。如這種開口係開在門上，則此開口應設有不燃材料製成的柵格。這些門應是不燃性的。

2 對船舶外部限界面的“**B**”級完整性的要求不適用於玻璃隔板、窗及舷窗。同樣，對“**B**”級完整性的要求也不適用於上層建築及甲板室的外門。載客不超過36人的客船，主管機關可允許分隔艙室與個別內部的衛生處所的門為可燃材料，例如淋浴間。

3 當設有符合規則12規定的自動噴水器系統時：

.1 在主豎區內未形成階層亦不作為水平區限界面的甲板上開口應能適度地緊密關閉，並且在主管機關認為合理和實際可行的範圍內，這類甲板應滿足“**B**”級完整性的要求。

.2 “**B**”級材料的走廊艙壁上的開口，應按規則25的規定加以保護。

## 規則32

### 通風系統

#### 1 載客超過36人的客船。

1.1 載客超過36人的客船的通風系統除滿足本規則之1款的要求以外，也應滿足規則16.2至16.9的要求。

1.2 通風機的分佈，一般應使通往各處的通風導管保持在同一主豎區內。

1.3 通風系統穿過甲板時，除應按照規則18.1.1及30.5有關甲板耐火完整性要求外，還應採取預防措施以減少煙及熾熱氣體通過該系統從一甲板間處所至另一甲板間處所的可能性。除按本規則中的隔熱要求外，在必要時，垂直導管應按規則26相應各表的要求予以隔熱。

1.4 除裝貨處所外，通風導管應用下列材料建造：

.1 截面面積不小於0.075平方米的導管以及不止用於一個甲板間處所的所有垂直導管，應用鋼材或其他等效材料建造。

.2 除本1.4.1款提到的以外的截面面積小於0.075平方米的導管，應用不燃材料建造。如這些導管穿過“A”級或“B”級分隔之處，應適當考慮保證該分隔的耐火完整性。

.3 截面面積一般不超過0.02平方米，長度又不大於2米的短節導管，倘若滿足下列所有條件，則不需使用不燃材料：

.3.1 此導管是用經主管機關同意的限制失火危險的材料建造；

.3.2 此導管只用作通風系統的末端；

.3.3 此導管的位置，不是位於沿其長度量至穿過“A”或“B”級分隔處，包括“B”級連續天花板在內為600毫米的範圍內。

1.5 如梯道環圍設有通風時，其導管或若干導管，應單獨從通風機室引出，而與通風系統的其他導管分開，並且不得用於其他任何處所。

1.6 除機器處所和裝貨處所的通風以及根據規則16.6可能要求的任何交替供氣的系統外，一切動力通風應設有控制裝置，將其集中在能從兩個儘可能遠離的地點中的任何一個地點將所有的通風機停止。用於機器處所的動力通風的控制裝置，也應集中而能從兩個地點加以控制，其中一個應設在機器處所的外面。用於裝貨處所動力通風系統的風機，應能在該處所外面的一個安全地點將其停止。

## 2 載客不超過36人的客船

2.1 載客不超過36人的客船的通風系統應滿足規則16 的要求。

### 規則33

#### 窗與舷窗

1 除適用規則30.6及規則31.2款的規定者外，起居處所、服務處所及控制站內各艙壁上的一切窗及舷窗，其構造應能保持其所在該型艙壁的完整性要求。

2 儘管有規則26及27各表的要求，但是：

.1 起居處所、服務處所及控制站與露天隔開的艙壁上的一切窗及舷窗應有鋼材或其他適宜材料建造的框架。玻璃應用金屬鑲邊或鑲角加以固定。

.2 應特別注意面向露天的或環圍的救生艇和救生筏登乘區域的窗的耐火完整性；並特別注意上述區域下面窗的耐火完整性，當這些窗的位置因失火而受損時，將會阻礙救生艇或筏的放下或人員登入者。



## 規則34

### 可燃材料的限制使用

1 除裝貨處所、郵件艙、行李室或服務處所的冷藏室外，一切襯板、地板、天花板及隔熱物應為不燃材料。為了實用或美術處理而用作某一處所內部分隔的局部艙壁或甲板，也應為不燃材料。

2 用於冷卻設備系統的與隔熱物連用的防潮層和黏合劑以及管系裝置的隔熱物，不需要為不燃材料，但應保持在實際可行的最低數量，並且它們的外露表面應具有經主管機關滿意的限制火焰蔓延的性質。

3 下列的表面應具有低播焰性：<sup>\*</sup>

.1 走廊及梯道環圍內的外露表面，以及所有起居處所及服務處所和控制站內艙壁、圍壁及天花板襯板的外露表面；

.2 起居處所、服務處所及控制站內隱蔽或不能到達的處所。

4 任何起居處所及服務處所內的可燃面板、嵌條、飾片及鑲片的總體積，不得超過相當於各圍壁及天花板的聯合面積上厚2.5毫米鑲片的體積。如船舶設有符合規則12規定的自動噴水器系統，則上述體積可以包含一些用於建立“C”級分隔的可燃材料。

5 本規則3款所要求的在表面的鑲片和襯板所具有的熱量之值對採用厚度的面積應不超過每平方米45 MJ。

6 走廊及梯道環圍內的家具應保持為最低數量。

7 用於外露的內部表面上的油漆，清漆及其他表面塗料應不致產生過量的煙及毒性產物。

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\* 參閱本組織通過的大會 166（特 IV）號決議“關於評定材料的防火性能的準則”。



8 在起居處所、服務處所及控制站內使用的甲板基層敷料（如塗敷時）應為在高速時不易着火或不會發生毒性或爆炸性危險的認可材料。\*

### 規則35

#### 構造細節

1 在起居處所和服務處所、控制站、走廊和梯道內：

.1 封閉在天花板、鑲板或襯板後面的空隙應以緊密安裝的且間距不超過14米的擋風條作適宜的分隔。

.2 上述此類圍蔽空隙，包括梯道、圍壁通道等襯板後面的空隙，在垂直方向上，應在每層甲板處加以封堵。

2 天花板及艙壁的構造應在不減損其防火效能的情況下，使消防及巡邏人員能探知隱蔽和不易到達處所的煙源，但主管機關認為該處所不致產生失火危險者可以除外。

### 規則36

#### 自動噴水器、探火和失火報警系統或自動探火和失火報警系統

1 凡適用本節所規定的任何船舶，除實質上沒有失火危險的處所（例如空室、盥洗室等）外，在所有起居處所和服務處所內的不論是垂直的或水平的每獨立分隔區內，以及主管機關認為必要時在控制站內，均應普遍設置下列兩者之一：

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\* 參閱本組織通過的大會 214（VII）號決議“關於甲板基層敷料試驗程序改進的暫行準則”。

- .1 符合規則12規定的一種經認可的自動噴水器以及探火和失火報警系統，其設置和佈置足以保護上述處所；
- .2 符合規則13規定的一種經認可的固定探火和失火報警系統，其設置和佈置足以探知上述處所內火災的發生。如果可不裝設規則13.2.2所要求的煙氣探測器的話。

## 規則37

### 特種處所的保護

#### 1 適用於不論艙壁甲板以上或以下特種處所的規定

##### 1.1 通則

1.1.1 構成本規則規定的基本原則的是在特種處所內按通常的主豎區進行劃分可能不切實際，但在這些處所內必須以水平區的概念和設置有效的固定滅火系統作為基礎來獲得等效的保護。根據這一概念，在本規則範圍內，倘若供車輛通過的總的全面淨高度不超過10米，則一個水平區可以包括多於一層甲板的若干特種處所。

1.1.2 規則16、18、30及32內所規定的為保持主豎區完整性的要求，應同樣適用於形成分隔各水平區之間以及分隔水平區與船舶其他部分之間的限界面的各甲板和艙壁。

##### 1.2 結構性保護

1.2.1 特種處所的限界面艙壁應按表26.1或表27.1（11）類處所的要求予以隔熱，同時水平限界面應按表26.3或27.2（11）類處所的要求予以隔熱。

1.2.2 駕駛室應設有指示器，當進出特種處所的任一防火門關閉時，這些指示器應能顯示出來。

### 1.3 固定式滅火系統 \*

每一特種處所，應設有人力操縱的經認可的固定式壓力水霧滅火系統，此系統應能保護該處所內任何甲板與車輛平台的所有部分，但是主管機關可以允許使用任何其他類型的固定式滅火系統，如此項系統係經在某一特種處所內作模擬的流動汽油火災條件的全面試驗，證明其對控制上述處所內可能發生火災的效果並不低於壓力水霧滅火系統。

### 1.4 巡邏與探火

1.4.1 在特種處所內應保持有效的巡邏制度。在整個航行期間，如果任何上述處所未保持連續的消防值班，則應裝設經認可的自動探火系統。

1.4.2 整個特種處所應設有必要的手動報警按鈕，並應在這些處所的每一出口處附近設置1個。

### 1.5 滅火設備

每一特種處所內應設有：

.1 至少3具水霧器；

.2 1具符合規則6.4規定的可攜式泡沫器裝置，但船上須備有供特種處所使用的這種裝置至少2具；

.3 主管機關認為足夠數量的手提式滅火機，但在通往此類處所的每一出口至少放置一具手提式滅火機。

### 1.6 通風系統

1.6.1 特種處所應設有有效的動力通風系統，每小時至少能足以更換空氣10次。這些處所的動力通風系統應與其他通風系統完全分開，並且當這些處所內載有車輛時，應一直在運轉。在裝卸車輛期間，主管機關

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\* 參閱本組織通過的大會 123 (V) 號決議“關於特種處所設置固定滅火系統的建議案”。

可以要求增加更換空氣的次數，使用於能夠有效密閉的特種處所的通風導管對每一此類處所應是分開的。這樣的系統應能在其所在處所的外面予以控制。

1.6.2 此項通風應能防止空氣層化和形成空氣囊。

1.6.3 駕駛室應設有指示裝置，以顯示出所需通風量的任何損失或減少。

1.6.4 考慮到天氣或海況，通風系統的佈置應在失火時可迅速關斷並能有效地關閉。

1.6.5 通風導管包括調節風門應為鋼質，其佈置應經主管機關同意。

## 2 僅適用於艙壁甲板以上特種處所的補充規定。

### 2.1 流水口

鑑於使用固定式壓力水霧滅火系統的結果，使甲板上大量積水，因而可能導致嚴重的穩性損失，流水口的安設，應能保證上述積水迅速地直接排出舷外。

### 2.2 防止易燃氣體着火的措施。

2.2.1 在任何載運車輛的且可能積聚爆炸性氣體的甲板上，可以形成易燃氣體着火源的設備，特別是電氣設備與線路，應安裝在甲板上方至少450毫米處。設在甲板上方超過450毫米的電氣設備應是封閉的並有保護的型式，以防止火花逸出。然而，如果為了船舶安全操作的需要，經主管機關同意上述電氣設備與線路的安設在甲板上方低於450米高度時，可以安裝此電氣設備與線路，但它們應是經認可在汽油與空氣爆炸性混合物中適用的一種型式。

2.2.2 電氣設備及線路如果安裝在排氣通風導管內，則應為經認可在汽油與空氣爆炸性混合物中適用的一種型式，並且任何排氣導管的出口，經考慮其他可能的着火源，應設在一個安全的地點。

### 3 僅適用於艙壁甲板以下特種處所的補充規定

#### 3.1 艙底抽水及排水

鑑於使用固定式壓力水霧滅火系統的結果，使甲板上或雙層底艙頂上大量積水，因而可能導致嚴重的穩性損失，主管機關可以在規則II-1/21各項規定之外，要求增設艙底抽水與排水設施。

#### 3.2 防止易燃氣體着火的措施

3.2.1 如裝有電氣設備與線路，它們應為在汽油與空氣爆炸性混合物中適用的型式，其他可以構成易燃氣體着火源的設備，不得使用。

3.2.2 電氣設備及線路，如果安裝在排氣通風導管內，則應為經認可在汽油與空氣爆炸性混合物中適用的一種型式，並且任何排氣導管的出口，經考慮其他可能的着火源，應設在一個安全的地點。

## 規則38

### 除特種處所外用於載運油箱中備有自用燃料的機動車輛的裝貨處所的保護

在任何裝貨處所內（特種處所除外），載有在油箱中備有自用燃料的機動車輛時，應符合以下規定：

#### 1 探火

應設有一個經認可的自動探火與失火報警系統。本系統的設計與佈置應與3款的通風要求一起考慮。

#### 2 滅火裝置

2.1 應設有符合規則5規定的固定式滅火系統，如果設置的是二氧化碳系統，則其所提供的自由氣體的容積應至少等於此種最大的能夠密封的

裝貨處所總容積的百分之四十五，且其佈置應保證在10分鐘內有關處所所要求的滅火劑量的三分之二注入。也可以設置任何能提供等效保護能力的其他固定式氣體滅火系統或固定式高膨脹泡沫滅火系統。此外，設計成載運不裝載任何貨物的車輛的裝貨處所可以安裝固定式鹵化烴滅火系統，該系統應符合規則5的規定。

2.2 或者，可以安裝符合規則37.1.3要求的系統，但也應適當地符合規則37.2.1或37.3.1的要求。

2.3 應設有任何這種處所使用的經主管機關認為足夠數量的手提式滅火機。至少在通往此類處所的出入口處設置一具手提式滅火機。

### 3 通風系統

3.1 應設有有效的動力通風系統，對載客超過36人的客船每小時至少足以更換空氣10次，對載客不超過36人的客船每小時至少足以更換空氣6次。供這種裝貨處所的這一通風系統應與其他通風系統完全分開，並且當這些處所內載有車輛時，應一直在運轉。使用在此類裝貨處所能夠有效密封的通風導管應與每一此類處所分開。該系統應在此類處所的外部進行控制。

3.2 此項通風應能防止空氣層化和形成空氣囊。

3.3 駕駛室應設有指示器，以顯示出所需通風量的任何損失或減少。

3.4 考慮到天氣或海況，通風系統的佈置應在失火時可迅速關斷並能有效地關閉。

3.5 通風導管包括調節風門應為鋼質，其佈置應經主管機關同意。

### 4 防止易燃氣體着火的措施

4.1 如裝有電氣設備及線路，它們應為在汽油與空氣爆炸性混合物中適用的一種型式，其他可以構成易燃氣體着火源的設備，不得使用。

4.2 電氣設備及線路，如果安裝在排氣通風導管內，則應為經認可在汽油與空氣爆炸性混合物中適用的一種型式，並且任何排氣導管的出口，經考慮其他可能的着火源，應設在一個安全的地點。

4.3 流水口應不引向機器處所或可能存在着火源的其他處所。

### **規則39**

#### **裝貨處所的固定式滅火佈置**

1 除本規則第3段規定者外，1,000總噸及1,000總噸以上船舶的裝貨處所應由符合規則5規定的固定式氣體滅火系統的保護，或者由提供等效保護的固定式高膨脹泡沫滅火系統保護。

2 若經主管機關同意的船舶，航程短暫應用1款的要求將屬不合理時，並且也是小於1,000總噸的船舶則裝貨處所的佈置應經主管機關同意。

3 從事載運危險貨物的船舶應在任何裝貨處所提供一符合規則5規定或符合固定式氣體滅火系統，或者根據主管機關的意見對裝載貨物提供等效保護的滅火系統。

### **規則40**

#### **消防巡邏和探火、失火報警和廣播系統**

1 起居處所和服務處所應遍設手動失火報警按鈕，以便能立即向駕駛室或主消防控制站發出報警。



2 在主管機關認為不能到達的任何裝貨處所內應設有經認可的探火報警或失火系統，該系統應能在一個或數個適當地點或站自動顯示火災的發生或徵兆及其位置，但經主管機關認為某船航程短暫，應用本要求將屬不合理者除外。

3 所有船舶在海上或港口的所有時間內（非營運時除外）應配置船員或設備，以保證負責船員能立即接到任何初始的失火警報。

4 應設置由駕駛室或控制站操縱的召集船員的專用報警器。此種報警器可以是船上通用報警系統的一部分，但是它應能與旅客處所的報警系統分開而單位施放。

5 起居處所、服務處所以及控制站應普遍設有廣播系統或其他有效的通信設施。

6 載客超過36人的客船應保持一有效的巡邏制可迅速探測到火災的發生。訓練每一消防巡邏人員熟悉船舶的佈置以及其可能被召喚去使用的任何設備的位置及操作。

#### 規則41

#### 載運危險貨物船舶的特別要求

規則54的要求如適當應適用於載運危險貨物的客船。

### 第三節 – 貨船的消防措施

(除規則53、54以及在規則57、58中另有規定者外，本節也適用於規則55所規定的油輪。)

#### 規則42

##### 構造

1 除本規則4款另有規定者外，船體、上層建築、結構性艙壁、甲板及甲板室應以鋼材或其他等效材料建造。

2 “A”級或“B”級分隔的鋁合金部件，除由主管機關認為無負荷的結構外，在標準耐火試驗的任何相應曝火時間內，其隔熱層應能使結構芯材的溫度升高不超過其周圍環境溫度200°C。

3 應特別注意用於支承救生艇、筏的存放、降落和登乘區域以及支承“A”和“B”級分隔的鋁合金圓柱、支柱和其他結構部件的隔熱要求，以保證：

.1 對用於支承救生艇、筏區域以及“A”級分隔的部件，在標準耐火試驗一小時結束時，其溫度升高界限應符合本規則2款的要求；和

.2 用對於支承“B”級分隔的部件，在標準耐火試驗半小時結束時，其溫度升高界限應符合本規則2款的要求。

4 A類機器處所的頂蓋和艙棚，應為足夠隔熱的鋼結構；其上的任何開口（如有時），均應適當佈置和保護，以防止火災蔓延。

5 在起居地區和服務地區內應採取下列保護方法之一：

.1 IC法 – 除非按規則52.1的要求外，在起居處所和服務處所內，以不燃的“B”級或“C”級分隔作內部分隔艙壁，一般沒有自動噴水器探火和失火報警系統；或

.2 II C法 – 在可能發生火源的所有處所，按規則52.3的要求裝設為探火及滅火用的自動噴水器、探火和失火報警系統，一般對內部分隔的艙壁型式不予限制；或

.3 III C法 – 除面積不超過50平方米的任何起居處所或用“A”級或“B”級分隔的各處所外，在可能發生火源的所有處所，按規則52.3的要求裝設固定式探火和失火報警系統，一般對內部分隔艙壁的型式不予限制，但在任何情況下任何起居處所或用“A”級或“B”級分隔的處所不得超過50平方米。主管機關審定可增加這種地區的公共處所面積。

6 在機器處所、控制站、服務處所等艙室內限界艙壁的構造和隔熱所用的不燃材料的要求，以及梯道環圍和走廊的保護應為本規則5款所述的三種方式。

### 規則43

#### 起居處所和服務處所內的艙壁

1 一切要求為“B”級分隔的艙壁，應由甲板延伸至甲板，並延伸至船殼或其他限界面；但如在艙壁的兩側均設有連續“B”級天花板或襯板時，此艙壁可終止於連續天花板或襯板。

2 I C法 – 凡本規則或其他規則未規定有“A”級或“B”級分隔的一切艙壁，至少應為“C”級構造。

3 II C法 – 除個別情況根據表44.1規定為“C”級艙壁外，凡本規則或其他規則未規定為“A”級或“B”級分隔的艙壁，在構造上應無限制。

4 III C法 – 除面積不超過50平方米的任何起居處所或用“A”級或“B”級分隔的各處所外，艙壁在結構上應無限制。除了個別情況，根據表44.1規定為“C”級艙壁，經主管機關審定可增加公共處所的面積。

#### 規則44

##### 艙壁和甲板的耐火完整性

1 艙壁和甲板的耐火完整性，除了應符合這些要求中的專門規定外，一切艙壁及甲板的最低耐火完整性應按表44.1及表44.2辦理。

2 下列要求應作為應用各表的指導原則：

.1 表44.1及表44.2分別適用於分隔相鄰處所的艙壁及甲板。

.2 為了對相鄰處所之間的分隔確定其適用的耐火完整性標準。這些處所應按其失火危險程度分為下列(1)至(11)類。每類的名稱只是舉例而不是限制。每類前面的括號內的數字是指表內相應的“列”或“行”數。

##### (1) 控制站

設有應急電源和應急照明電源的處所。

操舵室和海圖室。

設有船舶無線電報設備的處所。

滅火室、失火控制室和失火記錄站。

位於機器處所外面的推進機械控制室。

設有集中失火報警設備的處所。

##### (2) 走廊

走廊和休息室。

(3) 起居處所

規則3.10中規定的除走廊外的各處所。

(4) 梯道

內部梯道、升降機、自動扶梯（完全設在機器處所者除外）以及通往上述梯道等的環圍。至於僅環圍於一層甲板的梯道，應作為未被防火門隔開的處所的一部分。

(5) 失火危險較小的服務處所

面積小於2平方米的櫥櫃和儲藏室，乾燥室和洗衣間。

(6) A類機器處所

規則3.19中規定的各處所。

(7) 其他機器處所

除了A類機器處所以外規則3.20中規定的各處所。

(8) 裝貨處所

所有裝貨的處所（包括貨油艙）以及通往這些處所的圍壁通道及艙口。

(9) 失火危險較大的服務處所

廚房、具有烹調設備的配膳室、油漆間和燈間，具有面積2平方米或2平方米以上的櫥櫃和儲藏室，不屬於機器處所組成部分的工場。

(10) 開敞甲板處所

開敞甲板處所和沒有失火危險的圍蔽的散步甲板處所。  
露天處所（上層建築及甲板室外部的處所）。

(11) 滾裝裝貨處所

規則3.14中規定的各處所。用以載運油箱中裝有自用燃料以能自行推進的機動車輛的裝貨處所。

3 連續“B”級天花板或襯板，連同其甲板或艙壁可以認為已全部或部分滿足分隔的隔熱性和完整性要求。

4 規則42.1中規定為鋼質或其他等效材料的外部限界面，如本要求中的其他規定不要求其具有“A”級完整性者，可予穿透以裝設窗及舷窗。同樣，在這種無須具有“A”級完整性的限界面上，門可使用主管機關認為滿意的材料。

表 44.1 分隔相鄰處所艙壁的耐火完整性

處所	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
控制站	A-0 e/	A-0	A-60	A-0	A-15	A-60	A-15	A-60	A-60	*	A-60
走廊		C	B-0	B-0 A-0 c/	B-0	A-60	A-0	A-0	A-0	*	A-30
起居處所			C a, b/	B-0 A-0 c/	B-0	A-60	A-0	A-0	A-0	*	A-30
梯道				B-0 A-0 c/	B-0 A-0 c/	A-60	A-0	A-0	A-0	* *	A-30
較小失火危險的服務處所					C	A-60	A-0	A-0	A-0	*	A-0
A類機器處所						*	A-0	A-0 g/	A-60	*	A-60 f/
其他機器處所							A-0 d/	A-0	A-0	*	A-0





- f/ 如果不打算用於載運危險貨物或危險貨物的堆存距艙壁的水平距離不少於3米，該艙壁可為“A-0”級艙壁。
- g/ 用於載運危險貨物的貨艙應符合規則54.2.8的要求。
- h/ 滾裝船貨艙互相分隔的艙壁和甲板應能適當的氣密，這樣的分隔應在主管機關認為合理和可行的範圍內具有“A”級完整性的標準。

表 44.2 分隔相鄰處所甲板的耐火完整性

甲板下處所	甲板下處所	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
控制站	(1)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0	*	A-60
走廊	(2)	A-0	*	*	A-0	*	A-60	A-0	A-0	A-0	*	A-30
起居處所	(3)	A-60	A-0	*	A-0	*	A-60	A-0	A-0	A-0	*	A-30
梯道	(4)	A-0	A-0	A-0	*	A-0	A-60	A-0	A-0	A-0	*	A-30
較小失火危險的服務處所	(5)	A-15	A-0	A-0	A-0	*	A-60	A-0	A-0	A-0	*	A-0
A 類機器處所	(6)	A-60	A-60	A-60	A-60	A-60	*	A-60	A-30	A-60	*	A-60
其他機器處所	(7)	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*	A-0
裝貨處所	(8)	A-60	A-0	A-0	A-0	A-0	A-0	A-0	*	A-0	*	A-0
較大失火危險的服務處所	(9)	A-60	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0	*	A-30
開敞甲板處所	(10)	*	*	*	*	*	*	*	*	*	-	*
滾裝裝貨處所	(11)	A-60	A-30	A-30	A-30	A-0	A-60	A-0	A-0	A-30	*	*h/

註：

i/ 經主管機關審查，對於很少危險或沒有失火危險的（7）類機器處所可以不設置耐火絕緣。

\* 表中出現的星號是指這種分隔需要鋼材或等效材料製成，但不必具有“A”級標準的分隔。

## 規則 45

### 脫險通道

1 一切起居處所以及除機器處所外船員經常使用的處所，應佈置有梯道和梯子，以提供到達開敞甲板並繼而到達救生艇、筏的方便脫險通道。特別是應符合下列的一般規定：

.1 在起居處所的各層，從每一限定處所或處所群至少應有兩個遠離的脫險通道。

.2.1 在露天甲板以下，主要的脫險通道應是梯道，另一個可以是圍壁通道或梯道。

.2.2 在露天甲板以上，脫險通道應是通往開敞甲板的梯道或門或這兩者的結合。

.3 主管機關對處所的性质和部位以及通常居住或使用這些處所的人數經過恰當的考慮後，可例外地免除其中一個脫險通道。

.4 凡長度超過7米的一端不通的走廊，均不應接受。一端不通的走廊是只有單向脫險通道的走廊或走廊的一部分。

.5 脫險通道的寬度和連續性應取得主管機關的同意。

.6 如無線電台沒有直接通往開敞甲板的開口，則該台應有兩個出口或入口，其一可以為足夠尺寸的舷窗或窗或主管機關同意的其他設施，以供緊急脫險之用。

2 經常使用滾裝船貨艙的船員人數和通向開敞甲板脫險通道的位置應經主管機關滿意，但任何情況不應少於兩個，且應遠離。

3 除本規則4款規定免除的外，從每一A類機器處所應有兩個脫險通道。特別應符合下列的規定之一：

.1 兩具儘可能遠離的鋼梯，通至該處所上部同樣遠離的門，從該門至開敞甲板應設有通路。一般說來，其中一具鋼梯自該處所的下部至該處所外面的安全地點應提供連續的防火遮蔽。但是，如果由於機器處所的特殊佈置或尺度，從該處所的下部將有一個安全的脫險通路，則主管機關可以不要求這種遮蔽。該遮蔽應是鋼質的。

如果需要，應有主管機關認為滿意的隔熱裝置、同時在下端應設有一個自閉式的鋼門；或

.2 一具鋼梯通至該處所上部的門，從該門至開敞甲板應設有通路，此外，從該處所的下部遠離上述鋼梯的地點應有一個可以兩面操縱的鋼門，作為進入從該處所下部通往開敞甲板的安全脫險通路的入口。

4 少於1,000總噸的船舶，主管機關對該處所上部的寬度和佈置經過恰當的考慮後，可以免除本規則3款規定的脫險通道中的一個。

5 非A類機器處所的脫險通路的設置，應考慮到該處所的性质和地點以及人員是否經常使用該處所，並取得主管機關的同意。

6 升降機不應看作是本規則規定所要求的脫險通道。

## 規則46

### 起居處所、服務處所及控制站內的梯道與升降機圍壁通道的保護

1 僅穿過一層甲板的梯道，應至少在一個水平上用“B-0”級分隔及自閉門保護。僅穿過一層甲板的升降機，應在兩個水平面上用帶鋼門的“A-0”級分隔環圍。穿過多於一層甲板的梯道及升降機圍壁通道，應至少用“A-0”級分隔環圍，並在所有水平門上用自閉式門保護。

2 在容納12人或小於12人的船上，如梯道穿過多於一層甲板且每一層起居處所甲板上至少有兩個直接通往露天甲板的脫險通道，則經主管機關審定可降低本規則1款內的“A-0”級要求為“B-0”級。

3 除非主管機關批准使用其他等效材料，所有梯道應為鋼質結構。

#### 規則47

#### 阻火分隔上的門

1 在分隔上所裝設的門應儘可能與分隔的阻火性能相同。在“A”級分隔上的門及門框應為鋼質結構。裝在“B”級分隔上的門應用不燃材料製成。裝設在A類機器處所限界面艙壁上的門應適當氣密和自閉。按I C法建造的船舶，經主管機關同意，在分隔住室與個別的內部盥洗室如浴室的門可以用可燃材料。

2 要求自閉的門不應裝設門背鉤。但裝有安全釋放型遙控釋放設備的門背裝置可以使用。

3 除梯道環圍的門上及其下部不允許開設通風開口外，在走廊艙壁內的門上及門以下可允許開設通風開口。這種開口只允許設在門的下部。如這種開口係開在門上或門以下時，則任何這種開口或其開口的總淨面積不得超過0.05平方米。這種開口在門上時，則此開口應設有不燃材料製成的格柵。

4 水密門不必隔熱。



## 規則48

### 通風系統

貨船的通風系統應符合規則16的規定，但該規則的8款除外。

## 規則49

### 可燃材料的限制使用

1 走廊及梯道環圍內的所有外露表面，以及起居處所、服務處所和控制站內蔭蔽或不能到達處所的表面包括地板，均應具有低播焰性\*。起居處所、服務處所和控制站內天花板的外露表面，應具有低播焰性。

2 用於外露的內部表面上的油漆、清漆及其他表面塗料，應具有主管機關認為不會造成過度的失火危險的性質，並應不致產生過量的煙。

3 在起居處所、服務處所及控制站使用的甲板基層敷料（如塗敷時），應為主管機關認為不易着火的材料。\*\*

## 規則50

### 構造細節

1 IC法 – 在起居處所、服務處所和控制站中所有的襯板、風擋、天花板以及它們相連的地板，均應為不燃材料。

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\* 參閱本組織通過的大會 166（特 IV）號決議“關於評定材料的防火性能的準則。”

\*\* 參看本組織通過的大會 214（VII）號決議“關於甲板基層敷料試驗程序改進的暫行準則。”

2 II C法和III C法 – 供起居處所、服務處所和控制站使用的走廊和梯道環圍中的天花板、襯板、風擋以及它們相連的地板，均應為不燃材料。

### 3 I C、II C和III C法

3.1 除裝貨處所內或服務處所的冷藏庫室以外，隔熱材料應是不燃的。用於冷卻系統的隔熱物連同防潮層及黏合劑以及管系裝置的隔熱物無須為不燃材料，但它們的用量應儘可能維持在最低數量，同時它們的外露表面應具有主管機關認為滿意的限制火焰蔓延的性能。

3.2 起居處所和服務處所的艙壁、襯板和天花板如係不燃者，則它們可裝有厚度不超過2毫米的可燃鑲片。但走廊、梯道環圍和控制站內的鑲片厚度不得超過1.5毫米。

3.3 圍閉在天花板、鑲板或襯板背面的空隙，應用緊密安裝的、其間距不得大於14米的擋風條分隔之。在垂直方向，這種空隙，包括那些在梯道襯板、圍壁通道等的背面的空隙，應在每一層甲板予以封閉。

## 規則51

### 生活用途的氣體燃料的佈置

如以氣體燃料供生活用途，其佈置、儲存、分配和利用應考慮到使用這種燃料可能引起的失火和爆炸危險，以保護船舶和船上人員的安全。

## 規則52

### 固定式探火和失火報警系統自動噴水器、自動探火和失火報警系統

1 採用I C法的船舶，安裝和佈置規則13有關規定的煙氣探測系統應能保護居住處所的所有走廊、梯道和脫險通道。

2 採用II C法的船舶，應裝設經認可的且符合規則12有關規定的自動噴水器、探火和失火報警系統，其安裝和佈置應能保護起居處所、廚房以及其他服務處所，但實際上沒有火災危險的處所如空的處所、衛生處所等除外。另外，對規則13規定的煙氣探測系統的佈置和安裝，應能保護居住處所的走廊、梯道和脫險通道。

3 採用III C法的船舶，應裝設經認可的且符合規則13有關規定的固定式探火和失火報警系統，其佈置應能探測引起居住處所和服務處所所發生的火災，但實際上沒有火災危險的處所如空的處所、衛生處所等除外。

4 儘管有上述各條規定，主管機關在1985年9月1日為止以前不必要求按規則13.2.2的規定裝設探測器。

## 規則53

### 裝貨處所內的固定滅火裝置

#### 1 通則

1.1 除了包括在2款和3款內的裝貨處所外，在2,000總噸或2,000總噸以上的裝貨處所，應符合規則5規定的固定式氣體滅火系統予以保護或能提供等效作用的固定式滅火系統予以保護。

1.2 任何船舶的裝貨處所，如果它是專門建造用以裝運礦砂、煤、穀物，沒有乾燥的木料和不燃貨物或主管機關認為較小失火危險的各種貨物，則主管機關可以對之免除1.1款的要求。這樣的免除只有在船舶裝設有鋼結構的艙蓋板和具有能關閉所有通風導管的有效設施和其他通向裝貨處所的開口時方可允許。

1.3 儘管1.1款作了規定，任何從事載運危險貨物的船舶應在任何裝貨處所內設置符合規則5規定的固定氣體滅火系統或由主管機關認為能對所載貨物起同等保護作用的滅火系統。

## 2 滾裝裝貨處所

### 2.1 探火

應裝設一個經認可的自動探火和失火報警系統。該系統的設計和佈置應結合2.3款所述的通風要求考慮。

### 2.2 滅火裝置

2.2.1 可以進行密封的滾裝裝貨處所應裝有符合規則5規定的固定式氣體滅火系統，但下列除外：

.1 如果裝有一個二氧化碳滅火系統，則其所提供的自由氣體的最小容積應至少能夠等於這種可以密封的最大裝貨處所總容積的45%。

且其佈置應能保證有關處所所需的氣體至少有三分之二能在10分鐘內放入該處所。

.2 鹵化烴系統僅可以用於設計成用以載運不裝載任何貨物的車輛的裝貨處所。

.3 可以裝設任何其他固定式氣體滅火系統或高膨脹泡沫滅火系統，但其所具有的等效保護應為主管機關所滿意。

.4 作為替代可以安裝符合規則37.1.3要求的系統。然而，排水或泵的佈置應能防止自由液面的提高。如果達不到這個目的，應將水的額外重

量和自由液面對船的穩性的不良影響考慮在內，達到主管機關在批准穩性資料\*時認為必須考慮的程度。按照第II-1章規則22要求，這種資料應包括在給船長提供的穩性資料內。

2.2.2 不能進行密閉的滾裝裝貨處所應裝設符合規則37.1.3要求的一個系統。然而，排水和泵的佈置應能防止自由液面的提高。如果達不到這個目的，應將水的額外重量和自由液面對船舶穩性的不良影響考慮在內，達到主管機關在批准穩性資料\*時認為必需考慮的程度。按照第II-1章規則22要求，這種資料應包括在給船長提供的穩性資料內。

2.2.3 在任何滾裝裝貨處所內應配備主管機關認為數量足夠的手提式滅火機。至少應有一個手提式滅火機位於通到這種裝貨處所的每一出入口處。

2.2.4 每一用於載運油箱中裝有自用燃料的機動車輛的滾裝裝貨處所應裝設：

- .1 至少三個水霧噴射器；
- .2 一個符合規則6.4規定的移動式泡沫噴射器，但船上應至少備有兩具這種設備，以供滾裝裝貨處所內使用。

## 2.3 通風系統

2.3.1 閉式滾裝裝貨處所應設有有效的動力通風系統，在空艙的情況下每小時至少足以更換空氣6次。無論何時，只要船裝有車輛，一般通風機應繼續不斷地運轉。如不可能，那只要氣候許可，應每天規定一個時期開動這些通風機並在卸貨前運行一段合理的時間，之後該裝貨處所應被證明為無石油氣體的處所。為此，船上應配備一個或多個手提式可燃

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\* 參閱本組織通過的大會 123 (V) 號決議“關於特種類別處所的固定式滅火系統的建議案”。

氣體探測器。該系統應與其他通風系統完全分離。服務於可以進行有效密封的滾裝裝貨處所的通風導管應就每一裝貨處所予以隔離。主管機關可以要求在裝載或卸下車輛時增加一定數量的換氣次數。應能在上述這樣處所的外部位置控制這個系統。

2.3.2 此項通風應能防止空氣分層和形成空氣袋。

2.3.3 應在駕駛台配備設施以顯示需要的通風能量的任何損失。

2.3.4 應有設施以在失火時迅速停止和有效關閉通風系統，且應將氣候和海況考慮在內。

2.3.5 通風導管包括擋風閘，應用鋼製成，它們的佈置應由主管機關認為滿意。

## 2.4 防止易燃氣體着火措施

閉式滾裝裝貨處所用於載運油箱中裝有自用燃料的機動車輛應符合下列額外規定：

.1 除第2.4.2段規定者外，如裝有電氣設備及線路，它們應為在汽油與空氣的爆炸性混合物中適用的一種型式。

.2 在通風系統的設計和運轉能使載有車輛的貨物處所以每小時至少更換空氣10次的比率連續通風的條件下，可允許設在甲板上方450毫米的電氣設備為封閉的和有保護的型式，以防止火花逸出。

.3 不得使用可以構成易燃氣體着火源的其他設備。

.4 電氣設備及線路，如果安裝在排氣通風導管內，則應為經認可在汽油與空氣爆炸性混合物中適用的一種型式，並且任何排氣導管的出口，經考慮其他可能的着火源，應設在一個安全的地點。

.5 排氣孔不能延伸到可能出現着火源的機器處所或其他處所。

3 滾裝裝貨處所以外用於載運油箱中裝有自用燃料的機動車輛的裝貨處所

旨在載運油箱中裝有自用燃料的機動車輛的裝貨處所應符合2款的要求，但無須符合2.2.4款的要求。

## 規則54

### 載運危險貨物船舶的特殊要求

#### 1 通則

1.1 除了應符合貨船規則53的要求和客船規則38和39的要求以外，本規則1.2段所指用於載運危險貨物的船舶類型和裝貨處所應符合本規則的要求，但對載運有限數量\*的危險貨物時除外，除非這種要求由於遵守本章其他地方的規定已得到滿足。船舶類型和載運危險貨物的方式已在1.2款和表54.1中提到，出現在1.2款中的數字編號列於表的頂行。

1.2 下列船舶類型和裝貨處所應適用於表54.1和54.2：

- .1 不是特定設計來用於載運貨物集裝箱但旨在裝運包裝式危險貨物、包括裝在集裝箱和可移式貨櫃內的貨物的船舶和裝貨處所。
- .2 用於載運以集裝箱和可移式貨櫃載運危險貨物而專門建造的集裝箱船舶和裝貨處所。
- .3 用於載運危險貨物的滾裝船和滾裝裝貨處所。
- .4 用於載運散裝固體危險貨物的船舶和裝貨處所。
- .5 用於載運除了裝在船載駁船內的散裝液體和氣體以外的危險貨物的船舶和裝貨處所。

#### 2 特殊要求

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\* 關於“有限數量”這個詞的定義，參見國際海運危險貨物規則總導言之第 18 節。



除有明文規定外，下列要求應適用於指導表54.1、54.2和54.3對“在甲板上”和“在甲板下”這兩者堆裝危險貨物的實施，在那裏下列各款中的數字和編號列於第一欄。

## 2.1 供水

2.1.1 系統的佈置應保證通過固定加壓或適當位置的遙控起動消防泵立即向消防總管供給符合壓力要求的消防水。

2.1.2 出水量應滿足按規則4所規定的尺寸和壓力向四支水槍供水，並能使水射到當裝貨處所是空艙時的任何部位。上述水量也可由主管機關認為滿意的等效設施來達到。

2.1.3 應通過固定式噴霧水槍的佈置或放水浸沒裝貨處所等設施以用大量的水有效地冷卻指定的甲板下裝貨處所。為此對小的裝貨處所和較大裝貨處所的小區域主管機關可以酌情允許使用水帶。無論如何，排水和泵的佈置應能防止自由液面的上升。如不行，應將水的額外重量和自由液面對船舶穩性的不良影響考慮在內，達到主管機關批准穩性資料\*時認為必須考慮的程度。

2.1.4 可以採用特定介質來浸沒指定的甲板下裝貨處所的設備以代替2.1.3款的要求。

## 2.2 着火源

電氣設備和電線不應安裝在圍蔽的裝貨處所，除非主管機關認為閉式車輛甲板處所或開式車輛甲板處所出於營運目的而有此必要。然而，如果這種處所內裝有電氣設備，它應是合格的安全型\*\*，可用於暴露於危險的環境中，除非應能完全隔離電氣系統（通過移開系統內的隔離閘而不

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\* 參閱本組織通過的大會 123 (V) 號決議“關於特種類別處所的固定式滅火系統的建議案”。

\*\* 參閱國際電工協會出版的建議案，尤其是 92 期 – 船舶電氣裝置。

是保險絲)。電纜通過甲板和艙壁應予以密封以防止氣體或蒸汽通過。穿越的電纜和裝貨處所內之電纜應得到保護以便不致因碰撞而損壞。不允許裝設其他任何構成可燃蒸汽着火源的設備。

### 2.3 探測系統

所有閉式裝貨處所，包括閉式車輛甲板處所，應裝設一個經認可的探火和失火報警系統。如果探測系統是利用從這種處所抽出來的大氣為氣樣，應有設備防止萬一貨物滲漏時通過取樣系統向探測器械所在的處所內排放被污染的大氣。

應在設備所在處所展示永久性通告，說明如果貨物發出有毒煙霧，氣樣應排到開敞的空氣中去。

### 2.4 通風

2.4.1 閉式裝貨處所應設置足夠的動力通風。其佈置應能基於裝貨處所為空氣時每小時至少換氣6次，並能從裝貨處所的上部或下部排除蒸汽。

2.4.2 風機應能避免可燃氣體和空氣混合物着火的可能性。應在通風的入口和出口的開口處設有適當的鋼絲網。

### 2.5 艙底泵

如果在閉式裝貨處所內載運可以着火的或有毒液體，其艙底泵系統的設計應能保證防止由於疏忽而將這種液體泵送到機器處所的管系或泵。如載運大量這種液體，應考慮這些處所的額外排泄措施，這些措施並應使主管機關滿意。

### 2.6 人員的保護

2.6.1 除了規則17所要求的消防員裝備品以外，應配備四套對化學侵蝕能全面防護的服裝。防護服裝應罩蓋全部皮膚，使身體的任何部分都受到保護。

2.6.2 除了規則17所要求的以外，應配備至少兩套自背式呼吸器。

### 2.7 手提滅火機

裝貨處所應配備總容量至少為12公斤的乾粉或其等效的手提滅火機。這些滅火機是本章其他地方所要求的任何手提滅火機以外的增加物。

### 2.8 機器處所限界面的隔熱

在裝貨處所與A類機器處所之間的限界面艙壁應隔熱到“A-60”級標準，除非危險貨物的堆裝離開這種艙壁的水平距離至少3米。在這兩種處所之間的其他限界面也應隔熱到“A-60”標準。

### 2.9 水霧系統

每一個在其上方有一層甲板的開式滾裝裝貨處所以及被認為不能密封的閉式滾裝裝貨處所應裝設經認可的用人力操縱的固定壓力水霧系統，以保護任何甲板和車輛平台（如裝有的話）的所有部位。除非主管機關允許在該處所使用經全面積試驗證明其效應不低於上述設備的其他固定式滅火系統。無論如何，排水以及泵的佈置應能防止自由液面的升高。如果不行，應將水的額外重量和自由液面對船舶穩性的不良影響考慮在內，達到主管機關在批准穩性資料\*時認為必須考慮的程度。

## 3 證明符合要求的文件

主管機關應向船舶提供一個相應的文件，作為構造和設備符合本規則要求的證據。

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\* 見本組織通過的大會 123 (V) 號決議“關於特種類別處所固定滅火系統的建議案”。

表 54.1 對以不同方式在船上和貨物處所內載運危險貨物的要求的應用

在表 54.1 中出現“x”的任何地方，即指這一要求適用於表 54.3 相應的行所列的所有級別的危險貨物，有說明標誌者除外。

規則 54.1.2 規則 54.2	.1 不設 是計 特的 別	.2 集貨 裝處 箱所 裝	.3			.4 散危 裝險 固貨 體物	.5 船 載 駁 船
			閉裝處 式裝所 滾貨	開裝處 式裝所 滾貨	露 天 甲 板		
.1.1	x	x	x	x	x	關於對不同級別的危險貨物運用規則 54.2 的要求，見表 54.2。	x
.1.2	x	x	x	x	x		-
.1.3	x	x	x	x	-		x
.1.4	x	x	x	x	-		x
.2	x	x	x	x	-		x <sup>a/</sup>
.3	x	x	x	-	-		x <sup>a/</sup>
.4.1	x	x <sup>a/</sup>	x	-	-		x <sup>a/</sup>
.4.2	x	x <sup>a/</sup>	x	-	-		x <sup>a/</sup>
.5	x	x	x	-	-		-
.6.1	x	x	x	x	x		-
.6.2	x	x	x	x	x		-
.7	x	-	-	x	x		-
.8	x	x <sup>b/</sup>	x	x	x		-
.9	-		x <sup>c/</sup>	x	-		-

註：

a/ 對於4級和5.1級不適用於閉式貨物集裝箱。對於裝載在閉式貨物集裝箱內的2級、3級、6.1級和8級，其通風率可以減少到不少於換氣二次。作為這個要求的用意，一個可移式貨櫃可認為是一個閉式貨物集裝箱。

b/ 僅適用於甲板。

c/ 僅適用於不能進行密封的閉式滾裝裝貨處所。

d/ 在駁船能夠包容可燃蒸汽，或者作為替代，它們能夠通過與駁船相連接的通風管道將可燃蒸汽排到載運駁船的艙室以外的安全處所，對於上述這些特殊情況，經主管機關同意可以降低或取消這些要求。

表 54.2 載運散裝固體危險貨物的船舶和裝貨處所對不同級別危險貨物的  
要求的應用

級 - 第 VII 章 規則 54.2	4.1	4.2	4.3 <sup>e/</sup>	5.1	6.1	8	9
.1.1	x	x	-	x	x <sup>g/</sup>	x <sup>g/</sup>	x
.1.2 <sup>e/</sup>	x	x	-	x	-	-	x
.2	x	x <sup>g/</sup>	x	x <sup>g/</sup>	-	-	x <sup>g/</sup>
.4.1 <sup>h/</sup>	x <sup>g/</sup>	x <sup>g/</sup>	x	x <sup>g/</sup>	-	-	x <sup>g/</sup>
.4.2 <sup>h/</sup>	x	x <sup>g/</sup>	x	x <sup>g/</sup>	-	-	x <sup>g/</sup>
.6	x	x	x	x	x	x	x
.8	x	x	x	x <sup>g/</sup>	x <sup>g/</sup>	x <sup>g/</sup>	x

註：

e/ 這一要求適用於具有需要大量的水進行滅火這一特點的貨物。

f/ 可能散裝運輸的這一級別的物质危險是指除本表所列舉的特殊考慮外，主管機關必須就有關船舶的構造和設備予以特殊考慮。

g/ 參考國際海運危險品規則（經修訂的決議4.81（VI））或散裝固體危險貨物的安全實務規則（經修訂的決議A.434（XI）號）。

h/ 旨在載運散裝固體危險貨物的閉式裝貨處所應至少設有自然通風。在散裝固體危險貨物的安全實務規則（經修訂的決議A.434（XI）號）要求設有動力通風的情況下，經主管機關同意，使用移動式通風單元（設備）也是合乎要求的。

表 54.3 除散裝固體危險貨物外不同級別危險貨物的要求的應用

級 – 第 VII 章 規則 54.2	1	2	3	4	5.1	5.2	6.1	8
.1.1	x	x	x	x <sup>p/</sup>	x	x <sup>p/</sup>	x	x
.1.2 <sup>i/</sup>	x	x	x	x <sup>p/</sup>	x	x <sup>p/</sup>	-	-
.1.3	x <sup>k/</sup>	-	-	-	-	-	-	-
.1.4	x <sup>k/</sup>	-	-	-	-	-	-	-
.2	x <sup>k/</sup>	x <sup>l/</sup>	x <sup>m/</sup>	-	-	-	X <sup>m/</sup> <sub>p</sub>	X <sup>m/</sup> <sub>p/</sub>
.3	x	x	x	x	x	-	x	x
.4.1	-	x <sup>j/</sup>	x <sup>m/</sup>	x <sup>p/</sup>	x <sup>p/</sup>	-	X <sup>m/</sup> <sub>p/</sub>	X <sup>m/</sup> <sub>p/</sub>
.4.2	-	x <sup>l/</sup>	x <sup>m/</sup>	-	-	-	X <sup>m/</sup> <sub>p/</sub>	X <sup>m/</sup> <sub>p/</sub>
.5	-	-	x <sup>m/</sup>	-	-	-	x <sup>n/</sup>	x <sup>m/</sup>
.6	-	x	x	x	x	x <sup>p/</sup>	x	x
.7	-	-	x	x	x	x <sup>p/</sup>	x <sup>p/</sup>	x <sup>p/</sup>
.8	x <sup>k/</sup> <sub>Q/</sub>	x	x	x	x <sup>p/</sup>	-	x <sup>p/</sup>	x <sup>p/</sup>
.9	x	x	x <sup>m/</sup>	x <sup>p/</sup>	x	-	x <sup>m/</sup>	x <sup>m/</sup>

註

i/ 這一要求適用於具有需要大量的水進行滅火這一特點的貨物。

j/ 適用於可燃或有毒氣體。

k/ 適用S組，1.4分隔中的1級貨物除外。

l/ 所有可燃氣體。

m/ 所有閃點低於23°C（閉杯試驗）的液體。

n/ 僅限於液體。



o/ 任何情況下，1級貨物的堆裝距機器處所的限制界面的水平距離為3米。

p/ 相應參考國際海運危險貨物規則（經修訂的決議4.81（IV）號）或散裝固體危險貨物的安全實務規則（經修訂的決議A.434（XI）號）。

## 第四節 油船的消防措施

(除不適用於油船的規則53和54外，以及除規則57和58規定者外，本節的要求係增補第三節的規定)

### 規則55

#### 適用範圍

1 除另有明文規定者外，本節適用於載運具有經認可的閃點儀測定（閉杯試驗），其閃點不超過60°C、其雷特蒸汽壓低於大氣壓的原油和石油產品，以及載運具有同樣失火危險的其他液體產品的油船。

2 如果旨在載運1款所述那些貨物以外的液體貨物或能引起額外失火危險的液化氣體，就應適當注意散裝化學品運輸規則和氣體運輸規則的規定，並應採取主管機關滿意的額外安全措施。

3 本段適用於所有混裝船，這類船舶不得載運固體貨物，除非所有貨油艙已排空和排除了油氣，或者除非主管機關按照惰性氣體指南\*所列有關的營運要求對每一事項的處理認為滿意。

4 載運具有經認可的閃點儀測定閃點超過60°C（閉杯試驗）石油產品的油船應符合第三節的規定，但裝有符合規則61要求的固定式甲板泡沫滅火系統以代替規則53所要求的固定式滅火系統者除外。

5 所有化學品運輸船或氣體運輸船，當它們載運1款所述的貨物時，無須對它們實施規則60關於惰性氣體系統的要求，但它們要裝有本組織將予擬訂的替代裝置。 \*\*

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\* 見海上安全委員會 1980 年 5 月第 42 次會議通過的惰性氣體系統指南（海安會/通函 282）

\*\* 參閱本組織通過的大會 473（XII）號決議，關於載運石油產品的化學品船惰性氣體系統的臨時規則。

6 化學品運輸船和氣體運輸船應符合本節的規定，但是，注意到散裝化學品規則和氣體運輸規則的規定而裝備了主管機關認為滿意的選擇性和補充性裝置者除外。

## 規則56

### 處所的位置和分隔

1 A類機器處所，艏推力器及其有關設備所佔處所除外，應位於貨油艙和含油污水艙的後方，這類機器處所並應位於貨油泵艙和隔離空艙的後方，但不必位於燃油艙的後方。A類所有機器處所應用隔離空艙、貨油泵艙或燃油艙與之隔開。然而，貨油泵艙的下部可以凹入上述機器處所，以便安置貨油泵，其條件是凹入部分的頂板高度一般不超過龍骨上面型深的 $\frac{1}{3}$ ；但載重量不超過25,000噸的船舶除外，在這種船舶上，如能證明為便於進入壁凹部分和便於妥善佈置管系的需要，上述深度是不切實際的，則主管機關可以准許凹入部分超過上述高度，但不得超過龍骨上面型深的一半。

2 起居處所、貨油主控制站、控制站及服務處所（獨立的貨物裝卸工具儲藏室不包括在內）均應位於所有貨油艙、含油污水艙、貨油泵艙和用以隔開貨油艙、含油污水艙與A類機器處所的隔離空艙後方。分隔貨油泵艙（包括貨油泵搶的入口）與起居處所、服務處所和控制站的任何公共艙壁，其構造應為“A-60”標準。如認為必要時，起居處所、控制站、A類以外的機器處所以及服務處所可以允許位於所有貨油艙、含油污水艙、貨油泵艙和隔離空艙的前方，但須具備經主管機關認為等效的安全標準及適用的滅火裝置。

3 如經證明有必要把駕駛處所佈置在貨油艙區域的上方，則此處所只能用於駕駛目的，並且必須用一個高度為至少2米的開敞空間使之與貨油艙甲板隔離。

此外，這種駕駛處所的防火還應符合規則58.1和規則58.2所規定的要求，以及本節中可適用的其他規定。

4 應設有使甲板上溢油與起居和服務區域隔離的設施。這個設施可以是安裝一個具有適當高度延伸到兩舷的連續的固定擋板。對於具有尾部裝油設施的船舶，此項擋油佈置應予特別考慮。

5 環圍起居處所和服務處所的上層建築和甲板室的外部限界面，包括支承這些起居處所的懸架甲板，其面向貨油艙的全部限界面及該限界面之後3米之內，應隔熱至“A-60”標準。對於這種上層建築和甲板室的各個側面，此項隔熱標準應通達主管機關認為必要的高度。

6.1 通往起居處所、服務處所和控制站的入口、空氣進口和開口不得面向載貨區域。它們應位於不面向載貨區域的末端艙壁上，及/或位於上層建築或甲板室的外檔一邊、距離面向載貨區域的上層建築或甲板室的末端至少船長的25%但不少於3米。然而，這個距離無須超過5米。

6.2 在6.1款所述的限制範圍之內不准設門，但進入那些不能通往起居處所、服務處所和控制站的處所的門除外，主管機關可以准許在諸如貨物控制站、食物庫和物料庫設門。如果裝設這種門，處所限界面的隔熱應為“A-60”標準。在6.1款所規定的限制範圍之內允許裝設以螺栓固緊的板門，作為拆移機器之用。

駕駛室的門和操舵室的窗，只要它們的設計能保證駕駛台迅速而有效地達到氣體和蒸汽的氣密，就允許位於6.1款所規定的限制範圍之內。

6.3 面向載貨區域和在上層建築及甲板室側邊上6.1款規定的限制範圍之內的舷窗必須是永閉（不能開啟）型。在主甲板上第一排的這種舷窗應裝有鋼或其他等效材料製成的內部罩蓋。

### 規則57

#### 構造、起居處所和服務處所內的艙壁及其構造細節

- 1 對油船實施規則42、43和50的規定，只應使用規則42.5.1所規定的I C法。
- 2 貨油泵艙的天窗應用鋼製成，不應鑲有玻璃，並應能在泵艙外部予以關閉。

### 規則58

#### 艙壁和甲板的耐火完整性

- 1 作為規則44的替代並進而符合本節其他地方所作關於艙壁和甲板耐火完整性的規定，艙壁和甲板最低耐火完整性也按表58.1和58.2辦理。
- 2 下列要求應作為運用各表的指導原則：
  - .1 表58.1和58.2分別適用於分隔相鄰處所的艙壁和甲板。
  - .2 為了對相鄰處所之間的分隔確定其適用的耐火完整性標準，這些處所應按其失火危險程度分為（1）至（10）類。每類的名稱只是舉例而不是限制。每類前面括弧內的數字指的是表內相應的列或行。

#### （1）控制站

設有應急電源和應急照明電源的處所。

操舵室和海圖室。

設有船舶無線電報設備的處所。

滅火室、失火控制室和失火記錄站。

位於機器處所之外的推進機械控制站。

設有集中失火報警設備的處所。

(2) 走廊

走廊和休息室。

(3) 起居處所

規則3.10所規定的處所，不包括走廊。

(4) 梯道

內部梯道、升降機和自動扶梯（全部設在機器處所之內者除外）以及通往上述梯道等的環圍。至於僅環圍一層甲板的梯道應作為沒有被防火門隔開的處所的一部分。

(5) 較小失火危險的服務處所

面積小於2平方米的儲櫃和儲藏室、乾燥室和洗衣間。

(6) A類機器處所

規則3.19中規定的各處所。

(7) 其他機器處所

除了A類機器處所以外，規則3.20中規定的各處所。

(8) 貨油泵艙

設有貨油泵的處所以及進出這種處所的出入口和圍壁通道。

(9) 較大失火危險的服務處所

廚房、設有烹調設備的配膳室、油漆間和燈間、具有面積2平方米或2平方米以上的儲櫃和儲藏室，不屬於機器處所組成部分的工場。

(10) 開敞甲板處所

開敞甲板處所和沒有失火危險的圍蔽散步甲板處所。露天處所（上層建築和甲板室外部的處所）。

3 連續“B”級天花板或襯板連同其甲板或艙壁可以認為是全部或部分地起到分隔所要求的隔熱性和完整性作用。

4 規則57.1規定要用鋼或其他同等材料製成的外部限界面，如果這些規則不在其他地方對這種限界面提出“A”級完整性要求，就可以打洞，供安裝窗和舷窗之用。同樣，製造這種不要求具有“A”級完整性的限界面，門的材料應經主管機關滿意。

5 准許在分隔貨油泵艙和其他處所的艙壁和甲板上安裝經認可的、用於貨油泵艙照明的永固式氣密照明燈圍罩，但是，它們應具有足夠強度並能保持艙壁或甲板的完整性和氣密性。



表 58.1 分隔相鄰處所艙壁的耐火完整性

處所	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
控制站 (1)	A-0 c/	A-0	A-60	A-0	A-15	A-60	A-15	A-60	A-60	*
走廊 (2)		C/	B-0	B-0 A-0 a/	B-0	A-60	A-0	A-60	A-0	*
起居處所 (3)			C/	B-0 A-0 a/	B-0	A-60	A-0	A-60	A-0	*
梯道 (4)				B-0 A-0 a/	B-0 A-0 a/	A-60	A-0	A-60	A-0	*
較小失火危險 的服務處所 (5)					C/	A-60	A-0	A-60	A-0	*
A 類機器處所 (6)						*	A-0	A-0 d/	A-60	*
其他機器處所 (7)							A-0 b/	A-0	A-0	*
貨油泵艙 (8)								*	A-60	*
較大失火危險 的服務處所 (9)									A-0 b/	*
開敞甲板處所 (10)										-

註：根據情況適用於規則58.1和58.2。

表 58.2 分隔相鄰處所甲板的耐火完整性

甲板上處所	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
甲板下處所										
控制站 (1)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	-	A-0	*
走廊 (2)	A-0	*	*	A-0	*	A-60	A-0	-	A-0	*
起居處所 (3)	A-60	A-0	*	A-0	*	A-60	A-0	-	A-0	*
梯道 (4)	A-0	A-0	A-0	*	A-0	A-60	A-0	-	A-0	*
較小失火危險 的服務處所 (5)	A-15	A-0	A-0	A-0	*	A-60	A-0	-	A-0	*
A 類機器處所 (6)	A-60	A-60	A-60	A-60	A-60	*	A-60 e/	A-0	A-60	*
其他機器處所 (7)	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*
貨油泵艙 (8)	-	-	-	-	-	A-0 d/	A-0	*	-	*
較大失火危險 的服務處所 (9)	A-60	A-0	A-0	A-0	A-0	A-60	A-0	-	A-0 b/	*
開敞甲板處所 (10)	*	*	*	*	*	*	*	*	*	-

a 應用說明見規則45和46。

b 如果這些處所具有同一類別和出現了註有b的字樣，只有當採用不同用途的相鄰處所時才要求參閱這些表中所列等級的艙壁和甲板，例如在(9)類裏，在兩個廚房之間不必要求有艙壁分隔，但油漆間和廚房之間就要求有“A-0”級艙壁。

c 將操舵室、海圖室和無線電報室彼此分隔開的艙壁可以是“B-0”級。

d 在貨油泵艙和A類機器處所之間的艙壁和甲板可以讓貨油泵軸的填料涵蓋以及有填料的類似物體穿過，但是，必須在艙壁或甲板的穿洞部位裝有用有效潤滑或其他措施來保證永久性氣密的密封裝置。

e 經主管機關同意，對於很少或沒有失火危險的（7）類機器處所可以不設置耐火隔熱材料。

\* 表內出現星號的地方，其分隔要求用鋼或其他等效材料製成，但不要求它為“A”級標準。

## 規則 59

### 透氣、清除、除氣和通風

#### 1 貨油艙透氣

1.1 貨油艙的透氣系統應與船舶其他艙室的空氣管道完全隔開。凡貨油艙甲板上能散發出可燃氣體的開口，其佈置和部位應使可燃氣體進入含有着火源的圍蔽處所或積聚在可能構成着火危險的甲板機械和設備附近的可能性減至最小程度。

為此按照這一總的原則，如實施下列1.2至1.10款的規定。

1.2 透氣裝置的設計和操作應能保證貨油艙的壓力和真空都不超過設計參數，並足以使：

.1 在任何情況下，由於貨油艙內溫度變化所產生的少量氣體、空氣或惰性氣體混合物能流經壓力/真空閥；

.2 在裝貨油和壓載或卸油和卸載的過程中，大量的氣體、空氣或惰性氣體混合物能夠通過。

1.3.1 每一貨油艙的透氣裝置可以是獨立的，亦可以同其他貨油艙連在一起，並且可以與惰性氣體管系聯成一體。

1.3.2 如其裝置是與其他貨油艙連在一起時，應裝有截止閥或其他可接受的設施，以隔絕每一貨油艙。若安裝的是截止閥，它們應配備鎖閉裝置，並由高級負責船員控制。按照1.2.1款的規定，任何隔離措施須使由於貨油艙內溫度變化所產生的氣體等能繼續流通無阻。

1.4 透氣裝置應接至每一貨油艙的頂部，並在船舶處於縱傾和橫傾的所有正常情況下，應能自動排泄到貨油艙。如果不能裝設自動排泄管系，則應裝設永久性裝置，以使透氣管系排泄到貨油艙去。

1.5 透氣系統應設有裝置，以防止火焰進入貨油艙。這些裝置的設計、試驗和設置應符合主管機關所制訂的至少包括海協組織所通過的標準的各項要求。

1.6 應採取措施，以防止透氣系統內液體上升至可能超過貨油艙設計壓頭的高度。這一措施包括採用高液位警報、溢流控制系統或其他等效措施，以及測量裝置和貨油艙注油程序等所完成。

1.7 1.2.1款規定的壓力釋放口應為：

.1 具有高於貨油艙甲板儘可能大的高度，以獲得可燃氣體的最大擴散，但不得低於貨油艙甲板之上2米；

.2 佈置的距離儘可能最遠，但距通向含有着火源的圍蔽處所的最近進氣口和開口的和距可能構成着火危險的甲板機械和設備的距離，均不得少於5米。

1.8 當1.2.1款規定的壓力/真空閥位於透氣總管或桅桿式立管之內時，它們可以裝設旁通裝置。如設有上述裝置，則應有適當的指示器，以示明旁通裝置是否開啟還是關閉。

1.9 1.2.2款規定的用於貨油裝卸和壓載的透氣出口應為：

.1.1 能使氣體混合物自由流通；

.1.2 能使排泄氣體混合物的調節流速達到不小於30米/秒；

.2 佈置能傳氣體混合物垂直向上排出；

.3 如採用氣體混合物自由流通的方式，則其出口距離貨油艙甲板和前後舷梯的高度不得小於6米；倘若出口位於舷梯4米之內時，則距通向含有着火源的圍蔽處所的最近進氣口和開口的和距可能構成着火危險的甲板機械和設備的水平距離，均不得小於10米；

.4 如果採用高速排氣方法，其出口距離貨油艙甲板的高度應不小於2米，並距通向含有着火源的圍蔽處所的最近進氣口和開口的和距可能構

成着火危險的甲板機械和設備的水平距離，均不得小於10米。這些出口應設有認可型的高速裝置；

.5 為防止任何貨油艙的壓力超過設計壓力，並考慮到放氣情況，因此設計基礎應以最大設計裝油速率乘以至少1.25的系數。應向船長提供關於每一貨油艙最大許可裝油速率的資料，對於組合透氣系統來說，則應提供每一組貨油艙的資料。

1.10 對於混裝船舶，應以盲板法蘭將含有油類或油渣的污油艙與其他貨油艙加以隔離，這些法蘭當載運規則55.1所述液貨以外的貨物時應在所有時間保持在位。

## 2 貨油艙清除和/或除氣

貨油艙清除和/或除氣的佈置應能使由於大氣中可燃氣體的散佈和貨油艙內可燃混合氣體所造成的危險降至最低程度。因此：

.1 如船舶設有惰性氣體系統，應首先按照規則62.13的規定清除貨油艙氣體，直至貨油艙內碳氫氣體的濃度以體積計算降至少於2%為止，其後，可以在貨油艙甲板面上進行透氣。

.2 如船舶未設惰性氣體系統，則其操作應為初步排除可燃氣體：

.2.1 如1.9款所規定，通過透氣出口；

.2.2 以至少為20米/秒的垂直出氣速度，通過在貨油艙甲板之上至少為2米的出口，並且那些出口應有適當的防護裝置，以防止火焰通過。當出口處的可燃氣體濃度業已降至可燃下限的30%時，則可在貨油艙甲板面上進行排出氣體混合物。

## 3 通風

3.1 貨油泵艙應為機械通風，抽風機的排氣應予引至開敞甲板上的安全地點。這些艙室的通風能量應足以最大限度地降低可燃氣體積聚的可能性。根據該處所的總容積，換氣次數應至少為每小時20次。空氣導管

的佈置應使該處的所有空間均能得到有效通風。通風應為抽吸式，使用無火星型風機。

3.2 通風入口和出口以及甲板室和上層建築邊界處所上的其他開口，其佈置應與1款的規定相符。上述通風，尤其是機器處所的通風，應儘可能位於後部。

當船舶設有艙部裝卸貨油設備時，這一點應予適當考慮。諸如電氣設備一類的着火源，其佈置應避免發生爆炸危險。

3.3 對於混裝船舶，所有載貨處所及其相鄰的任何圍蔽處所均應進行機械通風。該通風可用可攜式風機進行通風。貨油泵艙、管道以及規則56.1所述的鄰接於污油艙的隔離室艙內，均應設置一認可的能監控可燃氣體的固定式氣體報警系統。佈置應適當，以便於測量貨油艙區域內其他所有處所的可燃氣體，測量應儘可能在開敞甲板上或易於到達的位置上進行。

## 規則60

### 貨油艙的保護

1 對於載重量為20,000噸及20,000噸以上的新油船，其貨油艙甲板區域和貨油艙的保護應按規則61及62的要求，通過裝設一個固定式甲板泡沫系統和一個固定式惰性氣體系統來獲得。但主管機關根據第一章規則5經考慮該船的佈置和設備後，可以同意採取其他能提供等效於上述系統的保護的固定式聯合裝置來代替上述裝置。

2 凡認為等效而建議用來代替甲板泡沫系統的系統，應：

- .1 能夠熄滅噴出的油火，並能阻止尚未燃燒的溢油着火；
- .2 能夠在破裂的貨油艙內撲滅火焰。



3 凡認為等效而建議用來代替固定式惰性氣體系統的系統，應：

.1 在空載正常航行的全航程中以及必要的艙內作業中，能防止爆炸性混合物在完整的貨油艙內作危險的積聚；

.2 設計成使該系統本身產生靜電而着火的危險減至最小程度。

4 在1984年9月1日以前建造，載重量為20,000噸或20,000噸以上從事於載運原油的油船，應裝有符合1款要求的一個惰性氣體系統，裝設日期不遲於：

.1 載重量為70,000噸或70,000噸以上的油船，1984年9月1日或竣工交船日期以兩者中較遲出現的日期為準；而

.2 載重量少於70,000噸的油船，1985年5月1日或竣工交船日期以兩者中較遲出現的日期為準，但是，對於載重量少於40,000噸未裝有自身出水量大於60立方米/小時洗艙機的油船，主管機關經考慮船舶的設計特點，認為實施這些要求是不合理、又不可行時，可以例外對此種油船免除這一款的要求。

5 在1984年9月1日以前建造、載重量為40,000噸或40,000噸以上從事於載運原油以外其他油類的油船，以及任何這種油船，其載重量為20,000噸或20,000噸以上從事於載運原油以外其他油類，並裝有自身出水量大於60立方米/小時洗艙機者，均應裝有符合1款要求的一個惰性氣體系統，裝設日期不遲於：

.1 載重量為70,000噸或70,000噸以上的油船，1984年9月1日或竣工交船日期兩者中以較遲出現的日期為準；而

.2 載重量少於70,000噸的油船，1985年5月1日或竣工交船日期兩者中以較遲出現的日期為準。

6 所有以使用原油為清洗貨油艙程序的油船應裝有符合規則62要求的一個惰性氣體系統和固定式貨油艙洗艙機。

7 所有裝有一個固定式惰性氣體系統的油船應配備閉式測量油艙液位系統。

8 載重量少於20,000噸的油船應配備一個符合規則61要求的泡沫系統。

## 規則61

### 固定式甲板泡沫系統

1 提供泡沫的設備應能將泡沫噴射到整個貨油艙區域並噴射到其甲板已經破裂的任何貨油艙內。

2 甲板泡沫系統應能使操作簡單而迅速。系統的主控制站應適當地位於貨油艙區域以外、鄰接於起居處所，並在被保護區域萬一失火時能易於到達和進行操縱的地點。

3 泡沫溶液的供給率不得少於下列數值中的最大值：

.1 按貨艙甲板面積：0.6升/分·平方米，此處貨艙甲板面積是指船舶最大寬度乘以貨油艙處所的縱向總長度；

.2 按單個具有最大這種面積的貨油艙的水平截面面積：6升/分·平方米；或

.3 按被最大炮式噴射器所保護並完全位於該噴射器前方的面積：3升/分·平方米，但不少於1,250升/分。

4 在引用3.1、3.2或3.3各款所規定的溶液供給率數值中的最大值時，應有足量的泡沫濃縮劑供應，以保證裝設了一個惰性氣體系統的油船能產生泡沫至少20分鐘，或者，保證沒有裝設惰性氣體系統的油船能產生泡沫至少30分鐘。

泡沫膨脹率（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。如本來就產生低膨脹泡沫的系統，但其膨脹率稍微超過12比1者，則所需的泡沫溶液的數量仍然按膨脹率為12比1的系統計算。當採用中等膨脹率的泡沫時（膨脹率在50比1至150比1之間），泡沫的噴射率和炮式噴射器的能量應取得主管機關同意。

5 來自固定式泡沫系統的泡沫，須用若干炮式噴射器和泡沫噴槍來供送。

每一炮式噴射器應至少供送3.1和3.2款所要求的泡沫噴射率的50%。對於載重量少於4,000噸的油船，主管機關可以不要求裝設炮式噴射器，而只要求裝設泡沫噴槍。但是，在這種情況下，每一噴槍的能量應至少是3.1和3.2款所要求的泡沫噴射率的25%。

6.1 炮式噴射器的數量和位置應符合1款的要求，任何一個炮式噴射器的能量應對由它保護、完全位於它的前方的甲板面積至少發射3升/分·平方米。這一能量不得低於1,250升/分。

6.2 從炮式噴射器到它前方所保護區域最遠端的距離，應不大於該炮式噴射器在平靜空氣中射程的75%。

7 車尾樓前端左右兩側或面向貨油艙甲板的起居處所的左右兩側應各裝設一具炮式噴射器和用於泡沫噴槍的軟管接頭。載重量少於4,000噸的油船，在尾樓前端左右兩側或面向貨油艙甲板的起居處所的左右兩側應各裝設一具用於泡沫噴槍的軟管接頭。

8 噴槍的裝設應保證在滅火操作中動作靈活，並覆蓋炮式噴射器保護不到的區域。任何噴槍的容量應不少於400升，在靜止空氣中噴槍的射程應不少於15米。裝設的泡沫噴槍數量不得少於四具。泡沫總管泡沫出口的數量和佈置應能使至少兩具噴槍將泡沫噴射到貨油艙甲板的任何區域。

9 為了隔離總管的損壞部分，泡沫總管和消防總管（後者如果是甲板泡沫系統整體的構成部分）均應裝有閥門，這些閥門應位於緊接任何炮式噴射器的前方。

10 按所需輸出量操作甲板泡沫系統時，須同時能從消防總管按所需壓力使用所需最少數目的水柱。

## 規則62

### 惰性氣體系統

1 規則60所提到的惰性氣體系統，從設計、構造和試驗均應使主管機關滿意。它的設計和操作應能導致並維持貨油艙\*內的大氣在任何時候不能着火，當需要這種艙排清油氣時除外。萬一惰性系統不能滿足上述規定的操作要求，並估計不能作有效修理時，那就只有在採取了惰性系統指南\*\*所規定的“緊急情況”措施後，才應重新繼續卸油、排除壓載和必要的貨油艙清洗工作。

2 該系統應能：

.1 通過降低每一個貨油艙大氣的含氧量到不能支持燃燒的水平而使空貨油艙惰化；

.2 在任何時候、在港內停泊和海上航行中，保持任何貨油艙內任何部分大氣的含氧量以體積計算不超過8%，並保持正壓；有必要排清貨油艙的油氣時除外。

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\* 在本規則內“貨油艙”這個詞也包括“含油污水艙”。

\*\* 參閱海上安全委員會 1980 年 5 月第四十二屆會議通過的（海安會/通函 282）惰性氣體系統指南。

.3 除有必要排清貨油艙的油氣外，在正常作業中應消除空氣進入貨油艙；

.4 掃清空貨油艙的碳氫化合物氣體，使後續的清除油氣工作永不在艙內產生可燃氣體。

3.1 該系統應能以船舶最大卸油率的125%的速率（以體積計算）向貨油艙輸送惰性氣體。

3.2 該系統應能以任何需要的流速，向貨油艙輸送惰性氣體，其在惰性氣體供氣總管內的含氧量（以體積計算）不超過5%。

4 惰性氣體的來源可以是主或副鍋爐的經過處理的煙道氣體。主管機關也可以允許系統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組合的煙道氣體，但必須達到等效的安全標準。這種系統應儘可能符合本規則的要求。不准使用儲備二氧化碳氣體，除非主管機關認為來自系統本身所產生的靜電着火危險已降至最小程度。

5 在鍋爐煙道與煙道氣體洗滌器之間的惰性氣體供氣總管上應裝設煙道氣體隔離閥。該閥應設有指示閥的開閉狀態的裝置，並在鍋爐吹灰器之間設有連鎖裝置或其他有效設施，以保證煙道氣體隔離閥打開時鍋爐吹灰器不能運轉，此外還應設有該閥的吹洗設施。

6.1 應裝設煙道氣體洗滌器，使其有效地冷卻3款所確定的整個氣體並清除其中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時並不妨礙船上其他任何有重要用途的供水。此外應配備冷卻水的備用供水裝置。

6.2 應裝設過濾器或等效設施，以儘量減少被帶到惰性氣體風機的水量。

6.3 洗滌器應位於所有貨油艙、貨油泵艙和將這些處所與A類機器處所分隔開的隔離空艙的後方。

7.1 應裝設至少兩個風機，在並用時它們應能向貨油艙至少輸送3款要求的惰性氣體體積。如果帶有氣體發生器的系統能輸出本規則第3條規定的氣體總量，則主管當局可允許只備一個風機。但船上應有風機及其發動機的足夠備件，以便船員在風機及其發動機發生故障時進行檢修。

7.2 惰性氣體發生器應裝有兩個燃油泵。在船上帶有燃油泵及其發動機的足夠備件以便船員在燃油泵及其發動機發生故障時可進行檢修的條件下，主管機關可允許只裝一個燃油泵。

7.3 惰性氣體系統的設計應使其作用在任何一個貨油艙的最大壓力不能超過該貨油艙的試驗壓力。在每一個風機的進、排氣口應裝有截止閥。應能使惰性氣體整台設備的功能在開始卸油以前能夠穩定運輸。如果將風機用於清除油氣，它們的新鮮空氣進口應裝有盲斷裝置。

7.4 風機應位於所有貨油艙、貨油泵艙和將這些處所與A類機器處所分隔開的隔離空艙的後方。

8.1 洗滌器和風機連同有關管系和附件的設計和位置應予以特別考慮，以防止煙道氣體滲漏到圍蔽的處所之內。

8.2 為了保證安全維護，應在煙道氣體隔離閥與洗滌器之間，或在洗滌器的煙道氣體入口處裝設一個附加水封裝置或其他能有效防止煙道氣體滲漏的有效設備。

9.1 在惰性氣體供氣總管上應裝設一個氣體調節閥。按照19.2和19.3兩款要求，這個閥應能自動控制到關閉。它也應能自動調節通往貨油艙的惰性氣體氣流，除非如7款所要求，裝有設備以自動控制惰性氣體風機的轉速。



9.2 在惰性氣體總管最前面的氣體安全處所\*的前艙壁處應裝設一個  
9.1款所述的氣體調節閥。

10.1 在惰性氣體供氣總管上，應裝設至少兩個止回裝置，其中之一應是一個水封，以便在船舶所有正常的縱傾、橫傾以及航行情況下，防止碳氫化合物氣體回流至機器處所的煙道，或回流到任何氣體安全處所。它們應位於9.1 款所要求的自動閥與通貨油艙或貨油管系最後方連接之間。

10.2 10.1款所述的裝置應位於貨油艙區域的甲板面上。

10.3 10.1款所述的水封應能由兩台獨立的泵供水，每一台應能連續保持足夠的供水量。

10.4 水封和它的附屬設備的佈置應能在各種工況下均能防止碳氫化合物氣體倒流，並能保證適當的密封作用。

10.5 應有確保防止水封被冰凍的措施，所採取的措施不能由於過熱而損壞水封的完整性。

10.6 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，應有防止上述環流水管被真空抽空的措施。

10.7 甲板水封和所有環流水管裝置應能防止碳氫化合物氣體在其壓力等於貨油艙的試驗壓力時回流。

10.8 第二個裝置應為止回閥或等效設備，應能防止氣體或液體倒流，其安裝位置應在10.1款所要求的甲板水封的前方。它應裝有可靠的關閉裝置。作為可靠的關閉裝置的替代，可以在止回閥的前方裝設一個附

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\* 油氣安全處所是這樣一個處所，碳氫化合物氣體進入它內部時，會產生着火或毒性方面的危險。



加的具有這種關閉設備的閥，以便將甲板水封與通往貨油艙惰性氣體總管隔離開來。

10.9 作為防止從甲板總管倒流來的碳氫化合物液體或氣體可能滲漏的一個附加措施應有透氣裝置以便當10.8款所述的具有可靠關閉裝置的閥關閉時，使該閥與9款所述的閥之間的管段，在閥的第一個被關閉時，能安全地透氣。

11.1 在10款所要求的止回裝置的前方，惰性氣體總管可以分成兩個或兩個以上的支管。

11.2.1 惰性氣體總管應裝有支管通向每一個貨油艙。惰性氣體支管應裝有截止閥或等效設施以隔離每一個貨油艙。如果裝的是截止閥，它們應設有鎖固裝置，這裝置由負責的高級船員控制。

11.2.2 對於油類/散裝兩用船，用以隔離含有來自其他艙櫃的油或油泥的含油污水艙的裝置應由盲板法蘭組成，在卸油類以外其他貨物時，這法蘭應在所有時間保持其位置，惰性氣體系統指南的有關段落另有規定者除外。

11.3 應裝有設備以保護貨油艙在被隔離於惰性氣體總管時受到因溫度變化而引起的超壓或真空的影響。

11.4 管系的設計應能在所有正常情況下防止貨油或水在管系內積聚。

11.5 應配備適當裝置使惰性氣體總管能與外界の惰性氣體供應管相連接。

12 用於排清所有在裝油和壓艙時所排出的氣體的裝置應符合規則59.1的規定，並應由一個或多個桅桿透氣管或多個高速出氣口組成。惰性氣體總管可以用於這種排氣。

13 用於2款所要求的空貨油艙惰性化、清掃或清除氣體的裝置應取得主管機關同意，這些裝置並應做到使碳氫化合物氣體在由貨油艙內部構件所形成的袋形空間的積聚降到最小程度，並且：

.1 在個別貨油艙的氣體出氣管（如果裝有）應儘可能位於遠離惰性氣體/空氣的進口，並應符合規則59.1的規定。這種出氣管的進氣口可以位於與甲板相平的高度或位於貨油艙底之上不超過1米。

.2 13.1款所述的這種出氣管的橫截面面積應是這樣：當同時向任何三個貨油艙供給惰性氣體時，出氣速度應至少為20米/秒。它們的出口伸延在甲板高度之上不應少於2米。

.3 13.2款所述的每一出氣口應裝有適當的盲斷裝置；

.4.1 如果在惰性氣體供氣總管與貨油管系之間裝有連接管，應有裝置來保證有效的隔離，這要注意到在兩個系統之間可能存在較大的壓力差。該裝置應有兩個截止閥組成，在兩閥之間具有安全方式的透氣裝置或為帶盲板裝置的短管組成。

.4.2 將惰性氣體供氣總管隔離於貨油總管、並且是位於貨油總管一側的閥應為帶有可靠關閉裝置的止回閥。

14.1 應在惰性氣體供氣總管上裝有一個或多個壓力 - 真空的休止裝置，以防止貨油艙遭受到：

.1 在以規定的最大速率裝貨油而所有其他出氣口被關閉時，超過貨油艙的試驗壓力的一個正壓；或

.2 在以貨油泵的最大額定功能卸貨油而惰性氣體噴射器失靈時，超過700毫米水柱壓力計的一個負壓。

14.2 14.1款所述的裝置的安裝位置和設計應符合規則59.1的規定。

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

16.1 當供給惰性氣體時應有儀錶連續指示和固定地記錄：

- .1 如10.1款所要求在止回裝置前方的惰性氣體供氣總管的壓力；和
- .2 在風機排氣端的惰性氣體供氣總管內惰性氣體的含氧量。

16.2 16.1款所述的裝置應安裝在貨油控制室內（如有此室）。但如果沒有貨油控制室，它們應安裝在負責貨油作業的高級船員容易到達的位置。

16.3 此外，應裝設下列儀錶：

.1 於駕駛台內，在全部時間指示16.1.1款所述的壓力，以及當含油污水艙被隔離於惰性氣體供氣總管時，顯示貨油/散貨兩用船的含油污水艙內的壓力；和

.2 於機器處所控制室或機器處所內，以顯示16.1.2款所述的含氧量。

17 應配備手提式儀器，用以測定氧氣和可燃氣體的濃度。此外，應在每一個貨油艙作出適當佈置，以便能使用這些手提式儀器來測定貨油艙大氣情況。

18 應配備適當裝置，用以校準16和17款所述的固定式和手提式氣體濃度測量儀錶的零位和刻度。

19.1 應裝設可視聽報警以顯示：

- .1 6.1款所述煙道氣體洗滌器的低水壓或低水流；
- .2 6.1款所述煙道氣體洗滌器內的高水位；
- .3 15款所述的氣體的高溫；
- .4 7款所述的惰性氣體風機的故障；
- .5 16.1.2款所述以體積計算含氧量超過8%；
- .6 9和16.1款所述的氣體調節閥自動控制系統和指示裝置的動力供應失靈；

.7 10.1款所述的水封內的低水位；

.8 16.1款所述的氣體壓力低於100毫米水柱。其報警裝置應保證油類/散裝兩用船的含油污水艙內的壓力在所有時間得到監控；以及

.9 16.1.1 款所述的氣體的高壓。

19.2 根據本規則19.1.1，19.1.3，19.1.5至19.1.9條，應給氣體發生器系統提供可視聽報警和附加的報警以顯示：

.1 燃油不足；

.2 發生器動力供應失靈；

.3 發生器自動控制系統動力供應失靈。

19.3 惰性氣體風機和氣體調節閥的自動關停應按照19.1.1、19.1.2和19.1.3款所述的預定極限值進行佈置。

19.4 氣體調節閥的自動關停應按照19.1.4款所述進行佈置。

19.5 按照19.1.5所述，當惰性氣體的含氧量超過8%時，應立即採取措施以改善氣體的性質。除非氣體的性質得到改善，不然所有貨油艙作業應予停止，以避免空氣被吸引到艙內，至於10.8款所述的隔離閥也應關閉。

19.6 19.1.5、19.1.6 和19.1.8所要求的報警應安裝在機器處所和貨油控制室（如有此室）之內，但在每一情況中，應安裝在使負責船員能立即收到警報位置。

19.7 關於19.1.7款所述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能自動形成水封，都應由主管機關核准。水封低水位的可視聽報警，在得不到惰性氣體供應時就應工作。

19.8 在裝設獨立於19.1.8款所要求的一個聲響報警系統或自動關停貨油泵裝置，它們應在惰性氣體供氣總管內達到事先制訂的低壓限額時進行工作。

20 在1984年9月1日以前建造、需要裝有惰性氣體系統的油船至少應該符合1974年國際海上人命安全公約\*第II-2章規則62的要求。此外，它們應符合本規則的要求，但下列事項除外：

.1 在1981年6月1日以前安裝在這種油船上的惰性氣體系統無須符合下列各款的要求：

3.2、6.3、7.4、8、9.2、10.2、10.7、10.9、11.3、11.4、13.2、13.4.2 和19.8；

.2 在1981年6月1日或以後安裝在這種油船上的惰性氣體系統無須符合下列各款的要求：3.2、6.3、7.4 和13.2。

21 船上應備有詳細的使用說明書，其內容包括操作方法、安全和維護要求以及惰性系統和將它運用於貨油艙系統\*有關的職業上對建康的危險。各說明書應包含萬一惰性氣體系統發生故障或失靈時所應遵循的程序指南。

### 規則63

#### 貨油泵艙

1 每一貨油泵艙應裝設下列固定式滅火系統之一，且可以在貨油泵艙外部一個隨時易於到達的位置進行操縱。貨油泵艙應裝設一個適合於A類機器處所的系統。

1.1 一個符合規則5規定的二氧化碳或鹵化烴系統，連同下列的：

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\* 以 1974 年國際海上人命安全會議所通過的文本為準。

\* 參閱海上安全委員會 1980 年 5 月第四十二屆會議通過的（海安會/通函 282）惰性氣體系統指南。

.1 符合規則5.1.6所述應能安全地用於可燃貨油氣體/空氣混合體中的報警；

.2 在控制部位顯示一個通告，說明由於靜電着火危險，這系統只能用於滅火而不能用於惰性目的。

1.2 符合規則9規定的一個高膨脹泡沫系統，且泡沫濃縮劑的供應應適宜於撲滅所載貨油的火災。

1.3 一個符合規則10規定的固定式壓力水霧系統。

2 如果用於貨油泵艙系統的滅火劑也用於為其他處所服務的系統，則所配備的滅火劑的量或其施放率無須多於最大艙室所需的最大用量。

### 第III章

#### 救生設備等

##### 規則1

##### 適用範圍

(c) (iii) (2) 項的現有文本用下文代替：

“(2) 規則II-2/28.1.5和II-2/28.1.6；和”

##### 規則27

##### 救生艇、救生筏和救生浮具

(c) (iii) 項中，提到“第II-1章規則1(d)款”之處修正為：

“規則II-1/1.5”

(c) (vii) 項中，提到“第II-1章規則1(d)款”之處修正為：  
“規則II-1/1.5”

### 規則30

#### 甲板、救生艇、救生筏等的照明

(a) 款中，提到“第II-1章規則25”之處修正為：  
“規則II-1/42”

### 規則38

#### 應急照明

提到“第II-1章規則26”之處修正為：  
“規則II-1/43”

## 第IV章

### 無線電報與無線電話

本章內增加下列新規則：



## 規則4-1

### 甚高頻無線電話設備

(a) 任何噸位的客船與300總噸及300總噸以上的貨船，應設置符合規則17規定的甚高頻無線電話設備。

(b) 規則17的規定也適用於締約國政府對於第V章所適用的在其主管水域內航行、而(a)款又未作強制要求的所有船舶的甚高頻無線電話設備。

規則7現有條文用下文取代：

## “規則7

### 無線電話值班

(a) 按照規則4設置無線電話台的每艘船舶，為了安全的目的，當該船在海上時，應在船上通常駕駛的地方，通過利用揚聲器、濾波揚聲器或無線電話自動報警器的無線電話遇險頻率值班收信機，在無線電話遇險頻率上保持連續值班。

(b) (a)款述及的每艘船舶應按下述配備合格的無線電話務員（該員可為船長、駕駛員或其他船員）：

(i) 如為300總噸及300總噸以上但小於500總噸時，至少一個話務員；

(ii) 如為500總噸及500總噸以上但小於1,600總噸時，至少兩個話務員。如果此種船上配備有一個專門履行有關無線電話職能的話務員，則無須強制配備第二個話務員。

(c) 按照規則3或規則4設置無線電報台的每艘船舶，當該船在海上時，應在船上由主管機構所確定的一個地方，通過利用揚聲器、濾波揚聲器或無線電報自動報警器的無線電話遇險頻率接收機，在無線電話遇險頻率上保持連續值班。”

規則8現有條文用下文取代：

### “規則8

#### 甚高頻無線電話值班

按照規則4-1設置甚高頻無線電話設備的每艘船舶，當在海上時，應在駕駛台上保持連續守聽值班：

- (i) 實際可行時，使用156.8MHz（16 頻道），和/或
- (ii) 按規則4-1（b）述及的締約國政府所可能要求的時間和頻率，保持守聽值班。”

### 規則10

#### 無線電報設備

(7) 款現有條文用下文取代：

“(g-1) 當主用及備用發信機連接於主用天線時，應具有下列最小正常射程，即在晝間以及正常情況和環境下，於所規定的射程內，\*它們

\* 在無場強的直接測量時，下列數據可作為近似地確定正常射程的參考。

A 非自撐式天線

註（續）：

正常射程海哩數	米-安培 <sup>1</sup>
200	128
175	102
150	76
125	58
100	45
75	34

<sup>1</sup> 天線最高部分至最深載重水線間距離（米）與天線電流（安培）的積。

表中第二欄所列數值，相當於下式比值的平均值：

$$\frac{\text{天線有效高度}}{\text{天線最大高度}} = 0.47$$

此比值隨天線附近情況而變，其變化範圍約在0.3與0.7之間。

B 自撐式發射天線

正常射程海哩數	米-安培 <sup>2</sup>
200	305
175	215
150	150
125	110
100	85
75	55

<sup>2</sup> 天線最高部分至最深載重水線間距離（米）與由天線發射部分底部量得的電流（安培）的積。第二欄所列數值係基於CCIR第368-2號建議案中的傳播曲線並根據CCIR第502-1號報告和第43-1號意見所述的方法、試驗結果與計算得出。米-安培這一必要的數值隨天線附近的情況而發生較大的變化。

應能在船與船之間發送清晰可辨的信號。（如收信機處的場強有效值至少為每米50微伏時，通常能收到清晰可辨的信號）。

	最小正常射程海哩數	
	主發信機	備用發信機
所有客船與1,600總噸及1,600總噸以上的貨船	150	100
1,600總噸以下的貨船	100	75

(g-2) 無線電報設備應包括在無線電話遇險頻率上進行無線電話發射和接收的設施。這一要求可通過在主用或備用設備或者其他安裝的設備中包括此類設施來實現。設備中無線電話部分如在1986年9月1日之後安裝，則其發信機功率和收信機靈敏度須分別符合規則16 (c) (i) 和 (f) 的規定。在此日期之前安裝的設備，此類發信機功率和收信機靈敏度應由主管機關確定。本規則所要求的無線電話設施的地點及其他情況應由主管機關確定，但當其構成主用或備用無線電報設備的一個部分時除外。

(h) (iv) 現有條文用下文取代：

“(h) (iv) (1) (g-2) 要求的無線電話發信設施，應有產生無線電話報警信號的自動裝置，其設計應能防止由於誤動作而開動，並應符合規則16 (e) 的要求。該設施應隨時能停止工作，以便能立即發送遇險通信。1986年9月1日之前安裝的設備，其產生無線電話報警信號自動裝置的設置應由主管機關確定。

(2) 應作好佈置，以便在遇險頻率以外的其他頻率上，使用一根適當的仿真天線，定期檢查產生無線電話報警信號的自動裝置是否正常工

作。對於只有無線電話遇險頻率的無線電話應急設備應視作例外，但此種情況下須採用適當的仿真天線。

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註：在採取所有合理步驟以保持裝置處於有效狀態的同時，本規則要求的無線電話發信設施功能失常，不得認作船舶不再適航，而在不能提供修理便利的港口亦不得作為拖延船舶在港的理由。”

刪去（1）（ii）現有條文。

（m）（iv）現有條文用下文取代：

“（m）（iv）按規則17（c）設置的甚高頻設備。”

## 規則16

### 無線電話設備

刪去A3H、A3A及A3J，以修正（b）的現有條文。

（c）的現有條文用下文取代：

“（c）（i）300總噸及300總噸以上但小於1,600總噸的貨船，其發信機應具有150海哩的最小正常射程，即在晝間以及正常情況和環境下，發信機應能在此射程\*範圍上，在船與船之間發送清晰可辨的信號。（如在收信機上，由未調製載波所產生的場強有效值對於雙邊帶和單邊帶全載波發射至少為每米25微伏時，通常能收到清晰可辨的信號。）

（ii）安裝在300總噸及300總噸以上但小於500總噸貨船上由雙邊帶發射的現有設備，其發信機的最小正常射程應至少為75海哩。”

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\* 在無場強測量時，如天線上的功率為 15 瓦特（未調製載波），且雙邊帶發射的天線效率為 27%，或以 100%單正弦振盪調製時單邊帶全載波發射包線峰值為 60 瓦時，則可假定獲得了此射

(j) (iv) 現有條文改成：

“ (iv) 按規則17 (c) 設置的甚高頻設備。”

規則17現有條文由下文取代：

## 規則17

### 甚高頻無線電話設備

(a) 甚高頻無線電話設備應符合本規則的規定位於船內上部並應包括一套發信機和收信機、能供其在額定功率上工作的電源以及適於在工作頻率上有效地發射和接收信號的天線。

(b) 在所有客船上，不管其大小如何以及在500總噸及500總噸以上的貨船上，應可由設置在船舶上部並至少能進行6小時有效工作的電源供電操作。

(c) 主管機關可授權以採用規則10 (m) 及規則16 (j) 述及的無線電報設備或無線電話設備的備用電源向甚高頻無線電話設備供電。在此情況下，備用電源應具有足夠能量以同時操作甚高頻無線電話設備和下述設備：

(i) 備用無線電報發信機和收信機至少工作6小時，但在裝有轉換裝置僅能確保交替工作者除外，或

(ii) 無線電話發信機和收信機至少工作6小時，但在裝有轉換裝置僅能確保交替工作者除外。

(d) 甚高頻無線電話設備應符合無線電規則為國際水上行動甚高頻無線電話業務所用設備所規定的要求，並應在無線電規則所規定的各頻道上和按規則4-1 (b) 述及的締約國政府可能要求的頻道上都能工作。\*

(e) 規則4-1 (b) 述及的締約國政府，不應要求發信機射頻載波的輸出功率大於10瓦特。天線應儘可能在所有方向不受遮擋。

(f) 為航行安全所需的頻道的控制，應在駕駛室內便於指揮的地點即刻可用；必要時，在駕駛室兩翼應有能進行無線電通信的設備。”

## 規則19

### 無線電日誌

下述段落加入現有條文，現有 (c) 重新編號為 (d)：

“(c) 每一根據規劃4-1設置甚高頻無線電話設備的船舶：

(i) 無線電規則所要求的記載事項應按主管機關要求記入無線電日誌；

(ii) 有關遇險、緊急和安全通航的所有通信的摘要應記入船舶日誌。

## 第 V 章

### 航行安全

規則12 的現有條文用下文取代：

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\* 作為參考，假設每艘船舶在高出水面 9.15 米的公稱高度處設有垂直極化單位增益天線、一個輸出功率為 10 瓦特的射頻發信機以及對於信噪比為 20 分貝的輸入端靈敏度為 2 毫伏的收信機。”



## 規則12

### 船用航海設備

(a) 在本規則範圍內，對於一艘船舶，“建造的”意謂相當於下述的某個建造階段：

(i) 安放龍骨；或

(ii) 相當於一艘具體船舶開始建造；或

(iii) 船舶至少不下於50噸或預計所有建造材料總量的1%的裝配已經開始，以小者為準。

(b) (i) 150總噸及150總噸以上的船舶均應裝設：

(1) 一具標準磁羅經，但符合(iv)款規定者除外；

(2) 一具電羅經，但在(1)項要求的標準羅經能提供艏向情況並使舵工在主操舵位置可以清楚地讀出的情況下可以除外；

(3) 標準羅經和正常控制航行的位置之間有為主管機關所滿意的足夠的通信手段；

(4) 在一個有360度弧度的平面上取得儘量接近實際的方位的手段。

(ii) (i) 款述及的各磁羅經應適當校正，並應隨時備有其剩餘偏差表或曲線。

(iii) 應配備一具能與標準羅經互換的備用磁羅經，但在設有(i) (2) 項提及的操舵羅經或羅經時除外。

(iv) 由於航程的性質、船舶接近陸地的情況或船舶類型的確無須標準羅經而在主管機關認為裝設此項設備為不合理或不必要時，可以對個

別船舶或某類船舶免除此類要求，但必須在任何情況下配備一個適當的操舵羅經。

(c) 150總噸以下的船舶，在主管機關認為合理及可行時，應裝設一具操舵羅經，同時應有取得方位的手段。

(d) 1984年9月1日或以後建造的500總噸及500總噸以上的船舶，應裝設一具符合下述要求的電羅經：

(i) 在主操舵位置上舵工可以清晰地讀出讀數的主電羅經或一具電羅經複示器；

(ii) 在1,600總噸及1,600總噸以上的船舶上應裝設一具或數具置於適當位置，以在一個有360度弧度的平面上取得儘量接近實際方位的電羅經複示器。

(e) 1984年9月1日之前建造、從事國際航行的1,600總噸及1,600總噸以上的船舶應裝設一具符合(d)款要求的電羅經。

(f) 在有應急操舵位置的船舶上，應有為此種位置提供艏向情況的裝置。

(g) 1984年9月1日或以後建造的500總噸及500總噸以上的船舶以及1984年9月1日以前建造的1,600總噸及1,600總噸以上的船舶，應裝設一台雷達裝置。

(h) 10,000總噸及10,000總噸以上的船舶均應裝設二台各自能獨立操作的雷達裝置。\*

(i) (g)款和(h)款要求裝設雷達裝置的每條船舶的駕駛室內應有便於標繪雷達讀數的設備。1984年9月1日或以後建造的每艘1,600總噸

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\* 參閱本組織通過的大會 477 (XII) 號決議，關於雷達裝置操作標準的建議案的第四節。

及1,600總噸以上的船舶，標繪雷達讀數的設備應至少與反射標圖儀一樣有效。

(j) (i) 下述船舶應設置一具自動雷達標圖儀：

(1) 1984年9月1日或以後建造的10,000總噸及10,000總噸以上的船舶；

(2) 1984年9月1日之前建造的油輪：

(aa) 總噸位為40,000及40,000以上者，〔1985年1月1日〕以前；

(bb) 總噸位為10,000及10,000以上但小於40,000者，〔1986年1月1日〕以前；

(3) 1984年9月1日以前建造的非油輪：

(aa) 總噸位為40,000及以上者，1986年9月1日以前；

(bb) 總噸位為20,000及以上但小於40,000者，1987年9月1日以前；

(cc) 總噸位為15,000及15,000以上但小於20,000者，1988年9月1日以前；

(ii) 1984年9月1日之前裝設、又不完全符合本組織通過的性能標準的自動雷達標圖儀，經主管機關考慮，可保留至1991年1月1日。

(iii) 主管機關在認為配備此類設備為不合理或不必要時，或當船舶在適當實施期二年之內將永久退役者，可以對此類船舶免除本款要求。

(k) 在1980年5月25日之前建造的1,600總噸及1,600總噸以上的船舶，以及在1980年5月25日或以後建造的500總噸及以上的船舶，當從事國際航行時，均應裝設一具回聲測聲儀。

(l) 在1984年9月1日或以後建造的500總噸及500總噸以上的船舶，當從事國際航行時，均應裝設指示速度和距離的儀器。(j)款要求裝設自動雷達標圖儀的船舶應裝設一台能通過水指示速度和距離的儀器。

(m) 在1984年9月1日之前建造的1,600總噸及1,600總噸以上的船舶以及在1984年9月1日或以後建造的500總噸及500總噸以上的船舶應裝設能顯示舵角及每個推進器轉速的指示器，此外，在裝有可變螺矩推進器或側推進器時，指示器應能顯示此類推進器的螺矩及工作方式。所有這些指示器均應在指揮的地點能夠讀數。

(n) 在1984年9月1日或以後建造的100,000總噸及100,000總噸以上的船舶，應裝設一具迴旋指示器。

(o) 除規則I/7(b)(ii)，I/8和I/9規定者外，在採取所有合理步驟以保持(d)至(n)款述及的裝置處於有效工作狀態的同時，設備的功能失常，不得認作船舶不再適航，而在不能提供修理便利的港口亦不得作為拖延船舶在港的理由。

(p) 1,600總噸以上的船舶，當從事國際航行時，應裝設符合規則IV/12(a)規定的無線電測向設備。主管機關在適當考慮了無線電測向設備既可作為一種航行儀器又可作為一種幫助測定其他船舶、飛機或救生艇筏位置的重要工具的事實以後，可以對5,000總噸的任何船舶免除此項要求。

(q) 在1980年5月25日或以後建造的1,600總噸及1,600總噸以上的船舶，當從事國際航行時，應裝設規則IV/12(b)有關規定中提的在無線電話遇險頻率上進行搜索的無線電設備。

(r) 按本規則裝設的所有設備，其型式應為主管機關所認可。在1984年9月1日或以後裝設在船上的設備應符合不低於本組織通過的相應的性能標準。對在有關性能標準通過以前裝設的設備，主管機關在適當

考慮了本組織可能通過的與有關標準相關的建議的衡準後，可以免除完全符合這些標準。

(s) 在本規則內，頂推船舶的剛性連結混合單元以及有關被頂推的船舶，當其設計成專用及一體的拖船和駁船時，應視作一艘船舶。

(t) 如果實施本規則的要求需要改變在1984年9月1日之前建造的船舶的結構，主管機關在考慮了這一船舶按目前規則要求的首次進乾塢的日期後，可允許將要求裝設的設備的期限延長至不遲於1989年9月1日。

(u) 除本規則其他地方另有規定外，任何從事航行的船舶，當其距陸地的最大距離、航行的距離和性質，大體上並無航行危險以及影響安全的其他情況決定其完全實施本規則為不合理或不必要時，主管機關可以對個別船舶進行部分或有條件的危險。當確定個別船舶是否給與免除時，主管機關應考慮到此種免除可能對所有其他船舶的安全所產生的影響。

## 規則16

### 救生信號

(d) 款現有條文由下文取代：

“(d) 飛機在進行搜索與營救工作中指引船舶駛向遇險的飛機、船舶或人員所用的信號：

(i) 飛機順序執行下列操作，表示它願意指引一艘水面船艇駛向一遇險的飛機或遇險的水面船艇。

(1) 環繞水面船艇飛行至少一次；

(2) 緊貼水面船艇艏前方低飛並橫越其航線的延伸方向，以及：

— 搖擺機翼；或

- 開閉節氣閥；或
- 變更推進器螺距；

（由於水面船艇的高噪音音頻，音響信號可能不如視覺信號有效並可視作吸引注意力的替代措施）。

（3）飛向指引水面船艇應前進的方向。

重複這些操作，其意義相同。

（ii）飛機執行下列操作表示已不再需要信號所指引的水面船艇提供援助：

緊貼水面船艇後身低飛並橫越該船艇的航跡，以及

- 搖擺機翼；或
- 開閉節氣閥；或
- 變更推進器螺距。

（由於水面船艇上的高噪音音頻，音響信號可能不如視覺信號有效並可視作吸引注意力的替代措施）。

註：對這些信號的變更將由本組織按需要預先發佈通告。

## 規則18

### 甚高頻無線電話

刪去本規則現有條文（見規則 IV/4-1（b））。

## 規則19

### 自動操舵儀的使用

將下述款加入現有條文：

(d) 在延長使用自動操舵儀之後以及在進入需要特別注意的航行區域之前，應對人工操舵進行測試。

將下述規則加入本章：

### 規則19-1

#### 操舵裝置的操作

在需要特別注意的航行區域，船舶應有一台以上能同時工作的操舵裝置的動力裝置進行工作。

### 規則19-2

#### 操舵裝置—測試及操演

(a) 船舶開航後十二個小時之內，應由船員對操舵裝置進行檢查和測試。測試程序在適當時應包括下述作業：

- (i) 主操舵裝置；
- (ii) 副操舵裝置；
- (iii) 操舵裝置遙控系統；
- (iv) 位於駕駛台內的操舵裝置；
- (v) 應急動力供應；



- (vi) 相對於舵的實際位置的舵角指示器；
- (vii) 操舵裝置遙控系統動力故障告警器；
- (viii) 操舵裝置動力裝置故障告警器；
- (ix) 自動隔斷裝置及其他自動設備。

(b) 檢查和測試應包括：

- (i) 根據操舵裝置所要求的能力的舵的全運動；
- (ii) 操舵裝置及其連結部件的直觀檢查；以及
- (iii) 駕駛台及操舵裝置室通信手段的工作情況。

(c) (i) 在駕駛台及操舵裝置室內應永久佈置顯示操舵裝置遙控系統和操舵裝置動力裝置轉換程序的簡單操作說明和方框圖。

(ii) 所有與操舵裝置的操作和維修有關的船舶駕駛員應熟悉裝設於船上的操舵系統的操作以及一個系統轉換到另一個系統的程序。

(d) 除 (b) 款所述的日常檢查和測試外，至少每三個月應進行一次應急操舵演習，以練習應急操舵程序。操演應包括在操舵裝置室內的直接控制，與駕駛台的通信程序，以及可行時的備用動力供應的操作。

(e) 對於從事定期短期航行的船舶，主管機關可取消進行 (a) 款和 (b) 款述及的進行檢查和測試的要求。這些船舶每周至少進行一次這樣的檢查和測試。

(f) 進行 (a) 款和 (b) 款述及的檢查和測試的日期以及進行 (d) 款述及的應急操舵裝置的演習的日期應按主管機關可能提出的要求載入航海日誌。

## 第VI章

### 穀物裝運

#### 第一節

##### 通則

規則1現有條文由下文取代：

##### 規則1

##### 適用範圍

除另有明文規定外，本章適用於現規則所適用的一切船舶的穀物裝運以及500總噸以下貨船的穀物裝運。

#### 第二節

##### 假定傾側力距的計算

#### 第五條

##### 現有船舶可替代的裝載佈置

##### (A) 總則

第二段修改如下：

“為本節的目的，“現有船舶”一詞指1980年5月25日以前安放龍骨的船舶”。

(B) 特別適合裝運穀物的船舶的裝載

(a) (ii) (2) 項現有條文由下文取代：

“ (2) 在部分裝載的艙間或貨艙內，穀物自由表面下沉和移動如 (1) 項所述，或移動到主管機關或代表主管機關的締約國政府認為必要的較大角度；如穀物表面加以堆裝，將散裝穀物整平並以袋裝穀物壓頂或以其他適當貨物緊密堆裝，則堆裝高度在由縱向艙壁或止移板分隔的處所應超出散裝穀物頂部不少於1.22米的距離；在並非此種分隔處所、而袋裝穀物或其他適當貨物由鋪於整個散裝穀物表面之上的適當平板支墊，而此種平板係由間隔不大於1.22米的承本組成，且又有25毫米的板條以不大於0.10米的間隔橫鋪其上或由堅固的分隔布覆蓋其上並有足夠重疊時，則移動到與原平整成水平的表面成8°傾角。在本項情況下，如設置止移板，可認為能限制穀物表面的橫向移動。”

AMENDMENTS TO THE INTERNATIONAL CONVENTION  
FOR THE SAFETY OF LIFE AT SEA, 1974

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**CHAPTER II-1. CONSTRUCTION – SUBDIVISION AND STABILITY, MACHINERY AND ELECTRICAL INSTALLATIONS**

The existing text of chapter II-1 is replaced by the following:

**PART A. GENERAL****Regulation 1. APPLICATION**

- 1.1. Unless expressly provided otherwise, this chapter shall apply to ships the keels of which are laid or which are at a similar stage of construction on or after 1 September 1984.
- 1.2. For the purpose of this Chapter, the term “a similar stage of construction” means the stage at which:
  1. Construction identifiable with a specific ship begins; and
  2. Assembly of that ship has commenced comprising at least 50 tonnes or one per cent of the estimated mass of all structural material, whichever is less.
- 1.3. For the purpose of this Chapter:
  1. The expression “ships constructed” means “ships the keels of which are laid or which are at a similar stage of construction”;
  2. The expression “all ships” means “ships constructed before, on or after 1 September 1984”;
  3. A cargo ship, whenever built, which is converted to a passenger ship shall be treated as a passenger ship constructed on the date on which such a conversion commences.



2. Unless expressly provided otherwise:

1. For ships constructed before 1 September 1984, the Administration shall ensure that subject to the provisions of paragraph 2.2 the requirements which are applicable under chapter 11-1 of the International Convention for the Safety of Life at Sea, 1974\* to new or existing ships as defined in that chapter are complied with;
2. For tankers constructed before 1 September 1984, the Administration shall ensure that the requirements which are applicable [under] chapter 11-1 of the annex to the Protocol of 1978<sup>1</sup> relating to the International Convention for the Safety of Life at Sea, 1974, as amended in 1981 to new or existing ships as defined in that chapter are complied with.
3. All ships which undergo repairs, alterations, modifications and outfitting related thereto shall continue to comply with at least the requirements previously applicable to these ships. Such ships if constructed before 1 September 1984 shall, as a rule, comply with the requirements for ships constructed on or after that date to at least the same extent as they did before undergoing such repairs, alterations, modifications or outfitting. Repairs, alterations and modifications of a major character and outfitting related thereto shall meet the requirements for ships constructed on or after 1 September 1984 in so far as the Administration deems reasonable and practicable.
4. The Administration of a State may, if it considers that the sheltered nature and conditions of the voyage are such as to render the application of any specific requirements of this chapter unreasonable or unnecessary, exempt from those requirements individual ships or classes of ships entitled to fly the flag of that State which, in the course of their voyage, do not proceed more than 20 miles from the nearest land.
5. Any passenger ship which is permitted under regulation III/27(c) to carry a number of persons in excess of the lifeboat capacity provided, shall comply with the special standards of subdivision set out in regulation 6.5, and the associated special provisions regarding permeability in Regulation 5.4, unless the Administration is satisfied that, having regard to the nature and conditions of the voyage, compliance with the other provisions of the Regulations of this chapter and chapter II-2 is sufficient.
6. In the case of passenger ships which are employed in special trades for the carriage of large numbers of special trade passengers, such as the pilgrim trade, the Administration of the State whose flag such ships are entitled to fly, if satisfied that it is impracticable to enforce compliance with the requirements of this Chapter, may exempt such ships from those requirements, provided that they comply fully with the provisions of:
  1. The Rules annexed to the Special Trade Passenger Ships Agreement, 1971; and
  2. The Rules annexed to the Protocol of Space Requirements for Special Trade Passenger Ships, 1973.

*Regulation 2. DEFINITIONS*

For the purpose of this chapter, unless expressly provided otherwise:

- 1.1. "Subdivision load line" is a water-line used in determining the subdivision of the ship.
- 1.2. "Deepest subdivision load line" is the water-line which corresponds to the greatest draught permitted by the subdivision requirements which are applicable.
2. "Length of the ship" is the length measured between perpendiculars taken at the extremities of the deepest subdivision load line.

\* The text as adopted by the International Conference on Safety of Life at Sea, 1974.

3. "Breadth of the ship" is the extreme width from outside of frame to outside of frame at or below the deepest subdivision load line.
4. "Draught" is the vertical distance from the moulded base line amidships to the subdivision load line in question.
5. "Bulkhead deck" is the uppermost deck up to which the transverse watertight bulkheads are carried.
6. "Margin line" is a line drawn at least 76 mm below the upper surface of the bulkhead deck at side.
7. "Permeability of a space" is the percentage of that space which can be occupied by water. The volume of a space which extends above the margin line shall be measured only to the height of that line.
8. "Machinery space" is to be taken as extending from the moulded base line to the margin line and between the extreme main transverse watertight bulkheads, bounding the spaces containing the main and auxiliary propulsion machinery, boilers serving the needs of propulsion, and all permanent coal bunkers. In the case of unusual arrangements, the Administration may define the limits of the machinery spaces.
9. "Passenger spaces" are those spaces which are provided for the accommodation and use of passengers, excluding baggage, store, provision and mail rooms. For the purposes of regulations 5 and 6, spaces provided below the margin line for the accommodation and use of the crew shall be regarded as passenger spaces.
10. In all cases volumes and areas shall be calculated to moulded lines.
11. "Weathertight" means that in any sea conditions water will not penetrate into the ship.

*Regulation 3. DEFINITIONS RELATING TO PARTS C, D AND E*

For the purpose of parts C, D and E, unless expressly provided otherwise:

1. "Steering gear control system" is the equipment by which orders are transmitted from the navigating bridge to the steering gear power units. Steering gear control systems comprise transmitters, receivers, hydraulic control pumps and their associated motors, motor controllers, piping and cables.
2. "Main steering gear" is the machinery, rudder actuators, steering gear power units, if any, and ancillary equipment and the means of applying torque to the rudder stock (e.g., tiller or quadrant) necessary for effecting movement of the rudder for the purpose of steering the ship under normal service conditions.
3. "Steering gear power unit" is:
  1. In the case of electric steering gear, an electric motor and its associated electrical equipment;
  2. In the case of electrohydraulic steering gear, an electric motor and its associated electrical equipment and connected pump;
  3. In the case of other hydraulic steering gear, a driving engine and connected pump.
4. "Auxiliary steering gear" is the equipment other than any part of the main steering gear necessary to steer the ship in the event of failure of the main steering gear but not including the tiller, quadrant or components serving the same purpose.
5. "Normal operational and habitable condition" is a condition under which the ship as a whole, the machinery, services, means and aids ensuring propulsion, ability to steer, safe navigation, fire and flooding safety, internal and external communications and signals, means of escape, and emergency boat winches, as well as the designed comfortable conditions of habitability are in working order and functioning normally.

6. “Emergency condition” is a condition under which any services needed for normal operational and habitable conditions are not in working order due to failure of the main source of electrical power.

7. “Main source of electrical power” is a source intended to supply electrical power to the main switchboard for distribution to all services necessary for maintaining the ship in normal operational and habitable conditions.

8. “Dead ship condition” is the condition under which the main propulsion plant, boilers and auxiliaries are not in operation due to the absence of power.

9. “Main generating station” is the space in which the main source of electrical power is situated.

10. “Main switchboard” is a switchboard which is directly supplied by the main source of electrical power and is intended to distribute electrical energy to the ship’s services.

11. “Emergency switchboard” is a switchboard which in the event of failure of the main electrical power supply system is directly supplied by the emergency source of electrical power or the transitional source of emergency power and is intended to distribute electrical energy to the emergency services.

12. “Emergency source of electrical power” is a source of electrical power, intended to supply the emergency switchboard in the event of failure of the supply from the main source of electrical power.

13. “Power actuating system” is the hydraulic equipment provided for supplying power to turn the rudder stock, comprising a steering gear power unit or units, together with the associated pipes and fittings, and a rudder actuator. The power actuating systems may share common mechanical components, i.e., tiller, quadrant and rudder stock, or components serving the same purpose.

14. “Maximum ahead service speed” is the greatest speed which the ship is designed to maintain in service at sea at the deepest sea-going draught.

15. “Maximum astern speed” is the speed which it is estimated the ship can attain at the designed maximum astern power at the deepest sea-going draught.

16. “Machinery spaces” are all machinery spaces of category A and all other spaces containing propelling machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air conditioning machinery, and similar spaces, and trunks to such spaces.

17. “Machinery spaces of category A” are those spaces and trunks to such spaces which contain:

1. Internal combustion machinery used for main propulsion; or
2. Internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW; or
3. Any oil-fired boiler or oil fuel unit.

18. “Control stations” are those spaces in which the ship’s radio or main navigating equipment or the emergency source of power is located or where the fire recording or [fire] control equipment is centralized.

19. “Chemical tanker” is a cargo ship constructed or adapted and used for the carriage in bulk of any liquid product listed in the summary of minimum requirements of the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk to be adopted by the Maritime Safety Committee under the authority of the Assembly of the Organization conferred by resolution A.490(XII) hereinafter referred to as “Bulk Chemical Code”, as may be amended by the Organization, or any liquid substance listed or provisionally assessed as

category A, B or C in appendix II to annex II of the International Convention for the Prevention of Pollution from Ships' in force.

20. "Gas carrier" is a cargo ship constructed or adapted and used for the carriage in bulk of any liquefied gas or other substance listed in chapter XIX of the Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk adopted by the Assembly of the Organization by resolution A.328(IX)<sup>2</sup>, hereinafter referred to as "Gas Carrier Code" as has been or may be amended by the Organization.

21. "Deadweight" is the difference in tonnes between the displacement of a ship in water of a specific gravity of 1.025 at the load water-line corresponding to the assigned summer freeboard and the lightweight of the ship.

22. "Lightweight" is the displacement of a ship in tonnes without cargo, fuel, lubricating oil, ballast water, fresh water and feedwater in tanks, consumable stores, and passengers and crew and their effects.

#### PART B. SUBDIVISION AND STABILITY\*

(Part B applies to passenger ships and to cargo ships, as indicated in the regulations)

##### *Regulation 4. FLOODABLE LENGTH IN PASSENGER SHIPS*

1. The floodable length at any point of the length of a ship shall be determined by a method of calculation which takes into consideration the form, draught [and] other characteristics of the ship in question.

2. In a ship with a continuous bulkhead deck, the floodable length at a given point is the maximum portion of the length of the ship, having its centre at the point in question, which can be flooded under the definite assumptions set forth in regulation 5 without the ship being submerged beyond the margin line.

3.1. In the case of a ship not having a continuous bulkhead deck, the floodable length at any point may be determined to an assumed continuous margin line which at no point is less than 76 mm below the top of the deck (at side) to which the bulkheads concerned and the shell are carried watertight.

3.2. Where a portion of an assumed margin line is appreciably below the deck to which bulkheads are carried, the Administration may permit a limited relaxation in the watertightness of those portions of the bulkheads which are above the margin line and immediately under the higher deck.

##### *Regulation 5. PERMEABILITY IN PASSENGER SHIPS*

1.1. The definite assumptions referred to in regulation 4 relate to the permeabilities of the spaces below the margin line.

1.2. In determining the floodable length, a uniform average permeability shall be used throughout the whole length of each of the following portions of the ship below the margin line:

- I. The machinery space as defined in regulation 2;
2. The portion forward of the machinery space; and
3. The portion abaft the machinery space.

\* Instead of the requirements in this part, the Regulations on Subdivision and Stability of Passenger Ships as an Equivalent to part B of chapter II of the International Convention for the Safety of Life at Sea, 1960, adopted by the Organization by resolution A.265(VIII), may be used, if applied in their entirety.

2.1. The uniform average permeability throughout the machinery space shall be determined from the formula:

$$85 + 10\left(\frac{a - c}{v}\right)$$

where:

- a = the volume of the passenger spaces, as defined in regulation 2, which are situated below the margin line within the limits of the machinery space;
- c = the volume of between deck spaces below the margin line within the limits of the machinery space which are appropriated to cargo, coal or stores;
- v = the whole volume of the machinery space below the margin line.

2.2. Where it is shown to the satisfaction of the Administration that the average permeability as determined by detailed calculation is less than that given by the formula, the detailed calculated value may be used. For the purpose of such calculation, the permeability of passenger spaces, as defined in regulation 2, shall be taken as 95, that of all cargo, coal and store spaces as 60, and that of double bottom, oil fuel and other tanks at such value as may be approved in each case.

3. Except as provided in paragraph 4, the uniform average permeability throughout the portion of the ship forward of or abaft the machinery space shall be determined from the formula:

$$63 + 35\frac{a}{v}$$

where:

- a = the volume of the passenger spaces, as defined in regulation 2, which are situated below the margin line, forward of or abaft the machinery space; and
- v = the whole volume of the portion of the ship below the margin line forward of or abaft the machinery space.

4.1. In the case of a ship which is permitted under regulation III/27(c) to carry a number of persons on board in excess of the lifeboat capacity provided, and is required under regulation 1.5 to comply with special provisions, the uniform average permeability throughout the portion of the ship forward of or abaft the machinery space shall be determined from the formula:

$$95 - 35\frac{b}{v}$$

where:

- b = the volume of the spaces below the margin line and above the tops of floors, inner bottom, or peak tanks, as the case may be, which are appropriated to and used as cargo spaces, coal or oil fuel bunkers, store-rooms, baggage and mail rooms, chain lockers and fresh water tanks, forward of or abaft the machinery space; and
- v = the whole volume of the portion of the ship below the margin line forward of or abaft the machinery space.

4.2. In the case of ships engaged on services where the cargo holds are not generally occupied by any substantial quantities of cargo, no part of the cargo spaces is to be included in calculating "b".

5. In the case of unusual arrangements the Administration may allow, or require, a detailed calculation of average permeability for the portions forward of or abaft the machinery space. For the purpose of such calculation, the permeability of passenger spaces as defined in regulation 2 shall be taken as 95, that of spaces containing machinery as 85, that of all cargo,



coal and store spaces as 60, and that of double bottom, oil fuel and other tanks at such value as may be approved in each case.

6. Where a between deck compartment between two watertight transverse bulkheads contains any passenger or crew space, the whole of that compartment, less any space completely enclosed within permanent steel bulkheads and appropriated to other purposes, shall be regarded as passenger space. Where, however, the passenger or crew space in question is completely enclosed within permanent steel bulkheads, only the space so enclosed need be considered as passenger space.

*Regulation 6. PERMISSIBLE LENGTH OF COMPARTMENTS IN PASSENGER SHIPS*

1. Ships shall be as efficiently subdivided as is possible having regard to the nature of the service for which they are intended. The degree of subdivision shall vary with the length of the ship and with the service, in such manner that the highest degree of subdivision corresponds with the ships of greatest length, primarily engaged in the carriage of passengers.

2. *Factor of subdivision*

2.1. The maximum permissible length of a compartment having its centre at any point in the ship's length is obtained from the floodable length by multiplying the latter by an appropriate factor called the factor of subdivision.

2.2. The factor of subdivision shall depend on the length of the ship, and for a given length shall vary according to the nature of the [service] for which the ship is intended. It shall decrease in a regular and continuous manner:

1. As the length of the ship increases, and
2. From a factor A, applicable to ships primarily engaged in the carriage of cargo, to a factor B, applicable to ships primarily engaged in the carriage of passengers.

2.3. The variations of the factors A and B shall be expressed by the following formulae (1) and (2) where L is the length of the ship as defined in regulation 2:

$$A = \frac{58.2}{L - 60} + .18 \text{ (L = 131 m and upwards)} \dots\dots\dots (1)$$

$$B = \frac{30.3}{L - 42} + .18 \text{ (L = 79 m and upwards)} \dots\dots\dots (2)$$

3. *Criterion of service*

3.1. For a ship of given length the appropriate factor of subdivision shall be determined by the criterion of service numeral (hereinafter called the criterion numeral) as given by the following formulae (3) and (4) where:

$C_s$  = the criterion numeral;

L = the length of the ship (metres), as defined in regulation 2;

M = the volume of the machinery space (cubic metres), as defined in regulation 2; with the addition thereto of the volume of any permanent oil fuel bunkers which may be situated above the inner bottom and forward or abaft the machinery space;

P = the whole volume of the passenger spaces below the margin line (cubic metres), as defined in regulation 2;

V = the whole volume of the ship below the margin line (cubic metres);

$P_1 = KN$  where:

N = the number of passengers for which the ship is to be certified, and

K = 0.056L.

3.2. Where the value of KN is greater than the sum of P and the whole volume of the actual passenger spaces above the margin line, the figure to be taken as P<sub>1</sub> is that sum or two-thirds KN, whichever is the greater.

When P<sub>1</sub> is greater than P:

$$C_s = 72 \frac{M + 2P_1}{V + P_1 - P} \dots\dots\dots (3)$$

and in other cases:

$$C_s = 72 \frac{M + 2P}{V} \dots\dots\dots (4)$$

3.3. For ships not having a continuous bulkhead deck the volumes are to be taken up to the actual margin lines used in determining the floodable lengths.

4. Rules for subdivision of ships other than those covered by paragraph 5

4.1. The subdivision abaft the forepeak of ships of 131 m in length and upwards having a criterion numeral of 23 or less shall be governed by the factor A given by formula (1); of those having a criterion numeral of 123 or more by the factor B given by formula (2); and of those having a criterion numeral between 23 and 123 by the factor F obtained by linear interpolation between the factors A and B, using the formula:

$$F = A - \frac{(A - B)(C_s - 23)}{100} \dots\dots\dots (5)$$

Nevertheless, where the criterion numeral is equal to 45 or more and simultaneously the computed factor of subdivision as given by formula (5) is .65 or less, but more than .50, the subdivision abaft the forepeak shall be governed by the factor .50.

4.2. Where the factor F is less than .40 and it is shown to the satisfaction of the Administration to be impracticable to comply with the factor F in a machinery compartment of the ship, the subdivision of such compartment may be governed by an increased factor, which, however, shall not exceed .40.

4.3. The subdivision abaft the forepeak of ships of less than 131 m but not less than 79 m in length having a criterion numeral equal to S, where:

$$S = \frac{3,574 - 25L}{13}$$

shall be governed by the factor unity; of those having a criterion numeral of 123 or more by the factor B given by the formula (2); of those having a criterion numeral between S and 123 by the factor F obtained by linear interpolation between unity and the factor B using the formula:

$$F = 1 - \frac{(1 - B)(C_s - S)}{123 - S} \dots\dots\dots (6)$$

4.4. The subdivision abaft the forepeak of ships of less than 131 m but not less than 79 m in length and having a criterion numeral less than S, and of ships of less than 79 m in length shall be governed by the factor unity, unless, in either case, it is shown to the satisfaction of the Administration to be impracticable to comply with this factor in any part of the ship, in which case the Administration may allow such relaxation as may appear to be justified, having regard to all the circumstances.

4.5. The provisions of paragraph 4.4 shall apply also to ships of whatever length, which are to be certified to carry a number of passengers exceeding 12 but not exceeding:

$$\frac{L_2}{650}, \text{ or } 50, \text{ whichever is the less.}$$



5. *Special standards of subdivision for ships which are permitted under regulation III/27(c) to carry a number of persons on board in excess of the lifeboat capacity provided and are required under regulation 1.5 to comply with special provisions*

5.1.1. In the case of ships primarily engaged in the carriage of passengers, the subdivision abaft the forepeak shall be governed by a factor of .50 or by the factor determined according to paragraphs 3 and 4, if less than .50.

5.1.2. In the case of such ships of less than 91.5 m in length, if the Administration is satisfied that compliance with such factor would be impracticable in a compartment, it may allow the length of that compartment to be governed by a higher factor provided the factor used is the lowest that is practicable and reasonable in the circumstances.

5.2. Where, in the case of any ship whether of less than 91.5 m or not, the necessity of carrying appreciable quantities of cargo makes it impracticable to require the subdivision abaft the forepeak to be governed by a factor not exceeding .50, the standard of subdivision to be applied shall be determined in accordance with the following sub-paragraphs 1 to 5, subject to the condition that where the Administration is satisfied that insistence on strict compliance in any respect would be unreasonable, it may allow such alternative arrangement of the watertight bulkheads as appears to be justified on merits and will not diminish the general effectiveness of the subdivision.

1. The provisions of paragraph 3 relating to the criterion numeral shall apply with the exception that in calculating the value of  $P_1$  for berthed passengers  $K$  is to have the value defined in paragraph 3, or  $3.5 \text{ m}^3$ , whichever is the greater, and for unberthed passengers  $K$  is to have the value  $3.5 \text{ m}^3$ .

2. The factor  $B$  in paragraph 2 shall be replaced by the factor  $BB$  determined by the following formula:

$$BB = \frac{17.6}{L - 33} + .20 \quad (L = 55 \text{ and upwards})$$

3. The subdivision abaft the forepeak of ships of 131 m in length and upwards having a criterion numeral of 23 or less shall be governed by the factor  $A$  given by formula (1) in paragraph 2.3; of those having a criterion numeral of 123 or more by the factor  $BB$  given by the formula in paragraph 5.2.2; and of those having a criterion numeral between 23 and 123 by the factor  $F$  obtained by linear interpolation between the factors  $A$  and  $BB$ , using the formula:

$$F = A - \frac{(A - BB)(C_s - 23)}{100}$$

except that if the factor  $F$  so obtained is less than .50 the factor to be used shall be either .50 or the factor calculated according to the provisions of paragraph 4.1, whichever is the smaller.

4. The subdivision abaft the forepeak of ships of less than 131 m but not less than 55 m in length having a criterion numeral equal to  $S_1$  where:

$$S_1 = \frac{3,712 - 25L}{19}$$

shall be governed by the factor unity; of those having a criterion numeral of 123 or more by the factor  $BB$  given by the formula in paragraph 5.2.2; of those having a criterion numeral between  $S_1$  and 123 by the factor  $F$  obtained by linear interpolation between unity and the factor  $BB$  using the formula:

$$F = 1 - \frac{(1 - BB)(C_s - S_1)}{123 - S_1}$$

except that in either of the two latter cases if the factor so obtained is less than .50 the subdivision may be governed by a factor not exceeding .50.

5. The subdivision abaft the forepeak of ships of less than 131 m but not less than 55 m in length and having a criterion numeral less than  $S_1$  and of ships of less than 55 m in length shall be governed by the factor unity, unless it is shown to the satisfaction of the Administration to be impracticable to comply with this factor in particular compartments, in which event the Administration may allow such relaxations in respect of those compartments as appear to be justified, having regard to all the circumstances, provided that the aftermost compartment and as many as possible of the forward compartments (between the forepeak and the after end of the machinery space) shall be kept within the floodable length.

*Regulation 7. SPECIAL REQUIREMENTS CONCERNING PASSENGER SHIP SUBDIVISION*

1. Where in a portion or portions of a ship the watertight bulkheads are carried to a higher deck than in the remainder of the ship and it is desired to take advantage of this higher extension of the bulkheads in calculating the floodable length, separate margin lines may be used for each such portion of the ship provided that:

1. The sides of the ship are extended throughout the ship's length to the deck corresponding to the upper margin line and all openings in the shell plating below this deck throughout the length of the ship are treated as being below a margin line, for the purposes of regulation 17; and
2. The two compartments adjacent to the "step" in the bulkhead deck are each within the permissible length corresponding to their respective margin lines, and, in addition, their combined length does not exceed twice the permissible length based on the lower margin line.

2.1. A compartment may exceed the permissible length determined by the rules of regulation 6 provided the combined length of each pair of adjacent compartments to which the compartment in question is common does not exceed either the floodable length or twice the permissible length, whichever is the less.

2.2. If one of the two adjacent compartments is situated inside the machinery space, and the second is situated outside the machinery space, and the average permeability of the portion of the ship in which the second is situated differs from that of the machinery space, the combined length of the two compartments shall be adjusted to the mean average permeability of the two portions of the ship in which the compartments are situated.

2.3. Where the two adjacent compartments have different factors of subdivision, the combined length of the two compartments shall be determined proportionately.

3. In ships of 100 m in length and upwards, one of the main transverse bulkheads abaft the forepeak shall be fitted at a distance from the forward perpendicular which is not greater than the permissible length.

4. A main transverse bulkhead may be recessed provided that all parts of the recess lie in-board of vertical surfaces on both sides of the ship, situated at a distance from the shell plating equal to one-fifth the breadth of the ship, as defined in regulation 2, and measured at right angles to the centre line at the level of the deepest subdivision load line. Any part of a recess which lies outside these limits shall be dealt with as a step in accordance with paragraph 5.

5. A main transverse bulkhead may be stepped provided that it meets one of the following conditions:

1. The combined length of the two compartments, separated by the bulkhead in question, does not exceed either 90 per cent of the floodable length or twice the permissible length, except that, in ships having a factor of subdivision greater than .9, the combined length of the two compartments in question shall not exceed the permissible length;
2. Additional subdivision is provided in way of the step to maintain the same measure of safety as that secured by a plane bulkhead;
3. The compartment over which the step extends does not exceed the permissible length corresponding to a margin line taken 76 mm below the step.

6. Where a main transverse bulkhead is recessed or stepped, an equivalent plane bulkhead shall be used in determining the subdivision.

7. If the distance between two adjacent main transverse bulkheads, or their equivalent plane bulkheads, or the distance between the transverse planes passing through the nearest stepped portions of the bulkheads, is less than 3.0 m plus 3 per cent of the length of the ship, or 11.0 m whichever is the less, only one of these bulkheads shall be regarded as forming part of the subdivision of the ship in accordance with the provisions of regulation 6.

8. Where a main transverse watertight compartment contains local subdivision and it can be shown to the satisfaction of the Administration that, after any assumed side damage extending over a length of 3.0 m plus 3 per cent of the length of the ship, or 11.0 m whichever is the less, the whole volume of the main compartment will not be flooded, a proportionate allowance may be made in the permissible length otherwise required for such compartment. In such a case the volume of effective buoyancy assumed on the undamaged side shall not be greater than that assumed on the damaged side.

9. Where the required factor of subdivision is .50 or less, the combined length of any two adjacent compartments shall not exceed the floodable length.

*Regulation 8. STABILITY OF PASSENGER SHIPS IN DAMAGED CONDITION*

1.1. Sufficient intact stability shall be provided in all service conditions so as to enable the ship to withstand the final stage of flooding of any one main compartment which is required to be within the floodable length.

1.2. Where two adjacent main compartments are separated by a bulkhead which is stepped under the conditions of regulation 7.5.1 the intact stability shall be adequate to withstand the flooding of those two adjacent main compartments.

1.3. Where the required factor of subdivision is .50 or less but more than .33 intact stability shall be adequate to withstand the flooding of any two adjacent main compartments.

1.4. Where the required factor of subdivision is .33 or less the intact stability shall be adequate to withstand the flooding of any three adjacent main compartments.

2.1. The requirements of paragraph 1 shall be determined by calculations which are in accordance with paragraphs 3, 4 and 6 and which take into consideration the proportions and design characteristics of the ship and the arrangement and configuration of the damaged compartments. In making these calculations the ship is to be assumed in the worst anticipated service condition as regards stability.

2.2. Where it is proposed to fit decks, inner skins or longitudinal bulkheads of sufficient tightness to seriously restrict the flow of water the Administration shall be satisfied that proper consideration is given to such restrictions in the calculations.

2.3. In cases where the Administration considers the range of stability in the damaged condition to be doubtful, it may require investigation thereof.

3. For the purpose of making damage stability calculations the volume and surface permeabilities shall be in general as follows:

<i>Spaces</i>	<i>Permeability</i>
Appropriated to cargo, coal or stores	60
Occupied by accommodation	95
Occupied by machinery	85
Intended for liquids	0 or 95*

\*Whichever results in the more severe requirements.

Higher surface permeabilities are to be assumed in respect of spaces which, in the vicinity of the damage waterplane, contain no substantial quantity of accommodation or machinery and spaces which are not generally occupied by any substantial quantity of cargo or stores.

4. Assumed extent of damage shall be as follows:

1. Longitudinal extent: 3.0 m plus 3 per cent of the length of the ship, or 11.0 m whichever is the less. Where the required factor of subdivision is .33 or less the assumed longitudinal extent of damage shall be increased as necessary so as to include any two consecutive main transverse watertight bulkheads;
2. Transverse extent (measured inboard from the ship's side, at right angles to the centre line at the level of the deepest subdivision load line): a distance of one-fifth of the breadth of the ship, as defined in regulation 2; and
3. Vertical extent: from the base line upwards without limit;
4. If any damage of lesser extent than that indicated in paragraphs 4.1, 4.2 and 4.3 would result in a more severe condition regarding heel or loss of metacentric height, such damage shall be assumed in the calculations.

5. Unsymmetrical flooding is to be kept to a minimum consistent with efficient arrangements. Where it is necessary to correct large angles of heel, the means adopted shall, where practicable, be self-acting, but in any case where controls to cross-flooding fittings are provided they shall be operable from above the bulkhead deck. These fittings together with their controls as well as the maximum heel before equalization shall be acceptable to the Administration. Where cross-flooding fittings are required the time for equalization shall not exceed 15 minutes. Suitable information concerning the use of cross-flooding fittings shall be supplied to the master of the ship.\*

6. The final conditions of the ship after damage and, in the case of unsymmetrical flooding, after equalization measures have been taken shall be as follows:

1. In the case of symmetrical flooding there shall be a positive residual metacentric height of at least 50 mm as calculated by the constant displacement method;
2. In the case of unsymmetrical flooding the total heel shall not exceed 7°, except that, in special cases, the Administration may allow additional heel due to the unsymmetrical moment, but in no case shall the final heel exceed 15°;
3. In no case shall the margin line be submerged in the final stage of flooding. If it is considered that the margin line may become submerged during an intermediate stage of flooding, the Administration may require such investigations and arrangements as it considers necessary for the safety of the ship.

7. The master of the ship shall be supplied with the data necessary to maintain sufficient intact stability under service conditions to enable the ship to withstand the critical damage. In the case of ships requiring cross-flooding the master of the ship shall be informed of the conditions of stability on which the calculations of heel are based and be warned that excessive heeling might result should the ship sustain damage when in a less favourable condition.

8.1. No relaxation from the requirements for damage stability may be considered by the Administration unless it is shown that the intact metacentric height in any service condition necessary to meet these requirements is excessive for the service intended.

8.2. Relaxations from the requirements for damage stability shall be permitted only in exceptional cases and subject to the condition that the Administration is to be satisfied that the proportions, arrangements and other characteristics of the ship are the most favourable to stability after damage which can practically and reasonably be adopted in the particular circumstances.

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\* Reference is made to the Recommendation on a Standard Method for Establishing Compliance with the Requirements for Cross-Flooding Arrangements in Passenger Ships, adopted by the Organization by resolution A.266(VIII).



**Regulation 9. BALLASTING OF PASSENGER SHIPS**

1. Water ballast should not in general be carried in tanks intended for oil fuel. In ships in which it is not practicable to avoid putting water in oil fuel tanks, oily-water separating equipment to the satisfaction of the Administration shall be fitted, or other alternative means, such as discharge to shore facilities, acceptable to the Administration shall be provided for disposing of the oily-water ballast.

2. The provisions of this regulation are without prejudice to the provisions of the International Convention for the Prevention of Pollution from Ships in force.

**Regulation 10. PEAK AND MACHINERY SPACE BULKHEADS, SHAFT TUNNELS, ETC.  
IN PASSENGER SHIPS**

1. A forepeak or collision bulkhead shall be fitted which shall be watertight up to the bulkhead deck. This bulkhead shall be located at a distance from the forward perpendicular of not less than 5 per cent of the length of the ship and not more than 3 m plus 5 per cent of the length of the ship.

2. Where any part of the ship below the water-line extends forward of the forward perpendicular, e.g., a bulbous bow, the distances stipulated in paragraph 1 shall be measured from a point either:

1. At the mid-length of such extension; or
  2. At a distance 1.5 per cent of the length of the ship forward of the forward perpendicular; or
  3. At a distance 3 m forward of the forward perpendicular;
- whichever gives the smallest measurement.

3. Where a long forward superstructure is fitted, the forepeak or collision bulkhead shall be extended weathertight to the deck next above the bulkhead deck. The extension need not be fitted directly above the bulkhead below provided it is located within the limits specified in paragraph 1 or 2 with the exemption permitted by paragraph 4 and the part of the deck which forms the step is made effectively weathertight.

4. Where bow doors are fitted and a sloping loading ramp forms part of the extension of the collision bulkhead above the bulkhead deck the part of the ramp which is more than 2.3 m above the bulkhead deck may extend forward of the limit specified in paragraphs 1 and 2. The ramp shall be weathertight over its complete length.

5. An afterpeak bulkhead, and bulkheads dividing the machinery space, as defined in regulation 2, from the cargo and passenger spaces forward and aft, shall also be fitted and made watertight up to the bulkhead deck. The afterpeak bulkhead may, however, be stepped below the bulkhead deck, provided the degree of safety of the ship as regards subdivision is not thereby diminished.

6. In all cases stern tubes shall be enclosed in watertight spaces of moderate volume. The stern gland shall be situated in a watertight shaft tunnel or other watertight space separate from the stern tube compartment and of such volume that, if flooded by leakage through the stern gland, the margin line will not be submerged.

**Regulation 11. COLLISION BULKHEADS IN CARGO SHIPS**

1. For the purpose of this regulation, "freeboard deck", "length of ship" and "forward perpendicular" have the meanings as defined in the International Convention on Load Lines in force.

2. A collision bulkhead shall be fitted which shall be watertight up to the freeboard deck. This bulkhead shall be located at a distance from the forward perpendicular of not less than 5 per cent of the length of the ship or 10 m, whichever is the less, and, except as may be permitted by the Administration, not more than 8 per cent of the length of the ship.

3. Where any part of the ship below the water-line extends forward of the forward perpendicular, e.g., a bulbous bow, the distances stipulated in paragraph 2 shall be measured from a point either:

1. At the mid-length of such extension; or
  2. At a distance 1.5 per cent of the length of the ship forward of the forward perpendicular; or
  3. At a distance 3 m forward of the forward perpendicular;
- whichever gives the smallest measurement.

4. The bulkhead may have steps or recesses provided they are within the limits prescribed in paragraph 2 or 3. Pipes piercing the collision bulkhead shall be fitted with suitable valves operable from above the freeboard deck and the valve chest shall be secured at the bulkhead inside the forepeak. The valves may be fitted on the after side of the collision bulkhead provided that the valves are readily accessible under all service conditions and the space in which they are located is not a cargo space. All valves shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable. No door, manhole, ventilation duct or any other opening shall be fitted in this bulkhead.

5. Where a long forward superstructure is fitted the collision bulkhead shall be extended weathertight to the deck next above the freeboard deck. The extension need not be fitted directly above the bulkhead below provided it is located within the limits prescribed in paragraph 2 or 3 with the exemption permitted by paragraph 6 and the part of the deck which forms the step is made effectively weathertight.

6. Where bow doors are fitted and a sloping loading ramp forms part of the extension of the collision bulkhead above the freeboard deck the part of the ramp which is more than 2.3 m above the freeboard deck may extend forward of the limit specified in paragraph 2 or 3. The ramp shall be weathertight over its complete length.

7. The number of openings in the extension of the collision bulkhead above the freeboard deck shall be restricted to the minimum compatible with the design and normal operation of the ship. All such openings shall be capable of being closed weathertight.

#### *Regulation 12. DOUBLE BOTTOMS IN PASSENGER SHIPS*

1. A double bottom shall be fitted extending from the forepeak bulkhead to the afterpeak bulkhead as far as this is practicable and compatible with the design and proper working of the ship.

1. In ships of 50 m and upwards but less than 61 m in length a double bottom shall be fitted at least from the machinery space to the forepeak bulkhead, or as near thereto as practicable.
2. In ships of 61 m and upwards but less than 76 m in length a double bottom shall be fitted at least outside the machinery space, and shall extend to the fore and after peak bulkheads, or as near thereto as practicable.
3. In ships of 76 m in length and upwards, a double bottom shall be fitted amidships, and shall extend to the fore and after peak bulkheads, or as near thereto as practicable.

2. Where a double bottom is required to be fitted its depth shall be to the satisfaction of the Administration and the inner bottom shall be continued out to the ship's sides in such a manner as to protect the bottom to the turn of the bilge. Such protection will be deemed satisfactory if the line of intersection of the outer edge of the margin plate with the bilge plating is not lower at any part than a horizontal plane passing through the point of intersection with the frame line amidships of a transverse diagonal line inclined at 25° to the base line and cutting it at a point one-half the ship's moulded breadth from the middle line.

3. Small wells constructed in the double bottom in connexion with drainage arrangements of holds, etc., shall not extend downwards more than necessary. The depth of the well shall in no case be more than the depth less 460 mm of the double bottom at the centre line,

nor shall the well extend below the horizontal plane referred to in paragraph 2. A well extending to the outer bottom is, however, permitted at the after end of the shaft tunnel. Other wells (e.g., for lubricating oil under main engines) may be permitted by the Administration if satisfied that the arrangements give protection equivalent to that afforded by a double bottom complying with this regulation.

4. A double bottom need not be fitted in way of watertight compartments of moderate size used exclusively for the carriage of liquids, provided the safety of the ship, in the event of bottom or side damage, is not, in the opinion of the Administration, thereby impaired.

5. In the case of ships to which the provisions of regulation 1.5 apply and which are engaged on regular service within the limits of a short international voyage as defined in regulation III/2, the Administration may permit a double bottom to be dispensed with in any part of the ship which is subdivided by a factor not exceeding .50, if satisfied that the fitting of a double bottom in that part would not be compatible with the design and proper working of the ship.

*Regulation 13. ASSIGNING, MARKING AND RECORDING OF SUBDIVISION LOAD LINES  
FOR PASSENGER SHIPS*

1. In order that the required degree of subdivision shall be maintained, a load line corresponding to the approved subdivision draught shall be assigned and marked on the ship's sides. A ship having spaces which are specially adapted for the accommodation of passengers and the carriage of cargo alternatively may, if the owners desire, have one or more additional load lines assigned and marked to correspond with the subdivision draughts which the Administration may approve for the alternative service conditions.

2. The subdivision load lines assigned and marked shall be recorded in the Passenger Ship Safety Certificate, and shall be distinguished by the notation C.1 for the principal passenger condition, and C.2, C.3, etc. for the alternative conditions.

3. The freeboard corresponding to each of these load lines shall be measured at the same position and from the same deck line as the freeboards determined in accordance with the International Convention on Load Lines in force.

4. The freeboard corresponding to each approved subdivision load line and the conditions of service for which it is approved, shall be clearly indicated on the Passenger Ship Safety Certificate.

5. In no case shall any subdivision load line mark be placed above the deepest load line in salt water as determined by the strength of the ship or the International Convention on Load Lines in force.

6. Whatever may be the position of the subdivision load line marks, a ship shall in no case be loaded so as to submerge the load line mark appropriate to the season and locality as determined in accordance with the International Convention on Load Lines in force.

7. A ship shall in no case be so loaded that when it is in salt water the subdivision load line mark appropriate to the particular voyage and condition of service is submerged.

*Regulation 14. CONSTRUCTION AND INITIAL TESTING OF WATERTIGHT BULKHEADS, ETC.,  
IN PASSENGER SHIPS AND CARGO SHIPS*

1. Each watertight subdivision bulkhead, whether transverse or longitudinal, shall be constructed in such a manner that it shall be capable of supporting, with a proper margin of resistance, the pressure due to the maximum head of water which it might have to sustain in the event of damage to the ship but at least the pressure due to a head of water up to the margin line. The construction of these bulkheads shall be to the satisfaction of the Administration.

2.1. Steps and recesses in bulkheads shall be watertight and as strong as the bulkhead at the place where each occurs.



2.2. Where frames or beams pass through a watertight deck or bulkhead, such deck or bulkhead shall be made structurally watertight without the use of wood or cement.

3. Testing main compartments by filling them with water is not compulsory. When testing by filling with water is not carried out, a hose test is compulsory; this test shall be carried out in the most advanced stage of the fitting out of the ship. In any case, a thorough inspection of the watertight bulkheads shall be carried out.

4. The forepeak, double bottoms (including duct keels) and inner skins shall be tested with water to a head corresponding to the requirements of paragraph 1.

5. Tanks which are intended to hold liquids, and which form part of the subdivision of the ship, shall be tested for tightness with water to a head up to the deepest subdivision load line or to a head corresponding to two-thirds of the depth from the top of keel to the margin line in way of the tanks, whichever is the greater; provided that in no case shall the test head be less than 0.9 m above the top of the tank.

6. The tests referred to in paragraphs 4 and 5 are for the purpose of ensuring that the subdivision structural arrangements are watertight and are not to be regarded as a test of the fitness of any compartment for the storage of oil fuel or for other special purposes for which a test of a superior character may be required depending on the height to which the liquid has access in the tank or its connexions.

*Regulation 15. OPENINGS IN WATERTIGHT BULKHEADS IN PASSENGER SHIPS*

1. The number of openings in watertight bulkheads shall be reduced to the minimum compatible with the design and proper working of the ship; satisfactory means shall be provided for closing these openings.

2.1. Where pipes, scuppers, electric cables, etc. are carried through watertight subdivision bulkheads, arrangements shall be made to ensure the watertight integrity of the bulkheads.

2.2. Valves not forming part of a piping system shall not be permitted in watertight subdivision bulkheads.

2.3. Lead or other heat sensitive materials shall not be used in systems which penetrate watertight subdivision bulkheads, where deterioration of such systems in the event of fire would impair the watertight integrity of the bulkheads.

3.1. No doors, manholes, or access openings are permitted:

1. In the collision bulkhead below the margin line;
2. In watertight transverse bulkheads dividing a cargo space from an adjoining cargo space or from a permanent or reserve bunker, except as provided in paragraph 12 and in regulation 16.

3.2. Except as provided in paragraph 3.3 the collision bulkhead may be pierced below the margin line by not more than one pipe for dealing with fluid in the forepeak tank, provided that the pipe is fitted with a screwdown valve capable of being operated from above the bulkhead deck, the valve chest being secured inside the forepeak to the collision bulkhead.

3.3. If the forepeak is divided to hold two different kinds of liquids the Administration may allow the collision bulkhead to be pierced below the margin line by two pipes, each of which is fitted as required by paragraph 3.2, provided the Administration is satisfied that there is no practical alternative to the fitting of such a second pipe and that, having regard to the additional subdivision provided in the forepeak, the safety of the ship is maintained.

4.1. Watertight doors fitted in bulkheads between permanent and reserve bunkers shall be always accessible, except as provided in paragraph 11.2 for between deck bunker doors.

4.2. Satisfactory arrangements shall be made by means of screens or otherwise to prevent the coal from interfering with the closing of watertight bunker doors.

5. Within spaces containing the main and auxiliary propulsion machinery including boilers serving the needs of propulsion and all permanent bunkers, not more than one door apart from the doors to bunkers and shaft tunnels may be fitted in each main transverse bulkhead. Where two or more shafts are fitted the tunnels shall be connected by an intercommunicating passage. There shall be only one door between the machinery space and the tunnel spaces where two shafts are fitted and only two doors where there are more than two shafts. All these doors shall be of the sliding type and shall be so located as to have their sills as high as practicable. The hand gear for operating these doors from above the bulkhead deck shall be situated outside the spaces containing the machinery if this is consistent with a satisfactory arrangement of the necessary gearing.

6.1. Watertight doors shall be sliding doors or hinged doors or doors of an equivalent type. Plate doors secured only by bolts and doors required to be closed by dropping or by the action of a dropping weight are not permitted.

6.2. Sliding doors may be either:

- Hand-operated only, or
- Power-operated as well as hand-operated.

6.3. Authorized watertight doors may therefore be divided into three classes:

- Class 1, hinged doors;
- Class 2, hand-operated sliding doors;
- Class 3, sliding doors which are power-operated as well as hand-operated.

6.4. The means of operation of any watertight door whether power-operated or not shall be capable of closing the door with the ship listed to 15° either way.

6.5. In all classes of watertight doors indicators shall be fitted which show, at all operating stations from which the doors are not visible, whether the doors are open or closed. If any of the watertight doors, of whatever class, is not fitted so as to enable it to be closed from a central control station, it shall be provided with a mechanical, electrical, telephonic, or any other suitable direct means of communication, enabling the officer of the watch promptly to contact the person who is responsible for closing the door in question, under previous orders.

7. Hinged doors (class 1) shall be fitted with quick action closing devices, such as catches, workable from each side of the bulkhead.

8. Hand-operated sliding doors (class 2) may have a horizontal or vertical motion. It shall be possible to operate the mechanism at the door itself from either side, and in addition, from an accessible position above the bulkhead deck, with an all round crank motion, or some other movement providing the same guarantee of safety and of an approved type. Departures from the requirement of operation on both sides may be allowed, if this requirement is impossible owing to the layout of the spaces. When operating a hand gear the time necessary for the complete closure of the door with the vessel upright, shall not exceed 90 seconds.

9.1. Power-operated sliding doors (class 3) may have a vertical or horizontal motion. If a door is required to be power-operated from a central control, the gearing shall be so arranged that the door can be operated by power also at the door itself from both sides. The arrangement shall be such that the door will close automatically if opened by local control after being closed from the central control, and also such that any door can be kept closed by local systems which will prevent the door from being opened from the upper control. Local control handles in connexion with the power gear shall be provided each side of the bulkhead and shall be so arranged as to enable persons passing through the doorway to hold both handles in the open position without being able to set the closing mechanism in operation accidentally. Power-operated sliding doors shall be provided with hand gear workable at the door itself on either side and from an accessible position above the bulkhead deck, with an all round crank motion or some other movement providing the same guarantee of safety and of an approved type. Provision shall be made to give warnings by sound signal that the door has begun to close and will con-

tinue to move until it is completely closed. The door shall take a sufficient time to close to ensure safety.

9.2. There shall be at least two independent power sources capable of opening and closing all the doors under control, each of them capable of operating all the doors simultaneously. The two power sources shall be controlled from the central station on the navigating bridge provided with all the necessary indicators for checking that each of the two power sources is capable of giving the required service satisfactorily.

9.3. In the case of hydraulic operation, each power source shall consist of a pump capable of closing all doors in not more than 60 seconds. In addition, there shall be for the whole installation hydraulic accumulators of sufficient capacity to operate all the doors at least three times, i.e., closed-open-closed. The fluid used shall be one which does not freeze at any of the temperatures liable to be encountered by the ship during its service.

10.1. Hinged watertight doors (class 1) in passenger, crew and working spaces are only permitted above a deck the underside of which, at its lowest point at side, is at least 2.0 m above the deepest subdivision load line.

10.2. Watertight doors, the sills of which are above the deepest load line and below the line specified in paragraph 10.1 shall be sliding doors and may be hand-operated (class 2), except in vessels engaged on short international voyages and required to have a factor of subdivision of .50 or less in which all such doors shall be power-operated. When trunkways in connexion with refrigerated cargo and ventilation or forced draught ducts are carried through more than one main watertight subdivision bulkhead, the doors at such openings shall be operated by power.

11.1. Watertight doors which may sometimes be opened at sea, and the sills of which are below the deepest subdivision load line shall be sliding doors. The following rules shall apply:

1. When the number of such doors (excluding doors at entrances to shaft tunnels) exceeds five, all of these doors and those at the entrance to shaft tunnels or ventilation or forced draught ducts, shall be power-operated (class 3) and shall be capable of being simultaneously closed from a central station situated on the navigating bridge;
2. When the number of such doors (excluding doors at entrances to shaft tunnels) is greater than one, but does not exceed five,
  - 2.1. Where the ship has no passenger spaces below the bulkhead deck, all the above-mentioned doors may be hand-operated (class 2);
  - 2.2. Where the ship has passenger spaces below the bulkhead deck all the above-mentioned doors shall be power-operated (class 3) and shall be capable of being simultaneously closed from a central station situated on the navigating bridge;
3. In any ship where there are only two such watertight doors and they are situated in the machinery space or in the bulkheads bounding such space, the Administration may allow these two doors to be hand-operated only (class 2).

11.2. If sliding watertight doors which have sometimes to be open at sea for the purpose of trimming coal are fitted between bunkers in the between decks below the bulkhead deck, these doors shall be operated by power. The opening and closing of these doors shall be recorded in such log book as may be prescribed by the Administration.

12.1. If the Administration is satisfied that such doors are essential, watertight doors of satisfactory construction may be fitted in watertight bulkheads dividing cargo between deck spaces. Such doors may be hinged, rolling or sliding doors but shall not be remotely controlled. They shall be fitted at the highest level and as far from the shell plating as practicable, but in no case shall the outboard vertical edges be situated at a distance from the shell plating which is less than one-fifth of the breadth of the ship, as defined in regulation 2, such distance being measured at right angles to the centre line of the ship at the level of the deepest subdivision load line.

12.2. Such doors shall be closed before the voyage commences and shall be kept closed during navigation: the time of opening such doors in port and of closing them before the ship leaves port shall be entered in the log book. Should any of the doors be accessible during the voyage, they shall be fitted with a device which prevents unauthorized opening. When it is proposed to fit such doors, the number and arrangements shall receive the special consideration of the Administration.

13. Portable plates on bulkheads shall not be permitted except in machinery spaces. Such plates shall always be in place before the ship leaves port, and shall not be removed during navigation except in case of urgent necessity. The necessary precautions shall be taken in replacing them to ensure that the joints shall be watertight.

14. All watertight doors shall be kept closed during navigation except when necessarily opened for the working of the ship, in which case they shall always be ready to be immediately closed.

15.1. Where trunkways or tunnels for access from crew accommodation to the stokehold, for piping, or for any other purpose are carried through main transverse watertight bulkheads, they shall be watertight and in accordance with the requirements of regulation 19. The access to at least one end of each such tunnel or trunkway, if used as a passage at sea, shall be through a trunk extending watertight to a height sufficient to permit access above the marginline. The access to the other end of the trunkway or tunnel may be through a watertight door of the type required by its location in the ship. Such trunkways or tunnels shall not extend through the first subdivision bulkhead abaft the collision bulkhead.

15.2. Where it is proposed to fit tunnels or trunkways for forced draught, piercing main transverse watertight bulkheads, these shall receive the special consideration of the Administration.

**Regulation 16. PASSENGER SHIPS CARRYING GOODS VEHICLES AND ACCOMPANYING PERSONNEL**

1. This Regulation applies to passenger ships regardless of the date of construction designed or adapted for the carriage of goods vehicle accompanying personnel where the total number of persons on board, other than those specified in regulation 1/2(e)(i) and (ii), exceeds 12.

2. If in such a ship the total number of passengers which include personnel accompanying vehicles does not exceed  $N = 12 + \sqrt{A/25}$ , where  $A$  = total deck area (square metres) of spaces available for the stowage of goods vehicles and where the clear height at the storage position and at the entrance to such spaces is not less than 4 m, the provisions of regulation 15.12 in respect of watertight doors apply except that the doors may be fitted at any level in watertight bulkheads dividing cargo spaces. Additionally, indicators are required on the navigating bridge to show automatically when each door is closed and all door fastenings are secured.

3. When applying the provisions of this Chapter to such a ship,  $N$  shall be taken as the maximum number of passengers for which the ship may be certified in accordance with this regulation.

4. In applying regulation 8 for the worst operating conditions, the permeability for cargo spaces intended for the stowage of goods vehicles and containers shall be derived by calculation in which the goods vehicles and containers shall be assumed to be non-watertight and their permeability taken as 65. For ships engaged in dedicated services the actual value of permeability for goods vehicles or containers may be applied. In no case shall the permeability of the cargo spaces in which the goods vehicles and containers are carried be taken as less than 60.

**Regulation 17. OPENINGS IN THE SHELL PLATING OF PASSENGER SHIPS BELOW THE MARGIN LINE**

1. The number of openings in the shell plating shall be reduced to the minimum compatible with the design and proper working of the ship.



2. The arrangement and efficiency of the means for closing any opening in the shell plating shall be consistent with its intended purpose and the position in which it is fitted and generally to the satisfaction of the Administration.

3.1. Subject to the requirements of the International Convention on Load Lines in force, no sidescuttle shall be fitted in such a position that its sill is below a line drawn parallel to the bulkhead deck at side and having its lowest point 2.5 per cent of the breadth of the ship above the deepest subdivision load line, or 500 mm, whichever is the greater.

3.2. All sidescuttles the sills of which are below the margin line, as permitted by paragraph 3.1 shall be of such construction as will effectively prevent any person opening them without the consent of the master of the ship.

3.1.1. Where in a between decks, the sills of any of the sidescuttles referred to in paragraph 3.2 are below a line drawn parallel to the bulkhead deck at side and having its lowest point 1.4 m plus 2.5 per cent of the breadth of the ship above the water when the ship departs from any port, all the sidescuttles in that between decks shall be closed watertight and locked before the ship leaves port, and they shall not be opened before the ship arrives at the next port. In the application of this paragraph the appropriate allowance for fresh water may be made when applicable.

3.3.2. The time of opening such sidescuttles in port and of closing and locking them before the ship leaves port shall be entered in such log book as may be prescribed by the Administration.

3.3.3. For any ship that has one or more sidescuttles so placed that the requirements of paragraph 3.3.1. would apply when it was floating at its deepest subdivision load line, the Administration may indicate the limiting mean draught at which these sidescuttles will have their sills above the line drawn parallel to the bulkhead deck at side, and having its lowest point 1.4 m plus 2.5 per cent of the breadth of the ship above the water-line corresponding to the limiting mean draught, and at which it will therefore be part from port without previously closing and locking them and to open them at sea on the responsibility of the master during the voyage to the next port. In tropical zones as defined in the International Convention on Load Lines in force, this limiting draught may be increased by 0.3 m.

4. Efficient hinged inside deadlights so arranged that they can be easily and effectively closed and secured watertight, shall be fitted to all sidescuttles except that abaft one-eighth of the ship's length from the forward perpendicular and above a line drawn parallel to the bulkhead deck at side and having its lowest point at a height of 3.7 m plus 2.5 per cent of the breadth of the ship above the deepest subdivision load line, the deadlights may be portable in passenger accommodation other than that for steerage passengers, unless the deadlights are required by the International Convention on Load Lines in force to be permanently attached in their proper positions. Such portable deadlights shall be stowed adjacent to the sidescuttles they serve.

5. Sidescuttles and their deadlights which will not be accessible during navigation shall be closed and secured before the ship leaves port.

6.1. No sidescuttles shall be fitted in any spaces which are appropriated exclusively to the carriage of cargo or coal.

6.2. Sidescuttles may, however, be fitted in spaces appropriated alternatively to the carriage of cargo or passengers, but they shall be of such construction as will effectively prevent any person opening them or their deadlights without the consent of the master.

6.3. If cargo is carried in such spaces, the sidescuttles and their deadlights shall be closed watertight and locked before the cargo is shipped and such closing and locking shall be recorded in such log book as may be prescribed by the Administration.

7. Automatic ventilating sidescuttles shall not be fitted in the shell plating below the margin line without the special sanction of the Administration.

8. The number of scuppers, sanitary discharges and other similar openings in the shell plating shall be reduced to the minimum either by making each discharge serve for as many as possible of the sanitary and other pipes, or in any other satisfactory manner.

9.1. All inlets and discharges in the shell plating shall be fitted with efficient and accessible arrangements for preventing the accidental admission of water into the ship.

9.2.1. Subject to the requirements of the International Convention on Load Lines in force, and except as provided in paragraph 9.3, each separate discharge led through the shell plating from spaces below the margin line shall be provided with either one automatic non-return valve fitted with a positive means of closing it from above the bulkhead deck or with two automatic non-return valves without positive means of closing, provided that the inboard valve is situated above the deepest subdivision load line and is always accessible for examination under service conditions. Where a valve with positive means of closing is fitted, the operating position above the bulkhead deck shall always be readily accessible and means shall be provided for indicating whether the valve is open or closed.

9.2.2. The requirements of the International Convention on Load Lines in force shall apply to discharges led through the shell plating from spaces above the margin line.

9.3. Machinery space main and auxiliary sea inlets and discharges in connexion with the operation of machinery shall be fitted with readily accessible valves between the pipes and the shell plating or between the pipes and fabricated boxes attached to the shell plating. The valves may be controlled locally and shall be provided with indicators showing whether they are open or closed.

9.4. All shell fittings and valves required by this regulation shall be of steel, bronze or other approved ductile material. Valves of ordinary cast iron or similar material are not acceptable. All pipes to which this regulation refers shall be of steel or other equivalent material to the satisfaction of the Administration.

10.1. Gangway, cargo and coaling ports fitted below the margin line shall be of sufficient strength. They shall be effectively closed and secured watertight before the ship leaves port, and shall be kept closed during navigation.

10.2. Such ports shall in no case be so fitted as to have their lowest point below the deepest subdivision load line.

11.1. The inboard opening of each ash-shoot, rubbish-shoot, etc. shall be fitted with an efficient cover.

11.2. If the inboard opening is situated below the margin line, the cover shall be watertight, and in addition an automatic non-return valve shall be fitted in the shoot in an easily accessible position above the deepest subdivision load line. When the shoot is not in use both the cover and the valve shall be kept closed and secured.

**Regulation 18. CONSTRUCTION AND INITIAL TESTS OF WATERTIGHT DOORS, SIDESCUTTLES, ETC., IN PASSENGER SHIPS AND CARGO SHIPS**

1. In passenger ships:

1. The design, materials and construction of all watertight doors, sidescuttles, gangway, cargo and coaling ports, valves, pipes, ash-shoots and rubbish-shoots referred to in these regulations shall be to the satisfaction of the Administration;
2. The frames of vertical watertight doors shall have no groove at the bottom in which dirt might lodge and prevent the door closing properly.

2. In passenger ships and cargo ships each watertight door shall be tested by water pressure to a head up to the bulkhead deck or freeboard deck respectively. The test shall be made before the ship is put into service, either before or after the door is fitted.

**Regulation 19. CONSTRUCTION AND INITIAL TESTS OF WATERTIGHT DECKS, TRUCKS, ETC.,  
IN PASSENGER SHIPS AND CARGO SHIPS**

1. Watertight decks, trunks, tunnels, duct keels and ventilators shall be of the same strength as watertight bulkheads at corresponding levels. The means used for making them watertight, and the arrangements adopted for closing openings in them, shall be to the satisfaction of the Administration. Watertight ventilators and trunks shall be carried at least up to the bulkhead deck in passenger ships and up to the freeboard deck in cargo ships.

2. After completion, a hose or flooding test shall be applied to watertight decks and a hose test to watertight trunks, tunnels and ventilators.

**Regulation 20. WATERTIGHT INTEGRITY OF PASSENGER SHIPS ABOVE THE MARGIN LINE**

1. The Administration may require that all reasonable and practicable measures shall be taken to limit the entry and spread of water above the bulkhead deck. Such measures may include partial bulkheads or webs. When partial watertight bulkheads and webs are fitted on the bulkhead deck, above or in the immediate vicinity of main subdivision bulkheads, they shall have watertight shell and bulkhead deck connexions so as to restrict the flow of water along the deck when the ship is in a heeled damaged condition. Where the partial watertight bulkhead does not line up with the bulkhead below, the bulkhead deck between shall be made effectively watertight.

2. The bulkhead deck or a deck above it shall be weathertight. All openings in the exposed weather deck shall have coamings of ample height and strength and shall be provided with efficient means for expeditiously closing them weathertight. Freeing ports, open rails and scuppers shall be fitted as necessary for rapidly clearing the weather deck of water under all weather conditions.

3. Sidescuttles, gangway, cargo and coaling ports and other means for closing openings in the shell plating above the margin line shall be of efficient design and construction and of sufficient strength having regard to the spaces in which they are fitted and their positions relative to the deepest subdivision load line.

4. Efficient inside deadlights, so arranged that they can be easily and effectively closed and secured watertight, shall be provided for all sidescuttles to spaces below the first deck above the bulkhead deck.

**Regulation 21. BILGE PUMPING ARRANGEMENTS**

**1. Passenger ships and cargo ships**

1.1. An efficient bilge pumping system shall be provided, capable of pumping from and draining any watertight compartment other than a space permanently appropriated for the carriage of fresh water, water ballast, oil fuel or liquid cargo and for which other efficient means of pumping are provided, under all practical conditions. Efficient means shall be provided for draining water from insulated holds.

1.2. Sanitary, ballast and general service pumps may be accepted as independent power bilge pumps if fitted with the necessary connexions to the bilge pumping system.

1.3. All bilge pipes used in or under coal bunkers or fuel storage tanks or in boiler or machinery spaces, including spaces in which oil-settling tanks or oil fuel pumping units are situated, shall be of steel or other suitable material.

1.4. The arrangement of the bilge and ballast pumping system shall be such as to prevent the possibility of water passing from the sea and from water ballast spaces into the cargo and machinery spaces, or from one compartment to another. Provision shall be made to prevent any deep tank having bilge and ballast connexions being inadvertently flooded from the sea when containing cargo, or being discharged through a bilge pipe when containing water ballast.



1.5. All distribution boxes and manually operated valves in connexion with the bilge pumping arrangements shall be in positions which are accessible under ordinary circumstances.

## 2. *Passenger ships*

2.1. The bilge pumping system required by paragraph 1.1 shall be capable of operation under all practicable conditions after a casualty whether the ship is upright or listed. For this purpose wing suction shall generally be fitted except in narrow compartments at the end of the ship where one suction may be sufficient. In compartments of unusual form, additional suction may be required. Arrangements shall be made whereby water in the compartment may find its way to the suction pipes. Where, for particular compartments, the Administration is satisfied that the provision of drainage may be undesirable, it may allow such provision to be dispensed with if calculations made in accordance with the conditions laid down in regulation 8.2.1 to 8.2.3 show that the survival capability of the ship will not be impaired.

2.2. At least three power pumps shall be fitted connected to the bilge main, one of which may be driven by the propulsion machinery. Where the criterion numeral is 30 or more, one additional independent power pump shall be provided.

2.3. Where practicable, the power bilge pumps shall be placed in separate watertight compartments and so arranged or situated that these compartments will not be flooded by the same damage. If the main propulsion machinery, auxiliary machinery and boilers are in two or more watertight compartments, the pumps available for bilge service shall be distributed as far as is possible throughout these compartments.

2.4. On a ship of 91.5 m in length and upwards or having a criterion numeral of 30 or more, the arrangements shall be such that at least one power bilge pump shall be available for use in all flooding conditions which the ship is required to withstand, as follows:

1. One of the required bilge pumps shall be an emergency pump of a reliable submersible type having a source of power situated above the bulkhead deck; or
2. The bilge pumps and their sources of power shall be so distributed throughout the length of the ship that at least one pump in an undamaged compartment will be available.

2.5. With the exception of additional pumps which may be provided for peak compartments only, each required bilge pump shall be so arranged as to draw water from any space required to be drained by paragraph 1.1.

2.6. Each power bilge pump shall be capable of pumping water through the required main bilge pipe at a speed of not less than 2 m/sec. Independent power bilge pumps situated in machinery spaces shall have direct suction from these spaces, except that not more than two such suction shall be required in any one space. Where two or more such suction are provided there shall be at least one on each side of the ship. The Administration may require independent power bilge pumps situated in other spaces to have separate direct suction. Direct suction shall be suitably arranged and those in a machinery space shall be of a diameter not less than that required for the bilge main.

2.7.1. In addition to the direct bilge suction or suction required by paragraph 2.6 a direct suction from the main circulating pump leading to the drainage level of the machinery space and fitted with a non-return valve shall be provided in the machinery space. The diameter of this direct suction pipe shall be at least two-thirds of the diameter of the pump inlet in the case of steamships, and of the same diameter as the pump inlet in the case of motorships.

2.7.2. Where in the opinion of the Administration the main circulating pump is not suitable for this purpose, a direct emergency bilge suction shall be led from the largest available independent power driven pump to the drainage level of the machinery space; the suction shall be of the same diameter as the main inlet of the pump used. The capacity of the pump so connected shall exceed that of a required bilge pump by an amount deemed satisfactory by the Administration.

2.7.3. The spindles of the sea inlet and direct suction valves shall extend well above the engine room platform.

2.8. All bilge suction piping up to the connexion to the pumps shall be independent of other piping.

2.9. The diameter  $d$  of the bilge main shall be calculated according to the following formula. However, the actual internal diameter of the bilge main may be rounded off to the nearest standard size acceptable to the Administration:

$$d = 25 + 1.68 \sqrt{L(B + D)}$$

where  $d$  is the internal diameter of the bilge main (millimetres);

$L$  and  $B$  are the length and the breadth of the ship (metres) as defined in Regulation 2; and

$D$  is the moulded depth of the ship to bulkhead deck (metres).

The diameter of the bilge branch pipes shall meet the requirements of the Administration.

2.10. Provision shall be made to prevent the compartment served by any bilge suction pipe being flooded in the event of the pipe being severed or otherwise damaged by collision or grounding in any other compartment. For this purpose, where the pipe is at any part situated nearer the side of the ship than one-fifth of the breadth of the ship (as defined in regulation 2 and measured at right angles to the centreline at the level of the deepest subdivision load line), or is in a duct keel, a non-return valve shall be fitted to the pipe in the compartment containing the open end.

2.11. Distribution boxes, cocks and valves in connexion with the bilge pumping system shall be so arranged that, in the event of flooding, one of the bilge pumps may be operative on any compartment; in addition, damage to a pump or its pipe connecting to the bilge main outboard of a line drawn at one-fifth of the breadth of the ship shall not put the bilge system out of action. If there is only one system of pipes common to all the pumps, the necessary valves for controlling the bilge suction must be capable of being operated from above the bulkhead deck. Where in addition to the main bilge pumping system an emergency bilge pumping system is provided, it shall be independent of the main system and so arranged that a pump is capable of operating on any compartment under flooding condition as specified in paragraph 2.1; in that case only the valves necessary for the operation of the emergency system need be capable of being operated from above the bulkhead deck.

2.12. All cocks and valves referred to in paragraph 2.11 which can be operated from above the bulkhead deck shall have their controls at their place of operation clearly marked and shall be provided with means to indicate whether they are open or closed.

### 3. *Cargo ships*

At least two power pumps connected to the main bilge system shall be provided, one of which may be driven by the propulsion machinery. If the Administration is satisfied that the safety of the ship is not impaired, bilge pumping arrangements may be dispensed with in particular compartments.

#### *Regulation 22. STABILITY INFORMATION FOR PASSENGER SHIPS AND CARGO SHIPS\**

1. Every passenger ship regardless of size and every cargo ship having a length, as defined in the International Convention on Load Lines in force, of 24 m and upwards, shall be inclined upon its completion and the elements of its stability determined. The master shall be sup-

\* Reference is made to the Recommendation on Intact Stability for Passenger and Cargo Ships under 100 metres in length, adopted by the Organization by resolution A.167(ES.IV), and Amendments to this Recommendation, adopted by the Organization by resolution A.206(VII).

plied with such information satisfactory to the Administration as is necessary to enable him by rapid and simple processes to obtain accurate guidance as to the stability of the ship under varying conditions of service. A copy of the stability information shall be furnished to the Administration.

2. Where any alterations are made to a ship so as to materially affect the stability information supplied to the master, amended stability information shall be provided. If necessary the ship shall be re-inclined.

3. The Administration may allow the inclining test of an individual ship to be dispensed with provided basic stability data are available from the inclining test of a sister ship and it is shown to the satisfaction of the Administration that reliable stability information for the exempted ship can be obtained from such basic data.

4. The Administration may also allow the inclining test of an individual ship or class of ships especially designed for the carriage of liquids or ore in bulk to be dispensed with when reference to existing data for similar ships clearly indicates that due to the ship's proportions and arrangements more than sufficient metacentric height will be available in all probable loading conditions.

**Regulation 23. DAMAGE CONTROL PLANS IN PASSENGER SHIPS**

There shall be permanently exhibited, for the guidance of the officer in charge of the ship, plans showing clearly for each deck and hold the boundaries of the watertight compartments, the openings therein with the means of closure and position of any controls thereof, and the arrangements for the correction of any list due to flooding. In addition, booklets containing the aforementioned information shall be made available to the officers of the ship.

**Regulation 24. MARKING, PERIODICAL OPERATION AND INSPECTION OF WATERTIGHT DOORS, ETC. IN PASSENGER SHIPS**

1. This regulation applies to all ships.

2.1. Drills for the operating of watertight doors, sidescuttles, valves and closing mechanisms of scuppers, ash-shoots and rubbish-shoots shall take place weekly. In ships in which the voyage exceeds one week in duration a complete drill shall be held before leaving port, and others thereafter at least once a week during the voyage.

2.2. All watertight doors, both hinged and power operated, in main transverse bulkheads, in use at sea, shall be operated daily.

3.1. The watertight doors and all mechanisms and indicators connected therewith, all valves, the closing of which is necessary to make a compartment watertight, and all valves the operation of which is necessary for damage control cross connexions shall be periodically inspected at sea at least once a week.

3.2. Such valves, doors and mechanisms shall be suitably marked to ensure that they may be properly used to provide maximum safety.

**Regulation 25. ENTRIES IN LOG OF PASSENGER SHIPS**

1. This regulation applies to all ships.

2. Hinged doors, portable plates, sidescuttles, gangway, cargo and coaling ports and other openings, which are required by these regulations to be kept closed during navigation, shall be closed before the ship leaves port. The time of closing and the time of opening (if permissible under these regulations) shall be recorded in such log book as may be prescribed by the Administration.

3. A record of all drills and inspections required by regulation 24 shall be entered in the log book with an explicit record of any defects which may be disclosed.

## PART C. MACHINERY INSTALLATIONS

(Except where expressly provided otherwise part C applies to passenger ships and cargo ships)

*Regulation 26. GENERAL*

1. The machinery, boilers and other pressure vessels, associated piping systems and fittings shall be of a design and construction adequate for the service for which they are intended and shall be so installed and protected as to reduce to a minimum any danger to persons on board, due regard being paid to moving parts, hot surfaces and other hazards. The design shall have regard to materials used in construction, the purpose for which the equipment is intended, the working conditions to which it will be subjected and the environmental conditions on board.

2. The Administration shall give special consideration to the reliability of single essential propulsion components and may require a separate source of propulsion power sufficient to give the ship a navigable speed, especially in the case of unconventional arrangements.

3. Means shall be provided whereby normal operation of propulsion machinery can be sustained or restored even though one of the essential auxiliaries becomes inoperative. Special consideration shall be given to the malfunctioning of:

1. A generating set which serves as a main-source of electrical power;
2. The sources of steam supply;
3. The boiler feed water systems;
4. The fuel oil supply systems for boilers or engines;
5. The sources of lubricating oil pressure;
6. The sources of water pressure;
7. A condensate pump and the arrangements to maintain vacuum in condensers;
8. The mechanical air supply for boilers;
9. An air compressor and receiver for starting or control purposes;
10. The hydraulic, pneumatic or electrical means for control in main propulsion machinery including controllable pitch propellers.

However, the Administration, having regard to overall safety considerations, may accept a partial reduction in propulsion capability from normal operation.

4. Means shall be provided to ensure that the machinery can be brought into operation from the dead ship condition without external aid.

5. All boilers, all parts of machines, all steam, hydraulic, pneumatic and other systems and their associated fittings which are under internal pressure shall be subjected to appropriate tests including a pressure test before being put into service for the first time.

6. Main propulsion machinery and all auxiliary machinery essential to the propulsion and the safety of the ship shall, as fitted in the ship, be designed to operate when the ship is upright and when inclined at any angle of list up to and including 15° either way under static conditions and 22.5° under dynamic conditions (rolling) either way and simultaneously inclined dynamically (pitching) 7.5° by bow or stern. The Administration may permit deviation from these angles, taking into consideration the type, size and service conditions of the ship.

7. Provision shall be made to facilitate cleaning, inspection and maintenance of main propulsion and auxiliary machinery including boilers and pressure vessels.

8. Special consideration shall be given to the design, construction and installation of propulsion machinery systems so that any mode of their vibrations shall not cause undue stresses in this machinery in the normal operating ranges.



**Regulation 27. MACHINERY**

1. Where risk from overspeeding of machinery exists, means shall be provided to ensure that the safe speed is not exceeded.
2. Where main or auxiliary machinery including pressure vessels or any parts of such machinery are subject to internal pressure and may be subject to dangerous overpressure, means shall be provided where practicable to protect against such excessive pressure.
3. All gearing and every shaft and coupling used for transmission of power to machinery essential for the propulsion and safety of the ship or for the safety of persons on board shall be so designed and constructed that they will withstand the maximum working stresses to which they may be subjected in all service conditions, and due consideration shall be given to the type of engines by which they are driven or of which they form part.
4. Internal combustion engines of a cylinder diameter of 200 mm or a crankcase volume of 0.6 m<sup>3</sup> and above shall be provided with crankcase explosion relief valves of a suitable type with sufficient relief area. The relief valves shall be arranged or provided with means to ensure that discharge from them is so directed as to minimize the possibility of injury to personnel.
5. Main turbine propulsion machinery and, where applicable, main internal combustion propulsion machinery and auxiliary machinery shall be provided with automatic shut-off arrangements in the case of failures such as lubricating oil supply failure which could lead rapidly to complete breakdown, serious damage or explosion. The Administration may permit provisions for overriding automatic shut-off devices.

**Regulation 28. MEANS OF GOING ASTERN**

1. Sufficient power for going astern shall be provided to secure proper control of the ship in all normal circumstances.
2. The ability of the machinery to reverse the direction of thrust of the propeller in sufficient time, and so to bring the ship to rest within a reasonable distance from maximum ahead service speed, shall be demonstrated and recorded.\*
3. The stopping times, ship headings and distances recorded on trials, together with the results of trials to determine the ability of ships having multiple propellers to navigate and manoeuvre with one or more propellers inoperative, shall be available on board for the use of the master or designated personnel.\*
4. Where the ship is provided with supplementary means for manoeuvring or stopping, the effectiveness of such means shall be demonstrated and recorded as referred to in paragraphs 2 and 3.

**Regulation 29. STEERING GEAR**

1. Unless expressly provided otherwise, every ship shall be provided with a main steering gear and an auxiliary steering gear to the satisfaction of the Administration. The main steering gear and the auxiliary steering gear shall be so arranged that the failure of one of them will not render the other one inoperative.
  - 2.1. All the steering gear components and the rudder stock shall be of sound and reliable construction to the satisfaction of the Administration. Special consideration shall be given to the suitability of any essential component which is not duplicated. Any such essential component shall, where appropriate, utilize anti-friction bearings such as ball bearings, roller bearings or sleeve bearings which shall be permanently lubricated or provided with lubrication fittings.

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\* Reference is made to the Recommendation on Information to be Included in the Manoeuvring Booklets adopted by the Organization by resolution A.209(VII).

2.2. The design pressure for calculations to determine the scantlings of piping and other steering gear components subjected to internal hydraulic pressure shall be at least 1.25 times the maximum working pressure to be expected under the operational conditions specified in paragraph 3.2, taking into account any pressure which may exist in the low pressure side of the system. At the discretion of the Administration, fatigue criteria shall be applied for the design of piping and components, taking into account pulsating pressures due to dynamic loads.

2.3. Relief valves shall be fitted to any part of the hydraulic system which can be isolated and in which pressure can be generated from the power source or from external forces. The setting of the relief valves shall not exceed the design pressure. The valves shall be of adequate size and so arranged as to avoid an undue rise in pressure above the design pressure.

3. The main steering gear and rudder stock shall be:

1. Of adequate strength and capable of steering the ship at maximum ahead service speed which shall be demonstrated;
2. Capable of putting the rudder over from 35° on one side to 35° on the other side with the ship at its deepest seagoing draught and running ahead at maximum ahead service speed and, under the same conditions, from 35° on either side to 30° on the other side in not more than 28 seconds;
3. Operated by power where necessary to meet the requirements of paragraph 3.2 and in any case when the Administration requires a rudder stock of over 120 mm diameter in way of the tiller, excluding strengthening for navigation in ice; and
4. So designed that they will not be damaged at maximum astern speed; however, this design requirement need not be proved by trials at maximum astern speed and maximum rudder angle.

4. The auxiliary steering gear shall be:

1. Of adequate strength and capable of steering the ship at navigable speed and of being brought speedily into action in an emergency;
2. Capable of putting the rudder over from 15° on one side to 15° on the other side in not more than 60 seconds with the ship at its deepest seagoing draught and running ahead at one half of the maximum ahead service speed or 7 knots, whichever is the greater; and
3. Operated by power where necessary to meet the requirements of paragraph 4.2 and in any case when the Administration requires a rudder stock of over 230 mm diameter in way of the tiller, excluding strengthening for navigation in ice.

5. Main and auxiliary steering gear power units shall be:

1. Arranged to re-start automatically when power is restored after a power failure; and
2. Capable of being brought into operation from a position on the navigating bridge. In the event of a power failure to any one of the steering gear power units, an audible and visual alarm shall be given on the navigating bridge.

6.1. Where the main steering gear comprises two or more identical power units, an auxiliary steering gear need not be fitted, provided that:

1. In a passenger ship, the main steering gear is capable of operating the rudder as required by paragraph 3.2 while any one of the power units is out of operation;
2. In a cargo ship, the main steering gear is capable of operating the rudder as required by paragraph 3.2 while operating with all power units;
3. The main steering gear is so arranged that after a single failure in its piping system or in one of the power units the defect can be isolated so that steering capability can be maintained or speedily regained.

6.2. The Administration may, until 1 September 1986, accept the fitting of a steering gear which has a proven record of reliability but does not comply with the requirements of paragraph 6.1.3 for a hydraulic system.

6.3. Steering gears, other than of the hydraulic type, shall achieve standards equivalent to the requirements of this paragraph to the satisfaction of the Administration.

7. Steering gear control shall be provided:

1. For the main steering gear, both on the navigating bridge and in the gear compartment;
2. Where the main steering gear is arranged in accordance with paragraph 6, by two independent control systems, both operable from the navigating bridge. This does not require duplication of the steering wheel or steering lever. Where the control system consists of an hydraulic telemotor, a second independent system need not be fitted, except in a tanker, chemical tanker or gas carrier of 10,000 tons gross tonnage and upwards;
3. For the auxiliary steering gear, in the steering gear compartment and, if power operated, it shall also be operable from the navigating bridge and shall be independent of the control system for the main steering gear.

8. Any main and auxiliary steering gear control system operable from the navigating bridge shall comply with the following:

1. If electric, it shall be served by its own separate circuit supplied from a steering gear power circuit from a point within the steering gear compartment, or directly from switchboard busbars supplying that steering gear power circuit at a point on the switchboard adjacent to the supply to the steering gear power circuit;
2. Means shall be provided in the steering gear compartment for disconnecting any control system operable from the navigating bridge from the steering gear it serves;
3. The system shall be capable of being brought into operation from a position on the navigating bridge;
4. In the event of a failure of electrical power supply to the control system, an audible and visual alarm shall be given on the navigating bridge; and
5. Short circuit protection only shall be provided for steering gear control supply circuits.

9. The electric power circuits and the steering gear control systems with their associated components, cables and pipes required by this regulation and by regulation 30 shall be separated as far as is practicable throughout their length.

10. A means of communication shall be provided between the navigating bridge and the steering gear compartment.

11. The angular position of the rudder shall:

1. If the main steering gear is power operated, be indicated on the navigating bridge. The rudder angle indication shall be independent of the steering gear control system;
2. Be recognizable in the steering gear compartment.

12. Hydraulic power-operated steering gear shall be provided with the following:

1. Arrangements to maintain the cleanliness of the hydraulic fluid taking into consideration the type and design of the hydraulic system;
2. A low level alarm for each hydraulic fluid reservoir to give the earliest practicable indication of hydraulic fluid leakage. Audible and visual alarms shall be given on the navigating bridge and in the machinery space where they can be readily observed; and
3. A fixed storage tank having sufficient capacity to recharge at least one power actuating system including the reservoir, where the main steering gear is required to be power operated. The storage tank shall be permanently connected by piping in such a manner that the hydraulic systems can be readily recharged from a position within the steering gear compartment and shall be provided with a contents gauge.



13. The steering gear compartment shall be:

1. Readily accessible and, as far as practicable, separated from machinery spaces; and
2. Provided with suitable arrangements to ensure working access to steering gear machinery and controls. These arrangements shall include handrails and gratings or other non-slip surfaces to ensure suitable working conditions in the event of hydraulic fluid leakage.

14. Where the rudder stock is required to be over 230 mm diameter in way of the tiller, excluding strengthening for navigation in ice, an alternative power supply, sufficient at least to supply the steering gear power unit which complies with the requirements of paragraph 4.2 and also its associated control system and the rudder angle indicator, shall be provided automatically, within 45 seconds, either from the emergency source of electrical power or from an independent source of power located in the steering gear compartment. This independent source of power shall be used only for this purpose. In every ship of 10,000 tons gross tonnage and upwards, the alternative power supply shall have a capacity for at least 30 minutes of continuous operation and in any other ship for at least 10 minutes.

15. In every tanker, chemical tanker or gas carrier of 10,000 tons gross tonnage and upwards and in every other ship of 70,000 tons gross tonnage and upwards, the main steering gear shall comprise two or more identical power units complying with the provisions of paragraph 6.

16. Every tanker, chemical tanker or gas carrier of 10,000 tons gross tonnage and upwards shall, subject to paragraph 17, comply with the following:

1. The main steering gear shall be so arranged that in the event of loss of steering capability due to a single failure in any part of one of the power actuating systems of the main steering gear, excluding the tiller, quadrant or components serving the same purpose, or seizure of the rudder actuators, steering capability shall be regained in not more than 45 seconds after the loss of one power actuating system;
2. The main steering gear shall comprise either:
  - 2.1. Two independent and separate power actuating systems, each capable of meeting the requirements of paragraph 3.2; or
  - 2.2. At least two identical power actuating systems which, acting simultaneously in normal operation, shall be capable of meeting the requirements of paragraph 3.2. Where necessary to comply with this requirement, inter-connexion of hydraulic power actuating systems shall be provided. Loss of hydraulic fluid from one system shall be capable of being detected and the defective system automatically isolated so that the other actuating system or systems shall remain fully operational;
3. Steering gears other than of the hydraulic type shall achieve equivalent standards.

17. For tankers, chemical tankers or gas carriers of 10,000 tons gross tonnage and upwards, but of less than 100,000 tonnes deadweight, solutions other than those set out in paragraph 16, which need not apply the single failure criterion to the rudder actuator or actuators, may be permitted provided that an equivalent safety standard is achieved and that:

1. Following loss of steering capability due to a single failure of any part of the piping system or in one of the power units, steering capability shall be regained within 45 seconds; and
2. Where the steering gear includes only a single rudder actuator, special consideration is given to stress analysis for the design including fatigue analysis and fracture mechanics analysis, as appropriate, to the material used, to the installation of sealing arrangements and to testing and inspection and to the provision of effective maintenance. In consideration of the foregoing, the Administration shall adopt regulations which include the provisions of the Guidelines for Acceptance of Non-Duplicated Rudder Actuators for Tankers,

Chemical Tankers and Gas Carriers of 10,000 Tons Gross Tonnage and Above but Less than 100,000 Tonnes Deadweight, adopted by the Organization.\*

18. For a tanker, chemical tanker or gas carrier of 10,000 tons gross tonnage and upwards, but less than 70,000 tonnes deadweight, the Administration may, until 1 September 1986, accept a steering gear system with a proven record of reliability which does not comply with the single failure criterion required for a hydraulic system in paragraph 16.

19. Every tanker, chemical tanker or gas carrier of 10,000 tons gross tonnage and upwards, constructed before 1 September 1984, shall comply, not later than 1 September 1986, with the following:

1. The requirements of paragraphs 7.1, 8.2, 8.4, 10, 11, 12.2, 12.3 and 13.2;
2. Two independent steering gear control systems shall be provided each of which can be operated from the navigating bridge. This does not require duplication of the steering wheel or steering lever;
3. If the steering gear control system in operation fails, the second system shall be capable of being brought into immediate operation from the navigating bridge; and
4. Each steering gear control system, if electric, shall be served by its own separate circuit supplied from the steering gear power circuit or directly from switchboard busbars supplying that steering gear power circuit at a point on the switchboard adjacent to the supply to the steering gear power circuit.

20. In addition to the requirements of paragraph 19, in every tanker, chemical tanker or gas carrier of 40,000 tons gross tonnage and upwards, constructed before 1 September 1984, the steering gear shall, not later than 1 September 1988, be so arranged that, in the event of a single failure of the piping or of one of the power units, steering capability can be maintained or the rudder movement can be limited so that steering capability can be speedily regained. This shall be achieved by:

1. An independent means of restraining the rudder; or
2. Fast acting valves which may be manually operated to isolate the actuators from the external hydraulic piping together with a means of directly refilling the actuators by a fixed independent power-operated pump and piping system; or
3. An arrangement such that, where hydraulic power systems are interconnected, loss of hydraulic fluid from one system shall be detected and the defective system isolated either automatically or from the navigating bridge so that the other system remains fully operational.

**Regulation 30. ADDITIONAL REQUIREMENTS FOR ELECTRIC AND ELECTROHYDRAULIC STEERING GEAR**

1. Means for indicating that the motors of electric and electrohydraulic steering gear are running shall be installed on the navigating bridge and at a suitable main machinery control position.

2. Each electric or electrohydraulic steering gear comprising one or more power units shall be served by at least two exclusive circuits fed directly from the main switchboard; however, one of the circuits may be supplied through the emergency switchboard. An auxiliary electric or electrohydraulic steering gear associated with a main electric or electrohydraulic steering gear may be connected to one of the circuits supplying this main steering gear. The circuits supplying an electric or electrohydraulic steering gear shall have adequate rating for sup-

\* Reference is made to the Guidelines for Acceptance of Non-Duplicated Rudder Actuators for Tankers, Chemical Tankers and Gas Carriers of 10,000 Tons Gross Tonnage and Above but Less than 100,000 Tonnes Deadweight, adopted by the Organization by resolution A.467(X11).

plying all motors which can be simultaneously connected to them and may be required to operate simultaneously.

3. Short circuit protection and an overload alarm shall be provided for such circuits and motors. Protection against excess current, including starting current, if provided, shall be for not less than twice the full load current of the motor or circuit so protected, and shall be arranged to permit the passage of the appropriate starting currents. Where a three-phase supply is used an alarm shall be provided that will indicate failure of any one of the supply phases. The alarms required in this paragraph shall be both audible and visual and shall be situated in a conspicuous position in the main machinery space or control room from which the main machinery is normally controlled and as may be required by regulation 51.

4. When in a ship of less than 1,600 tons gross tonnage an auxiliary steering gear which is required by regulation 29.4.3 to be operated by power is not electrically powered or is powered by an electric motor primarily intended for other services, the main steering gear may be fed by one circuit from the main switchboard. Where such an electric motor primarily intended for other services is arranged to power such an auxiliary steering gear, the requirement of paragraph 3 may be waived by the Administration if satisfied with the protection arrangement together with the requirements of [regulations] 29.5.1 and 2 and 29.7.3 applicable to auxiliary steering gear.

#### *Regulation 31. MACHINERY CONTROLS*

1. Main and auxiliary machinery essential for the propulsion and safety of the ship shall be provided with effective means for its operation and control.

2. Where remote control of propulsion machinery from the navigating bridge is provided and the machinery spaces are intended to be manned, the following shall apply:

1. The speed, direction of thrust and, if applicable, the pitch of the propeller shall be fully controllable from the navigating bridge under all sailing conditions, including manoeuvring;
2. The remote control shall be performed, for each independent propeller, by a control device so designed and constructed that its operation does not require particular attention to the operational details of the machinery. Where multiple propellers are designed to operate simultaneously, they may be controlled by one control device;
3. The main propulsion machinery shall be provided with an emergency stopping device on the navigating bridge which shall be independent of the navigating bridge control system;
4. Propulsion machinery orders from the navigating bridge shall be indicated in the main machinery control room or at the manoeuvring platform as appropriate;
5. Remote control of the propulsion machinery shall be possible only from one location at a time; at such locations interconnected control positions are permitted. At each location there shall be an indicator showing which location is in control of the propulsion machinery. The transfer of control between the navigating bridge and machinery spaces shall be possible only in the main machinery space or the main machinery control room. This system shall include means to prevent the propelling thrust from altering significantly when transferring control from one location to another;
6. It shall be possible to control the propulsion machinery locally, even in the case of failure in any part of the remote control system;
7. The design of the remote control system shall be such that in case of its failure an alarm will be given. Unless the Administration considers it impracticable the preset speed and direction of thrust of the propeller shall be maintained until local control is in operation;
8. Indicators shall be fitted on the navigating bridge for:
  - 8.1. Propeller speed and direction of rotation in the case of fixed pitch propellers;
  - 8.2. Propeller speed and pitch position in the case of controllable pitch propellers;

9. An alarm shall be provided on the navigating bridge and in the machinery space to indicate low starting air pressure which shall be set at a level to permit further main engine starting operations. If the remote control system of the propulsion machinery is designed for automatic starting, the number of automatic consecutive attempts which fail to produce a start shall be limited in order to safeguard sufficient starting air pressure for starting locally.

3. Where the main propulsion and associated machinery, including sources of main electrical supply, are provided with various degrees of automatic or remote control and are under continuous manual supervision from a control room the arrangements and controls shall be so designed, equipped and installed that the machinery operation will be as safe and effective as if it were under direct supervision; for this purpose regulations 46 to 50 shall apply as appropriate. Particular consideration shall be given to protect such spaces against fire and flooding.

4. In general, automatic starting, operational and control systems shall include provisions for manually overriding the automatic controls. Failure of any part of such systems shall not prevent the use of the manual override.

#### *Regulation 32. STEAM BOILERS AND BOILER FEED SYSTEMS*

1. Every steam boiler and every unfired steam generator shall be provided with not less than two safety valves of adequate capacity. However, having regard to the output or any other features of any boiler or unfired steam generator, the Administration may permit only one safety valve to be fitted if it is satisfied that adequate protection against overpressure is thereby provided.

2. Each oil-fired boiler which is intended to operate without manual supervision shall have safety arrangements which shut off the fuel supply and give an alarm in the case of low water level, air supply failure or flame failure.

3. Water tube boilers serving turbine propulsion machinery shall be fitted with a high-water-level alarm.

4. Every steam generating system which provides services essential for the safety of the ship, or which could be rendered dangerous by the failure of its feed water supply, shall be provided with not less than two separate feed water systems from and including the feed pumps, noting that a single penetration of the steam drum is acceptable. Unless overpressure is prevented by the pump characteristics means shall be provided which will prevent overpressure in any part of the systems.

5. Boilers shall be provided with means to supervise and control the quality of the feed water. Suitable arrangements shall be provided to preclude, as far as practicable, the entry of oil or other contaminants which may adversely affect the boiler.

6. Every boiler essential for the safety of the ship and designed to contain water at a specified level shall be provided with at least two means for indicating its water level, at least one of which shall be a direct reading gauge glass.

#### *Regulation 33. STEAM PIPE SYSTEMS*

1. Every steam pipe and every fitting connected thereto through which steam may pass shall be so designed, constructed and installed as to withstand the maximum working stresses to which it may be subjected.

2. Means shall be provided for draining every steam pipe in which dangerous water hammer action might otherwise occur.

3. If a steam pipe or fitting may receive steam from any source at a higher pressure than that for which it is designed a suitable reducing valve, relief valve and pressure gauge shall be fitted.



**Regulation 34. AIR PRESSURE SYSTEMS**

1. In every ship means shall be provided to prevent overpressure in any part of compressed air systems and wherever water jackets or casings of air compressors and coolers might be subjected to dangerous overpressure due to leakage into them from air pressure parts. Suitable pressure relief arrangements shall be provided for all systems.

2. The main starting air arrangements for main propulsion internal combustion engines shall be adequately protected against the effects of backfiring and internal explosion in the starting air pipes.

3. All discharge pipes from starting air compressor<sup>s</sup> shall lead directly to the starting air receivers, and all starting pipes from the air receivers to main or auxiliary engines shall be entirely separate from the compressor discharge pipe system.

4. Provision shall be made to reduce to a minimum the entry of oil into the air pressure systems and to drain these systems.

**Regulation 35. VENTILATING SYSTEMS IN MACHINERY SPACES**

Machinery spaces of category A shall be adequately ventilated so as to ensure that when machinery or boilers therein are operating at full power in all weather conditions including heavy weather, an adequate supply of air is maintained to the spaces for the safety and comfort of personnel and the operation of the machinery. Any other machinery space shall be adequately ventilated appropriate for the purpose of that machinery space.

**Regulation 36. PROTECTION AGAINST NOISE\***

Measures shall be taken to reduce machinery noise in machinery spaces to acceptable levels as determined by the Administration. If this noise cannot be sufficiently reduced the source of excessive noise shall be suitably insulated or isolated or a refuge from noise shall be provided if the space is required to be manned. Ear protectors shall be provided for personnel required to enter such spaces, if necessary.

**Regulation 37. COMMUNICATION BETWEEN NAVIGATING BRIDGE AND MACHINERY SPACE**

At least two independent means shall be provided for communicating orders from the navigating bridge to the position in the machinery space or in the control room from which the engines are normally controlled: one of these shall be an engine room telegraph which provides visual indication of the orders and responses both in the machinery space and on the navigating bridge. Appropriate means of communication shall be provided to any other positions from which the engines may be controlled.

**Regulation 38. ENGINEERS' ALARM**

An engineers' alarm shall be provided to be operated from the engine control room or at the manoeuvring platform as appropriate, and shall be clearly audible in the engineers' accommodation.

**Regulation 39. LOCATION OF EMERGENCY INSTALLATIONS IN PASSENGER SHIPS**

Emergency sources of electrical power, fire pumps, bilge pumps except those specifically serving the spaces forward of the collision bulkhead, any fixed fire-extinguishing system required by chapter II-2 and other emergency installations which are essential for the safety of the ship, except anchor windlasses, shall not be installed forward of the collision bulkhead.

\* Reference is made to the Code on Noise Levels on Board Ships, adopted by the Organization by resolution A.468(XII).

## PART D. ELECTRICAL INSTALLATIONS

(Except where expressly provided otherwise part D applies to passenger ships and cargo ships)

*Regulation 40. GENERAL*

1. Electrical installations shall be such that:
  1. All electrical auxiliary services necessary for maintaining the ship in normal operational and habitable conditions will be ensured without recourse to the emergency source of electrical power;
  2. Electrical services essential for safety will be ensured under various emergency conditions; and
  3. The safety of passengers, crew and ship from electrical hazards will be ensured.
2. The Administration shall take appropriate steps to ensure uniformity in the implementation and application of the provisions of this Part in respect of electrical installations.\*

*Regulation 41. MAIN SOURCE OF ELECTRICAL POWER AND LIGHTING SYSTEMS*

1.1. A main source of electrical power of sufficient capacity to supply all those services mentioned in regulation 40.1.1 shall be provided. This main source of electrical power shall consist of at least two generating sets.

1.2. The capacity of these generating sets shall be such that in the event of any one generating set being stopped it will still be possible to supply those services necessary to provide normal operational conditions of propulsion and safety. Minimum comfortable conditions of habitability shall also be ensured which include at least adequate services for cooking, heating, domestic refrigeration, mechanical ventilation, sanitary and fresh water.

1.3. The arrangements of the ship's main source of electrical power shall be such that the services referred to in regulation 40.1.1 can be maintained regardless of the speed and direction [of rotation] of the propulsion machinery or shafting.

1.4. In addition, the generating sets shall be such as to ensure that with any one generator or its primary source of power out of operation, the remaining generating sets shall be capable of providing the electrical services necessary to start the main propulsion plant from a dead ship condition. The emergency source of electrical power may be used for the purpose of starting from a dead ship condition if its capability either alone or combined with that of any other source of electrical power is sufficient to provide at the same time those services required to be supplied by regulations 42.2.1 to 42.2.3 or 43.2.1 to 43.2.4.

1.5. Where transformers constitute an essential part of the electrical supply system required by this paragraph, the system shall be so arranged as to ensure the same continuity of the supply as is stated in this paragraph.

2.1. A main electric lighting system which shall provide illumination throughout those parts of the ship normally accessible to and used by passengers or crew shall be supplied from the main source of electrical power.

2.2. The arrangement of the main electric lighting system shall be such that a fire or other casualty in spaces containing the main source of electrical power, associated transforming equipment, if any, the main switchboard and the main lighting switchboard, will not render the emergency electric lighting system required by regulations 42.2.1 and 42.2.2 or 43.2.1, 43.2.2 and 43.2.3 inoperative.

2.3. The arrangement of the emergency electric lighting system shall be such that a fire or other casualty in spaces containing the emergency source of electrical power, associated transforming equipment, if any, the emergency switchboard and the emergency lighting switchboard will not render the main electric lighting system required by this regulation inoperative.

\* Reference is made to the Recommendations published by the International Electrotechnical Commission and, in particular, Publication 92 — Electrical Installations in Ships.

3. The main switchboard shall be so placed relative to one main generating station that, as far as is practicable, the integrity of the normal electrical supply may be affected only by a fire or other casualty in one space. An environmental enclosure for the main switchboard such as may be provided by a machinery control room situated within the main boundaries of the space, is not to be considered as separating the switchboards from the generators.

4. Where the total installed electrical power of the main generating sets is in excess of 3 MW, the main busbars shall be subdivided into at least two parts which shall normally be connected by removable links or other approved means; so far as is practicable, the connexion of generating sets and any other duplicated equipment shall be equally divided between the parts. Equivalent arrangements may be permitted to the satisfaction of the Administration.

*Regulation 42. EMERGENCY SOURCE OF ELECTRICAL POWER IN PASSENGER SHIPS*

1.1. A self-contained emergency source of electrical power shall be provided.

1.2. The emergency source of electrical power, associated transforming equipment, if any, transitional source of emergency power, emergency switchboard and emergency lighting switchboard shall be located above the uppermost continuous deck and shall be readily accessible from the open deck. They shall not be located forward of the collision bulkhead.

1.3. The location of the emergency source of electrical power and associated transforming equipment, if any, the transitional source of emergency power, the emergency switchboard and the emergency electric lighting switchboards in relation to the main source of electrical power, associated transforming equipment, if any, and the main switchboard shall be such as to ensure to the satisfaction of the Administration that a fire or other casualty in spaces containing the main source of electrical power, associated transforming equipment, if any, and the main switchboard or in any machinery space of category A will not interfere with the supply, control and distribution of emergency electrical power. As far as practicable, the space containing the emergency source of electrical power, associated transforming equipment, if any, the transitional source of emergency electrical power and the emergency switchboard shall not be contiguous to the boundaries of machinery spaces of category A or those spaces containing the main source of electrical power, associated transforming equipment, if any, or the main switchboard.

1.4. Provided that suitable measures are taken for safeguarding independent emergency operation under all circumstances, the emergency generator may be used exceptionally, and for short periods, to supply non-emergency circuits.

2. The electrical power available shall be sufficient to supply all those services that are essential for safety in an emergency, due regard being paid to such services as may have to be operated simultaneously. The emergency source of electrical power shall be capable, having regard to starting currents and the transitory nature of certain loads, of supplying simultaneously at least the following services for the periods specified hereinafter, if they depend upon an electrical source for their operation:

2.1. For a period of 36 hours, emergency lighting:

1. At every embarkation station on deck and over sides as required by regulations III/19 and III/30;
2. In all service and accommodation alleyways, stairways and exits, personnel lift cars;
3. In the machinery spaces and main generating stations including their control positions;
4. In all control stations, machinery control rooms, and at each main and emergency switchboard;
5. At all stowage positions for firemen's outfits;
6. At the steering gear; and
7. At the fire pump, the sprinkler pump and the emergency bilge pump referred to in paragraph 2.4 and at the starting position of their motors.



2.2. For a period of 36 hours, the navigation lights and other lights required by the International Regulations for Preventing Collisions at Sea in force.

2.3. For a period of 36 hours:

1. All internal communication equipment required in an emergency;
  2. The navigational aids as required by regulation V/12; where such provision is unreasonable or impracticable the Administration may waive this requirement for ships of less than 5,000 tons gross tonnage;
  3. The fire detection and fire alarm system, and the fire door holding and release system, and
  4. For intermittent operation of the daylight signalling lamp, the ship's whistle, the [manually operated call points] and all internal signals that are required in an emergency;
- unless such services have an independent supply for the period of 36 hours from an accumulator battery suitably located for use in an emergency.

2.4. For a period of 36 hours:

1. One of the fire pumps required by regulation 11-2/4.3.1 and 4.3.3;
2. The automatic sprinkler pump, if any; and
3. The emergency bilge pump and all the equipment essential for the operation of electrically powered remote controlled bilge valves.

2.5. For the period of time required by regulation 29.14 the steering gear if required to be so supplied by that regulation.

2.6. For a period of half an hour:

1. Any watertight doors required by regulation 15 to be power operated together with their indicators and warning signals. Provided the requirements of regulation 15.9.2 are complied with, sequential operation of the doors may be permitted providing all doors can be closed in 60 seconds;
2. The emergency arrangements to bring the lift cars to deck level for the escape of persons. The passenger lift cars may be brought to deck level sequentially in an emergency.

2.7. In a ship engaged regularly on voyages of short duration, the Administration if satisfied that an adequate standard of safety would be attained may accept a lesser period than the 36 hour period specified in paragraphs 2.1 to 2.5 but not less than 12 hours.

3. The emergency source of electrical power may be either a generator or an accumulator battery, which shall comply with the following:

3.1. Where the emergency source of electrical power is a generator, it shall be:

1. Driven by a suitable prime-mover with an independent supply of fuel having a flashpoint (closed cup test) of not less than 43°C;
2. Started automatically upon failure of the electrical supply from the main source of electrical power and shall be automatically connected to the emergency switchboard; those services referred to in paragraph 4 shall then be transferred automatically to the emergency generating set. The automatic starting system and the characteristic of the prime-mover shall be such as to permit the emergency generator to carry its full rated load as quickly as is safe and practicable, subject to a maximum of 45 seconds; unless a second independent means of starting the emergency generating set is provided, the single source of stored energy shall be protected to preclude its complete depletion by the automatic starting system; and
3. Provided with a transitional source of emergency electrical power according to paragraph 4.

3.2. Where the emergency source of electrical power is an accumulator battery, it shall be capable of:

1. Carrying the emergency electrical load without recharging while maintaining the voltage of the battery throughout the discharge period within 12 per cent above or below its nominal voltage;
2. Automatically connecting to the emergency switchboard in the event of failure of the main source of electrical power; and
3. Immediately supplying at least those services specified in paragraph 4.
  4. The transitional source of emergency electrical power required by paragraph 3.1.3 shall consist of an accumulator battery suitably located for use in an emergency which shall operate without recharging while maintaining the voltage of the battery throughout the discharge period within 12 per cent above or below its nominal voltage and be of sufficient capacity and so arranged as to supply automatically in the event of failure of either the main or emergency source of electrical power at least the following services, if they depend upon an electrical source for their operation:
    - 4.1. For half an hour:
      1. The lighting required by paragraphs 2.1 and 2.2;
      2. All services required by paragraphs 2.3.1, 2.3.3 and 2.3.4 unless such services have an independent supply for the period specified from an accumulator battery suitably located for use in an emergency.
    - 4.2. Power to close the watertight doors but not necessarily all of them simultaneously, together with their indicators and warning signals as required by paragraph 2.6.1.
  - 5.1. The emergency switchboard shall be installed as near as is practicable to the emergency source of electrical power.
  - 5.2. Where the emergency source of electrical power is a generator, the emergency switchboard shall be located in the same space unless the operation of the emergency switchboard would thereby be impaired.
  - 5.3. No accumulator battery fitted in accordance with this regulation shall be installed in the same space as the emergency switchboard. An indicator shall be mounted in a suitable place on the main switchboard or in the machinery control room to indicate when the batteries constituting either the emergency source of electrical power or the transitional source of emergency electrical power referred to in paragraph 3.1.3 or 4 are being discharged.
  - 5.4. The emergency switchboard shall be supplied during normal operation from the main switchboard by an interconnector feeder which is to be adequately protected at the main switchboard against overload and short circuit and which is to be disconnected automatically at the emergency switchboard upon failure of the main source of electrical power. Where the system is arranged for feedback operation, the interconnector feeder is also to be protected at the emergency switchboard at least against short circuit.
  - 5.5. In order to ensure ready availability of the emergency source of electrical power, arrangements shall be made where necessary to disconnect automatically non-emergency circuits from the emergency switchboard to ensure that power shall be available to the emergency circuits.
6. The emergency generator and its prime-mover and any emergency accumulator battery shall be so designed and arranged as to ensure that they will function at full rated power when the ship is upright and when inclined at any angle of list up to 22.5° or when inclined up to 10° either in the fore or aft direction, or is in any combination of angles within those limits.
7. Provision shall be made for the periodic testing of the complete emergency system and shall include the testing of automatic starting arrangements.

**Regulation 43. EMERGENCY SOURCE OF ELECTRICAL POWER IN CARGO SHIPS**

1.1. A self-contained emergency source of electrical power shall be provided.

1.2. The emergency source of electrical power, associated transforming equipment, if any, transitional source of emergency power, emergency switchboard and emergency lighting switchboard shall be located above the [uppermost] continuous deck and shall be readily accessible from the open deck. They shall not be located forward of the collision bulkhead, except where permitted by the Administration in exceptional circumstances.

1.3. The location of the emergency source of electrical power, associated transforming equipment, if any, the transitional source of emergency power, the emergency switchboard and the emergency lighting switchboard in relation to the main source of electrical power, associated transforming equipment, if any, and the main switchboard shall be such as to ensure to the satisfaction of the Administration that a fire or other casualty in the space containing the main source of electrical power, associated transforming equipment, if any, and the main switchboard, or in any machinery space of category A will not interfere with the supply, control and distribution of emergency electrical power. As far as practicable the [space] containing the emergency source of electrical power, associated transforming equipment, if any, the transitional source of emergency electrical power and the emergency switchboard shall not be contiguous to the boundaries of machinery spaces of category A or those spaces containing the main source of electrical power, associated transforming equipment, if any, and the main switchboard.

1.4. Provided that suitable measures are taken for safeguarding independent emergency operation under all circumstances, the emergency generator may be used, exceptionally, and for short periods, to supply non-emergency circuits.

2. The electrical power available shall be sufficient to supply all those services that are essential for safety in an emergency, due regard being paid to such services as may have to be operated simultaneously. The emergency source of electrical power shall be capable, having regard to starting currents and the transitory nature of certain loads, of supplying simultaneously at least the following services for the periods specified hereinafter, if they depend upon an electrical source for their operation:

2.1. For a period of 3 hours, emergency lighting at every embarkation station on deck and over sides as required by regulations III/19 and III/38.

2.2. For a period of 18 hours, emergency lighting:

1. In all service and accommodation alleyways stairways and exits, personnel lift cars and personnel lift trunks;
2. In the machinery spaces and main generating stations including their control positions;
3. In all control stations, machinery control rooms, and at each main and emergency switchboard;
4. At all stowage positions for firemen's outfits;
5. At the steering gear; and
6. At the fire pump referred to in paragraph 2.5, at the sprinkler pump, if any, and at the emergency bilge pump, if any, and at the starting positions of their motors.

2.3. For a period of 18 hours, the navigation lights and other lights required by the International Regulations for Preventing Collisions at Sea in force.

2.4. For a period of 18 hours:

1. All internal communication equipment as required in an emergency;
2. The navigational aids as required by regulation V/12; where such provision is unreasonable or impracticable the Administration may waive this requirement for ships of less than 5,000 tons gross tonnage;
3. The fire detection and fire alarm system; and

4. Intermittent operation of the daylight signalling lamp, the ship's whistle, the [manually operated call points] and all internal signals that are required in an emergency; unless such services have an independent supply for the period of 18 hours from an accumulator battery suitably located for use in an emergency.

2.5. For a period of 18 hours one of the fire pumps required by regulation II-2/4.3.1 and 4.3.3 if dependent upon the emergency generator for its source of power.

2.6.1. For the period of time required by regulation 29.14 the steering gear where it is required to be so supplied by that regulation.

2.6.2. In a ship engaged regularly in voyages of short duration, the Administration if satisfied that an adequate standard of safety would be attained may accept a lesser period than the 18 hour period specified in paragraphs 2.2 to 2.5 but not less than 12 hours.

3. The emergency source of electrical power may be either a generator or an accumulator battery, which shall comply with the following:

3.1. Where the emergency source of electrical power is a generator, it shall be:

1. Driven by a suitable prime-mover with an independent supply of fuel, having a flashpoint (closed cup test) of not less than 43°C;
2. Started automatically upon failure of the main source of electrical power supply unless a transitional source of emergency electrical power in accordance with paragraph 3.1.3 is provided; where the emergency generator is automatically started, it shall be automatically connected to the emergency switchboard; those services referred to in paragraph 4 shall then be connected automatically to the emergency generator; and unless a second independent means of starting the emergency generator is provided the single source of stored energy shall be protected to preclude its complete depletion by the automatic starting system; and
3. Provided with a transitional source of emergency electrical power as specified in paragraph 4 unless an emergency generator is provided capable both of supplying the services mentioned in that paragraph and of being automatically started and supplying the required load as quickly as is safe and practicable subject to a maximum of 45 seconds.

3.2. Where the emergency source of electrical power is an accumulator battery it shall be capable of:

1. Carrying the emergency electrical load without recharging while maintaining the voltage of the battery throughout the discharge period within 12 per cent above or below its nominal voltage;
2. Automatically connecting to the emergency switchboard in the event of failure of the main source of electrical power; and
3. Immediately supplying at least those services specified in paragraph 4.

4. The transitional source of emergency electrical power where required by paragraph 3.1.3 shall consist of an accumulator battery suitably located for use in an emergency which shall operate without recharging while maintaining the voltage of the battery throughout the discharge period within 12 per cent above or below its nominal voltage and be of sufficient capacity and shall be so arranged as to supply automatically in the event of failure of either the main or the emergency source of electrical power for half an hour at least the following services if they depend upon an electrical source for their operation:

1. The lighting required by paragraphs 2.1, 2.2 and 2.3. For this transitional phase, the required emergency electric lighting, in respect of the machinery space and accommodation and service spaces may be provided by permanently fixed, individual, automatically charged, relay operated accumulator lamps; and



2. All services required by paragraphs 2.4.1, 2.4.3 and 2.4.4 unless such services have an independent supply for the period specified from an accumulator battery suitably located for use in an emergency.
  - 5.1. The emergency switchboard shall be installed as near as is practicable to the emergency source of electrical power.
  - 5.2. Where the emergency source of electrical power is a generator, the emergency switchboard shall be located in the same space unless the operation of the emergency switchboard would thereby be impaired.
  - 5.3. No accumulator battery fitted in accordance with this regulation shall be installed in the same space as the emergency switchboard. An indicator shall be mounted in a suitable place on the main switchboard or in the machinery control room to indicate when the batteries constituting either the emergency source of electrical power or the transitional source of electrical power referred to in paragraph 3.2 or 4 are being discharged.
  - 5.4. The emergency switchboard shall be supplied during normal operation from the main switchboard by an interconnector feeder which is to be adequately protected at the main switchboard against overload and short circuit and which is to be disconnected automatically at the emergency switchboard upon failure of the main source of electrical power. Where the system is arranged for feedback operation, the interconnector feeder is also to be protected at the emergency switchboard at least against short circuit.
  - 5.5. In order to ensure ready availability of the emergency source of electrical power, arrangements shall be made where necessary to disconnect automatically non-emergency circuits from the emergency switchboard to ensure that electrical power shall be available automatically to the emergency circuits.
6. The emergency generator and its prime-mover and any emergency accumulator battery shall be so designed and arranged as to ensure that they will function at full rated power when the ship is upright and when inclined at any angle of list up to 22.5° or when inclined up to 10° either in the fore or aft direction, or is in any combination of angles within those limits.
7. Provision shall be made for the periodic testing of the complete emergency system and shall include the testing of automatic starting arrangements.

*Regulation 44. STARTING ARRANGEMENTS FOR EMERGENCY GENERATING SETS*

1. Emergency generating sets shall be capable of being readily started in their cold condition at a temperature of 0 °C. If this is impracticable, or if lower temperatures are likely to be encountered, provision acceptable to the Administration shall be made for the maintenance of heating arrangements, to ensure ready starting of the generating sets.
2. Each emergency generating set arranged to be automatically started shall be equipped with starting devices approved by the Administration with a stored energy capability of at least three consecutive starts. A second source of energy shall be provided for an additional three starts within 30 minutes unless manual starting can be demonstrated to be effective.
3. The stored energy shall be maintained at all times as follows:
  1. Electrical and hydraulic starting systems shall be maintained from the emergency switchboard;
  2. Compressed air starting systems may be maintained by the main or auxiliary compressed air receivers through a suitable non-return valve or by an emergency air compressor which, if electrically driven, is supplied from the emergency switchboard;
  3. All of these starting, charging and energy storing devices shall be located in the emergency generator space; these devices are not to be used for any purpose other than the operation of the emergency generating set. This does not preclude the supply to the air receiver of the emergency generating set from the main or auxiliary compressed air system through the non-return valve fitted in the emergency generator space.

4.1. Where automatic starting is not required, manual starting is permissible, such as manual cranking, inertia starters, manually charged hydraulic accumulators, or powder charge cartridges, where they can be demonstrated as being effective.

4.2. When manual starting is not practicable, the requirements of paragraphs 2 and 3 shall be complied with except that starting may be manually initiated.

**Regulation 45. PRECAUTIONS AGAINST SHOCK, FIRE AND OTHER HAZARDS  
OF ELECTRICAL ORIGIN**

1.1. Exposed metal parts of electrical machines or equipment which are not intended to be live but which are liable under fault conditions to become live shall be earthed unless the machines or equipment are:

1. Supplied at a voltage not exceeding 55 V direct current or 55 V, root mean square between conductors; auto-transformers shall not be used for the purpose of achieving this voltage; or
2. Supplied at a voltage not exceeding 250 V by safety isolating transformers supplying only one consuming device; or
3. Constructed in accordance with the principle of double insulation.

1.2. The Administration may require additional precautions for portable electrical equipment for use in confined or exceptionally damp spaces where particular risks due to conductivity may exist.

1.3. All electrical apparatus shall be so constructed and so installed as not to cause injury when handled or touched in the normal manner.

2. Main and emergency switchboards shall be so arranged as to give easy access as may be needed to apparatus and equipment, without danger to personnel. The sides and the rear and, where necessary, the front of switchboards shall be suitably guarded. Exposed live parts having voltages to earth exceeding a voltage to be specified by the Administration shall not be installed on the front of such switchboards. Where necessary, non-conducting mats or gratings shall be provided at the front and rear of the switchboard.

3.1. The hull return system of distribution shall not be used for any purpose in a tanker, or for power, heating, or lighting in any other ship of 1,600 tons gross tonnage and upwards.

3.2. The requirement of paragraph 3.1 does not preclude under conditions by the Administration the use of:

1. Impressed current cathodic protective systems;
2. Limited and locally earthed systems; or
3. Insulation level monitoring devices provided the circulation current does not exceed 30 mA under the most unfavourable conditions.

3.3. Where the hull return system is used, all final subcircuits, i.e. all circuits after the last protective device, shall be two-wire and special precautions shall be taken to the satisfaction of the Administration.

4.1. Earthed distribution systems shall not be used in a tanker. The Administration may exceptionally permit in a tanker the earthing of the neutral for alternating current power networks of 3,000 V (line to line) and over, provided that any possible resulting current does not flow directly through any of the dangerous spaces.

4.2. When a distribution system, whether primary or secondary, for power, heating or lighting, with no connexion to earth is used, a device capable of continuously monitoring the insulation level to earth and of giving an audible or visual indication of abnormally low insulation values shall be provided.

5.1. Except as permitted by the Administration in exceptional circumstances, all metal sheaths and armour of cables shall be electrically continuous and shall be earthed.

5.2. All electric cables and wiring external to equipment shall be at least of a flame retardant type and shall be so installed as not to impair their original flame retarding properties. Where necessary for particular applications the Administration may permit the use of special types of cables such as radio frequency cables, which do not comply with the foregoing.

5.3. Cables and wiring serving essential or emergency power, lighting, internal communications or signals shall so far as practicable be routed clear of galleys, laundries, machinery spaces of category A and their casings and other high fire risk areas. Cables connecting fire pumps to the emergency switchboard shall be of a fire resistant type where they pass through high fire risk areas. Where practicable all such cables should be run in such a manner as to preclude their being rendered unserviceable by heating of the bulkheads that may be caused by a fire in an adjacent space.

5.4. Where cables which are installed in hazardous areas introduce the risk of fire or explosion in the event of an electrical fault in such areas, special precautions against such risks shall be taken to the satisfaction of the Administration.

5.5. Cables and wiring shall be installed and supported in such a manner as to avoid chaffing or other damage.

5.6. Terminations and joints in all conductors shall be so made as to retain the original electrical, mechanical, flame retarding and, where necessary, fire resisting properties of the cable.

6.1. Each separate circuit shall be protected against short circuit and against overload, except as permitted in regulations 29 and 30 or where the Administration may exceptionally otherwise permit.

6.2. The rating or appropriate setting of the overload protective device for each circuit shall be permanently indicated at the location of the protective device.

7. Lighting fittings shall be so arranged as to prevent temperature rises which could damage the cables and wiring, and to prevent surrounding material from becoming excessively hot.

8. All lighting and power circuits terminating in a bunker or cargo space shall be provided with a multiple pole switch outside the space for disconnecting such circuits.

9.1. Accumulator batteries shall be suitably housed, and compartments used primarily for their accommodation shall be properly constructed and efficiently ventilated.

9.2. Electrical or other equipment which may constitute a source of ignition of flammable vapours shall not be permitted in these compartments except as permitted in paragraph 10.

9.3. Accumulator batteries shall not be located in sleeping quarters except where hermetically sealed to the satisfaction of the Administration.

10. No electrical equipment shall be installed in any space where flammable mixtures are liable to collect including those on board tankers or in compartments assigned principally to accumulator batteries, in paint lockers, acetylene stores or similar spaces, unless the Administration is satisfied that such equipment is:

1. Essential for operational purposes;
2. Of a type which will not ignite the mixture concerned;
3. Appropriate to the space concerned; and
4. Appropriately certified for safe usage in the dusts, vapours or gases likely to be encountered.

11. In a passenger ship, distribution systems shall be so arranged that fire in any main vertical zone as is defined in regulation 11-2/3.9 will not interfere with services essential for safety in any other such zone. This requirement will be met if main and emergency feeders passing through any such zone are separated both vertically and horizontally as widely as is practicable.



**PART E. ADDITIONAL REQUIREMENTS FOR  
PERIODICALLY UNATTENDED MACHINERY SPACES**

(Part E applies to cargo ships except that regulation 54 refers to passenger ships)

**Regulation 46. GENERAL**

1. The arrangements provided shall be such as to ensure that the safety of the ship in all sailing conditions, including manoeuvring, is equivalent to that of a ship having the machinery spaces manned.
2. Measures shall be taken to the satisfaction of the Administration to ensure that the equipment is functioning in a reliable manner and that satisfactory arrangements are made for regular inspections and routine tests to ensure continuous reliable operation.
3. Every ship shall be provided with documentary evidence, to the satisfaction of the Administration, of its fitness to operate with periodically unattended machinery spaces.

**Regulation 47. FIRE PRECAUTIONS**

1. Means shall be provided to detect and give alarms at an early stage in case of fires:
  1. In boiler air supply casings and exhausts (uptakes); and
  2. In scavenging air belts of propulsion machinery,unless the Administration considers this to be unnecessary in a particular case.
2. Internal combustion engines of 2250 kW and above or having cylinders of more than 300 mm bore shall be provided with crankcase oil mist detectors or engine bearing temperature monitors or equivalent devices.

**Regulation 48. PROTECTION AGAINST FLOODING**

1. Bilge wells in periodically unattended machinery spaces shall be located and monitored in such a way that the accumulation of liquids is detected at normal angles of trim and heel, and shall be large enough to accommodate easily the normal drainage during the unattended period.
2. Where the bilge pumps are capable of being started automatically, means shall be provided to indicate when the influx of liquid is greater than the pump capacity or when the pump is operating more frequently than would normally be expected. In these cases, smaller bilge wells to cover a reasonable period of time may be permitted. Where automatically controlled bilge pumps are provided, special attention shall be given to oil pollution prevention requirements.
3. The location of the controls of any valve serving a sea inlet, a discharge below the water-line or a bilge injection system shall be so sited as to allow adequate time for operation in case of influx of water to the space, having regard to the time likely to be required in order to reach and operate such controls. If the level to which the space could become flooded with the ship in the fully loaded condition so requires, arrangements shall be made to operate the controls from a position above such level.

**Regulation 49. CONTROL OF PROPULSION MACHINERY FROM THE NAVIGATING BRIDGE**

1. Under all sailing conditions, including manoeuvring, the speed, direction of thrust and, if applicable, the pitch of the propeller shall be fully controllable from the navigating bridge.
  - 1.1. Such remote control shall be performed by a single control device for each independent propeller, with automatic performance of all associated services, including, where necessary, means of preventing overload of the propulsion machinery.

1.2. The main propulsion machinery shall be provided with an emergency stopping device on the navigating bridge which shall be independent of the navigating bridge control system.

2. Propulsion machinery orders from the navigating bridge shall be indicated in the main machinery control room or at the propulsion machinery control position as appropriate.

3. Remote control of the propulsion machinery shall be possible only from one location at a time; at such locations interconnected control positions are permitted. At each location there shall be an indicator showing which location is in control of the propulsion machinery. The transfer of control between the navigating bridge and machinery spaces shall be possible only in the [main] machinery space or in the [main] machinery control room. The system shall include means to prevent the propelling thrust from altering significantly when transferring control from one location to another.

4. It shall be possible for all machinery essential for the safe operation of the ship to be controlled from a local position, even in the case of failure in any part of the automatic or remote control systems.

5. The design of the remote automatic control system shall be such that in case of its failure an alarm will be given. Unless the Administration considers it impracticable, the preset speed and direction of thrust [of the propeller] shall be maintained until local control is in operation.

6. Indicators shall be fitted on the navigating bridge for:

1. Propeller speed and direction of rotation in [the] case of fixed pitch propellers; or
2. Propeller speed and pitch position in [the] case of controllable pitch propellers.

7. The number of consecutive automatic attempts which fail to produce a start shall be limited to safeguard sufficient starting air pressure. An alarm shall be provided to indicate low starting air pressure set at a level which still permits starting operations of the propulsion machinery.

#### *Regulation 50. COMMUNICATION*

A reliable means of vocal communication shall be provided between the main machinery control room or the propulsion machinery control position as appropriate, the navigating bridge and the engineer officers' accommodation.

#### *Regulation 51. ALARM SYSTEM*

1. An alarm system shall be provided indicating any fault requiring attention and shall:

1. Be capable of sounding an audible alarm in the main machinery control room or at the propulsion machinery control position, and indicate visually each separate alarm function at a suitable position;
2. Have a connexion to the engineers' public rooms and to each of the engineers' cabins through a selector switch, to ensure connexion to at least one of those cabins. Administrations may permit equivalent arrangements;
3. Activate an audible and visual alarm on the navigating bridge for any situation which requires action by or attention of the officer on watch;
4. As far as is practicable be designed on the fail-to-safety principle; and
5. Activate the engineers' alarm required by regulation 38 if an alarm function has not received attention locally within a limited time.

2.1. The alarm system shall be continuously powered and shall have an automatic change-over to a stand-by power supply in case of loss of normal power supply.

2.2. Failure of the normal power supply of the alarm system shall be indicated by an alarm.

3.1. The alarm system shall be able to indicate at the same time more than one fault and the acceptance of any alarm shall not inhibit another alarm.

3.2. Acceptance at the position referred to in paragraph 1 of any alarm condition shall be indicated at the positions where it was shown. Alarms shall be maintained until they are accepted and the visual indications of individual alarms shall remain until the fault has been corrected, when the alarm system shall automatically reset to the normal operating condition.

*Regulation 52. SAFETY SYSTEMS*

A safety system shall be provided to ensure that serious malfunction in machinery or boiler operations, which presents an immediate danger, shall initiate the automatic shut-down of that part of the plant and that an alarm shall be given. Shut-down of the propulsion system shall not be automatically activated except in cases which could lead to serious damage, complete breakdown, or explosion. Where arrangements for overriding the shut-down of the main propelling machinery are fitted, these shall be such as to preclude inadvertent operation. Visual means shall be provided to indicate when the override has been activated.

*Regulation 53. SPECIAL REQUIREMENTS FOR MACHINERY,  
BOILER AND ELECTRICAL INSTALLATIONS*

1. The special requirements for the machinery, boiler and electrical installations shall be to the satisfaction of the Administration and shall include at least the requirements of this regulation.

2. The main source of electrical power shall comply with the following:

2.1. Where the electrical power can normally be supplied by one generator, suitable load shedding arrangements shall be provided to ensure the integrity of supplies to services required for propulsion and steering as well as the safety of the ship. In the case of loss of the generator in operation adequate provision shall be made for automatic starting and connecting to the main switchboard of a stand-by generator of sufficient capacity to permit propulsion and steering and to ensure the safety of the ship with automatic re-starting of the essential auxiliaries including, where necessary, sequential operations. The Administration may dispense with this requirement for a ship of less than 1,600 tons gross tonnage, if it is considered impracticable.

2.2. If the electrical power is normally supplied by more than one generator simultaneously in parallel operation, provision shall be made, for instance by load shedding, to ensure that, in case of loss of one of these generating sets, the remaining ones are kept in operation without overload to permit propulsion and steering, and to ensure the safety of the ship.

3. Where stand-by machines are required for other auxiliary machinery essential to propulsion, automatic change-over devices shall be provided.

4. *Automatic control and alarm system*

4.1. The control system shall be such that the services needed for the operation of the main propulsion machinery and its auxiliaries are ensured through the necessary automatic arrangements.

4.2. An alarm shall be given on the automatic change-over.

4.3. An alarm system complying with regulation 51 shall be provided for all important pressures, temperatures and fluid levels and other essential parameters.

4.4. A centralized control position shall be arranged with the necessary alarm panels and instrumentation indicating any alarm.

5. Means shall be provided to keep the starting air pressure at the required level where internal combustion engines are used for main propulsion.

**Regulation 54. SPECIAL CONSIDERATION IN RESPECT OF PASSENGER SHIPS**

Passenger ships shall be specially considered by the Administration as to whether or not their machinery spaces may be periodically unattended and if so whether additional requirements to those stipulated in these regulations are necessary to achieve equivalent safety to that of normally attended machinery spaces.

**CHAPTER II-2. CONSTRUCTION – FIRE PROTECTION, FIRE DETECTION AND FIRE EXTINCTION**

The existing text of chapter II-2 is replaced by the following:

**PART A. GENERAL****Regulation 1. APPLICATION**

1.1. Unless expressly provided otherwise, this chapter shall apply to ships the keels of which are laid or which are at a similar stage of construction on or after 1 September 1984.

1.2. For the purpose of this chapter the term “a similar stage of construction” means the stage at which:

1. Construction identifiable with a specific ship begins; and
2. Assembly of that ship has commenced comprising at least 50 tonnes or one per cent of the estimated mass of all structural material, whichever is less.

1.3. For the purpose of this chapter:

1. The expression “ships constructed” means “ships the keels of which are laid or which are at a similar stage of construction”;

2. The expression “all ships” means “ships constructed before, on or after 1 September 1984”;

3. A cargo ship, whenever built, which is converted to a passenger ship shall be treated as a passenger ship constructed on the date on which such a conversion commences.

2. Unless expressly provided otherwise:

1. For ships constructed before 1 September 1984, the Administration shall ensure that, subject to the provisions of paragraph 2.2, the requirements which are applicable under chapter II-2 of the International Convention for the Safety of Life at Sea, 1974\* to new or existing ships as defined in that chapter are complied with;

2. For tankers constructed before 1 September 1984, the Administration shall ensure that the requirements which are applicable under chapter II-2 of the annex to the Protocol of 1978 relating to the International Convention for the Safety of Life at Sea, 1974 to new or existing ships as defined in that chapter are complied with.

3. All ships which undergo repairs, alterations, modifications and outfitting related thereto shall continue to comply with at least the requirements previously applicable to these ships. Such ships, if constructed before 1 September 1984 shall, as a rule, comply with the requirements for ships constructed on or after that date to at least the same extent as they did before undergoing such repairs, alterations, modifications or outfitting. Repairs, alterations and modifications of a major character and outfitting related thereto shall meet the requirements for ships constructed on or after 1 September 1984 in so far as the Administration deems reasonable and practicable.

4.1. The Administration of a State may, if it considers that the sheltered nature and conditions of the voyage are such as to render the application of any specific requirements of this chapter unreasonable or unnecessary, exempt from those requirements individual ships or

\* The text as adopted by the International Conference on Safety of Life at Sea, 1974.

classes of ships entitled to fly the flag of that State which, in the course of their voyage, do not proceed more than 20 miles from the nearest land.

4.2. In the case of passenger ships which are employed in special trades for the carriage of large numbers of special trade passengers, such as the pilgrim trade, the Administration of the State whose flag such ships are entitled to fly, if satisfied that it is impracticable to enforce compliance with the requirements of this chapter, may exempt such ships from those requirements, provided that they comply fully with provisions of:

1. The Rules annexed to the Special Trade-Passenger Ships Agreement, 1971; and
2. The Rules annexed to the Protocol on Space Requirements for Special Trade Passenger Ships, 1973.

#### *Regulation 2. BASIC PRINCIPLES*

1. The purpose of this chapter is to require the fullest practicable degree of fire protection, fire detection and fire extinction in ships.

2. The following basic principles underlie the regulations in this chapter and are embodied in the regulations as appropriate, having regard to the type of ships and the potential fire hazard involved:

1. Division of ship into main vertical zones by thermal and structural boundaries;
2. Separation of accommodation spaces from the remainder of the ship by thermal and structural boundaries;
3. Restricted use of combustible materials;
4. Detection of any fire in the zone of origin;
5. Containment and extinction of any fire in the space of origin;
6. Protection of means of escape or access for fire fighting;
7. Ready availability of fire-extinguishing appliances;
8. Minimization of possibility of ignition of flammable cargo vapour.

#### *Regulation 3. DEFINITIONS*

For the purpose of this chapter, unless expressly provided otherwise:

1. "Non-combustible material" is a material which neither burns nor gives off flammable vapours in sufficient quantity for self-ignition when heated to approximately 750 °C, this being determined to the satisfaction of the Administration by an established test procedure.\* Any other material is a combustible material.

2. "A standard fire test" is one in which specimens of the relevant bulkheads or decks are exposed in a test furnace to temperatures corresponding approximately to the standard time-temperature curve. The specimen shall have an exposed surface of not less than 4.65 m<sup>2</sup> and height (or length of deck) of 2.44 m, resembling as closely as possible the intended construction and including where appropriate at least one joint. The standard time-temperature curve is defined by a smooth curve drawn through the following temperature points measured above the initial furnace temperature:

- At the end of the first 5 minutes, 556 °C
- At the end of the first 10 minutes, 659 °C
- At the end of the first 15 minutes, 718 °C
- At the end of the first 30 minutes, 821 °C
- At the end of the first 60 minutes, 925 °C

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\* Reference is made to Improved Recommendation on Test Method for Qualifying Marine Construction Materials as Non-Combustible, adopted by the Organization by resolution A.472(XII).



3. “A’ class divisions” are those divisions formed by bulkheads and decks which comply with the following:

1. They shall be constructed of steel or other equivalent material;
2. They shall be suitably stiffened;
3. They shall be so constructed as to be capable of preventing the passage of smoke and flame to the end of the one-hour standard fire test;
4. They shall be insulated with approved non-combustible materials such that the average temperature of the unexposed side will not rise more than 139°C above the original temperature, nor will the temperature, at any one point, including any joint, rise more than 180°C above the original temperature, within the time listed below:
  - Class “A-60”, 60 minutes
  - Class “A-30”, 30 minutes
  - Class “A-15”, 15 minutes
  - Class “A-0”, 0 minutes
5. The Administration may require a test of a prototype bulkhead or deck to ensure that it meets the above requirements for integrity and temperature rise.\*

4. “B’ class divisions” are those divisions formed by bulkheads, decks, ceilings or linings which comply with the following:

1. They shall be so constructed as to be capable of preventing the passage of flame to the end of the first half hour of the standard fire test;
2. They shall have an insulation value such that the average temperature of the unexposed side will not rise more than 139°C above the original temperature, nor will the temperature at any one point, including any joint, rise more than 225°C above the original temperature, within the time listed below:
  - Class “B-15” 15 minutes
  - Class “B-0” 0 minutes
3. They shall be constructed of approved non-combustible materials and all materials entering into the construction and erection of “B” class divisions shall be non-combustible, with the exception that combustible veneers may be permitted provided they meet other requirements of this chapter;
4. The Administration may require a test of a prototype division to ensure that it meets the above requirements for integrity and temperature rise.\*

5. “C’ class divisions” are divisions constructed of approved non-combustible materials. They need meet neither requirements relative to the passage of smoke and flame nor limitations relative to the temperature rise. Combustible veneers are permitted provided they meet other requirements of this chapter.

6. “Continuous ‘B’ class ceilings or linings” are those “B” class ceilings or linings which terminate only at an “A” or “B” class division.

7. “Steel or other equivalent material”. Where the words “steel or other equivalent material” occur, “equivalent material” means any non-combustible material which, by itself or due to insulation provided, has structural and integrity properties equivalent to steel at the end of the applicable exposure to the standard fire test (e.g., aluminium alloy with appropriate insulation).

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\* Reference is made to Recommendation for Fire Test Procedures for “A” and “B” Class Divisions, adopted by the Organization by resolutions A.163(ES.IV) and A.215(VII).



8. “Low flame spread” means that the surface thus described will adequately restrict the spread of flame, this being determined to the satisfaction of the Administration by an established test procedure.

9. “Main vertical zones” are those sections into which the hull, superstructure, and deck-houses are divided by “A” class divisions, the mean length of which on any deck does not in general exceed 40 m.

10. “Accommodation spaces” are those spaces used for public spaces, corridors, lavatories, cabins, offices, hospitals, cinemas, games and hobbies rooms, barber shops, pantries containing no cooking appliances and similar spaces.

11. “Public spaces” are those portions of the accommodation which are used for halls, dining rooms, lounges and similar permanently enclosed spaces.

12. “Service spaces” are those spaces used for galleys, pantries containing cooking appliances, lockers, [mail] and specie rooms, store-rooms, workshops other than those forming part of the machinery spaces, and similar spaces and trunks to such spaces.

13. “Cargo spaces” are all spaces used for cargo (including cargo oil tanks) and trunks to such spaces.

14. “Ro/ro cargo spaces” are spaces not normally subdivided in any way and extending to either a substantial length or the entire length of the ship in which goods (packaged or in bulk, in or on rail or road-cars, vehicles (including road or rail tankers), trailers, containers, pallets, demountable tanks or in or on similar stowage units or other receptacles) can be loaded and unloaded normally in a horizontal direction.

15. “Open ro/ro cargo spaces” are ro/ro cargo spaces either open at both ends, or open at one end and provided with adequate natural ventilation effective over their entire length through permanent openings in the side plating or deckhead to the satisfaction of the Administration.

16. “Closed ro/ro cargo spaces” are ro/ro cargo spaces which are neither open ro/ro cargo spaces nor weather decks.

17. “Weather deck” is a deck which is completely exposed to the weather, from above and from at least two sides.

18. “Special category spaces” are those enclosed spaces above or below the bulkhead deck intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion, into and from which such vehicles can be driven and to which passengers have access.

19. “Machinery spaces of category A” are those spaces and trunks to such spaces which contain:

1. Internal combustion machinery used for main propulsion; or
2. Internal combustion machinery used for purposes other than main propulsion where such machinery has in the aggregate a total power output of not less than 375 kW; or
3. Any oil-fired boiler or oil fuel unit.

20. “Machinery spaces” are all machinery spaces of category A and all other spaces containing propulsion machinery, boilers, oil fuel units, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air conditioning machinery, and similar spaces, and trunks to such spaces.

21. “Oil fuel unit” is the equipment used for the preparation of oil fuel for delivery to an oil-fired boiler, or equipment used for the preparation for delivery of heated oil to an internal combustion engine, and includes any oil pressure pumps, filters and heaters dealing with oil at a pressure of more than 0.18 N/mm<sup>2</sup>.

22. “Control stations” are those spaces in which the ship’s radio or main navigation equipment or the emergency source of power is located or where the fire recording or fire control equipment is centralized.

23. "Rooms containing furniture and furnishings of restricted fire risk" are, for the purpose of regulation 26, those rooms containing furniture and furnishings of restricted fire risk (whether cabins, public spaces, offices or other types of accommodation) in which:

1. All case furniture such as desks, wardrobes, dressing tables, bureaux, dressers, is constructed entirely of approved non-combustible materials, except that a combustible veneer not exceeding 2 mm may be used on the working surface of such articles;
2. All free-standing furniture such as chairs, sofas, tables, is constructed with frames of non-combustible materials;
3. All draperies, curtains and other suspended textile materials have, to the satisfaction of the Administration, qualities of resistance to the propagation of flame not inferior to those of wool of mass 0.8 kg/m<sup>2</sup>;<sup>\*</sup>
4. All floor coverings have, to the satisfaction of the Administration, qualities of resistance to the propagation of flame not inferior to those of an equivalent woollen material used for the same purpose;
5. All exposed surfaces of bulkheads, linings and ceilings have low flame-spread characteristics; and
6. All upholstered furniture has qualities of resistance to the ignition and propagation of flame to the satisfaction of the Administration.

24. "Bulkhead deck" is the uppermost deck up to which the transverse watertight bulkheads are carried.

25. "Deadweight" is the difference in tonnes between the displacement of a ship in water of a specific gravity of 1.025 at the load water-line corresponding to the assigned summer freeboard and the lightweight of the ship.

26. "Lightweight" is the displacement of a ship in tonnes without cargo, fuel, lubricating oil, ballast water, fresh water and feedwater in tanks, consumable stores, and passengers and crew and their effects.

27. "Combination carrier" is a tanker designed to carry oil or alternatively solid cargoes in bulk.

28. "Crude oil" is any oil occurring naturally in the earth whether or not treated to render it suitable for transportation and includes:

1. Crude oil from which certain distillate fractions may have been removed; and
2. Crude oil to which certain distillate fractions may have been added.

29. "Dangerous goods" are those goods referred to in regulation V11/2.

30. "Chemical tanker" is a tanker constructed or adapted and used for the carriage in bulk of any liquid product of a flammable nature listed in the summary of minimum requirements of the Code for the Construction and Equipment of Ships Carrying Dangerous Chemicals in Bulk to be adopted by the Maritime Safety Committee under the authority of the Assembly of the Organization conferred by resolution A.490(XII), hereinafter referred to as "Bulk Chemical Code", as may be amended by the Organization.

31. "Gas carrier" is a tanker constructed or adapted and used for the carriage in bulk of any liquefied gas or certain other substances of a flammable nature listed in chapter XIX of the Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk adopted by the Organization by resolution A.328(IX), hereinafter referred to as "Gas Carrier Code", as has been or may be amended by the Organization.

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<sup>\*</sup> Reference is made to Recommendation on Test Method for Determining the Resistance to Flame of Vertically Supported Textiles and Films, adopted by the Organization by resolution A.471(XII).

**Regulation 4. FIRE PUMPS, FIRE MAINS, HYDRANTS AND HOSES**

1. Every ship shall be provided with fire pumps, fire mains, hydrants and hoses complying as applicable with the requirements of this Regulation.

**2. Capacity of fire pumps**

2.1. The required fire pumps shall be capable of delivering for fire-fighting purposes a quantity of water, at the pressure specified in paragraph 4, as follows:

1. Pumps in passenger ships, not less than two-thirds of the quantity required to be dealt with by the bilge pumps when employed for bilge pumping; and
2. Pumps in cargo ships, other than any emergency pump, not less than four-thirds of the quantity required under regulation 11-1/21 to be dealt with by each of the independent bilge pumps in a passenger ship of the same dimension when employed in bilge pumping, provided that in no cargo ship need the total required capacity of the fire pumps exceed 180 m<sup>3</sup>/hour.

2.2. Each of the required fire pumps (other than any emergency pump required in paragraph 3.3.2 for cargo ships) shall have a capacity not less than 80 per cent of the total required capacity divided by the minimum number of required fire pumps but in any case not less than 25 m<sup>3</sup>/hour and each such pump shall in any event be capable of delivering at least the two required jets of water. These fire pumps shall be capable of supplying the fire main system under the required conditions. Where more pumps than the minimum of required pumps are installed the capacity of such additional pumps shall be to the satisfaction of the Administration.

**3. Arrangements of fire pumps and of fire mains**

3.1. Ships shall be provided with independently driven fire pumps as follows:

1. Passenger ships of 4,000 tons gross tonnage and upwards: at least three
2. Passenger ships of less than 4,000 tons gross tonnage and cargo ships of 1,000 tons gross tonnage and upwards: at least two
3. Cargo ships of less than 1,000 tons gross tonnage: to the satisfaction of the Administration

3.2. Sanitary, ballast, bilge or general service pumps may be accepted as fire pumps, provided that they are not normally used for pumping oil and that if they are subject to occasional duty for the transfer or pumping of oil fuel, suitable change-over arrangements are fitted.

3.3. The arrangement of sea connexions, fire pumps and their sources of power shall be such as to ensure that:

1. In passenger ships of 1,000 tons gross tonnage and upwards, in the event of a fire in any one compartment all the fire pumps will not be put out of action.
2. In cargo ships of 2,000 tons gross tonnage and upwards if a fire in any one compartment could put all the pumps out of action there shall be an alternative means consisting of a fixed independently driven emergency pump which shall be capable of supplying two jets of water to the satisfaction of the Administration. The pump and its location shall comply with the following requirements:
  - 2.1. The capacity of the pump shall not be less than 40 per cent of the total capacity of the fire pumps required by this Regulation and in any case not less than 25 m<sup>3</sup>/hour.
  - 2.2. When the pump is delivering the quantity of water required by paragraph 3.3.2.1 the pressure at any hydrant shall be not less than the minimum pressures given in paragraph 4.2.
  - 2.3. Any diesel driven power source for the pump shall be capable of being readily started in its cold condition down to a temperature of 0 ° C by hand (manual) cranking. If this is impracticable, or if lower temperatures are likely to be encountered, consideration is to be given to the provision and maintenance of heating arrangements, 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 6 times within a period of 30 minutes, and at least twice within the first 10 minutes.
- 2.4. Any service fuel tank shall contain sufficient fuel to enable the pump to run on full load for at least three hours and sufficient reserves of fuel shall be available outside the main machinery space to enable the pump to be run on full load for an additional 15 hours.
  - 2.5. The total suction head of the pump shall not exceed 4.5 m under all conditions of list and trim likely to be encountered in service and the suction piping shall be designed to minimize suction losses.
  - 2.6. The boundaries of the space containing the fire pump shall be insulated to a standard of structural fire protection equivalent to that required for a control [station] in regulation 44.
  - 2.7. No direct access shall be permitted between the machinery space and the space containing the emergency fire pump and its source of power. When this is impracticable an Administration may accept an arrangement where the access is by means of an airlock, each of the two doors being self-closing, or through a watertight door capable of being operated from a space remote from the machinery space and the space containing the emergency fire pump and unlikely to be cut off in the event of fire in those spaces. In such cases a second means of access to the space containing the emergency fire pump and its source of power shall be provided.
  - 2.8. Ventilation arrangements to the space containing the independent source of power for the emergency fire pump shall be such as to preclude, as far as practicable, the possibility of smoke from a machinery space fire entering or being drawn into that space.
3. In passenger ships of less than 1,000 tons gross tonnage and cargo ships of less than 2,000 tons gross tonnage, if a fire in any one compartment could put all the pumps out of action the alternative means of providing water for fire-fighting purposes are to the satisfaction of the Administration.
  4. In addition, in cargo ships where other pumps, such as general service, bilge and ballast, etc., are fitted in a machinery space, arrangements shall be made to ensure that at least one of these pumps, having the capacity and pressure required by paragraphs 2.2 and 4.2, is capable of providing water to the fire main.
    - 3.4. The arrangements for the ready availability of water supply shall be:
      1. In passenger ships of 1,000 tons gross tonnage and upwards such that at least one effective jet of water is immediately available from any hydrant in an interior location and so as to ensure the continuation of the output of water by the automatic starting of a required fire pump;
      2. In passenger ships of less than 1,000 tons gross tonnage and in cargo ships to the satisfaction of the Administration;
      3. In cargo ships with a periodically unattended machinery space or when only one person is required on watch there shall be immediate water delivery from the fire main system at a suitable pressure, either by remote starting of one of the main fire pumps with remote starting from the navigating bridge and fire control station, if any, or permanent pressurization of the fire main system by one of the main fire pumps, except that the Administration may waive this requirement for cargo ships of less than 1,600 tons gross tonnage if the arrangement of the machinery space access makes it unnecessary;
      4. In passenger ships, if fitted with periodically unattended machinery spaces in accordance with Regulation II-1/54, the Administration shall determine provisions for fixed water



fire-extinguishing arrangement for such spaces equivalent to those required for normally attended machinery spaces.

3.5. Relief valves shall be provided in conjunction with all fire pumps if the pumps are capable of developing a pressure exceeding the design pressure of the water service pipes, hydrants and hoses. These valves shall be so placed and adjusted as to prevent excessive pressure in any part of the fire main system.

3.6. In tankers isolation valves shall be fitted in the fire main at poop front in a protected position and on the tank deck at intervals of not more than 40 m to preserve the integrity of the fire main system in case of fire or explosion.

#### 4. *Diameter of and pressure in the fire mains*

4.1. The diameter of the fire main and water service pipes shall be sufficient for the effective distribution of the maximum required discharge from two fire pumps operating simultaneously; except that in the case of cargo ships the diameter need only be sufficient for the discharge of 140 m<sup>3</sup>/hour.

4.2. With the two pumps simultaneously delivering through nozzles specified in paragraph 8 the quantity of water specified in paragraph 4.1, through any adjacent hydrants, the following minimum pressures shall be maintained at all hydrants:

- Passenger ships:
  - 4,000 tons gross tonnage and upwards: 0.31 N/mm<sup>2</sup>
  - 1,000 tons gross tonnage and upwards but under 4,000 tons gross tonnage: 0.27 N/mm<sup>2</sup>
  - Under 1,000 tons gross tonnage: to the satisfaction of the Administration
- Cargo ships:
  - 6,000 tons gross tonnage and upwards: 0.27 N/mm<sup>2</sup>
  - 1,000 tons gross tonnage and upwards but under 6,000 tons gross tonnage: 0.25 N/mm<sup>2</sup>
  - Under 1,000 tons gross tonnage: to the satisfaction of the Administration

4.3. The maximum pressure at any hydrant shall not exceed that at which the effective control of a fire hose can be demonstrated.

#### 5. *Number and position of hydrants*

5.1. The number and position of hydrants shall be such that at least two jets of water not emanating from the same hydrant, one of which shall be from a single length of hose, may reach any part of the ship normally accessible to the passengers or crew while the ship is being navigated and any part of any cargo space when empty, any ro/ro cargo space or any special category space in which latter case the two jets shall reach any part of such space, each from a single length of hose. Furthermore, such hydrants shall be positioned near the accesses to the protected spaces.

5.2. In the accommodation, service and machinery spaces of passenger ships the number and position of hydrants shall be such that the requirements of paragraph 5.1 may be complied with when all watertight doors and all doors in main vertical zone bulkheads are closed.

5.3. Where, in a passenger ship, access is provided to a machinery space of category A at a low level from an adjacent shaft tunnel, two hydrants shall be provided external to, but near the entrance to that machinery space. Where such access is provided from other spaces, in one of those spaces two hydrants shall be provided near the entrance to the machinery space of category A. Such provision need not be made where the tunnel or adjacent spaces are not part of the escape route.

#### 6. *Pipes and hydrants*

6.1. Materials readily rendered ineffective by heat shall not be used for fire mains and hydrants unless adequately protected. The pipes and hydrants shall be so placed that the fire hoses may be easily coupled to them. The arrangement of pipes and hydrants shall be such as to avoid

the possibility of freezing. In ships where deck cargo may be carried, the positions of the hydrants shall be such that they are always readily accessible and the pipes shall be arranged as far as practicable to avoid risk of damage by such cargo. Unless one hose and nozzle is provided for each hydrant in the ship, there shall be complete interchangeability of hose couplings and nozzles.

6.2. A valve shall be fitted to serve each fire hose so that any fire hose may be removed while the fire pumps are at work.

6.3. Isolating valves to separate the section of the fire main within the machinery space containing the main fire pump or pumps from the rest of the fire main shall be fitted in an easily accessible and tenable position outside the machinery spaces. The fire main shall be so arranged that when the isolating valves are shut all the hydrants on the ship, except those in the machinery space referred to above, can be supplied with water by a fire pump not located in this machinery space through pipes which do not enter this space. Exceptionally, the Administration may permit short lengths of the emergency fire pump suction and discharge piping to penetrate the machinery space if it is impracticable to route it externally provided that the integrity of the fire main is maintained by the enclosure of the piping in a substantial steel casing.

#### 7. Fire hoses

7.1. Fire hoses shall be of material approved by the Administration and shall be sufficient in length to project a jet of water to any of the spaces in which they may be required to be used. Their maximum length shall be to the satisfaction of the Administration. Each hose shall be provided with a nozzle and the necessary couplings. Hoses specified in this chapter as "fire hoses" shall together with any necessary fittings and tools be kept ready for use in conspicuous positions near the water service hydrants or connexions. Additionally in interior locations in passenger ships carrying more than 36 passengers fire hoses shall be connected to the hydrants at all times.

7.2. Ships shall be provided with fire hoses the number and diameter of which shall be to the satisfaction of the Administration.

7.3. In passenger ships there shall be at least one fire hose for each of the hydrants required by paragraph 5 and these hoses shall be used only for the purposes of extinguishing fires or testing the fire-extinguishing apparatus at fire drills and surveys.

7.4.1. In cargo ships of 1,000 tons gross tonnage and upwards the number of fire hoses to be provided shall be one for each 30 m length of the ship and one spare but in no case less than five in all. This number does not include any hoses required in any engine or boiler room. The Administration may increase the number of hoses required so as to ensure that hoses in sufficient number are available and accessible at all times, having regard to the type of ship and the nature of trade in which the ship is employed.

7.4.2. In cargo ships of less than 1,000 tons gross tonnage the number of fire hoses to be provided shall be to the satisfaction of the Administration.

#### 8. Nozzles

8.1. For the purposes of this chapter, standard nozzle sizes shall be 12 mm, 16 mm and 19 mm or as near thereto as possible. Larger diameter nozzles may be permitted at the discretion of the Administration.

8.2. For accommodation and service spaces, a nozzle size greater than 12 mm need not be used.

8.3. For machinery spaces and exterior locations, the nozzle size shall be such as to obtain the maximum discharge possible from two jets at the pressure mentioned in paragraph 4 from the smallest pump, provided that a nozzle size greater than 19 mm need not be used.

8.4. All nozzles shall be of an approved dual purpose type (i.e. spray/jet type) incorporating a shut-off.



**9. Location and arrangement of water pumps, etc., for other fire-extinguishing systems**

Pumps required for the provision of water for other fire-extinguishing systems required by this chapter, their sources of power and their controls shall be installed outside the space or spaces protected by such systems and shall be so arranged that a fire in the space or spaces protected will not put any such system out of action.

**Regulation 5. FIXED GAS FIRE-EXTINGUISHING SYSTEMS**

**1. General**

1.1. 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 in such quantities as to endanger persons shall not be permitted.

1.2. The necessary pipes for conveying fire-extinguishing medium into 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 admission of the medium to any space. Where a cargo space fitted with a gas fire-extinguishing system is used as a passenger space the gas connexion shall be blanked during such use.

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

1.4. Means shall be provided to close all openings which may admit air to or allow gas to escape from a protected space.

1.5. Where the volume of free air contained in air receivers in any space is such that, if released in such space in the event of fire, such release of air within that space would seriously affect the efficiency of the fixed fire-extinguishing system, the Administration shall require the provision of an additional quantity of fire-extinguishing medium.

1.6. Means shall be provided for automatically giving audible warning of the release of fire-extinguishing medium into any space in which personnel normally work or to which they have access. The alarm shall operate for a suitable period before the medium is released.

1.7. The means of control of any fixed gas fire-extinguishing system 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 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.

1.8. Automatic release of fire-extinguishing medium shall not be permitted, except as permitted by paragraph 3.3.5 and in respect of local automatically operated units referred to in paragraphs 3.4 and 3.5.

1.9. Where the quantity of 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.

1.10. Except as otherwise permitted by paragraphs 3.3, 3.4 or 3.5 pressure containers required for the storage of fire-extinguishing medium, other than steam, shall be located outside protected spaces in accordance with paragraph 1.13.

1.11. Means shall be provided for the crew to safely check the quantity of medium in the containers.

1.12. 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.

1.13. When the fire-extinguishing medium is stored outside a protected space, it shall be stored in a room which shall be situated in a safe and readily accessible position and shall be effectively ventilated to the satisfaction of the Administration. Any entrance to such a storage room shall preferably be from the open deck and in any case shall be independent of the protected

space. Access doors shall open outwards, and bulkheads and decks including doors and other means of closing any opening therein, which form the boundaries between such rooms and adjoining enclosed spaces shall be gastight. For the purpose of the application of the integrity tables in regulations 26, 27, 44 and 58, such storage rooms shall be treated as control stations.

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

## 2. Carbon dioxide systems

2.1. 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 per cent of the gross volume of the largest cargo space so protected in the ship.

2.2. 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 per cent 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 per cent 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 per cent of the gross volume of the largest machinery space protected, including the casing;

provided that the above-mentioned percentages may be reduced to 35 per cent and 30 per cent respectively for cargo ships of less than 2,000 tons gross tonnage; provided also that if two or more machinery spaces are not entirely separate they shall be considered as forming one space.

2.3. For the purpose of this paragraph the volume of free carbon dioxide shall be calculated at 0.56 m<sup>3</sup>/kg.

2.4. For machinery spaces the fixed piping system shall be such that 85 per cent of the gas can be discharged into the space within 2 minutes.

## 3. Halogenated hydrocarbon systems

3.1. The use of halogenated hydrocarbons as fire-extinguishing media is only permitted in machinery spaces, pumprooms and in cargo spaces intended solely for the carriage of vehicles which are not carrying any cargo.

3.2. When halogenated hydrocarbons are used as the fire-extinguishing media in total flooding systems:

1. The system shall be arranged for manual initiation of power release only.
2. If the charge of halogenated hydrocarbon is required to supply more than one space, the arrangements for its storage and release shall be such that compliance with paragraphs 3.2.9 or 3.2.10 respectively, is obtained.
3. Means shall be provided for automatically stopping all ventilation fans serving the protected space before the medium is released.
4. Means shall be provided to manually close all dampers in the ventilation system serving a protected space.
5. The discharge arrangements shall be so designed that the minimum quantity of medium required for cargo spaces or machinery spaces in paragraphs 3.2.9 or 3.2.10 respectively can be substantially discharged in a nominal 20 seconds or less based on the discharge of the liquid phase.
6. The system shall be designed to operate within a temperature range to the satisfaction of the Administration.
7. The discharge shall not endanger personnel engaged on maintenance of equipment or using the normal access ladders and escapes serving the space.
8. Means shall be provided for the crew to safely check the pressure within containers.

9. The quantity of extinguishing medium for cargo spaces intended solely for the carriage of vehicles which are not carrying any cargo shall be calculated in accordance with table 5.1. This quantity shall be based on the gross volume of the protected space. In respect of Halon 1301 and 1211, the quantity shall be calculated on a volumetric ratio basis, and in respect of Halon 2402 on a mass per unit volume basis.

Table 5.1

Halon	Minimum	Maximum
1301	5 per cent	7 per cent
1211	5 per cent	5.5 per cent
2402	0.23 kg/m <sup>3</sup>	0.30 kg/m <sup>3</sup>

10. The quantity of extinguishing media for machinery spaces shall be calculated in accordance with table 5.2. This quantity shall be based on the gross volume of the space in respect of the minimum concentration and the net volume of the space in respect of the maximum concentration, including the casing. In respect of Halon 1301 and 1211, the quantity shall be calculated on a volumetric ratio basis, and in respect of Halon 2402 on a mass per unit volume basis.

Table 5.2

Halon	Minimum	Maximum
1301	4.25 per cent	7 per cent
1211	4.25 per cent	5.5 per cent
2402	0.20 kg/m <sup>3</sup>	0.30 kg/m <sup>3</sup>

11. For the purpose of paragraphs 3.2.9 and 3.2.10, the volume of Halon 1301 shall be calculated at 0.16 m<sup>3</sup>/kg and the volume of Halon 1211 shall be calculated at 0.14 m<sup>3</sup>/kg.

3.3. Only Halon 1301 may be stored within a protected machinery space. Containers shall be individually distributed throughout that space and the following requirements shall be complied with:

1. A manually initiated power release, located outside the protected space, shall be provided. Duplicate sources of power shall be provided for this release and shall be located outside the protected space and be immediately available except that for machinery spaces, one of the sources of power may be located inside the protected space.
2. Electric power circuits connecting the containers shall be monitored for fault conditions and loss of power. Visual and audible alarms shall be provided to indicate this.
3. Pneumatic or hydraulic power circuits connecting the containers shall be duplicated. The sources of pneumatic or hydraulic pressure shall be monitored for loss of pressure. Visual and audible alarms shall be provided to indicate this.
4. Within the protected space, electrical circuits essential for the release of the system shall be heat resistant e.g. mineral insulated cable or equivalent. Piping systems essential for the release of systems designed to be operated hydraulically or pneumatically shall be of steel or other equivalent heat-resisting material to the satisfaction of the Administration.
5. Each pressure container shall be fitted with an automatic overpressure release device which, in the event of the container being exposed to the effects of fire and the system not being operated, will safely vent the contents of the container into the protected space.
6. The arrangement of containers and the electrical circuits and piping essential for the release of any system shall be such that in the event of damage to any one power release line through fire or explosion in a protected space, i.e. a single fault concept, at least two thirds of the fire-extinguishing charge required by paragraphs 3.2.9 or 3.2.10 for that space can still be discharged having regard to the requirement for uniform distribution of medium

throughout the space. The arrangements in respect of systems for spaces requiring only one or two containers shall be to the satisfaction of the Administration.

7. Not more than two discharge nozzles shall be fitted to any pressure container and the maximum quantity of agent in each container shall be to the satisfaction of the Administration having regard to the requirement for uniform distribution of medium throughout the space.
8. The containers shall be monitored for decrease in pressure due to leakage and discharge. Visual and audible alarms in the protected area and on the navigating bridge or in the space where the fire control equipment is centralized shall be provided to indicate this condition, except that for cargo spaces, alarms are only required on the navigating bridge or the space where the fire control equipment is centralized.

3.4. Local automatically operated fixed fire-extinguishing units containing Halon 1301 or 1211, fitted in enclosed areas of high fire risk within machinery spaces, in addition to, and independent of, any required fixed fire-extinguishing system may be accepted subject to compliance with the following:

1. The space in which such additional local protection is provided shall preferably be on one working level and on the same level as the access. At the discretion of the Administration more than one working level may be permitted subject to an access being provided on each level.
2. The size of the space and arrangements of accesses thereto and machinery therein, shall be such that escape from anywhere in the space can be effected in not more than 10 seconds.
3. The operation of any unit shall be signalled both visually and audibly outside each access to the machinery space and at the navigating bridge or in the space where the fire control equipment is centralized.
4. A notice indicating that the space contains one or more automatically operated fire-extinguishing units and stating which medium is used, shall be displayed outside each access thereto.
5. Discharge nozzles shall be so positioned that the discharge does not endanger personnel using the normal access ladders and escapes serving the compartment. Provision shall also be made to protect personnel engaged in maintenance of machinery from inadvertent discharge of the medium.
6. The fire-extinguishing units shall be designed to operate within a temperature range to the satisfaction of the Administration.
7. Means shall be provided for the crew to safely check the pressure within the containers.
8. The total quantity of extinguishing medium provided in the local automatically operated units shall be such that a concentration of 7 per cent in respect of Halon 1301 and 5.5 per cent in respect of Halon 1211 at 20°C based on the net volume of the enclosed space is not exceeded. This requirement applies when either a local automatically operated unit or a fixed system fitted in compliance with paragraph 3.2 has operated, but not when both have operated. The volume of Halon 1301 shall be calculated at 0.16 m<sup>3</sup>/kg and the volume of Halon 1211 shall be calculated at 0.14 m<sup>3</sup>/kg.
9. The time of discharge of a unit, based on the discharge of the liquid phase, shall be 10 seconds or less.
10. The arrangement of local automatically operated fire-extinguishing units shall be such that their release does not result in loss of electrical power or reduction of the manoeuvrability of the ship.

3.5. Automatically operated fire-extinguishing units, as described in paragraph 3.4, fitted in machinery spaces over equipment having a high fire risk, in addition to and independent of any required fixed fire-extinguishing system, may be accepted subject to compliance with paragraphs 3.4.3 to 3.4.6, 3.4.9 and 3.4.10 and with the following:



1. The quantity of medium provided in local automatically operated units shall be such that a vapour in air concentration not greater than 1.25 per cent at 20 ° C based on the gross volume of the machinery space is obtained in the event of their simultaneous operation.
2. The volume of Halon 1301 shall be calculated at 0.16 m<sup>3</sup>/kg and the volume of Halon 1211 shall be calculated at 0.14 m<sup>3</sup>/kg.

#### 4. *Steam systems*

In general, the Administration shall not permit the use of steam as a fire-extinguishing medium in fixed fire-extinguishing systems. Where the use of steam is permitted by the Administration it shall be used only in restricted areas as an addition to the required fire-extinguishing medium and with the proviso that the boiler or boilers available for supplying steam shall have an evaporation of at least 1.0 kg of steam per hour for each 0.75 m<sup>3</sup> 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.

#### 5. *Other gas systems*

5.1. Where gas other than carbon dioxide or halogenated hydrocarbons, or steam as permitted by paragraph 4 is produced on the ship and is used as a fire-extinguishing medium, it 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 have been reduced to a permissible minimum.

5.2. 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.

5.3. Where such gas is used as a 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 per cent of the gross volume of the largest space protected in this way for a period of 72 hours.

### *Regulation 6. FIRE EXTINGUISHERS*

#### 1. *All fire extinguishers shall be of approved types and designs.*

1.1. The capacity of required portable fluid extinguishers shall be not more than 13.5 l and not less than 9 l. Other extinguishers shall be at least as portable as the 13.5 l fluid extinguisher and shall have a fire-extinguishing capability at least equivalent to that of a 9 l fluid extinguisher.

1.2. The Administration shall determine the equivalents of fire extinguishers.

2. Spare charges shall be provided in accordance with requirements to be specified by the Administration.

3. Fire extinguishers containing an extinguishing medium which, in the opinion of the Administration, either by itself or under expected conditions of use gives off toxic gases in such quantities as to endanger persons shall not be permitted.

4. A portable foam applicator unit shall consist of an air-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-making liquid and one spare tank. The nozzle shall be capable of producing effective foam suitable for extinguishing an oil fire, at the rate of at least 1.5 m<sup>3</sup>/minute.

5. Fire extinguishers shall be periodically examined and subjected to such tests as the Administration may require.

6. One of the portable fire extinguishers intended for use in any space shall be stowed near the entrance to that space.

7. Accommodation spaces, service spaces and control stations shall be [sufficient] with portable fire extinguishers of appropriate types and in sufficient number to the satisfaction of the Administration. Ships of 1,000 tons gross tonnage and upwards shall carry at least five portable fire extinguishers.

**Regulation 7. FIRE-EXTINGUISHING ARRANGEMENTS IN MACHINERY SPACES**

**1. Spaces containing oil-fired boilers or oil fuel units**

1.1. Machinery spaces of category A containing oil-fired boilers or oil fuel units shall be provided with any one of the following fixed fire-extinguishing systems:

1. A gas system complying with the provisions of regulation 5;
2. A high expansion foam system complying with the provisions of regulation 9;
3. A pressure water-spraying system complying with the provisions of regulation 10.

In each case if the engine and boiler rooms are not entirely separate, or if fuel oil can drain from the boiler room into the engine room, the combined engine and boiler rooms shall be considered as one compartment.

1.2. There shall be in each boiler room at least one set of portable [foam applicator unit] complying with the provisions of regulation 6.4.

1.3. There shall be at least two portable foam extinguishers or equivalent in each firing space in each boiler room and in each space in which a part of the oil fuel installation is situated. There shall be not less than one approved foam-type extinguisher of at least 135 l capacity or equivalent in each boiler room. These extinguishers shall be provided with hoses on reels suitable for reaching any part of the boiler room. In the case of domestic boilers of less than 175 kW in cargo ships the Administration may consider relaxing the requirements of this paragraph.

1.4. In each firing space there shall be a receptacle containing sand, sawdust impregnated with soda, or other approved dry material in such quantity as may be required by the Administration. An approved portable extinguisher may be substituted as an alternative:

**2. Spaces containing internal combustion machinery**

Machinery spaces of category A containing internal combustion machinery shall be provided with:

1. One of the fire-extinguishing systems required by paragraph 1.1.
2. At least one set of portable air-foam equipment complying with the provisions of regulation 6.4.
3. In each such space approved foam type fire extinguishers, each of at least 45 l capacity or equivalent, sufficient in number to enable foam or its equivalent to be directed on to any part of the fuel and lubricating oil pressure systems, gearing and other fire hazards. In addition, there shall be provided a sufficient number of portable foam extinguishers or equivalent which shall be so located that no point in the space is more than 10 m walking distance from an extinguisher and that there are at least two such extinguishers in each such space. For smaller spaces of cargo ships the Administration may consider relaxing this requirement.

**3. Spaces containing steam turbines or enclosed steam engines**

In spaces containing steam turbines or enclosed steam engines used either for main propulsion or for other purposes when such machinery has in the aggregate a total power output of not less than 375 kW there shall be provided:

1. Approved foam fire extinguishers each of at least 45 l capacity or equivalent sufficient in number to enable foam or its equivalent to be directed on to any part of the pressure lubrication system, on to any part of the casings enclosing pressure lubricated parts of the turbines, engines or associated gearing, and any other fire hazards. However, such extinguishers



shall not be required if protection at least equivalent to that required by this sub-paragraph is provided in such spaces by a fixed fire-extinguishing system fitted in compliance with paragraph 1.1.

2. A sufficient number of portable foam extinguishers or equivalent which shall be so located that no point in the space is more than 10 m walking distance from an extinguisher and that there are at least two such extinguishers in each such space, except that such extinguishers shall not be required in addition to any provided in compliance with paragraph 1.3.
3. One of the fire-extinguishing systems required by paragraph 1.1, where such spaces are periodically unattended.

4. *Fire-extinguishing appliances in other machinery spaces*

Where, in the opinion of the Administration, a fire hazard exists in any machinery space for which no specific provisions for fire-extinguishing appliances are prescribed in paragraphs 1, 2 and 3, there shall be provided in, or adjacent to, that space such a number of approved portable fire extinguishers or other means of fire extinction as the Administration may deem sufficient.

5. *Fixed fire-extinguishing systems not required by this chapter*

Where a fixed fire-extinguishing system not required by this chapter is installed, such a system shall be to the satisfaction of the Administration.

6. *Machinery spaces of category A in passenger ships*

In passenger ships carrying more than 36 passengers each machinery space of category A shall be provided with at least two suitable water fog applicators.\*

**Regulation 8. FIXED LOW-EXPANSION FOAM FIRE-EXTINGUISHING SYSTEMS  
IN MACHINERY SPACES**

1. Where in any machinery space a fixed low-expansion foam fire-extinguishing system is fitted in addition to the requirements of regulation 7, such system shall be capable of discharging through fixed discharge outlets in not more than five minutes 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 system shall be capable of generating foam suitable for extinguishing oil fires. Means shall be provided for 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 expansion ratio of the foam shall not exceed I2 to I.

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.

**Regulation 9. FIXED HIGH-EXPANSION FOAM FIRE-EXTINGUISHING SYSTEMS  
IN MACHINERY SPACES**

1.1. 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.

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

\* A water fog applicator might consist of a metal "L" -shaped pipe, the long limb being about 2 m in length capable of being fitted to a fire hose and the short limb being about 250 mm in length fitted with a fixed water fog nozzle or capable of being fitted with a water spray nozzle.

2. 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.

3. 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.

4. 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.

*Regulation 10. FIXED PRESSURE WATER-SPRAYING FIRE-EXTINGUISHING SYSTEMS  
IN MACHINERY SPACES*

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

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/m<sup>2</sup> per minute in the spaces to be protected. Where increased application rates are considered necessary, these shall be to the satisfaction of the Administration. 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.

3. 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 and will not be readily cut off by a fire in the protected space.

4. 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.

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

6. The pump may be driven by 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-1/44 or regulation II-1/45, 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 5 is immediately available. When the pump is driven by independent internal combustion machinery it shall be so situated that a fire in the protected space will not affect the air supply to the machinery.

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

*Regulation 11. SPECIAL ARRANGEMENTS IN MACHINERY SPACES*

1. The provisions of this regulation shall apply to machinery spaces of category A and, where the Administration considers it desirable, to other machinery spaces.

2.1. The number of skylights, doors, ventilators, openings in funnels to permit exhaust ventilation and other openings to machinery spaces shall be reduced to a minimum consistent with the needs of ventilation and the proper and safe working of the ship.

2.2. Skylights shall be of steel and shall not contain glass panels. Suitable arrangements shall be made to permit the release of smoke in the event of fire, from the space to be protected.

2.3. In passenger ships, doors other than power-operated watertight doors, shall be so arranged that positive closure is assured in case of fire in the space, by power-operated closing arrangements or by the provision of self-closing doors capable of closing against an inclination

of 3.5° opposing closure and having a fail-safe hook-back facility, provided with a remotely operated release device.

3. Windows shall not be fitted in machinery space boundaries. This does not preclude the use of glass in control rooms within the machinery spaces.

4. Means of control shall be provided for:

1. Opening and closure of skylights, closure of openings in funnels which normally allow exhaust ventilation, and closure of ventilator dampers;
2. Permitting the release of smoke;
3. Closing power-operated doors or actuating release mechanism on doors other than power-operated watertight doors;
4. Stopping ventilating fans; and
5. Stopping forced and induced draught fans, oil fuel transfer pumps, oil fuel unit pumps and other similar fuel pumps.

5. The controls required in paragraph 4 and in regulation 15.2.5 shall be located outside the space concerned, where they will not be cut off in the event of fire in the space they serve. In passenger ships such controls and the controls for any required fire-extinguishing system shall be situated at one control position or grouped in as few positions as possible to the satisfaction of the Administration. Such positions shall have a safe access from the open deck.

6. When access to any machinery space of category A is provided at a low level from an adjacent shaft tunnel, there shall be provided in the shaft tunnel, near the watertight door, a light steel fire-screen door operable from each side.

7. For periodically unattended machinery spaces in cargo ships, the Administration shall give special consideration to maintaining fire integrity of the machinery spaces, the location and centralization of the fire-extinguishing system controls, the required shut-down arrangements (e.g., ventilation, fuel pumps, etc.) and may require additional fire-extinguishing appliances and other fire-fighting equipment and breathing apparatus. In passenger ships these requirements shall be at least equivalent to those of machinery spaces normally attended.

8. [A fixed] fire detection and alarm system complying with the provisions of regulation 14 shall be fitted in any machinery space:

1. Where the installation of automatic and remote control systems and equipment has been approved in lieu of continuous manning of the space; and
2. Where the main propulsion and associated machinery including sources of main electrical supply are provided with various degrees of automatic or remote control and are under continuous manned supervision from a control room.

*Regulation 12. AUTOMATIC SPRINKLER, FIRE DETECTION AND FIRE ALARM SYSTEMS*

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. It 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. Any parts of the system which may be subjected to freezing temperatures in service shall be suitably protected against freezing. It shall be kept charged at the necessary pressure and shall have provision for a continuous supply of water as required in this regulation.

1.2. 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.

1.2.1. In passenger ships such units shall give an indication of any fire and its location in any space served by the system and shall be centralized on the navigating bridge or in the main

fire control station, which shall be so manned or equipped as to ensure that any alarm from the system is immediately received by a responsible member of the crew.

1.2.2. In cargo ships such units shall indicate in which section served by the system fire has occurred and shall be centralized on the navigating bridge and in addition, visible and audible alarms from the unit shall be placed in a position other than on the navigating bridge, so as to ensure that the indication of fire is immediately received by the crew.

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.

2.2. 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 and its location shall be clearly and permanently indicated. Means shall be provided to prevent the operation of the stop valves by any unauthorized person.

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

2.4. The sprinklers shall be resistant to corrosion by marine atmosphere. In accommodation and service spaces the sprinklers shall come into operation within the temperature range from 68° 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.

2.5. 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.

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/m<sup>2</sup> per minute 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.

4.1. A pressure tank having a volume equal to at least twice that of the charge of water specified in this sub-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 one minute by the pump referred to in paragraph 5.2, 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.

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

5.1. 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.

5.2. 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 m<sup>2</sup> at the application rate specified in paragraph 3.



5.3. 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 4.1.

5.4. 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.

6. 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.

7.1. In 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 change-over 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 6, be so situated that a fire in any protected space will not affect the air supply to the machinery.

7.2. In 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 6, be so situated that a fire in any protected space will not affect the air supply to the machinery.

8. The sprinkler system shall have a connexion from the ship's fire main by prevent a backflow from the sprinkler system to the fire main.

9.1. 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.

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

9.3. Switches shall be provided at one of the indicating positions referred to in paragraph 1.2 which will enable the alarm and the indicators for each section of sprinklers to be tested.

10. Spare sprinkler heads shall be provided for each section of sprinklers to the satisfaction of the Administration.

**Regulation 13. FIXED FIRE DETECTION AND FIRE ALARM SYSTEMS****1. General requirements**

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.

1.2. 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.

1.3. There shall be not less than two sources of power supply for the electrical equipment used in the operation of the 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.

1.4. Detectors and manually operated call points shall be grouped into sections. 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 two minutes 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.

1.5. The control panel shall be located on the navigating bridge or in the main fire control station.

1.6. Indicating units shall denote the section in which a detector or manually operated call point has operated. At least one unit shall be so located that it is easily accessible to responsible members of the crew at all times, when at sea or in port except when the ship is out of service. One indicating unit shall be located on the navigating bridge if the control panel is located in the main fire control station.

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

1.8. No section covering more than one deck within accommodation, service 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 fifty enclosed spaces be permitted in any section.

1.9. In passenger ships 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 Administration, if it is satisfied that the protection of the ship against fire will not thereby be reduced, may permit such a section of detectors to serve both sides of the ship and more than one deck.

1.10. 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.

1.11. 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.

1.12. Suitable instructions and components spares for testing and maintenance shall be provided.

1.13. The function of the detection system shall be periodically tested to the satisfaction of the Administration by means of equipment producing hot air at the appropriate temperature, or smoke or aerosol particles having the appropriate range of density or particle size, or



other phenomena associated with incipient fires to which the detector is designed to respond. 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.

1.14. The fire detection 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. *Installation requirements*

2.1. [Manually operated] call points shall be installed throughout the accommodation spaces, service spaces and control stations. One [manually operated] call point shall be located at each exit. [Manually operated] call points shall be readily accessible in the corridors of each deck such that no part of the corridor is more than 20 m from a [manually operated] call point.

2.2. Smoke detectors shall be installed in all stairways, corridors and escape routes within accommodation spaces. Consideration shall be given to the installation of special purpose smoke detectors within ventilation ducting.

2.3. Where a fixed fire detection and fire alarm system is required for the protection of spaces other than those specified in paragraph 2.2, at least one detector complying with paragraph 1.11 shall be installed in each such space.

2.4. 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. In general, detectors which are located on the overhead shall be a minimum distance of 0.5 m away from bulkheads.

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

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

The Administration may require or permit other spacings based upon test data which demonstrate the characteristics of the detectors.

2.6. 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.

3. *Design requirements*

3.1. 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.

3.2. Smoke detectors required by paragraph 2.2 shall be certified to operate before the smoke density exceeds 12.5 per cent obscuration per metre, but not until the smoke density exceeds 2 per cent 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.

3.3. 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.

3.4. At the discretion of the Administration, the permissible temperature of operation of heat detectors may be increased to 30°C above the maximum deckhead temperature in drying rooms and similar spaces of a normal high ambient temperature.

**Regulation 14. FIXED FIRE DETECTION AND FIRE ALARM SYSTEMS FOR PERIODICALLY UNATTENDED MACHINERY SPACES**

1. A fixed fire detection and fire alarm system in accordance with the relevant provisions of regulation 13 shall be installed in periodically unattended machinery spaces.

2. This fire detection system shall be so designed and the detectors so positioned as to detect rapidly the onset of fire in any part of those spaces and under any normal conditions of operation of the machinery and variations of ventilation as required by the possible range of ambient temperatures. Except in spaces of restricted height and where their use is specially appropriate, detection systems using only thermal detectors shall not be permitted. The detection system shall initiate audible and visual alarms distinct in both respects from the alarms of any other system not indicating fire, in sufficient places to ensure that the alarms are heard and observed on the navigating bridge and by a responsible engineer officer. When the navigating bridge is unmanned the alarm shall sound in a place where a responsible member of the crew is on duty.

3. After installation the system shall be tested under varying conditions of engine operation and ventilation.

**Regulation 15. ARRANGEMENTS FOR OIL FUEL, LUBRICATING OIL AND OTHER FLAMMABLE OILS**

**1. Limitations in the use of oil as fuel**

The following limitations shall apply to the use of oil as fuel:

1. Except as otherwise permitted by this paragraph, no oil fuel with a flashpoint of less than 60°C shall be used.
2. In emergency generators oil fuel with a flashpoint of not less than 43°C may be used.
3. Subject to such additional precautions as it may consider necessary and on condition that the ambient temperature of the space in which such oil fuel is stored or used shall not be allowed to rise to within 10°C below the flashpoint of the oil fuel, the Administration may permit the general use of oil fuel having a flashpoint of less than 60°C but not less than 43°C.
4. In cargo ships the use of fuel having a lower flashpoint than otherwise specified in this paragraph, for example crude oil, may be permitted provided that such fuel is not stored in any machinery space and subject to the approval by the Administration of the complete installation.

The flashpoint of oils shall be determined by an approved closed cup method.

**2. Oil fuel arrangements**

In a ship in which oil fuel is used, the arrangements for the storage, distribution and utilization of the oil fuel shall be such as to ensure the safety of the ship and persons on board and shall at least comply with the following provisions:

1. As far as practicable, parts of the oil fuel system containing heated oil under pressure exceeding 0.18 N/mm<sup>2</sup> shall not be placed in a concealed position such that defects and leakage cannot readily be observed. The machinery spaces in way of such parts of the oil fuel system shall be adequately illuminated.
2. The ventilation of machinery spaces shall be sufficient under all normal conditions to prevent accumulation of oil vapour.
3. As far as practicable, oil fuel tanks shall be part of the ship's structure and shall be located outside machinery spaces of category A. Where oil fuel tanks, other than double bottom

tanks, are necessarily located adjacent to or within machinery spaces of category A, at least one of their vertical sides shall be contiguous to the machinery space boundaries, and shall preferably have a common boundary with the double bottom tanks, and the area of the tank boundary common with the machinery spaces shall be kept to a minimum. Where such tanks are situated within the boundaries of machinery spaces of category A they shall not contain oil fuel having a flashpoint of less than 60°C. In general the use of free standing oil fuel tanks shall be avoided. When such tanks are employed their use shall be prohibited in category A machinery spaces on passenger ships. Where permitted, they shall be placed in an oil-tight spill tray of ample size having a suitable drain pipe leading to a suitably sized spill oil tank.

4. No oil fuel tank shall be situated where spillage or leakage therefrom can constitute a hazard by falling on heated surfaces. Precautions shall be taken to prevent any oil that may escape under pressure from any pump, filter or heater from coming into contact with heated surfaces.
5. Every oil fuel pipe, which, if damaged, would allow oil to escape from a storage, settling or daily service tank situated above the double bottom shall be fitted with a cock or valve directly on the tank capable of being closed from a safe position outside the space concerned in the event of a fire occurring in the space in which such tanks are situated. In the special case of deep tanks situated in any shaft or pipe tunnel or similar space, valves on the tank shall be fitted but control in the event of fire may be effected by means of an additional valve on the pipe or pipes outside the tunnel or similar space. If such additional valve is fitted in the machinery space it shall be operated from a position outside this space.
6. Safe and efficient means of ascertaining the amount of oil fuel contained in any oil fuel tank shall be provided. Sounding pipes shall not terminate in any space where the risk of ignition of spillage from the sounding pipe might arise. In particular, they shall not terminate in passenger or crew spaces. Other means of ascertaining the amount of oil fuel contained in any oil fuel tank may be permitted:
  - 6.1. In passenger ships, if such means do not require penetration below the top of the tank, and providing their failure or over-filling of the tanks will not permit release of fuel;
  - 6.2. In cargo ships, providing the failure of such means or over-filling of the tanks will not permit release of fuel. The use of cylindrical gauge glasses is prohibited. The Administration may permit the use of oil level gauges with flat glasses and self-closing valves between the gauges and oil tanks.

Such other means shall be acceptable to the Administration and shall be maintained in the proper condition to ensure their continued accurate functioning in service.

7. Provision shall be made to prevent overpressure in any oil tank or in any part of the oil fuel system, including the filling pipes. Any relief valves and air or overflow pipes shall discharge to a position which, in the opinion of the Administration, is safe.
8. Oil fuel pipes and their valves and fittings shall be of steel or other approved material, except that restricted use of flexible pipes shall be permissible in positions where the Administration is satisfied that they are necessary. Such flexible pipes and end attachments shall be of approved fire-resisting materials of adequate strength and shall be constructed to the satisfaction of the Administration.

### 3. *Lubricating oil arrangements*

The arrangements for the storage, distribution and utilization of oil used in pressure lubrication systems shall be such as to ensure the safety of the ship and persons on board, and such arrangements in machinery spaces of category A and whenever practicable in other machinery spaces shall at least comply with the provisions of paragraphs 2.1, 2.4, 2.5, 2.6, 2.7 and 2.8,

except that this does not preclude the use of sight flow glasses in lubricating systems provided that they are shown by test to have a suitable degree of fire resistance.

#### 4. *Arrangements for other flammable oils*

The arrangements for the storage, distribution and utilization of other flammable oils employed under pressure in power transmission systems, control and activating systems and heating systems shall be such as to ensure the safety of the ship and persons on board. In locations where means of ignition are present, such arrangements shall at least comply with the provisions of paragraphs 2.4 and 2.6, and with the provisions of paragraphs 2.7 and 2.8 in respect of strength and construction.

#### 5. *Periodically unattended machinery spaces*

In addition to the requirements of paragraphs 1 to 4, the oil fuel and lubricating oil systems shall comply with the following:

1. Where necessary, oil fuel and lubricating oil pipelines shall be screened or otherwise suitably protected to avoid as far as practicable oil spray or oil leakages on to hot surfaces or into machinery air intakes. The number of joints in such piping systems shall be kept to a minimum and, where practicable, leakages from high pressure oil fuel pipes shall be collected and arrangements provided for an alarm to be given.
2. Where daily service oil fuel tanks are filled automatically, or by remote control, means shall be provided to prevent overflow spillages. Other equipment which treats flammable liquids automatically, e.g. oil fuel purifiers, which, whenever practicable, shall be installed in a special space reserved for purifiers and their heaters, shall have arrangements to prevent overflow spillages.
3. Where daily service oil fuel tanks or settling tanks are fitted with heating arrangements, a high temperature alarm shall be provided if the flashpoint of the oil fuel can be exceeded.

### *Regulation 16. VENTILATION SYSTEMS IN SHIPS OTHER THAN PASSENGER SHIPS CARRYING MORE THAN 36 PASSENGERS*

1. Ventilation ducts shall be of non-combustible material. Short ducts, however, not generally exceeding 2 m in length and with a cross-section not exceeding 0.02 m<sup>2</sup> need not be non-combustible, subject to the following conditions:

1. These ducts shall be of a material which, in the opinion of the Administration, has a low fire risk;
2. They may only be used at the end of the ventilation device;
3. They shall not be situated less than 600 mm, measured along the duct, from an opening in an "A" or "B" class division including continuous "B" class ceilings.

2. Where the ventilation ducts with a free-sectional area exceeding 0.02 m<sup>2</sup> pass through class "A" bulkheads or decks, the opening shall be lined with a steel sheet sleeve unless the ducts passing through the bulkheads or decks are of steel in the vicinity of passage through the deck or bulkhead and the ducts and sleeves shall comply in this part with the following:

1. The sleeves shall have a thickness of at least 3 mm and a length of at least 900 mm. When passing through bulkheads, this length shall be divided preferably into 450 mm on each side of the bulkhead. These ducts, or sleeves lining such ducts, shall be provided with fire insulation. The insulation shall have at least the same fire integrity as the bulkhead or deck through which the duct passes. Equivalent penetration protection may be provided to the satisfaction of the Administration.
2. Ducts with a free cross-sectional area exceeding 0.075 m<sup>2</sup> shall be fitted with fire dampers in addition to the requirements of paragraph 2.1. The fire damper shall operate automatically but shall also be capable of being closed manually from both sides of the bulkhead or deck. The damper shall be provided with an indicator which shows whether the damper is



open or closed. Fire dampers are not required, however, where ducts pass through spaces surrounded by “A” class divisions, without serving those spaces, provided those ducts have the same fire integrity as the divisions which they pierce.

3. Ducts provided for the ventilation of machinery spaces of category A, galleys, car deck spaces, ro/ro cargo spaces or special category spaces shall not pass through accommodation spaces, service spaces or control stations unless [they comply with the conditions specified in sub-paragraphs 1.1 to 1.4 or 2.1 and 2.2 below:]

- 1.1. [The ducts are] constructed of steel having a thickness of at least 3 mm and 5 mm for ducts the widths or diameters of which are up to and including 300 mm and 760 mm and over respectively and, in the case of such ducts, the widths or diameters of which are between 300 mm and 760 mm having a thickness to be obtained by interpolation;
- 1.2. [The ducts are] suitably supported and stiffened;
- 1.3. [The ducts are] fitted with automatic fire dampers close to the boundaries penetrated; and
- 1.4. [The ducts are] insulated to “A-60” standard from the machinery spaces, galleys, car deck spaces, ro/ro cargo spaces or special category spaces to a point at least 5 m beyond each fire damper;

or

- 2.1. [The ducts are] constructed of steel in accordance with paragraphs 3.1.1 and 3.1.2; and
- 2.2. [The ducts are] insulated to “A-60” standard throughout the accommodation spaces, service spaces or control stations;

except that penetrations of main zone divisions shall also comply with the requirements of paragraph 8.

4. Ducts provided for ventilation to accommodation spaces, service spaces or control stations shall not pass through machinery spaces of category A, galleys, car deck spaces, ro/ro cargo spaces or special category spaces unless [they comply with the conditions specified in sub-paragraphs 1.1 to 1.3 or 2.1 and 2.2 below:]

- 1.1. The ducts where they pass through a machinery space of category A, galley, car deck space, ro/ro cargo space or special category space are constructed of steel in accordance with paragraphs 3.1.1 and 3.1.2;
- 1.2. Automatic fire dampers are fitted close to the boundaries penetrated; and
- 1.3. The integrity of the machinery space, galley, car deck space, ro/ro cargo space or special category space boundaries is maintained at the penetrations;

or

- 2.1. The ducts where they pass through a machinery space of category A, galley, car deck space, ro/ro cargo space or special category space are constructed of steel in accordance with paragraphs 3.1.1 and 3.1.2; and
- 2.2. [The ducts] are insulated to “A-60” standard within the machinery space, galley, car deck space, ro/ro cargo space or special category space;

except that penetrations of main zone divisions shall also comply with the requirements of paragraph 8.

5. Ventilation ducts with a free cross-sectional area exceeding 0.02 m<sup>2</sup> passing through “B” class bulkheads shall be lined with steel sheet sleeves of 900 mm in length divided preferably into 450 mm on each side of the bulkheads unless the duct is of steel for this length.

6. Such measures as are practicable shall be taken in respect of control stations outside machinery spaces in order to ensure that ventilation, visibility and freedom from smoke are maintained, so that in the event of fire the machinery and equipment contained therein may be supervised and continue to function effectively. Alternative and separate means of air supply shall be provided; air inlets of the two sources of supply shall be so disposed that the risk of

both inlets drawing in smoke simultaneously is minimized. At the discretion of the Administration, such requirements need not apply to control stations situated on, and opening on to, an open deck, or where local closing arrangements would be equally effective.

7. Where they pass through accommodation spaces or spaces containing combustible materials, the exhaust ducts from galley ranges shall be constructed of "A" class divisions. Each exhaust duct shall be fitted with:

1. A grease trap readily removable for cleaning;
2. A fire damper located in the lower end of the duct;
3. Arrangements, operable from within the galley, for shutting off the exhaust fans; and
4. Fixed means for extinguishing a fire within the duct.

8. Where in a passenger ship it is necessary that a ventilation duct passes through a main vertical zone division, a fail-safe automatic closing fire damper shall be fitted adjacent to the division. The damper shall also be capable of being manually closed from each side of the division. The operating position shall be readily accessible and be marked in red light-reflecting colour. The duct between the division and the damper shall be of steel or other equivalent material and, if necessary, insulated to comply with the requirements of regulation 18.1.1. The damper shall be fitted on at least one side of the division with a visible indicator showing whether the damper is in the open position.

9. The main inlets and outlets of all ventilation systems shall be capable of being closed from outside the spaces being ventilated.

10. Power ventilation of accommodation spaces, service spaces, cargo spaces, control stations and machinery spaces shall be capable of being stopped from an easily accessible position outside the space being served. This position should not be readily cut off in the event of a fire in the spaces served. The means provided for stopping the power ventilation of the machinery spaces shall be entirely separate from the means provided for stopping ventilation of other spaces.

#### *Regulation 17. FIREMAN'S OUTFIT*

1. A fireman's outfit shall consist of:

1.1. Personal equipment comprising:

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 and gloves of rubber or other electrically non-conducting material.
3. A rigid helmet providing effective protection against impact.
4. An electric safety lamp (hand lantern) of an approved type with a minimum burning period of three hours.
5. An axe to the satisfaction of the Administration.

1.2. A breathing apparatus of an approved type which may be either:

1. A smoke helmet or smoke mask which shall be provided with a suitable air pump and a length of air hose sufficient to reach from the open deck, well clear of hatch or doorway, to any part of the holds or machinery spaces. If, in order to comply with this sub-paragraph, an air hose exceeding 36 m in length would be necessary, a self-contained breathing apparatus shall be substituted or provided in addition as determined by the Administration; or
2. A self-contained compressed air-operated breathing apparatus, the volume of air contained in the cylinders of which shall be at least 1,200 l, or other self-contained breathing apparatus which shall be capable of functioning for at least 30 minutes. A number of spare charges, suitable for use with the apparatus provided, shall be available on board to the satisfaction of the Administration.



2. For each breathing apparatus a fireproof lifeline of sufficient length and strength shall be provided capable of being attached by means of a snaphook 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.

3. All ships shall carry at least two fireman's outfits complying with the requirements of paragraph 1.

3.1. In addition, there shall be provided:

1. In passenger ships for every 80 m, or part thereof, of the aggregate of the lengths of all passenger spaces and service spaces on the deck which carries such spaces or, if there is more than one such deck, on the deck which has the largest aggregate of such lengths, two fireman's outfits and two sets of personal equipment, each set comprising the items stipulated in paragraphs 1.1.1, 1.1.2 and 1.1.3;

2. In tankers, two fireman's outfits.

3.2. In passenger ships carrying more than 36 passengers for each pair of breathing apparatus there shall be provided one water fog applicator which shall be stored adjacent to such apparatus.

3.3 The Administration may require additional sets of personal equipment and breathing apparatus, having due regard to the size and type of the ship.

4. The fireman's outfits or sets of personal equipment shall be so stored as to be easily accessible and ready for use and, where more than one fireman's outfit or more than one set of personal equipment is carried, they shall be stored in widely separated positions. In passenger ships at least two fireman's outfits and one set of personal equipment shall be available at any one position.

#### *Regulation 18. MISCELLANEOUS ITEMS*

1.1. Where "A" class divisions are penetrated for the passage of electric cables, pipes, trunks, ducts, etc., or for girders, beams or other structural members, arrangements shall be made to ensure that the fire resistance is not impaired, subject to the provisions of regulation 30.5.

1.2. Where "B" class divisions are penetrated for the passage of electric cables, pipes, trunks, ducts, etc., or for the fitting of ventilation terminals, lighting fixtures and similar devices, arrangements shall be made to ensure that the fire resistance is not impaired.

2.1. Pipes penetrating "A" or "B" class divisions shall be of materials approved by the Administration having regard to the temperature such divisions are required to withstand.

2.2. Where the Administration may permit the conveying of oil and combustible liquids through accommodation and service spaces, the pipes conveying oil or combustible liquids shall be of a material approved by the Administration having regard to the fire risk.

2.3. Materials readily rendered ineffective by heat shall not be used for overboard scuppers, sanitary discharges, and other outlets which are close to the water-line and where the failure of the material in the event of fire would give rise to danger of flooding.

3. Electric radiators, if used, shall be fixed in position and so constructed as to reduce fire risks to a minimum. No such radiators shall be fitted with an element so exposed that clothing, curtains, or other similar materials can be scorched or set on fire by heat from the element.

4. Cellulose-nitrate based films shall not be used for cinematograph installations.

5. All waste-receptacles shall be constructed of non-combustible materials with no openings in the sides or bottom.

6. In spaces where penetration of oil products is possible, the surface of insulation shall be impervious to oil or oil vapours.

**Regulation 19. INTERNATIONAL SHORE CONNEXION\***

1. Ships of 500 tons gross tonnage and upwards shall be provided with at least one international shore connexion, complying with provisions of paragraph 3.
2. Facilities shall be available enabling such a connexion to be used on either side of the ship.
3. Standard dimensions of flanges for the international shore connexion shall be in accordance with the following table:

<i>Description</i>	<i>Dimension</i>
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

4. The connexion shall be of steel or other suitable material and shall be designed for I.0 N/mm<sup>2</sup> services. The flange shall have a flat face on one side and on the other shall be permanently attached to a coupling that will fit the ship's hydrant and hose. The connexion shall be kept aboard the ship together with a gasket of any material suitable for I.0 N/mm<sup>2</sup> services, together with four 16 mm bolts, 50 mm in length and eight washers.

**Regulation 20. FIRE CONTROL PLANS**

1. In all ships general arrangement plans shall be permanently exhibited for the guidance of the ship's officers, showing clearly for each deck the control stations, the various fire sections enclosed by "A" class divisions, the sections enclosed by "B" class divisions together with particulars of the fire detection and fire alarm systems, the sprinkler installation, the fire-extinguishing appliances, means of access to different compartments, decks, etc. and the ventilating system including particulars of the fan control positions, the position of dampers and identification numbers of the ventilating fans serving each section. Alternatively, at the discretion of the Administration, the aforementioned details may be set out in a booklet, a copy of which shall be supplied to each officer, and one copy shall at all times be available on board in an accessible position. Plans and booklets shall be kept up to date, any alterations being recorded thereon as soon as practicable. Description in such plans and booklets shall be in the [official language of the flag State]. If the language is neither English nor French, a translation into one of those languages shall be included. In addition, instructions concerning the maintenance and operation of all the equipment and installations on board for the fighting and containment of fire shall be kept under one cover, readily available in an accessible position.
2. In all ships a duplicate set of fire control plans or a booklet containing such plans shall be permanently stored in a prominently marked weathertight enclosure outside the deckhouse for the assistance of shoreside fire-fighting personnel.

**Regulation 21. READY AVAILABILITY OF FIRE-EXTINGUISHING APPLIANCES**

In all ships, fire-extinguishing appliances shall be kept in good order and available for immediate use at all times during the voyage.

\* Reference is made to the recommendation contained in resolution A.470(XII) adopted by the Organization entitled "International Shore Connexion (shore side)".

**Regulation 22. ACCEPTANCE OF SUBSTITUTES**

1. This regulation applies to all ships.
2. Where in this chapter any special type of appliance, apparatus, extinguishing medium or arrangement is specified in any ship, any other type of appliance etc., may be allowed, provided the Administration is satisfied that it is not less effective.

**PART B. FIRE SAFETY MEASURES FOR PASSENGER SHIPS****Regulation 23. STRUCTURE**

1. The hull, superstructure, structural bulkheads, decks and deckhouses shall be constructed of steel or other equivalent material. For the purpose of applying the definition of steel or other equivalent material as given in regulation 3.7 the “applicable fire exposure” shall be according to the integrity and insulation standards given in the tables of regulations 26 and 27. For example where divisions such as decks or sides and ends of deckhouses are permitted to have “B-0” fire integrity, the “applicable fire exposure” shall be half an hour.
2. However, in cases where any part of the structure is of aluminium alloy, the following shall apply:
  1. The insulation of aluminium alloy components of “A” or “B” class divisions, except structure which, in the opinion of the Administration, is non-load-bearing, shall be such that the temperature of the structural core does not rise more than 200°C above the ambient temperature at any time during the applicable fire exposure to the standard fire test.
  2. Special attention shall be given to the insulation of aluminium alloy components of columns, stanchions and other structural members required to support lifeboat and liferaft stowage, launching and embarkation areas, and “A” and “B” class divisions to ensure:
    - 2.1. That for such members supporting lifeboat and liferaft areas and “A” class divisions, the temperature rise limitation specified in paragraph 2.1 shall apply at the end of one hour; and
    - 2.2. That for such members required to support “B” class divisions, the temperature rise limitation specified in paragraph 2.1 shall apply at the end of half an hour.
  3. Crowns and casings of machinery spaces of category A shall be of steel construction adequately insulated and openings therein, if any, shall be suitably arranged and protected to prevent the spread of fire.

**Regulation 24. MAIN VERTICAL ZONES AND HORIZONTAL ZONES**

- 1.1. For ships carrying more than 36 passengers, the hull, superstructure and deckhouses shall be subdivided into main vertical zones by “A” class divisions. Steps and recesses shall be kept to a minimum, but where they are necessary they shall also be “A” class divisions. These divisions shall have insulation values in accordance with tables in regulation 26.
- 1.2. For ships carrying not more than 36 passengers, the hull, superstructure and deckhouses in way of accommodation and service spaces shall be subdivided into main vertical zones by “A” class divisions. These divisions shall have insulation values in accordance with tables in regulation 27.
2. As far as practicable, the bulkheads forming the boundaries of the main vertical zones above the bulkhead deck shall be in line with watertight subdivision bulkheads situated immediately below the bulkhead deck.
3. Such bulkheads shall extend from deck to deck and to the shell or other boundaries.
4. Where a main vertical zone is subdivided by horizontal “A” class divisions into horizontal zones for the purpose of providing an appropriate barrier between sprinklered and non-sprinklered zones of the ship, the divisions shall extend between adjacent main vertical zone

bulkheads and to the shell or exterior boundaries of the ship and shall be insulated in accordance with the fire insulation and integrity values given in table 26.3 or in table 27.2.

5.1. On ships designed for special purposes, such as automobile or railroad car ferries, where the provision of main vertical zone bulkheads would defeat the purpose for which the ship is intended, equivalent means for controlling and limiting a fire shall be substituted and specifically approved by the Administration.

5.2. However, in a ship with special category spaces, any such space shall comply with the applicable provisions of regulation 37 and in so far as such compliance would be inconsistent with compliance with other requirements of this part, the requirements of regulation 37 shall prevail.

**Regulation 25. BULKHEADS WITHIN A MAIN VERTICAL ZONE**

1.1. For ships carrying more than 36 passengers all bulkheads which are not required to be "A" class divisions shall be at least "B" class or "C" class divisions as prescribed in the tables in regulation 26.

1.2. For ships carrying not more than 36 passengers all bulkheads within accommodation and service spaces which are not required to be "A" class divisions shall be at least "B" class or "C" class divisions as prescribed in the tables in regulation 27.

1.3. All such divisions may be faced with combustible materials in accordance with the provisions of regulation 34.

2. All corridor bulkheads where not required to be "A" class shall be class divisions which shall extend from deck to deck except:

1. When continuous "B" class ceilings or linings are fitted on both sides of the bulkhead, the portion of the bulkhead behind the continuous ceiling or lining shall be of material which, in thickness and composition, is acceptable in the construction of "B" class divisions but which shall be required to meet "B" class integrity standards only in so far as is reasonable and practicable in the opinion of the Administration;
2. In the case of a ship protected by an automatic sprinkler system complying with the provisions of regulation 12 the corridor bulkheads of "B" class materials may terminate at a ceiling in the corridor provided such a ceiling is of material which, in thickness and composition, is acceptable in the construction of "B" class divisions. Notwithstanding the requirements of regulations 26 and 27 such bulkheads and ceilings shall be required to meet "B" class integrity standards only in so far as is reasonable and practicable in the opinion of the Administration. All doors and frames in such shall be of non-combustible materials and shall be so constructed and erected as to provide substantial fire resistance to the satisfaction of the Administration.

3. All bulkheads required to be "B" class divisions, except corridor bulkheads, shall extend from deck to deck and to the shell or other boundaries unless continuous "B" class ceilings or linings are fitted on both sides of the bulkhead, in which case the bulkhead may terminate at the continuous ceiling or lining.

**Regulation 26. FIRE INTEGRITY OF BULKHEADS AND DECKS IN SHIPS  
CARRYING MORE THAN 36 PASSENGERS**

1. In addition to complying with the specific provisions for fire integrity of bulkheads and decks mentioned elsewhere in this Part, the minimum fire integrity of all bulkheads and decks shall be as prescribed in tables 26.1 to 26.4. Where, due to any particular structural arrangements in the ship, difficulty is experienced in determining from the tables the minimum fire integrity value of any divisions, such values shall be determined to the satisfaction of the Administration.

2. The following requirements shall govern application of the tables:
1. Table 26.1 shall apply to bulkheads bounding main vertical zones or horizontal zones.  
Table 26.2 shall apply to bulkheads not bounding either main vertical zones or horizontal zones.  
Table 26.3 shall apply to decks forming steps in main vertical zones or bounding horizontal zones.  
Table 26.4 shall apply to decks not forming steps in main vertical zones nor bounding horizontal zones.
  2. [For] determining the appropriate fire integrity standards to be applied to boundaries between adjacent spaces, such spaces are classified according to their fire risk as shown in categories (1) to (14) below. Where the contents and use of a space are such that there is a doubt as to its classification for the purpose of this regulation, it shall be treated as a space within the relevant category having the most stringent boundary requirements. The title of each category is intended to be typical rather than restrictive. The number in parentheses preceding each category refers to the applicable column or row [ ] in the tables.
    - (1) Control stations
      - Spaces containing emergency sources of power and lighting.
      - Wheelhouse and chartroom.
      - Spaces containing the ship's radio equipment.
      - Fire-extinguishing rooms, fire control [rooms] and [fire-]recording stations.
      - Control room for propulsion machinery when located outside the propulsion machinery space.
      - Spaces containing centralized fire alarm equipment.
      - Spaces containing centralized emergency public address system stations and equipment.
    - (2) Stairways
      - Interior stairways, lifts and escalators (other than those wholly contained within the machinery spaces) for passengers and crew and enclosures thereto.
      - In this connexion a stairway which is enclosed at only one level shall be regarded as part of the space from which it is not separated by a fire door.
    - (3) Corridors
      - Passenger and crew corridors and lobbies.
    - (4) Lifeboat and liferaft handling and embarkation stations
      - Open deck spaces and enclosed promenades forming lifeboat and liferaft embarkation and lowering stations.
    - (5) Open deck spaces
      - Open deck spaces and enclosed promenades clear of lifeboat and liferaft embarkation and lowering stations.
      - Air spaces (the space outside superstructures and deckhouses).
    - (6) Accommodation spaces of minor fire risk
      - Cabins containing furniture and furnishings of restricted fire risk.
      - Offices and dispensaries containing furniture and furnishings of restricted fire risk.
      - Public spaces containing furniture and furnishings of restricted fire risk and having a deck area of less than 50 m<sup>2</sup>.



- (7) Accommodation spaces of moderate fire risk
  - Spaces as in category (6) above but containing furniture and furnishings of other than restricted fire risk.
  - Public spaces containing furniture and furnishings of restricted fire risk and having a deck area of 50 m<sup>2</sup> or more.
  - Isolated lockers and small store-rooms in accommodation spaces.
  - Sale shops.
  - Motion picture projection and film stowage rooms.
  - Diet kitchens (containing no open flame).
  - Cleaning gear lockers (in which flammable liquids are not stowed).
  - Laboratories (in which flammable liquids are not stowed).
  - Pharmacies.
  - Small drying rooms (having a deck area of 4 m<sup>2</sup> or less).
  - Specie rooms.
- (8) Accommodation spaces of greater fire risk
  - Public spaces containing furniture and furnishings of other than restricted fire risk and having a deck area of 50 m<sup>2</sup> or more.
  - Barber shops and beauty parlours.
- (9) Sanitary and similar spaces
  - Communal sanitary facilities, showers, baths, water closets, etc.
  - Small laundry rooms.
  - Indoor swimming pool area.
  - Operating rooms.
  - Isolated pantries containing no cooking appliances in accommodation spaces.
  - Private sanitary facilities shall be considered a portion of the space in which they are located.
- (10) Tanks, voids and auxiliary machinery spaces having little or no fire risk
  - Water tanks forming part of the ship's structure.
  - Voids and cofferdams.
  - Auxiliary machinery spaces which do not contain machinery having a pressure lubrication system and where storage of combustibles is prohibited, such as ventilation and air-conditioning rooms; windlass room; steering gear room; stabilizer equipment room; electrical propulsion motor room; rooms containing section switchboards and purely electrical equipment other than oil-filled electrical transformers (above 10 kVA); shaft alleys and pipe tunnels; spaces for pumps and refrigeration machinery (not handling or using flammable liquids).
  - Closed trunks serving the spaces listed above.
  - Other closed trunks such as pipe and cable trunks.
- (11) Auxiliary machinery spaces, cargo spaces, special category spaces, cargo and other oil tanks and other similar spaces of moderate fire risk
  - Cargo oil tanks.
  - Cargo holds, trunkways and hatchways.
  - Refrigerated chambers.
  - Oil fuel tanks (where installed in a separate space with no machinery).
  - Shaft alleys and pipe tunnels allowing storage of combustibles.



- Auxiliary machinery spaces as in category (10) which contain machinery having a pressure lubrication system or where storage of combustibles is permitted.
  - Oil fuel filling stations.
  - Spaces containing oil-filled electrical transformers (above 10 kVA).
  - Spaces containing turbine and reciprocating steam engine driven auxiliary generators and small internal combustion engines of power output up to 110 kW driving emergency generators, sprinkler, drencher or fire pumps, bilge pumps, etc.
  - Special category spaces (tables 26.1 and 26.3 only apply).
  - Closed trunks serving the spaces listed above.
- (12) Machinery spaces and main galleys
- Main propulsion machinery rooms (other than electric propulsion motor rooms) and boiler rooms.
  - Auxiliary machinery spaces other than those in categories (10) and (11) which contain internal combustion machinery or other oil-burning, heating or pumping units.
  - Main galleys and annexes.
  - Trunks and casings to the spaces listed above.
- (13) Store-rooms, workshops, pantries, etc.
- Main pantries not annexed to galleys.
  - Main laundry.
  - Large drying rooms (having a deck area of more than 4 m<sup>2</sup>).
  - Miscellaneous stores.
  - Mail and baggage rooms.
  - Garbage rooms.
  - Workshops (not part of machinery spaces, galleys, etc.)
- (14) Other spaces in which flammable liquids are stowed
- Lamp rooms.
  - Paint rooms.
  - Store-rooms containing flammable liquids (including dyes, medicines, etc.).
  - Laboratories (in which flammable liquids are stowed).
3. Where a single value is shown for the fire integrity of a boundary between two spaces, that value shall apply in all cases.
  4. In determining the applicable fire integrity standard of a boundary between two spaces within a main vertical zone or horizontal zone which is not protected by an automatic sprinkler system complying with the provisions of regulation 12 or between such zones neither of which is so protected, the higher of the two values given in the tables shall apply.
  5. In determining the applicable fire integrity standard of a boundary between two spaces within a main vertical zone or horizontal zone which is protected by an automatic sprinkler system complying with the provisions of regulation 12 or between such zones both of which are so protected, the lesser of the two values given in the tables shall apply. Where a sprinklered zone and a non-sprinklered zone meet within accommodation and service spaces, the higher of the two values given in the tables shall apply to the division between the zones.
  6. Notwithstanding the provisions of regulation 35 there are no special requirements for material or integrity of boundaries where only a dash appears in the tables.
  7. The Administration shall determine in respect of category (5) spaces whether the insulation values in table 26.1 or 26.2 shall apply to ends of deckhouses and superstructures, and



TABLE 26.2 – BULKHEADS NOT BOUNDING EITHER MAIN VERTICAL ZONES OR HORIZONTAL ZONES

Spaces	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Control stations	B-0 <sup>a</sup>	A-0	A-0	A-0	A-0 B-0	A-60	A-60	A-60	A-0	A-0	A-60	A-60	A-60	A-60
Stairways		A-0 <sup>a</sup>	A-0	A-0	A-0	A-0	A-15 A-0	A-30 A-0	A-0	A-0	A-15	A-30	A-15 A-0	A-30
Corridors			C	A-0	A-0 B-0	B-0	B-15 B-0	B-15 B-0	B-0	A-0	A-15	A-30	A-0	A-30 A-0
Lifeboat and liferaft handling and embarkation stations				-	-	A-0	A-0	A-0	A-0	A-0	A-0	A-15	A-0	A-15 A-0
Open deck space					-	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0	A-0	A-0	A-0	A-0 B-0
Accommodation spaces of minor fire risk						B-0 C	B-15 C	B-15 C	B-0 C	A-0	A-15 A-0	A-30	A-0	A-30 A-0
Accommodation spaces of moderate fire risk							B-15 C	B-15 C	B-0 C	A-0	A-15 A-0	A-60	A-15	A-60 A-15
Accommodation spaces of greater fire risk								B-15 C	B-0 C	A-0	A-30 A-0	A-60	A-15	A-60 A-15
Sanitary and similar spaces									C	A-0	A-0	A-0	A-0	A-0
Tanks, voids and auxiliary machinery spaces having little or no fire risk										A-0 <sup>a</sup>	A-0	A-0	A-0	A-0
Auxiliary machinery spaces, cargo spaces, cargo and other oil tanks and other similar spaces of moderate fire risk											A-0 <sup>a</sup>	A-0	A-0	A-30 <sup>b</sup> / A-15
Machinery spaces and main galleys												A-0 <sup>a</sup>	A-0	A-60
Store-rooms, workshops, pantries, etc.													A-0 <sup>a</sup>	A-0
Other spaces in which flammable liquids are stowed														A-30 <sup>b</sup> / A-15

TABLE 26.3 – DECKS FORMING STEPS IN MAIN VERTICAL ZONES OR BOUNDING HORIZONTAL ZONES

Space below ↓	Space above →	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Control stations	(1)	A-60	A-60	A-30	A-0	A-0	A-15	A-30	A-60	A-0	A-0	A-30	A-60	A-15	A-60
Stairways	(2)	A-15	A-0	A-0	A-0	A-0	A-0	A-15 A-0	A-15 A-0	A-0	A-0	A-0	A-60	A-0	A-60
Corridors	(3)	A-30	A-0	A-0	A-0	A-0	A-0	A-15 A-0	A-15 A-0	A-0	A-0	A-0	A-60	A-0	A-60
Lifeboat and liferaft handling and embarkation stations	(4)	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Open deck spaces	(5)	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Accommodation spaces of minor fire risk	(6)	A-60	A-30 A-0	A-15 A-0	A-0	A-0	A-0	A-15 A-0	A-30 A-0	A-0	A-0	A-15 A-0	A-15 A-0	A-0	A-15
Accommodation spaces of moderate fire risk	(7)	A-60	A-60 A-15	A-30 A-0	A-15 A-0	A-0	A-15 A-0	A-30 A-0	A-60 A-15	A-0	A-0	A-30 A-0	A-30 A-0	A-0	A-30
Accommodation spaces of greater fire risk	(8)	A-60	A-60 A-15	A-60 A-15	A-60 A-15	A-0	A-30 A-0	A-60 A-15	A-60 A-15	A-0	A-0	A-30 A-0	A-60 A-15	A-15 A-0	A-60
Sanitary and similar spaces	(9)	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Tanks, voids and auxiliary machinery spaces having little or no fire risk	(10)	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0
Auxiliary machinery spaces, cargo spaces, special category spaces, cargo and other oil tanks and other similar spaces of moderate fire risk	(11)	A-60	A-60	A-60	A-60	A-0	A-30 A-0	A-60 A-15	A-60 A-15	A-0	A-0	A-0	A-30	A-30/ A-0	A-30
Machinery spaces and main galleys	(12)	A-60	A-60	A-60	A-60	A-0	A-60	A-60	A-60	A-0	A-0	A-60	A-60	A-60	A-60
Store-rooms, workshops, pantries, etc.	(13)	A-60	A-60 A-15	A-30 A-0	A-15	A-0	A-15 A-0	A-30 A-0	A-60 A-15	A-0	A-0	A-0	A-30	A-0	A-30
Other spaces in which flammable liquids are stowed	(14)	A-60	A-60	A-60	A-60	A-0	A-60	A-60	A-60	A-0	A-0	A-60	A-60	A-60	A-60

TABLE 26.4 – DECKS NOT FORMING STEPS IN MAIN VERTICAL ZONES NOR BOUNDING HORIZONTAL ZONES

Space below →	Space above →	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
Control stations	(1)	A-30 A-0	A-30 A-0	A-15 A-0	A-0	A-0 B-0	A-0	A-15 A-0	A-30 A-0	A-0	A-0	A-0	A-60	A-0	A-60 A-15
Stairways	(2)	A-0	A-0	A-0	A-0	A-0 B-0	A-0	A-0	A-0	A-0	A-0	A-0	A-30	A-0	A-30 A-0
Corridors	(3)	A-15 A-0	A-0	A-0 <sup>a/</sup> B-0 <sup>a/</sup>	A-0	A-0 B-0	A-0	A-15 B-0	A-15 B-0	A-0 B-0	A-0	A-0	A-30	A-0	A-30 A-0
Lifeboat and liferaft handling and embarkation stations	(4)	A-0	A-0	A-0	A-0	-	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0	A-0	A-0	A-0	A-0
Open deck spaces	(5)	A-0	A-0	A-0	A-0	-	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0	A-0	A-0	A-0	A-0
Accommodation spaces of minor fire risk	(6)	A-60	A-15 A-0	A-0	A-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0	A-0	A-15 A-0	A-0	A-15 A-0
Accommodation spaces of moderate fire risk	(7)	A-60	A-30 A-0	A-15 A-0	A-15 A-0	A-0 B-0	A-0 B-0	A-15 B-0	A-30 B-0	A-0 B-0	A-0	A-15 A-0	A-30 A-0	A-0	A-30 A-0
Accommodation spaces of greater fire risk	(8)	A-60	A-60 A-15	A-60 A-0	A-30 A-0	A-0 B-0	A-15 B-0	A-30 B-0	A-60 B-0	A-0 B-0	A-0	A-30 A-0	A-30 A-0	A-0	A-30 A-0
Sanitary spaces and similar spaces	(9)	A-0	A-0	A-0	A-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0 B-0	A-0	A-0	A-0	A-0	A-0
Tanks, voids and auxiliary machinery spaces having little or no fire risk	(10)	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0	A-0 <sup>a/</sup>	A-0	A-0	A-0	A-0
Auxiliary machinery spaces, cargo spaces, cargo and other oil tanks and other similar spaces of moderate fire risk	(11)	A-60	A-60 A-15	A-60 A-15	A-10 A-0	A-0	A-0	A-15 A-0	A-30 A-0	A-0	A-0	A-0 <sup>a/</sup>	A-0	A-0	A-30 <sup>b/</sup> A-15
Machinery spaces and main galleys	(12)	A-60	A-60	A-60	A-60	A-0	A-60	A-60	A-60	A-0	A-0	A-30	A-30 <sup>a/</sup>	A-0	A-60
Store-rooms, workshops, pantries, etc.	(13)	A-60	A-30 A-0	A-15 A-0	A-15 A-0	A-0 B-0	A-15 A-0	A-30 A-0	A-30 A-0	A-0 B-0	A-0	A-0	A-0	A-0	A-15 <sup>b/</sup> A-0
Other spaces in which flammable liquids are stowed	(14)	A-60	A-60 A-30	A-60 A-30	A-60	A-0	A-30 A-0	A-60 A-15	A-60 A-15	A-0	A-0	A-30 <sup>b/</sup> A-0	A-30 <sup>b/</sup> A-0	A-0	A-30 <sup>b/</sup> A-0

Notes: To be applied to tables 26.1 to 26.4, as appropriate.

a/ Where adjacent spaces are in the same numerical category and superscript a/ appears, a bulkhead or deck between such spaces need not be fitted if deemed unnecessary by the Administration. For example, in category (12) a bulkhead need not be required between a galley and its annexed pantries provided the pantry bulkheads and decks maintain the integrity of the galley boundaries. A bulkhead is, however, required between a galley and a machinery space even though both spaces are in category (12).

b/ Where superscript b/ appears the lesser insulation value may be permitted only if at least one of the adjoining spaces is protected by an automatic sprinkler system complying with the provisions of Regulation 12.

whether the insulation values in table 26.3 or 26.4 shall apply to weather decks. In no case shall the requirements of category (5) of tables 26.1 to 26.4 necessitate enclosure of spaces which in the opinion of the Administration need not be enclosed.

3. Continuous “B” class ceilings or linings, in association with the relevant decks or bulkheads, may be accepted as contributing wholly or in part, to the required insulation and integrity of a division.

4. In approving structural fire protection details, the Administration shall have regard to the risk of heat transmission at intersections and terminal points of required thermal barriers.

**Regulation 27. FIRE INTEGRITY OF BULKHEADS AND DECKS IN SHIPS CARRYING NOT MORE THAN 36 PASSENGERS**

1. In addition to complying with the specific provisions for fire integrity of bulkheads and decks mentioned elsewhere in this part, the minimum fire integrity of bulkheads and decks shall be as prescribed in table 27.1 and table 27.2.

2. The following requirements shall govern application of the tables:

1. Tables 27.1 and 27.2 shall apply respectively to the bulkheads and decks separating adjacent spaces.
2. For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified according to their fire risk as shown in categories (1) to (11) below. The title of each category is intended to be typical rather than restrictive. The number in parentheses preceding each category refers to the applicable column or row in the tables.
  - (1) Control stations
    - Spaces containing emergency sources of power and lighting.
    - Wheelhouse and chartroom.
    - Spaces containing the ship’s radio equipment.
    - Fire-extinguishing rooms, fire control [rooms] and fire-recording stations.
    - Control room for propulsion machinery when located outside the machinery space.
    - Spaces containing centralized fire alarm equipment.
  - (2) Corridors
    - Passenger and crew corridors and lobbies.
  - (3) Accommodation spaces
    - Spaces as defined in regulation 3.10 excluding corridors.
  - (4) Stairways
    - Interior stairways, lifts and escalators (other than those wholly contained within the machinery spaces) and enclosures thereto.
    - In this connexion, a stairway which is enclosed only at one level shall be regarded as part of the space from which it is not separated by a fire door.
  - (5) Service spaces (low risk)
    - Lockers and store-rooms having areas of less than 2 m<sup>2</sup>, drying rooms and laundries.
  - (6) Machinery spaces of category A
    - Spaces as defined in regulation 3.19.
  - (7) Other machinery spaces
    - Spaces as defined in regulation 3.20 excluding machinery spaces of category A.



**TABLE 27.1 – FIRE INTEGRITY OF BULKHEADS SEPARATING ADJACENT SPACES**

Spaces	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control stations (1)	A-0 <sup>a</sup>	A-0	A-60	A-0	A-15	A-60	A-15	A-60	A-60	*	A-60
Corridors (2)		C <sup>e</sup>	B-0 <sup>e</sup>	A-0 <sup>b</sup> B-0 <sup>e</sup>	B-0 <sup>e</sup>	A-60	A-0	A-0	A-15 A-0 <sup>d</sup>	*	A-15
Accommodation spaces (3)			C <sup>e</sup>	A-0 <sup>b</sup> B-0 <sup>e</sup>	B-0 <sup>e</sup>	A-60	A-0	A-0	A-15 A-0 <sup>d</sup>	*	A-30 A-0 <sup>d</sup>
Stairways (4)				A-0 <sup>b</sup> B-0 <sup>e</sup>	A-0 <sup>b</sup> B-0 <sup>e</sup>	A-60	A-0	A-0	A-15 A-0 <sup>d</sup>	*	A-15
Service spaces (low risk) (5)					C <sup>e</sup>	A-60	A-0	A-0	A-0	*	A-0
Machinery spaces (6) of category A						*	A-0	A-0	A-60	*	A-60
Other machinery (7) spaces							A-0 <sup>b</sup>	A-0	A-0	*	A-0
Cargo spaces (8)								*	A-0	*	A-0
Service spaces (high risk) (9)									A-0 <sup>b</sup>	*	A-30
Open decks (10)										-	A-0
Special category (11) spaces											A-0

Notes: To be applied to both tables 27.1 and 27.2, as appropriate.

<sup>a</sup> For clarification as to which applies see Regulations 25 and 29.

<sup>b</sup> Where spaces are of the same numerical category and superscript b appears, a bulkhead or deck of the ratings shown in the tables is only required when the adjacent spaces are for a different purpose, e.g. in category (9). A galley next to a galley does not require a bulkhead but a galley next to a paint room requires an "A-0" bulkhead.

<sup>c</sup> Bulkheads separating the wheelhouse and chartroom from each other may be "B-0" rating.

<sup>d</sup> See 2.3 and 2.4 of this Regulation.

<sup>e</sup> For the application of Regulation 24.1.2, "B-0" and "C", where appearing in table 27.1, shall be read as "A-0".

<sup>f</sup> Fire insulation need not be fitted if the machinery space of category (7), in the opinion of the Administration, has little or no fire risk.

\* Where an asterisk appears in the tables, the division is required to be of steel or other equivalent material but is not required to be of "A" class standard.

For the application of Regulation 24.1.2 an asterisk, where appearing in table 27.2, except for categories (8) and (10), shall be read as "A-0".

TABLE 27.2 – FIRE INTEGRITY OF DECKS SEPARATING ADJACENT SPACES

Space below ↓ Space above →	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control stations (1)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0	*	A-30
Corridors (2)	A-0	*	*	A-0	*	A-60	A-0	A-0	A-0	*	A-0
Accommodation spaces (3)	A-60	A-0	*	A-0	*	A-60	A-0	A-0	A-0	*	A-30 A-0 <sub>d</sub>
Stairways (4)	A-0	A-0	A-0	*	A-0	A-60	A-0	A-0	A-0	*	A-0
Service spaces (low risk) (5)	A-15	A-0	A-0	A-0	*	A-60	A-0	A-0	A-0	*	A-0
Machinery spaces of category A (6)	A-60	A-60	A-60	A-60	A-60	*	A-60 f	A-30	A-60	*	A-60
Other machinery spaces (7)	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*	A-0
Cargo spaces (8)	A-60	A-0	A-0	A-0	A-0	A-0	A-0	*	A-0	*	A-0
Service spaces (high risk) (9)	A-60	A-30 A-0 <sub>d</sub>	A-30 A-0 <sub>d</sub>	A-30 A-0 <sub>d</sub>	A-0	A-60	A-0	A-0	A-0	*	A-30
Open decks (10)	*	*	*	*	*	*	*	*	*	—	A-0
Special category spaces (11)	A-60	A-15	A-30 A-0 <sub>d</sub>	A-15	A-0	A-30	A-0	A-0	A-30	A-0	A-0

## (8) Cargo spaces

- All spaces used for cargo (including cargo oil tanks) and trunkways and hatchways to such spaces, other than special category spaces.

## (9) Service spaces (high risk)

- Galleys, pantries containing cooking appliances, paint and lamp rooms, lockers and store-rooms having areas of 2 m<sup>2</sup> or more and workshops other than those forming part of the machinery spaces.

## (10) Open decks

- Open deck spaces and enclosed promenades having no fire risk. Air spaces (the space outside superstructures and deckhouses).

## (11) Special category spaces

- Spaces as defined in regulation 3.18.

- In determining the applicable fire integrity standard of a boundary between two spaces within a main vertical zone or horizontal zone which is not protected by an automatic sprinkler system complying with the provisions of regulation 12 or between such zones neither of which is so protected, the higher of the two values given in the tables shall apply.
- In determining the applicable fire integrity standard of a boundary between two spaces within a main vertical zone or horizontal zone which is protected by an automatic sprinkler system complying with the provisions of regulation 12 or between such zones both of

which are so protected, the lesser of the two values given in the tables shall apply. Where a sprinklered zone and a non-sprinklered zone meet within accommodation and service spaces, the higher of the two values given in the tables shall apply to the division between the zones.

3. Continuous “B” class ceilings or linings, in association with the relevant decks or bulkheads, may be accepted as contributing, wholly or in part, to the required insulation and integrity of a division.

4. External boundaries which are required in regulation 23.1 to be of steel or other equivalent material may be pierced for the fitting of windows and sidescuttles provided that there is no requirement for such boundaries to have “A” class integrity elsewhere in [this part]. Similarly, in such boundaries which are not required to have “A” class integrity, doors may be of materials to the satisfaction of the Administration.

#### *Regulation 28. MEANS OF ESCAPE*

1. Stairways and ladders shall be arranged to provide ready means of escape to the lifeboat and liferaft embarkation deck from all passenger and crew spaces and from spaces in which the crew is normally employed, other than machinery spaces. In particular, the following provisions shall be complied with:

1. Below the bulkhead deck two means of escape, at least one of which shall be independent of watertight doors, shall be provided from each watertight compartment or similarly restricted space or group of spaces. Exceptionally, the Administration may dispense with one of the means of escape, due regard being paid to the nature and location of spaces and to the number of persons who might normally be accommodated or employed there.
2. Above the bulkhead deck there shall be at least two means of escape from each main vertical zone or similarly restricted space or group of spaces at least one of which shall give access to a stairway forming a vertical escape.
3. If a radiotelegraph station has no direct access to the open deck, two means of escape from or access to such station shall be provided, one of which may be a porthole or window of sufficient size or another means to the satisfaction of the Administration.
4. A corridor or part of a corridor from which there is only one route of escape shall not exceed:
  - 13 m in length for ships carrying more than 36 passengers, and 7 m in length for ships carrying not more than 36 passengers.
5. At least one of the means of escape required by paragraphs 1.1 and 1.2 shall consist of a readily accessible enclosed stairway, which shall provide continuous fire shelter from the level of its origin to the appropriate lifeboat and liferaft embarkation decks or the highest level served by the stairway, whichever level is the highest. However, where the Administration has granted dispensation under the provisions of paragraph 1.1 the sole means of escape shall provide safe escape to the satisfaction of the Administration. The width, number and continuity of the stairways shall be to the satisfaction of the Administration.
6. Protection of access from the stairway enclosures to the lifeboat and liferaft embarkation areas shall be to the satisfaction of the Administration.
7. Stairways serving only a space and a balcony in that space shall not be considered as forming one of the required means of escape.

2.1. In special category spaces the number and disposition of the means of escape both below and above the bulkhead deck shall be to the satisfaction of the Administration and in general the safety of access to the embarkation deck shall be at least equivalent to that provided for under paragraphs 1.1, 1.2, 1.5 and 1.6.

2.2. One of the escape routes from the machinery spaces where the crew is normally employed shall avoid direct access to any special category space.

3.1. Two means of escape shall be provided from each machinery space. In particular, the following provisions shall be complied with:

1. Where the space is below the bulkhead deck the two means of escape shall consist of either:
  - 1.1. Two sets of steel ladders as widely separated as possible, leading to doors in the upper part of the space similarly separated and from which access is provided to the appropriate lifeboat and liferaft embarkation decks. One of these ladders shall provide continuous fire shelter from the lower part of the space to a safe position outside the space; or
  - 1.2. One steel ladder leading to a door in the upper part of the space from which access is provided to the embarkation deck and additionally, in the lower part of the space and in a position well separated from the ladder referred to, a steel door capable of being operated from each side and which provides access to a safe escape route from the lower part of the space to the embarkation deck.
2. Where the space is above the bulkhead deck, the two means of escape shall be as widely separated as possible and the doors leading from such means of escape shall be in a position from which access is provided to the appropriate lifeboat and liferaft embarkation decks. Where such means of escape require the use of ladders, these shall be of steel.
  - 3.2. In a ship of less than 1,000 tons gross tonnage, the Administration may dispense with one of the means of escape, due regard being paid to the width and disposition of the upper part of the space, and in a ship of 1,000 tons gross tonnage and above, the Administration may dispense with one means of escape from any such space so long as either a door or a steel ladder provides a safe escape route to the embarkation deck, due regard being paid to the nature and location of the space and whether persons are normally employed in that space.
4. In no case shall lifts be considered as forming one of the required means of escape.

**Regulation 29. PROTECTION OF STAIRWAYS AND LIFTS IN ACCOMMODATION AND SERVICE SPACES**

1. All stairways shall be of steel frame construction except where the Administration sanctions the use of other equivalent material, and shall be within enclosures formed of "A" class divisions, with positive means of closure at all openings, except that:

1. A stairway connecting only two decks need not be enclosed, provided the integrity of the deck is maintained by proper bulkheads or doors in one 'tweendeck space. When a stairway is closed in one 'tweendeck space, the stairway enclosure shall be protected in accordance with the tables for decks in regulations 26 or 27;
2. Stairways may be fitted in the open in a public space, provided they lie wholly within such public space.
  2. Stairway enclosures shall have direct communication with the corridors and be of sufficient area to prevent congestion, having in view the number of persons likely to use them in an emergency. In so far as is practicable, stairway enclosures shall not give direct access to cabins, service lockers, or other enclosed spaces containing combustibles in which a fire is likely to originate.
  3. Lift trunks shall be so fitted as to prevent the passage of smoke and flame from one 'tweendeck to another and shall be provided with means of closing so as to permit the control of draught and smoke.

**Regulation 30. OPENINGS IN "A" CLASS DIVISIONS**

1. Except for hatches between cargo, special category, store, and baggage spaces, and between such spaces and the weather-decks, all openings shall be provided with permanently attached means of closing which shall be at least as effective for resisting fires as the divisions in which they are fitted.

2. The construction of all doors and door frames in “A” class divisions, with the means of securing them when closed, shall provide resistance to fire as well as to the passage of smoke and flame, as far as practicable, equivalent to that of the bulkheads in which the doors are situated. Such doors and door frames shall be constructed of steel or other equivalent material. Watertight doors need not be insulated.

3. It shall be possible for each door to be opened and closed from each side of the bulkhead by one person only.

4. Fire doors in main vertical zone bulkheads and stairway enclosures, other than power-operated watertight doors and those which are normally locked, shall be of the self-closing type capable of closing against an inclination of 3.5° opposing closure. The speed of door closure shall, if necessary, be controlled so as to prevent undue danger to persons. All such doors, except those that are normally closed, shall be capable of release from a control station, either simultaneously or in groups, and also individually from a position at the door. The release mechanism shall be so designed that the door will automatically close in the event of disruption of the control system; however, approved power-operated watertight doors will be considered acceptable for this purpose. Hold-back hooks not subject to control station release will not be permitted. When double swing doors are permitted, they shall have a latch arrangement which is automatically engaged by the operation of the door release system.

5. Where a space is protected by an automatic sprinkler system complying with the provisions of regulation 12 or fitted with a continuous “B” class ceiling, openings in decks not forming steps in main vertical zones nor bounding horizontal zones shall be closed reasonably tight and such decks shall meet the “A” class integrity requirements in so far as is reasonable and practicable in the opinion of the Administration.

6. The requirements for “A” class integrity of the outer boundaries of a ship shall not apply to glass partitions, windows and sidescuttles. Similarly, the requirements for “A” class integrity shall not apply to exterior doors in superstructures and deckhouses.

#### *Regulation 31. OPENINGS IN “B” CLASS DIVISIONS*

1. Doors and door frames in “B” class divisions and means of securing them shall provide a method of closure which shall have resistance to fire as far as practicable equivalent to that of the divisions except that ventilation openings may be permitted in the lower portion of such doors. Where such opening is in or under a door the total net area of any such opening or openings shall not exceed 0.05 m<sup>2</sup>. When such opening is cut in a door it shall be fitted with a grill made of non-combustible material. Doors shall be non-combustible.

2. The requirements for “B” class integrity of the outer boundaries of a ship shall not apply to glass partitions, windows and sidescuttles. Similarly, the requirements for “B” class integrity shall not apply to exterior doors in superstructures and deckhouses. For ships carrying not more than 36 passengers, the Administration may permit the use of combustible materials in doors separating cabins from the individual interior sanitary spaces such as showers.

3. Where an automatic sprinkler system complying with the provisions of regulation 12 is fitted:

1. Openings in decks not forming steps in main vertical zones nor bounding horizontal zones shall be closed reasonably tight and such decks shall meet the “B” class integrity requirements in so far as is reasonable and practicable in the opinion of the Administration; and
2. Openings in corridor bulkheads of “B” class materials shall be protected in accordance with the provisions of regulation 25.



**Regulation 32. VENTILATION SYSTEMS****1. Passenger ships carrying more than 36 passengers**

1.1. The ventilation system of a passenger ship carrying more than 36 passengers shall, in addition to this part of this regulation, also be in compliance with the requirements of regulation 16.2 to 16.9.

1.2. In general, the ventilation fans shall be so disposed that the ducts reaching the various spaces remain within the main vertical zone.

1.3. Where ventilation systems penetrate decks, precautions shall be taken, in addition to those relating to the fire integrity of the deck required by regulations 18.1.1 and 30.5, to reduce the likelihood of smoke and hot gases passing from one 'tweendeck space to another through the system. In addition to insulation requirements contained in this regulation, vertical ducts shall, if necessary, be insulated as required by the appropriate tables in regulation 26.

1.4. Except in cargo spaces, ventilation ducts shall be constructed of the following materials:

1. Ducts not less than 0.075 m<sup>2</sup> in sectional area and all vertical ducts serving more than a single 'tweendeck space shall be constructed of steel or other equivalent material;
2. Ducts less than 0.075 m<sup>2</sup> in sectional area other than the vertical ducts referred to in paragraph 1.4.1, shall be constructed of non-combustible materials. Where such ducts penetrate "A" or "B" class divisions due regard shall be given to ensuring the fire integrity of the division;
3. Short lengths of duct, not in general exceeding 0.02 m<sup>2</sup> in sectional area nor 2 m in length, need not be non-combustible provided that all of the following conditions are met:
  - 3.1. The duct is constructed of a material of [low] fire risk to the satisfaction of the Administration;
  - 3.2. The duct is used only at the terminal end of the ventilation system; and
  - 3.3. The duct is not located closer than 600 mm measured along its length to a penetration of an "A" or "B" class division, including continuous "B" class ceilings.
- 1.5. Where a stairway enclosure is ventilated, the duct or ducts shall be taken from the fan room independently of other ducts in the ventilation system and shall not serve any other space.

1.6. All power ventilation, except machinery space and cargo space ventilation and an alternative system which may be required under regulation 16.6, shall be fitted with controls so grouped that all fans may be stopped from either of two separate positions which shall be situated as far apart as practicable. Controls provided for the power ventilation serving machinery spaces shall also be grouped so as to be operable from two positions, one of which shall be outside such spaces. Fans serving power ventilation systems to cargo spaces shall be capable of being stopped from a safe position outside such spaces.

**2. Passenger ships carrying not more than 36 passengers**

2.1. The ventilation system of passenger ships carrying not more than 36 passengers shall be in compliance with regulation 16.

**Regulation 33. WINDOWS AND SIDESCUTTLES**

1. All windows and sidescuttles in bulkheads within accommodation and service spaces and control stations other than those to which the provisions of regulation 30.6 and of regulation 31.2 apply, shall be so constructed as to preserve the integrity requirements of the type of bulkheads in which they are fitted.



2. Notwithstanding the requirements of the tables in regulations 26 and 27:
  1. All windows and sidescuttles in bulkheads separating accommodation and service spaces and control stations from weather shall be constructed with frames of steel or other suitable material. The glass shall be retained by a metal glazing bead or angle;
  2. Special attention shall be given to the fire integrity of windows facing open or enclosed lifeboat and liferaft embarkation areas and to the fire integrity of windows situated below such areas in such a position that their failure during a fire would impede the launching of, or embarkation into, lifeboats or liferafts.

**Regulation 34. RESTRICTED USE OF COMBUSTIBLE MATERIALS**

1. Except in cargo spaces, mail rooms, baggage rooms, or refrigerated compartments of service spaces, all linings, grounds, ceilings and insulations shall be of non-combustible materials. Partial bulkheads or decks used to subdivide a space for utility or artistic treatment shall also be of non-combustible material.
2. Vapour barriers and adhesives used in conjunction with insulation, as well as insulation of pipe fittings, for cold service systems need not be non-combustible, but they shall be kept to the minimum quantity practicable and their exposed surfaces shall have qualities of resistance to the propagation of flame to the satisfaction of the Administration.
3. The following surfaces shall have low flame-spread characteristics:\*
  1. Exposed surfaces in corridors and stairway enclosures, and of bulkheads, wall and ceiling linings in all accommodation and service spaces and control stations;
  2. Concealed or inaccessible spaces in accommodation, service spaces and control stations.
4. The total volume of combustible facings, mouldings, decorations and veneers in any accommodation and service space shall not exceed a volume equivalent to 2.5 mm veneer on the combined area of the walls and ceilings. In the case of ships fitted with an automatic sprinkler system complying with the provisions of regulation 12, the above volume may include some combustible material used for erection of "C" class divisions.
5. Veneers used on surfaces and linings covered by the requirements of paragraph 3 shall have a calorific value not exceeding 45 MJ/m<sup>2</sup> of the area for the thickness used.
6. Furniture in the corridors and stairway enclosures shall be kept to a minimum.
7. Paints, varnishes and other finishes used on exposed interior surfaces shall not be capable of producing excessive quantities of smoke and toxic products.
8. Primary deck coverings, if applied within accommodation and service spaces and control stations, shall be of approved material which will not readily ignite, or give rise to toxic or explosive hazards at elevated temperatures.\*\*

**Regulation 35. DETAILS OF CONSTRUCTION**

1. In accommodation and service spaces, control stations, corridors and stairways:
  1. Air spaces enclosed behind ceilings, panelling or linings shall be suitably divided by close-fitting draught stops not more than 14 m apart;
  2. In the vertical direction, such enclosed air spaces, including those behind linings of stairways, trunks, etc. shall be closed at each deck.

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\* Reference is made to Guideline on the Evaluation of Fire Hazard Properties of Materials, adopted by the Organization by resolution A.166(ES.IV) .

\*\* Reference is made to Improved Provisional Guidelines on Text Procedures for Primary Deck Coverings, adopted by the Organization by resolution A.214(VII) .

2. The construction of ceiling and bulkheading shall be such that it will be possible, without impairing the efficiency of the fire protection, for the fire patrols to detect any smoke originating in concealed and inaccessible places, except where in the opinion of the Administration there is no risk of fire originating in such places.

**Regulation 36. AUTOMATIC SPRINKLER, FIRE DETECTION AND FIRE ALARM SYSTEMS OR [FIXED] FIRE DETECTION AND FIRE ALARM SYSTEMS**

1. In any ship to which this part applies there shall be installed throughout each separate zone, whether vertical or horizontal, in all accommodation and service spaces and, where it is considered necessary by the Administration, in control stations, except spaces which afford no substantial fire risk (such as void spaces, sanitary spaces, etc.) either:

1. An automatic sprinkler, fire detection and fire alarm system of an approved type, complying with the provisions of regulation 12 and so installed and arranged as to protect such spaces; or
2. A fixed fire detection and fire alarm system of an approved type, complying with the provisions of regulation 13 and so installed and arranged as to detect the presence of fire in such spaces, except that the smoke detectors required by regulation 13.2.2 need not be provided.

**Regulation 37. PROTECTION OF SPECIAL CATEGORY SPACES**

1. *Provisions applicable to special category spaces whether above or below the bulkhead deck*

**I.1. General**

1.1.1. The basic principle underlying the provisions of this regulation is that as normal main-vertical zoning may not be practicable in special category spaces, equivalent protection must be obtained in such spaces on the basis of a horizontal zone concept and by the provision of an efficient fixed fire-extinguishing system. Under this concept a horizontal zone for the purpose of this regulation may include special category spaces on more than one deck provided that the total overall clear height for vehicles does not exceed 10 m.

1.1.2. The requirements of regulations 16, 18, 30 and 32 for maintaining the integrity of vertical zones shall be applied equally to decks and bulkheads forming the boundaries separating horizontal zones from each other and from the remainder of the ship.

**1.2. Structural protection**

1.2.1. Boundary bulkheads of special category spaces shall be insulated as required for category (11) spaces in table 26.1 or in table 27.1 and the horizontal boundaries as required for category (11) spaces in table 26.3 or in table 27.2.

1.2.2. Indicators shall be provided on the navigating bridge which shall indicate when any fire door leading to or from the special category spaces is closed.

**1.3. Fixed fire-extinguishing system\***

Each special category space shall be fitted with an approved fixed pressure water-spraying system for manual operation which shall protect all parts of any deck and vehicle platform in such space, provided that the Administration may permit the use of any other fixed fire-extinguishing system that has been shown by full-scale test in conditions simulating a flowing petrol fire in a special category space to be not less effective in controlling fires likely to occur in such a space.

\* Reference is made to Recommendation on Fixed Fire-Extinguishing Systems for Special Category Spaces, adopted by the Organization by resolution A.123(V).

#### 1.4. Patrols and detection

1.4.1. An efficient patrol system shall be maintained in special category spaces. In any such space in which the patrol is not maintained by a continuous fire watch at all times during the voyage there shall be provided [a fixed] fire detection system of an approved type.

1.4.2. Manually operated call points shall be provided as necessary throughout the special category spaces and one shall be placed close to each exit from such spaces.

#### 1.5. Fire-extinguishing equipment

There shall be provided in each special category space:

1. At least three water fog applicators;
2. One portable foam applicator unit complying with the provisions of regulation 6.4, provided that at least two such units are available in the ship for use in such spaces; and
3. Such number of portable fire extinguishers as the Administration may deem sufficient, provided that at least one portable extinguisher is located at each access to such spaces.

#### 1.6. Ventilation system

1.6.1. There shall be provided an effective power ventilation system for the special category spaces sufficient to give at least 10 air changes per hour. The system for such spaces shall be entirely separated from other ventilation systems and shall be operating at all times when vehicles are in such spaces. The Administration may require an increased number of air changes when vehicles are being loaded and unloaded. Ventilation ducts serving special category spaces capable of being effectively sealed shall be separated for each such space. The system shall be capable of being controlled from a position outside such spaces.

1.6.2. The ventilation shall be such as to prevent air stratification and the formation of air pockets.

1.6.3. Means shall be provided to indicate on the navigating bridge any loss or reduction of the required ventilating capacity.

1.6.4. Arrangements shall be provided to permit a rapid shut-down and effective closure of the ventilation system in case of fire, taking into account the weather and sea conditions.

1.6.5. Ventilation ducts, including dampers, shall be made of steel and their arrangement shall be to the satisfaction of the Administration.

#### 2. *Additional provisions applicable only to special category spaces above the bulkhead deck*

##### 2.1. Scuppers

In view of the serious loss of stability which could arise due to large quantities of water accumulating on the deck or decks consequent on the operation of the fixed pressure water-spraying system, scuppers shall be fitted so as to ensure that such water is rapidly discharged directly overboard.

##### 2.2. Precautions against ignition of flammable vapours

2.2.1. On any deck on which vehicles are carried and on which explosive vapours might be expected to accumulate, equipment which may constitute a source of ignition of flammable vapours and, in particular, electrical equipment and wiring, shall be installed at least 450 mm above the deck. Electrical equipment installed at more than 450 mm above the deck shall be of a type so enclosed and protected as to prevent the escape of sparks. However, if the Administration is satisfied that the installation of electrical equipment and wiring at less than 450 mm above the deck is necessary for the safe operation of the ship, such electrical equipment and wiring may be installed provided that it is of a type approved for use in an explosive petrol and air mixture.

2.2.2. Electrical equipment and wiring, if installed in an exhaust ventilation duct, shall be of a type approved for use in explosive petrol and air mixtures and the outlet from any exhaust duct shall be sited in a safe position, having regard to other possible sources of ignition.

**3. Additional provisions applicable only to special category spaces below the bulkhead deck**

**3.1. Bilge pumping and drainage**

In view of the serious loss of stability which could arise due to large quantities of water accumulating on the deck or tank top consequent on the operation of the fixed pressure water-spraying system, the Administration may require pumping and drainage facilities to be provided additional to the requirements of regulation 11-1/21.

**3.2. Precautions against ignition of flammable vapours**

**3.2.1.** Electrical equipment and wiring, if fitted, shall be of a type suitable for use in explosive petrol and air mixtures. Other equipment which constitute a source of ignition of flammable vapours shall not be permitted.

**3.2.2.** Electrical equipment and wiring, if installed in an exhaust ventilation duct, shall be of a type approved for use in explosive petrol and air mixtures and the outlet from any exhaust duct shall be sited in a safe position, having regard to other possible sources of ignition.

**Regulation 38. PROTECTION OF CARGO SPACES, OTHER THAN SPECIAL CATEGORY SPACES, INTENDED FOR THE CARRIAGE OF MOTOR VEHICLES WITH FUEL IN THEIR TANKS FOR THEIR OWN PROPULSION**

In any cargo space (other than special category spaces) containing motor vehicles with fuel in their tanks for their own propulsion the following provisions shall be complied with.

**1. Fire detection**

There shall be provided an approved automatic fire detection and fire alarm system. The design and arrangements of this system shall be considered in conjunction with the ventilation requirements referred to in paragraph 3.

**2. Fire-extinguishing arrangements**

**2.1.** There shall be fitted a fixed fire-extinguishing system which shall comply with the provisions of regulation 5, except that, if a carbon dioxide system is fixed, the quantity of gas available shall be at least sufficient to give a minimum volume of free gas equal to 45 per cent of the gross volume of the largest such cargo space which is capable of being sealed, and the arrangements shall be such as to ensure that at least two thirds of the gas required for the relevant space shall be introduced during 10 minutes. Any other fixed gas fire-extinguishing system or fixed high expansion foam fire-extinguishing system may be fitted provided it gives equivalent protection. Furthermore, any cargo space designated only for vehicles which are not carrying any cargo may be fitted with fixed halogenated hydrocarbon fire-extinguishing systems which shall comply with the provisions of regulation 5.

**2.2.** As an alternative, a system meeting the requirements of regulation 37.1.3 may be fitted, provided that regulation 37.2.1 or 37.3.1, as appropriate, is also complied with.

**2.3.** There shall be provided for use in any such space such number of portable fire extinguishers as the Administration may deem sufficient. At least one portable extinguisher shall be located at each access to such spaces.

**3. Ventilation system**

**3.1.** There shall be provided an effective power ventilation system sufficient to give at least 10 air changes per hour for ships carrying more than 36 passengers, and 6 air changes per hour for ships carrying not more than 36 passengers. The system for such cargo spaces shall be entirely separate from other ventilation systems and shall be operating at all times when vehicles are in such spaces. Ventilation ducts serving such cargo spaces capable of being effectively sealed shall be separated for each such space. The system shall be capable of being controlled from a position outside such spaces.



3.2. The ventilation shall be such as to prevent air stratification and the formation of air pockets.

3.3. Means shall be provided to indicate on the navigating bridge any loss or reduction of the required ventilating capacity.

3.4. Arrangements shall be provided to permit a rapid shut-down and effective closure of the ventilation system in case of fire, taking into account the weather and sea conditions.

3.5. Ventilation ducts, including dampers, shall be made of steel and their arrangement shall be to the satisfaction of the Administration.

4. *Precautions against ignition of flammable vapours*

4.1. Electrical equipment and wiring, if fitted, shall be of a type suitable for use in explosive petrol and air mixtures. Other equipment which may constitute a source of ignition of flammable vapours shall not be permitted.

4.2. Electrical equipment and wiring, if installed in an exhaust ventilation duct, shall be of a type approved for use in explosive petrol and air mixtures and the outlet from any exhaust duct shall be sited in a safe position, having regard to other possible sources of ignition.

4.3. Scuppers shall not be led to machinery or other spaces where sources of ignition may be present.

*Regulation 39. FIXED FIRE-EXTINGUISHING ARRANGEMENTS IN CARGO SPACES*

1. Except as provided for in paragraph 3, the cargo spaces of ships of 1,000 tons gross tonnage and upwards shall be protected by a fixed gas fire-extinguishing system complying with the provisions of regulation 5, or by a fixed high expansion foam fire-extinguishing system which gives equivalent protection.

2. Where it is shown to the satisfaction of the Administration that a ship is engaged on voyages of such short duration that it would be unreasonable to apply the requirements of paragraph 1 and also in ships of less than 1,000 tons gross tonnage, the arrangements in cargo spaces shall be to the satisfaction of the Administration.

3. A ship engaged in the carriage of dangerous goods shall be provided in any cargo spaces with a fixed gas fire-extinguishing system complying with the provisions of regulation 5 or with a fire-extinguishing system which in the opinion of the Administration gives equivalent protection for the cargoes carried.

*Regulation 40. FIRE PATROLS, DETECTION, ALARMS AND PUBLIC ADDRESS SYSTEMS*

1. [Manually operated call points] shall be fitted throughout the accommodation and service spaces to transmit an alarm immediately to the navigating bridge or main fire control station.

2. An approved fire detection or fire alarm system shall be provided which will automatically indicate at one or more suitable points or stations the presence or indication of fire and its location in any cargo space which, in the opinion of the Administration, is not accessible except where it is shown to the satisfaction of the Administration that the ship is engaged on voyages of such short duration that it would be unreasonable to apply this requirement.

3. All ships shall at all times when at sea, or in port (except when out of service), be so manned or equipped as to ensure that any initial fire alarm is immediately received by a responsible member of the crew.

4. A special alarm, operated from the navigating bridge or fire control station, shall be fitted to summon the crew. This alarm may be part of the ship's general alarm system but it shall be capable of being sounded independently of the alarm to the passenger spaces.

5. A public address system or other effective means of communication shall be available throughout the accommodation and service spaces and control stations.

6. For ships carrying more than 36 passengers an efficient patrol system shall be maintained so that an outbreak of fire may be promptly detected. Each member of the fire patrol shall be trained to be familiar with the arrangements of the ship as well as the location and operation of any equipment he may be called upon to use.

*Regulation 41. SPECIAL REQUIREMENTS FOR SHIPS CARRYING DANGEROUS GOODS*

The requirements of regulation 54 shall apply, as appropriate, to passenger ships carrying dangerous goods.

PART C. FIRE SAFETY MEASURES FOR CARGO SHIPS

(Regulation 54 of this part also applies to passenger ships as appropriate.)

*Regulation 42. STRUCTURE*

1. Subject to the provisions of paragraph 4, the hull, superstructure, structural bulkheads, [decks] and deckhouses shall be constructed of steel or other equivalent material.

2. The insulation of aluminium alloy components of "A" or "B" class divisions, except structure which in the opinion of the Administration is non-load-bearing, shall be such that the temperature of the structural core does not rise more than 200°C above the ambient temperature at any time during the applicable exposure to the standard fire test.

3. Special attention shall be given to the insulation of aluminium alloy components of columns, stanchions and other structural members required to support lifeboat and liferaft stowage, launching and embarkation areas, and "A" and "B" class divisions, to ensure:

1. That for such members supporting lifeboat and liferaft areas and class divisions, the temperature rise limitation specified in paragraph 2 shall apply at the end of one hour; and
2. That for such members required to support "B" class divisions, the temperature rise limitation specified in paragraph 2 shall apply at the end of half an hour.

4. Crowns and casings of machinery spaces of category A shall be of steel construction adequately insulated and openings therein, if any, shall be suitably arranged and protected to prevent the spread of fire.

5. One of the following methods of protection shall be adopted in accommodation and service areas:

1. Method IC: The construction of all internal divisional bulkheading of non-combustible "B" or "C" class divisions generally without the installation of an automatic sprinkler, fire detection and fire alarm system in the accommodation and service spaces, except as required by regulation 52.1; or
2. Method IIC: The fitting of an automatic sprinkler, fire detection and fire alarm system as required by regulation 52.2 for the detection and extinction of fire in all spaces in which fire might be expected to originate, generally with no restriction on the type of internal divisional bulkheading; or
3. Method IIIC: The fitting of a fixed fire detection and fire alarm system, as required by regulation 52.3, in all spaces in which a fire might be expected to originate, generally with no restriction on the type of internal divisional bulkheading, except that in no case must the area of any accommodation space or spaces bounded by an "A" or "B" class division exceed 50 m<sup>2</sup>. Consideration may be given by the Administration to increasing this area for public spaces.

6. The requirements for the use of non-combustible materials in construction and insulation of the boundary bulkheads of machinery spaces, control stations, service spaces, etc., and the protection of stairway enclosures and corridors will be common to all three methods outlined in paragraph 5.



**Regulation 43. BULKHEADS WITHIN THE ACCOMMODATION AND SERVICE SPACES**

1. All bulkheads required to be “B” class divisions shall extend from deck to deck and to the shell or other boundaries, unless continuous “B” class ceilings or linings are fitted on both sides of the bulkhead in which case the bulkhead may terminate at the continuous ceiling or lining.

2. *Method IC:* All bulkheads not required by this or other regulations of this Part to be “A” or “B” class divisions, shall be of at least “C” class construction.

3. *Method IIC:* There shall be no restriction on the construction of bulkheads not required by this or other regulations of this part to be “A” or “B” class divisions except in individual cases where “C” class bulkheads are required in accordance with table 44.1.

4. *Method IIIC:* There shall be no restriction on the construction of bulkheads not required by this Part to be “A” or “B” class divisions except that the area of any accommodation space or spaces bounded by a continuous “A” or “B” class division must in no case exceed 50 m<sup>2</sup> except in individual cases where “C” class bulkheads are required in accordance with table 44.1. Consideration may be given by the Administration to increasing this area for public space.

**Regulation 44. FIRE INTEGRITY OF BULKHEADS AND DECKS**

1. In addition to complying with the specific provisions for fire integrity of bulkheads and decks mentioned elsewhere in this part, the minimum fire integrity of bulkheads and decks shall be as prescribed in tables 44.1 and 44.2.

2. The following requirements shall govern application of the tables:

1. Tables 44.1 and 44.2 shall apply respectively to the bulkheads and decks separating adjacent spaces.
2. For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified according to their fire risk as shown in categories (1) to (11) below. The title of each category is intended to be typical rather than restrictive. The number in parentheses preceding each category refers to the applicable column or row in the tables.
  - (1) Control stations
    - Spaces containing emergency sources of power and lighting.
    - Wheelhouse and chartroom.
    - Spaces containing the ship’s radio equipment.
    - Fire-extinguishing rooms, fire control rooms and fire-recording stations.
    - Control room for propulsion machinery when located outside the machinery space.
    - Spaces containing centralized fire alarm equipment.
  - (2) Corridors
    - Corridors and lobbies.
  - (3) Accommodation spaces
    - Spaces as defined in regulation 3.10, excluding corridors.
  - (4) Stairways
    - Interior stairways, lifts and escalators (other than those wholly contained within the machinery spaces) and enclosures thereto.
    - In this connexion, a stairway which is enclosed only at one level shall be regarded as part of the space from which it is not separated by a fire door.
  - (5) Service spaces (low risk)
    - Lockers and store-rooms having an area of less than 2 m<sup>2</sup>, drying rooms and laundries.

TABLE 44.1 – FIRE INTEGRITY OF BULKHEADS SEPARATING ADJACENT SPACES

Spaces	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control stations (1)	A-0 <sup>b/</sup>	A-0	A-60	A-0	A-15	A-60	A-15	A-60	A-60	*	A-60
Corridors (2)		C	B-0	B-0 A-0 <sup>c/</sup>	B-0	A-60	A-0	A-0	A-0	*	A-30
Accommodation spaces (3)			C <sup>a,b/</sup>	B-0 A-0 <sup>c/</sup>	B-0	A-60	A-0	A-0	A-0	*	A-30
Stairways (4)				B-0 A-0 <sup>c/</sup>	B-0 A-0 <sup>c/</sup>	A-60	A-0	A-0	A-0	*	A-30
Service spaces (low risk) (5)					C	A-60	A-0	A-0	A-0	*	A-0
Machinery spaces of category A (6)						*	A-0	A-0 <sup>e/</sup>	A-60	*	A-60 <sup>f/</sup>
Other machinery spaces (7)							A-0 <sup>d/</sup>	A-0	A-0	*	A-0
Cargo spaces (8)								*	A-0	*	A-0
Service spaces (high risk) (9)									A-0 <sup>d/</sup>	*	A-30
Open decks (10)										-	A-0
Ro/ro cargo spaces (11)											<sup>g,h/</sup>

Notes: To be applied to both tables 44.1 and 44.2, as appropriate.

<sup>a</sup> No special requirements are imposed upon bulkheads in methods IIC and IIIC fire protection.

<sup>b</sup> In case of method IIIC "B" class bulkheads of "B-0" rating shall be provided between spaces or groups of spaces of 50 m<sup>2</sup> and over in area.

<sup>c</sup> For clarification as to which applies, see Regulations 43 and 46.

<sup>d</sup> Where spaces are of the same numerical category and superscript d appears, a bulkhead or deck of the rating shown in the tables is only required when the adjacent spaces are for a different purpose, e.g. in category (9). A galley next to a galley does not require a bulkhead but a galley next to a paint room requires an "A-0" bulkhead.

<sup>e</sup> Bulkheads separating the wheelhouse, chartroom and radio room from each other may be "B-0" rating.

<sup>f</sup> A-0 rating may be used if no dangerous goods are intended to be carried or if such goods are stowed not less than 3 m horizontally from such bulkhead.

<sup>g</sup> For cargo spaces in which dangerous goods are intended to be carried, Regulation 54.2.8 applies.

<sup>h</sup> Bulkheads and decks separating ro/ro cargo spaces shall be capable of being closed reasonably gastight and such divisions shall have "A" class integrity in so far as is reasonable and practicable in the opinion of the Administration.

<sup>i</sup> Fire insulation need not be fitted if the machinery space in category (7) in the opinion of the Administration has little or no fire risk.

\* Where an asterisk appears in the tables, the division is required to be of steel or other equivalent material but is not required to be of "A" class standard.

**TABLE 44.2 – FIRE INTEGRITY OF DECKS SEPARATING ADJACENT SPACES**

Space below ↓	Space above →	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Control stations	(1)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0	*	A-60
Corridors	(2)	A-0	*	*	A-0	*	A-60	A-0	A-0	A-0	*	A-30
Accommodation spaces	(3)	A-60	A-0	*	A-0	*	A-60	A-0	A-0	A-0	*	A-30
Stairways	(4)	A-0	A-0	A-0	*	A-0	A-60	A-0	A-0	A-0	*	A-30
Service spaces (low risk)	(5)	A-15	A-0	A-0	A-0	*	A-60	A-0	A-0	A-0	*	A-0
Machinery spaces of category A	(6)	A-60	A-60	A-60	A-60	A-60	*	A-60 <i>i/</i>	A-30	A-60	*	A-60
Other machinery spaces	(7)	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*	A-0
Cargo spaces	(8)	A-60	A-0	A-0	A-0	A-0	A-0	A-0	*	A-0	*	A-0
Service spaces (high risk)	(9)	A-60	A-0	A-0	A-0	A-0	A-60	A-0	A-0	A-0 <i>d/</i>	*	A-30
Open decks	(10)	*	*	*	*	*	*	*	*	*	–	*
Ro/ro cargo spaces	(11)	A-60	A-30	A-30	A-30	A-0	A-60	A-0	A-0	A-30	*	<i>h/</i>

- (6) Machinery spaces of category A
  - Spaces as defined in regulation 3.19.
- (7) Other machinery spaces
  - Spaces as defined in regulation 3.20 excluding machinery spaces of category A.
- (8) Cargo spaces
  - All spaces used for cargo (including cargo oil tanks) and trunkways and hatchways to such spaces.
- (9) Service spaces (high risk)
  - Galleys, pantries containing cooking appliances, paint and lamp rooms, lockers and store-rooms having an area of 2 m<sup>2</sup> or more, workshops other than those forming part of the machinery spaces.
- (10) Open decks
  - Open deck spaces and enclosed promenades having no fire risk. Air spaces (the space outside superstructures and deck houses).
- (11) Ro/ro cargo spaces
  - Spaces as defined in regulation 3.14. Cargo spaces intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion.

3. Continuous “B” class ceilings or linings, in association with the relevant decks or bulkheads, may be accepted as contributing, wholly or in part, to the required insulation and integrity of a division.

4. External boundaries which are required in regulation 42.1 to be of steel or other equivalent material may be pierced for the fitting of windows and sidescuttles provided that there is no requirement for such boundaries to have "A" class integrity elsewhere in this part. Similarly, in such boundaries which are not required to have "A" class integrity, doors may be of materials to the satisfaction of the Administration.

*Regulation 45. MEANS OF ESCAPE*

1. Stairways and ladders shall be so arranged as to provide, from all accommodation spaces and from spaces in which the crew is normally employed, other than machinery spaces, ready means of escape to the open deck and thence to the lifeboats and liferafts. In particular the following general provisions shall be complied with:

1. At all levels of accommodation there shall be provided at least two widely separated means of escape from each restricted space or group of spaces.
  - 2.1. Below the lowest open deck the main means of escape shall be a stairway and the second escape may be a trunk or a stairway.
  - 2.2. Above the lowest open deck the means of escape shall be stairways or doors to an open deck or a combination thereof.
3. Exceptionally the Administration may dispense with one of the means of escape, due regard being paid to the nature and location of spaces and to the numbers of persons who normally might be quartered or employed there.
4. No dead-end corridors having a length of more than 7 m shall be accepted. A dead-end corridor is a corridor or part of a corridor from which there is only one escape route.
5. The width and continuity of the means of escape shall be to the satisfaction of the Administration.
6. If a radiotelegraph station has no direct access to the open deck, two means of access to or egress from such station shall be provided, one of which may be a porthole or window of sufficient size or other means to the satisfaction of the Administration, to provide an emergency escape.
  2. In all ro/ro cargo spaces where the crew is normally employed the number and locations of escape routes to the open deck shall be to the satisfaction of the Administration, but shall in no case be less than two and shall be widely separated.
  3. Except as provided in paragraph 4, two means of escape shall be provided from each machinery space of category A. In particular, one of the following provisions shall be complied with:
    1. Two sets of steel ladders as widely separated as possible leading to doors in the upper part of the space similarly separated and from which access is provided to the open deck. In general, one of these ladders shall provide continuous fire shelter from the lower part of the space to a safe position outside the space. However, the Administration may not require the shelter if, due to the special arrangement or dimensions of the machinery space, a safe escape route from the lower part of this space is provided. This shelter shall be of steel, insulated, where necessary, to the satisfaction of the Administration and be provided with a self-closing steel door at the lower end; or
    2. One steel ladder leading to a door in the upper part of the space from which access is provided to the open deck and additionally, in the lower part of the space and in a position well separated from the ladder referred to, a steel door capable of being operated from each side and which provides access to a safe escape route from the lower part of the space to the open deck.
    4. In a ship of less than 1,000 tons gross tonnage, the Administration may dispense with one of the means of escape required under paragraph 3, due regard being paid to the dimension and disposition of the upper part of the space.

5. From machinery spaces other than those of category A, escape routes shall be provided to the satisfaction of the Administration having regard to the nature and location of the space and whether persons are normally employed in that space.

6. Lifts shall not be considered as forming one of the required means of escape as required by this regulation.

**Regulation 46. PROTECTION OF STAIRWAYS AND LIFT TRUNKS IN ACCOMMODATION SPACES, SERVICE SPACES AND CONTROL STATIONS**

1. Stairways which penetrate only a single deck shall be protected at least at one level by at least “B-0” class divisions and self-closing doors. Lifts which penetrate only a single deck shall be surrounded by “A-0” class divisions with steel doors at both levels. Stairways and lift trunks which penetrate more than a single deck shall be surrounded by at least “A-0” class divisions and be protected by self-closing doors at all levels.

2. On ships having accommodation for 12 persons or less, where stairways penetrate more than a single deck and where there are at least two escape routes direct to the open deck at every accommodation level, consideration may be given by the Administration to reducing the “A-0” requirements of paragraph 1 to “B.0”.

3. All stairways shall be of steel frame construction except where the Administration sanctions the use of other equivalent material.

**Regulation 47. DOORS IN FIRE RESISTING DIVISIONS**

1. The fire resistance of doors shall, as far as practicable, be equivalent to that of the division in which they are fitted. Doors and door frames in “A” class divisions shall be constructed of steel. Doors in “B” class divisions shall be non-combustible. Doors fitted in boundary bulkheads of machinery spaces of category A shall be reasonably gastight and self-closing. In ships constructed according to method 1C, an Administration may permit the use of combustible materials in doors separating cabins from individual interior sanitary accommodation such as showers.

2. Doors required to be self-closing shall not be fitted with hold-back hooks. However, hold-back arrangements fitted with remote release devices of the fail-safe type may be utilized.

3. In corridor bulkheads ventilation openings may be permitted only in and under the doors of cabins and public spaces. The openings shall be provided only in the lower half of a door. Where such opening is in or under a door the total net area of any such opening or openings shall not exceed 0.05 m<sup>2</sup>. When such opening is cut in a door it shall be fitted with a grille made of non-combustible material.

4. Watertight doors need not be insulated.

**Regulation 48. VENTILATION SYSTEMS**

The ventilation systems of cargo ships shall be in compliance with the provisions of regulation 16, except paragraph 8.

**Regulation 49. RESTRICTED USE OF COMBUSTIBLE MATERIALS**

1. All exposed surfaces in corridors and stairway enclosures and surfaces including grounds in concealed or inaccessible spaces in accommodation and service spaces and control stations shall have low flame-spread characteristics.\* Exposed surfaces of ceilings in accommodation and service spaces and control stations shall have low flame-spread characteristics.

2. Paints, varnishes and other finishes used on exposed interior surfaces shall not offer an undue fire hazard in the judgement of the Administration and shall not be capable of producing excessive quantities of smoke.

\* Reference is made to Guidelines on the Evaluation of Fire Hazard Properties of Materials, adopted by the Organization by resolution A.166(ES.IV).



3. Primary deck coverings, if applied [ ] in accommodation and service spaces and control stations shall be of an approved material which will not readily ignite.\*

**Regulation 50. DETAILS OF CONSTRUCTION**

1. *Method IC:* In accommodation and service spaces and control stations all linings, draught stops, ceilings and their associated grounds shall be of non-combustible materials.

2. *Methods IIC and IIIC:* In corridors and stairway enclosures serving accommodation and service spaces and control stations, ceilings, linings, draught stops and their associated grounds shall be of non-combustible materials.

3. *Methods IC, IIC and IIIC*

3.1. Except in cargo spaces or refrigerated compartments of service spaces, insulating materials shall be non-combustible. Vapour barriers and adhesives used in conjunction with insulation, as well as the insulation of pipe fittings, for cold service systems, need not be of non-combustible materials, but they shall be kept to the minimum quantity practicable and their exposed surfaces shall have qualities of resistance to the propagation of flame to the satisfaction of the Administration.

3.2. Where non-combustible bulkheads, linings and ceilings are fitted in accommodation and service spaces they may have a combustible veneer not exceeding 2.0 mm in thickness within any such space except corridors, stairway enclosures and control stations, where the veneer shall not exceed 1.5 mm in thickness.

3.3. Air spaces enclosed behind ceilings, panellings, or linings, shall be divided by close-fitting draught stops spaced not more than 14 m apart. In the vertical direction, such air spaces, including those behind linings of stairways, trunks, etc., shall be closed at each deck.

**Regulation 51. ARRANGEMENT FOR GASEOUS FUEL FOR DOMESTIC PURPOSES**

Where gaseous fuel is used for domestic purposes the arrangements [for the] storage, distribution and utilization of the fuel shall be such that, having regard to the hazards of fire and explosion which the use of such fuel may entail, the safety of the ship and the persons on board is preserved.

**Regulation 52. FIXED FIRE DETECTION AND FIRE ALARM SYSTEMS  
AUTOMATIC SPRINKLER, FIRE DETECTION AND FIRE ALARM SYSTEMS**

1. In ships in which method IC is adopted, a smoke detection system in accordance with the relevant provisions of regulation 13 shall be so installed and arranged as to protect all corridors, stairways and escape routes within accommodation spaces.

2. In ships in which method IIC is adopted, an automatic sprinkler, fire detection and fire alarm system of an approved type and complying relevant provisions of regulation 12 shall be so installed and arranged as to protect accommodation spaces, galleys and other service spaces, except spaces which afford no substantial fire risk such as void spaces, sanitary spaces, etc. In addition, a smoke detection system in accordance with the relevant provisions of regulation 13 shall be so arranged and installed as to protect corridors, stairways and escape routes within accommodation spaces.

3. In ships in which method IIIC is adopted, a fixed fire detection and fire alarm system of an approved type and complying with the relevant provisions of regulation 13 shall be so installed and arranged as to detect the presence of fire in all accommodation spaces and service spaces, except spaces which afford no substantial fire risk such as void spaces, sanitary spaces, etc.

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\* Reference is made to Improved Provisional Guidelines on Test Procedures for Primary Deck Coverings, adopted by the Organization by resolution A.214(VII).



4. Notwithstanding the provisions of the above, the Administration need not require the installation of detectors required in accordance with the provisions of regulation 13.2.2 until 1 September 1985.

*Regulation 53. FIRE PROTECTION ARRANGEMENTS IN CARGO SPACES*

1. *General*

1.1. Except for cargo spaces covered in paragraphs 2 and 3, cargo spaces of ships of 2,000 tons gross tonnage and upwards shall be protected by a fixed gas fire-extinguishing system complying with the provisions of regulation 5 or by a fire-extinguishing system which gives equivalent protection.

1.2. The Administration may exempt from the requirements of paragraph 1.1 cargo spaces of any ship if constructed and solely intended for carrying ore, coal, grain, unseasoned timber and non-combustible cargoes or cargoes which, in the opinion of the Administration, constitute a low fire risk. Such exemptions may be granted only if the ship is fitted with steel hatch covers and effective means of closing all ventilators and other openings leading to the cargo spaces.

1.3. Notwithstanding the provisions of paragraph 1.1, any ship engaged in the carriage of dangerous goods shall be provided in any cargo spaces with a fixed gas fire-extinguishing system complying with the provisions of regulation 5 or [with] a fire-extinguishing system which in the opinion of the Administration gives equivalent protection for the cargoes carried.

2. *Ro/ro cargo spaces*

2.1. *Fire detection*

There shall be provided [a fixed] fire detection and fire alarm system. The design and arrangements of this system shall be considered in conjunction with the ventilation requirements referred to in 2.3.

2.2. *Fire-extinguishing arrangements*

2.2.1. Ro/ro cargo spaces capable of being sealed shall be fitted with a fixed gas fire-extinguishing system which shall comply with the provisions of regulation 5, except that:

1. If a carbon dioxide system is fitted, the quantity of gas available shall be at least sufficient to give a minimum volume of free gas equal to 45 per cent of the gross volume of the largest such cargo space which is capable of being sealed, and the arrangements shall be such as to ensure that at least two thirds of the gas required for the relevant space shall be introduced during 10 minutes;
2. A halogenated hydrocarbon system may be used only for spaces designated only for vehicles which are not carrying any cargo;
3. Any other fixed gas fire-extinguishing system or fixed high expansion foam fire-extinguishing system may be fitted provided the Administration is satisfied that an equivalent protection is achieved;
4. As an alternative, a system meeting the requirements of regulation 37.1.3 may be fitted. However, the drainage and pumping arrangements shall be such as to prevent the build-up of free surfaces. If this is not possible the adverse effect upon stability of the added weight and free surface of water shall be taken into account to the extent deemed necessary by the Administration in its approval of the stability information. \* Such information shall be included in the stability information supplied to the master as required by regulation 11-1/22.

2.2.2. Ro/ro cargo spaces not capable of being sealed shall be fitted with a system meeting the requirements of regulation 37.1.3. However, the drainage and pumping arrangements shall be such as to prevent the build-up of free surfaces. If this is not possible the

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\* Reference is made to Recommendation on Fixed Fire-Extinguishing Systems for Special Category Spaces, adopted by the Organization by resolution A.123(V).

adverse effect upon stability of the added weight and free surface of water shall be taken into account to the extent deemed necessary by the Administration in its approval of the stability information\*. Such information shall be included in the stability information supplied to the master as required by regulation II-1/22.

2.2.3. There shall be provided for use in any ro/ro cargo space such number of portable fire extinguishers as the Administration may deem sufficient. At least one portable extinguisher shall be located at each access to such a cargo space.

2.2.4. Each ro/ro cargo space intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion shall be provided with:

1. At least three water fog applicators;
2. One portable foam applicator unit complying with the provisions of regulation 6.4 provided that at least two such units are available in the ship for use in such ro/ro cargo spaces.

### 2.3. Ventilation system

2.3.1. Closed ro/ro cargo spaces shall be provided with an effective power ventilation system sufficient to provide at least six air changes per hour based on an empty hold. Ventilation fans shall normally be run continuously whenever vehicles are on board. Where this is impracticable, they shall be operated for a limited period daily as weather permits and in any case for a reasonable period prior to discharge, after which period the ro/ro cargo space shall be proved gas free. One or more portable combustible gas detecting instruments shall be carried for this purpose. The system shall be entirely separate from other ventilating systems. Ventilation ducts serving ro/ro cargo spaces capable of being effectively sealed shall be separated for each cargo space. The Administration may require an increased number of air changes when vehicles are being loaded or unloaded. The system shall be capable of being controlled from a position outside such spaces.

2.3.2. The ventilation shall be so arranged as to prevent air stratification and the formation of air pockets.

2.3.3. Means shall be provided to indicate any loss of the required ventilating capacity on the navigating bridge.

2.3.4. Arrangements shall be provided to permit a rapid shut-down and effective closure of the ventilation system in case of fire, taking into account the weather and sea conditions.

2.3.5. Ventilation ducts, including dampers, shall be made of steel and their arrangement shall be to the satisfaction of the Administration.

### 2.4. Precautions against ignition of flammable vapours

Closed ro/ro cargo spaces carrying motor vehicles with fuel in their tanks for their own propulsion shall comply with the following additional provisions:

1. Except as provided in paragraph 2.4.2, electrical equipment and wiring shall be of a type suitable for use in explosive petrol and air mixtures.
2. Above a height of 450 mm from the deck, electrical equipment of a type so enclosed and protected as to prevent the escape of sparks shall be permitted as an alternative on condition that the ventilating system is so designed and operated as to provide continuous ventilation of the cargo spaces at the rate of at least ten air changes per hour whenever vehicles are on board.
3. Other equipment which may constitute a source of ignition of flammable vapours shall not be permitted.

\* Reference is made to Recommendation on Fixed Fire-Extinguishing Systems for Special Category Spaces, adopted by the Organization by resolution A.123(V).

4. Electrical equipment and wiring in an exhaust ventilation duct shall be of a type approved for use in explosive petrol and air mixtures and the outlet from any exhaust duct shall be sited in a safe position, having regard to other possible sources of ignition.
5. Scuppers shall not be led to machinery or other spaces where sources of ignition may be present.

3. *Cargo spaces, other than ro/ro cargo spaces, intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion*

Spaces intended for the carriage of motor vehicles with fuel in their tanks for their own propulsion shall comply with requirements of paragraph 2, except that paragraph 2.2.4 need not be complied with.

**Regulation 54. SPECIAL REQUIREMENTS FOR SHIPS CARRYING DANGEROUS GOODS**

1. General

1.1. In addition to complying with the requirements of regulation 53 for cargo ships and with the requirements of regulations 38 and 39 for passenger ships as appropriate, ship types and cargo spaces, referred to in paragraph 1.2, intended for the carriage of dangerous goods shall comply with the requirements of this regulation, as appropriate, except when carrying dangerous goods in limited quantities\* unless such requirements have already been met by compliance with the requirements elsewhere in this chapter. The types of ships and modes of carriage of dangerous goods are referred to in paragraph 1.2 and in table 54.1, where the numbers appearing in paragraph 1.2 are referred to in the top line.

1.2. The following ship types and cargo spaces shall govern the application of tables 54.1 and 54.2:

1. Ships and cargo spaces not specifically designed for the carriage of freight containers but intended for the carriage of dangerous goods in packaged form including goods in freight containers and portable tanks.
2. Purpose built container ships and cargo spaces intended for the carriage of dangerous goods in freight containers and portable tanks.
3. Ro/ro ships and ro/ro cargo spaces intended for the carriage of dangerous goods.
4. Ships and cargo spaces intended for the carriage of solid dangerous goods in bulk.
5. Ships and cargo spaces intended for carriage of dangerous goods other than liquids and gases in bulk in shipborne barges.

2. *Special requirements*

Unless otherwise specified the following requirements shall govern the application of tables 54.1, 54.2 and 54.3 to both “on deck” and “under deck” stowage of dangerous goods where the numbers of the following paragraphs are indicated in the first column.

2.1. Water supplies

2.1.1. Arrangements shall be Made to ensure immediate availability of a supply of water from the fire main at the required pressure either by permanent pressurization or by suitably placed remote starting arrangements for the fire pumps.

2.1.2. The quantity of water delivered shall be capable of supplying four nozzles of a size and at pressures as specified in regulation 4, capable of being trained on any part of the cargo space when empty. This amount of water may be applied by equivalent means to the satisfaction of the Administration.

2.1.3. Means of effectively cooling the designated under deck cargo space by copious quantities of water, either by a fixed arrangement of spraying nozzles, or flooding the cargo space with water, shall be provided. Hoses may be used for this purpose in small cargo spaces

\* Reference is made to Section 18 of the General Introduction to the International Maritime Dangerous Goods Code (the IMDG Code) for a definition of the term “limited quantities”.

**TABLE 54.1 – APPLICATION OF THE REQUIREMENTS TO DIFFERENT MODES OF CARRIAGE OF DANGEROUS GOODS IN SHIPS AND CARGO SPACES**

Wherever “x” appears in table 54.1 it means that this requirement is applicable to all classes of dangerous goods as given in the appropriate line of table 54.3, except as indicated by the notes.

Regulation 54.1.2 Regulation 54.2	.1 Not specifically designed	.2 Container cargo spaces	.3			.4 Solid dangerous goods in bulk	.5 Shipborne barges
			Closed ro/ro cargo spaces	Open ro/ro cargo spaces	Weather decks		
.1.1	x	x	x	x	x	For application of requirements of Regulation 54 to different classes of dangerous goods – see Table 54.2	x
.1.2	x	x	x	x	x		–
.1.3	x	x	x	x	–		x
.1.4	x	x	x	x	–		x
.2	x	x	x	x	–		x <sup>d/</sup>
.3	x	x	x	–	–		x <sup>d/</sup>
.4.1	x	x <sup>a/</sup>	x	–	–		x <sup>d/</sup>
.4.2	x	x <sup>a/</sup>	x	–	–		x <sup>d/</sup>
.5	x	x	x	–	–		–
.6.1	x	x	x	x	x		–
.6.2	x	x	x	x	x		–
.7	x	–	–	x	x		–
.8	x	x <sup>b/</sup>	x	x	x		–
.9	–	–	x <sup>c/</sup>	x	–		–

*Notes*

<sup>a</sup> For classes 4 and 5.1 not applicable to closed freight containers.

For classes 2, 3, 6.1 and 8 when carried in closed freight containers the ventilation rate may be reduced to not less than two air changes. For the purpose of this requirement a portable tank is a closed freight container.

<sup>b</sup> Applicable to decks only.

<sup>c</sup> Applies only to closed ro/ro cargo spaces, not capable of being sealed.

<sup>d</sup> In the special case where the barges are capable of containing flammable vapours or alternatively if they are capable of discharging flammable vapours to a safe space outside the barge carrier compartment by means of ventilation ducts connected to the barges, these requirements may be reduced or waived to the satisfaction of the Administration.

**TABLE 54.2 – APPLICATION OF THE REQUIREMENTS TO DIFFERENT CLASSES OF DANGEROUS GOODS FOR SHIPS AND CARGO SPACES CARRYING SOLID DANGEROUS GOODS IN BULK**

Class – Chapter VII Regulation 54.2	4.1	4.2	4.3 <sup>f/</sup>	5.1	6.1	8	9
.1.1	x	x	–	x	x <sup>g/</sup>	x <sup>g/</sup>	x
.1.2 <sup>e/</sup>	x	x	–	x	–	–	x
.2	x	x <sup>g/</sup>	x	x <sup>g/</sup>	–	–	x <sup>g/</sup>
.4.1 <sup>h/</sup>	x <sup>g/</sup>	x <sup>g/</sup>	x	x <sup>g/</sup>	–	–	x <sup>g/</sup>
.4.2 <sup>h/</sup>	x	x <sup>g/</sup>	x	x <sup>g/</sup>	–	–	x <sup>g/</sup>
.6	x	x	x	x	x	x	x
.8	x	x	x	x <sup>g/</sup>	x <sup>g/</sup>	x <sup>g/</sup>	x

*Notes*

<sup>e</sup> This requirement is applicable when the characteristics of the substance call for large quantities of water for fire fighting.

<sup>f</sup> The hazards of substances in this class which may be carried in bulk are such that special consideration must be given by the Administration to the construction and equipment of the ships involved in addition to [meeting the requirements] enumerated in this table.

<sup>g</sup> Reference is made to the International Maritime Dangerous Goods Code (resolution A.81(1V) as amended) or the Code of Safe Practice for Solid Bulk Cargoes (resolution A.434(XI) as amended), as appropriate.

<sup>h</sup> At least natural ventilation is required in enclosed cargo spaces intended for carriage of solid dangerous goods in bulk. In cases where power ventilation is required in the Code of Safe Practice for Solid Bulk Cargoes (resolution A.434(XI) as amended), the use of portable ventilation units (equipment) to the satisfaction of the Administration may suffice.

**TABLE 54.3 – APPLICATION OF THE REQUIREMENTS TO DIFFERENT CLASSES OF DANGEROUS GOODS EXCEPT SOLID DANGEROUS GOODS IN BULK**

Class – Chapter VII Regulation 54.2	I	2	3	4	5.1	5.2	6.1	8
.1.1	x	x	x	x <sup>p/</sup>	x	x <sup>p/</sup>	x	x
.1.2 <sup>l/</sup>	x	x	x	x <sup>p/</sup>	x	x <sup>p/</sup>	–	–
.1.3	x <sup>k/</sup>	–	–	–	–	–	–	–
.1.4	x <sup>k/</sup>	–	–	–	–	–	–	–
.2	x <sup>k/</sup>	x <sup>l/</sup>	x <sup>m/</sup>	–	–	–	x <sup>m/</sup> x <sup>p/</sup>	x <sup>m/</sup> x <sup>p/</sup>
.3	x	x	x	x	x	–	x	x
.4.1	–	x <sup>j/</sup>	x <sup>m/</sup>	x <sup>p/</sup>	x <sup>p/</sup>	–	x <sup>m/</sup> x <sup>p/</sup>	x <sup>m/</sup> x <sup>p/</sup>
.4.2	–	x <sup>l/</sup>	x <sup>m/</sup>	–	–	–	x <sup>m/</sup> x <sup>p/</sup>	x <sup>m/</sup> x <sup>p/</sup>
.5	–	–	x <sup>m/</sup>	–	–	–	x <sup>n/</sup>	x <sup>m/</sup>
.6	–	x	x	x	x	x <sup>p/</sup>	x	x
.7	–	–	x	x	x	x <sup>p/</sup>	x <sup>p/</sup>	x <sup>p/</sup>
.8	x <sup>k/</sup> x <sup>p/</sup>	x	x	x	x <sup>p/</sup>	–	x <sup>p/</sup>	x <sup>p/</sup>
.9	x	x	x <sup>m/</sup>	x <sup>p/</sup>	x	–	x <sup>m/</sup>	x <sup>m/</sup>

*Notes*

<sup>i</sup> This requirement is applicable when the characteristics of the substance call for large quantities of water for fire fighting.

<sup>j</sup> Applicable to flammable or poisonous gases.

<sup>k</sup> Except goods of class 1 in division 1.4, compatibility group S.

<sup>l</sup> All flammable gases.

<sup>m</sup> All liquids having a flashpoint below 23°C (closed cup test).

<sup>n</sup> Liquids only.

<sup>o</sup> Goods of class 1 shall be stowed 3 m horizontally away from the machinery space boundaries in all cases.

<sup>p</sup> Reference is made to the International Maritime Dangerous Goods Code (resolution A.81(IV) as amended) or the Code of Safe Practice for Solid Bulk Cargoes (resolution A.434(XI) as amended), as appropriate.



and in small areas of larger cargo spaces at the discretion of the Administration. In any event the drainage and pumping arrangements shall be such as to prevent the build-up of free surfaces. If this is not possible the adverse effect upon stability of the added weight and free surface of water shall be taken into account to the extent deemed necessary by the Administration in its approval of the stability information.\*

2.1.4. Provision to flood a designated under deck cargo space with suitable specified media may be substituted for the requirements in paragraph 2.1.3.

## 2.2. Sources of ignition

Electrical equipment and wiring shall not be fitted in enclosed cargo spaces, closed vehicle deck spaces, or open vehicle deck spaces unless it is essential for operational purposes in the opinion of the Administration. However, if electrical equipment is fitted in such spaces, it shall be of a certified safe type\*\* for use in the dangerous environments to which it may be exposed unless it is possible to completely isolate the electrical system (by removal of links in the system, other than fuses). Cable penetrations of the decks and bulkheads shall be sealed against the passage of gas or vapour. Through runs of cables and cables within the cargo spaces shall be protected against damage from impact. Any other equipment which may constitute a source of ignition of flammable vapour shall not be permitted.

## 2.3. Detection system

An approved fire detection and fire alarm system shall be fitted to all enclosed cargo spaces including closed vehicle deck spaces. Where the detection system utilizes samples of atmosphere drawn from such cargo spaces provision shall be made to prevent, in the event of cargo leakage, the discharge of contaminated atmosphere through the sampling system into the space in which the detection apparatus is situated. A notice stating that the samples shall be discharged to the open air when cargoes giving off toxic fumes are being carried shall be permanently exhibited at the equipment.

## 2.4. Ventilation

2.4.1. Adequate power ventilation shall be provided in enclosed cargo spaces. The arrangement shall be such as to provide for at least six air changes per hour in the cargo space based on an empty cargo space and for removal of vapours from the upper or lower parts of the cargo space, as appropriate.

2.4.2. The fans shall be such as to avoid the possibility of ignition of flammable gas air mixtures. Suitable wire mesh guards shall be fitted over inlet and outlet ventilation openings.

## 2.5. Bilge pumping

Where it is intended to carry flammable or toxic liquids in enclosed cargo spaces the bilge pumping system shall be designed to ensure against inadvertent pumping of such liquids through machinery space piping or pumps. Where large quantities of such liquids are carried, consideration shall be given to the provision of additional means of draining those cargo spaces. These means shall be to the satisfaction of the Administration.

## 2.6. Personnel protection

2.6.1. Four sets of full protective clothing resistant to chemical attack shall be provided in addition to the fireman's outfits required by regulation 17. The protective clothing shall cover all skin, so that no part of the body is unprotected.

2.6.2. At least two self-contained breathing apparatuses additional to those required by regulation 17 shall be provided.

\* Reference is made to Recommendation on Fixed Fire-Extinguishing Systems for Special Category Spaces, adopted by the Organization by resolution A.123(V).

\*\* Reference is made to Recommendations published by the International Electrotechnical Commission and, in particular, Publication 92—Electrical Installations in Ships.

### 2.7. Portable fire extinguishers

Portable fire extinguishers with a total capacity of at least 12 kg of dry powder or equivalent shall be provided for the cargo spaces. These extinguishers shall be in addition to any portable fire extinguishers required elsewhere in this chapter.

### 2.8. Insulation of machinery space boundaries

Bulkheads forming boundaries between cargo spaces and machinery spaces of category A shall be insulated to "A-60" standard, unless the dangerous goods are stowed at least 3 m horizontally away from such bulkheads. Other boundaries between such spaces shall be insulated to "A-60" standard.

### 2.9. Water spray system

Each open ro/ro cargo space having a deck above it and each space deemed to be a closed ro/ro cargo space not capable of being sealed shall be fitted with an approved fixed pressure water-spraying system for manual operation which shall protect all parts of any deck and vehicle platform in such space, except that the Administration may permit the use of any other fixed fire-extinguishing system that has been shown by full-scale test to be no less effective. In any event the drainage and pumping arrangements shall be such as to prevent the build-up of free surfaces. If this is not possible the adverse effect upon stability of the added weight and free surface of water shall be taken into account to the extent deemed necessary by the Administration in its approval of the stability information.\*

### 3. Document of compliance

The Administration shall provide the ship with an appropriate document as evidence of compliance of construction and equipment with the requirements of this regulation.

## PART D. FIRE SAFETY MEASURES FOR TANKERS

(The requirements of this part are additional to those of part C except for regulations 53 and 54 which do not apply to tankers and except as provided otherwise in regulations 57 and 58.)

### Regulation 55. APPLICATION

1. Unless expressly provided otherwise, this part shall apply to tankers carrying crude oil and petroleum products having a flashpoint not exceeding 60°C (closed cup test), as determined by an approved flashpoint apparatus, and a Reid vapour pressure which is below atmospheric pressure and other liquid products having a similar fire hazard.

2. Where liquid cargoes other than those referred to in paragraph 1 or liquefied gases which introduce additional fire hazards are intended to be carried, additional safety measures shall be required to the satisfaction of the Administration, having due regard to the provisions of the Bulk Chemical Code and the Gas Carrier Code.

3. This paragraph applies to all ships which are combination carriers. Such ships shall not carry solid cargoes unless all cargo tanks are empty of oil and gas freed or unless the arrangements provided in each case are to the satisfaction of the Administration and in accordance with the relevant operational requirements contained in the Guidelines for Inert Gas Systems.\*\*

4. Tankers carrying petroleum products having a flashpoint exceeding 60°C (closed cup test) as determined by an approved flashpoint apparatus shall comply with the provisions of part C, except that in lieu of the fixed fire-extinguishing system required in regulation 53 they shall be fitted with a fixed deck foam system which shall comply with the provisions of regulation 61.

\* Reference is made to Recommendation on Fixed Fire-Extinguishing Systems for Special Category Spaces, adopted by the Organisation by resolution A.123(V).

\*\* Reference is made to Guidelines for Inert Gas Systems, adopted by the Maritime Safety Committee at its forty-second session in May 1980 (MSC/Circ.282).

5. The requirements for inert gas systems of regulation 60 need not be applied to all chemical tankers or gas carriers when carrying cargoes described in paragraph 1, provided that alternative arrangements, to be developed by the Organization, are fitted.\*

6. Chemical tankers and gas carriers shall comply with the requirements of this part, except where alternative and supplementary arrangements are provided to the satisfaction of the Administration, having due regard to the provisions of the Bulk Chemical Code and the Gas Carrier Code.

*Regulation 56. LOCATION AND SEPARATION OF SPACES*

1. Machinery spaces of category A other than such spaces for bow thrusters and their associated equipment shall be positioned aft of cargo tanks and slop tanks; they shall also be situated aft of cargo pump rooms and cofferdams, but not necessarily aft of the oil fuel bunker tanks. Any machinery space of category A shall be isolated from cargo tanks and slop tanks by a cofferdam, a cargo pump room, or an oil fuel bunker tank. However, the lower portion of the pump room may be recessed into machinery spaces of category A to accommodate pumps provided that the deckhead of the recess is in general not more than one third of the moulded depth above the keel except that in the case of ships of not more than 25,000 tonnes deadweight, where it can be demonstrated that for reasons of access and satisfactory piping arrangements this is impracticable, the Administration may permit a recess in excess of such height, but not exceeding one half of the moulded depth above the keel.

2. Accommodation spaces, main cargo control stations, control stations and service spaces (excluding isolated cargo handling gear lockers) shall be positioned aft of all cargo tanks, slop tanks, cargo pump rooms and cofferdams which isolate cargo or slop tanks from machinery spaces of category A. Any common bulkheads separating a cargo pump room, including the cargo pump room entrance, from accommodation and service spaces and control stations shall be constructed to "A-60" standard. Where deemed necessary, accommodation spaces, control stations, machinery spaces other than those of category A, and service spaces may be permitted forward of all cargo tanks, slop tanks, cargo pump rooms and cofferdams subject to an equivalent standard of safety and appropriate availability of fire-extinguishing arrangements being provided to the satisfaction of the Administration.

3. Where the fitting of a navigation position above the cargo tank area is shown to be necessary it shall be for navigation purposes only and it shall be separated from the cargo tank deck by means of an open space with a height of at least 2 m. The fire protection of such navigation position shall in addition be as required for control spaces as set forth in regulation 58.1 and 58.2 and other provisions, as applicable, of this part.

4. Means shall be provided to keep deck spills away from the accommodation and service areas. This may be accomplished by provision of a permanent continuous coaming of a suitable height extending from side to side. Special consideration shall be given to the arrangements associated with stern loading.

5. Exterior boundaries of superstructures and deckhouses enclosing accommodation and service spaces and including any overhanging decks which support such accommodation, shall be insulated to "A-60" standard for the whole of the portions which face cargo oil tanks and for 3 m aft of the front boundary. In the case of the sides of these superstructures and deckhouses, such insulation shall be carried as high as is deemed necessary by the Administration.

6.1. Entrances, air inlets and openings to accommodation spaces, service spaces and control stations shall not face the cargo area. They shall be located on the end bulkhead not

\* Reference is made to Interim Regulation for Inert Gas Systems on Chemical Tankers Carrying Petroleum Products, adopted by the Organization by resolution A.473(XII).

facing the cargo area and/or on the outboard side of the superstructure or deckhouse at a distance of at least [4] per cent of the length of the ship but not less than 3 m from the end of the superstructure or deckhouse facing the cargo area. This distance, however, need not exceed 5 m.

6.2. No doors shall be permitted within the limits mentioned in paragraph 6.1, except that doors to those spaces not having access to accommodation spaces, service spaces and control stations, such as cargo control stations, provision rooms and store-rooms may be permitted by the Administration. Where such doors are fitted, the boundaries of the space shall be insulated to "A-60" standard. Bolted plates for removal of machinery may be fitted within the limits specified in paragraph 6.1. [Wheelhouse] doors and wheelhouse windows may be located within the limits specified in paragraph 6.1 so long as they are so designed that a rapid and efficient gas and vapour tightening of the [wheelhouse] can be ensured.

6.3. Port lights facing the cargo area and on the sides of the superstructures and deckhouses within the limits specified in paragraph 6.1 shall be of the fixed (non-opening) type. Such port lights in the first tier on the main deck shall be fitted with inside covers of steel or other equivalent material.

**Regulation 57. STRUCTURE, BULKHEADS WITHIN ACCOMMODATION AND SERVICE SPACES AND DETAILS OF CONSTRUCTION**

1. For the application of the requirements of regulations 42, 43 and 50 to tankers, only method IC as defined in regulation 42.5.1 shall be used.

2. Skylights to cargo pump rooms shall be of steel, shall not contain any glass and shall be capable of being closed from outside the pump room.

**Regulation 58. FIRE INTEGRITY OF BULKHEADS AND DECKS**

1. In lieu of regulation 44 and in addition to complying with the specific provisions for fire integrity of bulkheads and decks mentioned elsewhere in this part the minimum fire integrity of bulkheads and decks shall be as prescribed in tables 58.1 and 58.2.

2. The following requirements shall govern application of the tables:

1. Tables 58.1 and 58.2 shall apply respectively to the bulkhead and decks separating adjacent spaces.
2. For determining the appropriate fire integrity standards to be applied to divisions between adjacent spaces, such spaces are classified according to their fire risk as shown in categories (1) to (10) below. The title of each category is intended to be typical rather than restrictive. The number in parentheses preceding each category refers to the applicable column or row in the tables.
  - (1) Control stations
    - Spaces containing emergency sources of power and lighting.
    - Wheelhouse and chartroom.
    - Spaces containing the ship's radio equipment.
    - Fire-extinguishing rooms, fire control rooms and fire-recording stations.
    - Control room for propulsion machinery when located outside the machinery space.
    - Spaces containing centralized fire alarm equipment.
  - (2) Corridors
    - Corridors and lobbies.
  - (3) Accommodation spaces
    - Spaces as defined in regulation 3.10, excluding corridors.

**TABLE 58.1 – FIRE INTEGRITY OF BULKHEADS SEPARATING ADJACENT SPACES**

Spaces	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Control stations (1)	A-0 <sup>a</sup> /	A-0	A-60	A-0	A-15	A-60	A-15	A-60	A-60	*
Corridors (2)		C	B-0	B-0 A-0 <sup>a</sup> / <sub>2</sub> /	B-0	A-60	A-0	A-60	A-0	*
Accommodation spaces (3)			C	B-0 A-0 <sup>a</sup> / <sub>2</sub> /	B-0	A-60	A-0	A-60	A-0	*
Stairways (4)				B-0 A-0 <sup>a</sup> / <sub>2</sub> /	B-0 A-0 <sup>a</sup> / <sub>2</sub> /	A-60	A-0	A-60	A-0	*
Service spaces (low risk) (5)					C	A-60	A-0	A-60	A-0	*
Machinery spaces of category A (6)						*	A-0	A-0 <sup>b</sup> / <sub>2</sub> /	A-60	*
Other machinery spaces (7)							A-0 <sup>b</sup> / <sub>2</sub> /	A-0	A-0	*
Cargo pump rooms (8)								*	A-60	*
Service spaces (high risk) (9)									A-0 <sup>b</sup> / <sub>2</sub> /	*
Open decks (10)										—

Notes: To be applied to tables 58.1 and 58.2, as appropriate.

<sup>a</sup> For clarification as to which applies, see Regulations 43 and 46 of this Chapter.

<sup>b</sup> Where spaces are of the same numerical category and superscript [b] appears, a bulkhead or deck of the rating shown in the tables is only required when the adjacent spaces are for a different purpose, e.g. in category (9). A galley next to a galley does not require a bulkhead but a galley next to a paint room requires an "A-0" bulkhead.

<sup>c</sup> Bulkheads separating the wheelhouse, chartroom and radio room from each other may be "B-0" rating.

<sup>d</sup> Bulkheads and decks between cargo pump rooms and machinery spaces of category A may be penetrated by cargo pump shaft glands and similar glanded penetrations, provided that gastight seals with efficient lubrication or other means of ensuring the permanence of the gas seal are fitted in way of the bulkhead or deck.

<sup>e</sup> Fire insulation need not be fitted if the machinery space in category (7), in the opinion of the Administration, has little or no fire risk.

\* Where an asterisk appears in the tables, the division is required to be of steel or other equivalent material but is not required to be of "A" class standard.



**TABLE 58.2 – FIRE INTEGRITY OF DECKS SEPARATING ADJACENT SPACES**

Space below ↓	Space above →	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Control stations	(1)	A-0	A-0	A-0	A-0	A-0	A-60	A-0	–	A-0	*
Corridors	(2)	A-0	*	*	A-0	*	A-60	A-0	–	A-0	*
Accommodation spaces	(3)	A-60	A-0	*	A-0	*	A-60	A-0	–	A-0	*
Stairways	(4)	A-0	A-0	A-0	*	A-0	A-60	A-0	–	A-0	*
Service spaces (low risk)	(5)	A-15	A-0	A-0	A-0	*	A-60	A-0	–	A-0	*
Machinery spaces of category A	(6)	A-60	A-60	A-60	A-60	A-60	*	A-60 <sub>e/</sub>	A-0	A-60	*
Other machinery spaces	(7)	A-15	A-0	A-0	A-0	A-0	A-0	*	A-0	A-0	*
Cargo pump rooms	(8)	–	–	–	–	–	A-0 <sub>d/</sub>	A-0	*	–	*
Service spaces (high risk)	(9)	A-60	A-0	A-0	A-0	A-0	A-60	A-0	–	A-0 <sub>b/</sub>	*
Open decks	(10)	*	*	*	*	*	*	*	*	*	–

**(4) Stairways**

- Interior stairways, lifts and escalators (other than those wholly contained within the machinery spaces) and enclosures thereto.
- In this connexion, a stairway which is enclosed only at one level shall be regarded as part of the space from which it is not separated by a fire door.

**(5) Service spaces (low risk)**

- Lockers and store-rooms having areas of less than 2 m<sup>2</sup>, drying rooms and laundries.

**(6) Machinery spaces of category A**

- Spaces as defined in regulation 3.19.

**(7) Other machinery spaces**

- Spaces as defined in regulation 3.20 excluding machinery spaces of category A.

**(8) Cargo pump rooms**

- Spaces containing cargo pumps and entrances and trunks to such spaces.

**(9) Service spaces (high risk)**

- Galleys, pantries containing cooking appliances, paint and lamp rooms, lockers and store-rooms having an area of 2 m<sup>2</sup> or more, workshops other than those forming part of the machinery spaces.



## (10) Open decks

- Open deck spaces and enclosed promenades having no fire risk. Air spaces (the space outside superstructures and deckhouses).

3. Continuous “B” class ceilings or linings, in association with the relevant decks or bulkheads, may be accepted as contributing, wholly or in part, to the required insulation and integrity of a division.

4. External boundaries which are required in regulation 57.1 to be of steel or other equivalent material may be pierced for the fitting of windows and sidescuttles provided that there is no requirement for such boundaries to have “A” class integrity elsewhere in [this part]. Similarly, in such boundaries which are not required to have “A” class integrity, doors may be of materials to the satisfaction of the Administration.

5. Permanent approved gastight lighting enclosures for illuminating cargo pump rooms may be permitted in bulkheads and decks separating car rooms and other spaces provided they are of adequate strength and the integrity and gastightness of the bulkhead or deck is maintained.

*Regulation 59. VENTING, PURGING, GAS FREEING AND VENTILATION*

1. *Cargo tank venting*

1.1. The venting systems of cargo tanks are to be entirely distinct from the air pipes of the other compartments of the ship. The arrangements and position of openings in the cargo tank deck from which emission of flammable vapours can occur shall be such as to minimize the possibility of flammable vapours being admitted to enclosed spaces containing a source of ignition, or collecting in the vicinity of deck machinery and equipment which may constitute an ignition hazard. In accordance with this general principle the criteria in paragraphs 1.2 to 1.10 will apply.

1.2. The venting arrangements shall be so designed and operated as to ensure that neither pressure nor vacuum in cargo tanks shall exceed design parameters and be such as to provide for:

1. The flow of the small volumes of vapour, air or inert gas mixtures caused by thermal variations in a cargo tank in all cases through pressure/vacuum valves; and
2. The passage of large volumes of vapour, air or inert gas mixtures during cargo loading and ballasting, or during discharging.

1.3.1. The venting arrangements in each cargo tank may be independent or combined with other cargo tanks and may be incorporated into the inert gas piping.

1.3.2. Where the arrangements are combined with other cargo tanks either stop valves or other acceptable means shall be provided to isolate each cargo tank. Where stop valves are fitted, they shall be provided with locking arrangements which shall be under the control of the responsible ship’s officer. Any isolation must continue to permit the flow caused by thermal variations in a cargo tank in accordance with paragraph 1.2.1.

1.4. The venting arrangements shall be connected to the top of each cargo tank and shall be self-draining to the cargo tanks under all normal conditions of trim and list of the ship. Where it may not be possible to provide self-draining lines permanent arrangements shall be provided to drain the vent lines to a cargo tank.

1.5. The venting system shall be provided with devices to prevent the passage of flame into the cargo tanks. The design, testing and locating of these devices shall comply with the requirements established by the Administration which shall contain at least the standards adopted by the Organization.

1.6. Provision shall be made to guard against liquid rising in the venting system to a height which would exceed the design head of cargo tanks. This shall be accomplished by high level alarms or overflow control systems or other equivalent means, together with gauging devices and cargo tank filling procedures.

1.7. Openings for pressure release required by paragraph 1.2.1 shall:

1. Have as great a height as is practicable above the cargo tank deck to obtain maximum dispersal of flammable vapours but in no case less than 2 m above the cargo tank deck;
2. Be arranged at the furthest distance practicable but not less than 5 m from the nearest air intakes and openings to enclosed spaces containing a source of ignition and from deck machinery and equipment which may constitute an ignition hazard.

1.8. Pressure/vacuum valves required by paragraph 1.2.1 may be provided with a by-pass arrangement when they are located in a vent main or masthead riser. Where such an arrangement is provided there shall be suitable indicators to show whether the by-pass is open or closed.

1.9. Vent outlets for cargo loading, discharging and ballasting required by paragraph 1.2.2 shall:

- 1.1. Permit the free flow of vapour mixtures; or
- 1.2. Permit the throttling of the discharge of the vapour mixtures to achieve a velocity of not less than 30 m/sec;
2. Be so arranged that the vapour mixture is discharged vertically upwards;
3. Where the method is by free flow of vapour mixtures, be such that the outlet shall be not less than 6 m above the cargo tank deck or fore and aft gangway if situated within 4 m of the gangway and located not less than 10 m measured horizontally from the nearest air intakes and openings to enclosed spaces containing a source of ignition and from deck machinery and equipment which may constitute an ignition hazard;
4. Where the method is by high velocity discharge, be located at a height not less than 2 m above the cargo tank deck and not less than 10 m measured horizontally from the nearest air intakes and openings to enclosed spaces containing a source of ignition and from deck machinery and equipment which may constitute an ignition hazard. These outlets shall be provided with high velocity devices of an approved type;
5. Be designed on the basis of the maximum designed loading rate multiplied by a factor of at least 1.25 to take account of gas evolution, in order to prevent the pressure in any cargo tank from exceeding the design pressure. The master shall be provided with information regarding the maximum permissible loading rate for each cargo tank and in the case of combined venting systems, for each group of cargo tanks.

1.10. In combination carriers, the arrangement to isolate slop tanks containing oil or oil residues from other cargo tanks shall consist of blank flanges which will remain in position at all times when cargoes other than liquid cargoes referred to in regulation 55.1 are carried.

#### 2. *Cargo tank purging and/or gas freeing*

Arrangements for purging and/or gas freeing shall be such as to minimize the hazards due to the dispersal of flammable vapours in the atmosphere and to flammable mixture in a cargo tank. Accordingly:

1. When the ship is provided with an inert gas system the cargo tanks shall first be purged in accordance with the provisions of regulation 62.13 until the concentration of hydrocarbon vapours in the cargo tanks has been reduced to less than 2 per cent by volume. Thereafter, venting may be at the cargo tank deck level.
2. When the ship is not provided with an inert gas system, the operation shall be such that the flammable vapour is initially discharged:
  - 2.1. Through the vent outlets as specified in paragraph 1.9; or
  - 2.2. With a vertical exit velocity of at least 20 m/sec through outlets at least 2 m above the cargo tank deck level and which are protected by suitable devices to prevent the passage of flame.

When the flammable [vapour] concentration in the outlet has been reduced to 30 per cent of the lower flammable limit the discharge of the [vapour] mixture may be at the cargo tank deck level.

### 3. Ventilation

3.1. Cargo pump rooms shall be mechanically ventilated and discharges from the exhaust fans shall be led to a safe place on the open deck. The ventilation of these rooms shall have sufficient capacity to minimize the possibility of accumulation of flammable vapours. The number of changes of air shall be at least 20 per hour, based upon the gross volume of the space. The air ducts shall be arranged so that all of the space is effectively ventilated. The ventilation shall be of the suction type using fans of the non-sparking type.

3.2. The arrangement of ventilation inlets and outlets and other deckhouse and superstructure boundary space openings shall be such as to complement the provisions of paragraph 1. Such vents especially for machinery spaces shall be situated as far aft as practicable. Due consideration in this regard should be given when the ship is equipped to load or discharge at the stern. Sources of ignition such as electrical equipment shall be so arranged as to avoid an explosion hazard.

3.3. In combination carriers all cargo spaces and any enclosed spaces adjacent to cargo spaces shall be capable of being mechanically ventilated. The mechanical ventilation may be provided by portable fans. An approved fixed gas warning system capable of monitoring flammable vapours shall be provided in cargo pump rooms and pipe ducts and cofferdams referred to in regulation 56.1 adjacent to slop tanks. Suitable arrangements shall be made to facilitate measurement of flammable vapours in all other spaces within the cargo [ ] area. Such measurements shall be made possible from open deck or easily accessible positions.

#### *Regulation 60. CARGO TANK PROTECTION*

1. For tankers of 20,000 tonnes deadweight and upwards the protection of the cargo tanks deck area and cargo tanks shall be achieved by a fixed deck foam system and a fixed inert gas system in accordance with the requirements of regulations 61 and 62, except that, in lieu of the above installations, the Administration, after having given consideration to the ship's arrangement and equipment, may accept other combinations of fixed installations if they afford protection equivalent to the above, in accordance with regulation 1/5.

2. To be considered equivalent, the system proposed in lieu of the deck foam system shall:

1. Be capable of extinguishing spill fires and also preclude ignition of spilled oil not yet ignited; and
2. Be capable of combating fires in ruptured tanks.

3. To be considered equivalent, the system proposed in lieu of the fixed inert gas system shall:

1. Be capable of preventing dangerous accumulations of explosive mixtures in intact cargo tanks during normal service throughout the ballast voyage and necessary in-tank operations; and
2. Be so designed as to minimize the risk of ignition from the generation of static electricity by the system itself.

4. Tankers of 20,000 tonnes deadweight and upwards constructed before 1 September 1984 which are engaged in the trade of carrying crude oil shall be fitted with an inert gas system, complying with the requirements of paragraph 1, not later than:

1. For a tanker of 70,000 tonnes deadweight and upwards 1 September 1984 or the date of delivery of the ship, whichever occurs later; and
2. For a tanker of less than 70,000 tonnes deadweight 1 May 1985 or the date of delivery of the ship, whichever occurs later except that for tankers of less than 40,000 tonnes

deadweight not fitted with tank washing machines having an individual throughput of greater than 60 m<sup>3</sup>/hour the Administration may exempt such tankers from the requirements of this paragraph, if it would be unreasonable and impracticable to apply these requirements, taking into account the ship's design characteristics.

5. Tankers of 40,000 tonnes deadweight and upwards constructed before 1 September 1984 which are engaged in the trade of carrying oil other than crude oil and any such tanker of 20,000 tonnes deadweight and upwards engaged in the trade of carrying oil other than crude oil fitted with tank washing machines having an individual throughput of greater than 60 m<sup>3</sup>/hour shall be fitted with an inert gas system, complying with the requirements of paragraph 1, not later than:

1. For a tanker of 70,000 tonnes deadweight and upwards 1 September 1984 or the date of delivery of the ship, whichever occurs later; and
2. For a tanker of less than 70,000 tonnes deadweight 1 May 1985 or the date of delivery of the ship, whichever occurs later.

6. All tankers operating with a cargo tank cleaning procedure using crude oil washing shall be fitted with an inert gas system complying with the requirements of regulation 62 and with fixed tank washing machines.

7. All tankers fitted with a fixed inert gas system shall be provided with a closed ullage system.

8. Tankers of less than 20,000 tonnes deadweight shall be provided with a deck foam system complying with the requirements of regulation 61.

#### *Regulation 61. FIXED DECK FOAM SYSTEMS*

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

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

1. 0.6 l/minute 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/minute per square metre of the horizontal sectional area of the single tank having the largest such area; or
3. 3 l/minute 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/minute.

4. Sufficient foam concentrate shall be supplied to ensure at least 20 minutes of foam generation in tankers fitted with an inert gas installation or 30 minutes of foam generation in tankers not fitted with an inert gas installation when using solution rates stipulated in paragraphs 3.1, 3.2 or 3.3, 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 at 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.

5. Foam from the fixed foam system shall be supplied by means of monitors and foam applicators. At least 50 per cent of the foam solution supply rate required in paragraphs 3.1 and 3.2 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 per cent of the foam solution supply rate required in paragraphs 3.1 or 3.2.

6.1. The number and position of monitors shall be such as to comply with paragraph 1. The capacity of any monitor shall be at least 3 l/minute 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/minute.

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

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

8. Applicators shall be provided to ensure flexibility of action during fire-fighting operations and to cover areas screened from the monitors. The capacity of any applicator shall be not less than 400 l/minute and the applicator throw in still air conditions shall be not less than 15 m. 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.

9. 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.

10. 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.

#### *Regulation 62. INERT GAS SYSTEMS*

1. The inert gas system referred to in regulation 60 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 impractical to effect a repair, then cargo discharge, deballasting and necessary tank cleaning shall only be resumed when the "emergency conditions" laid down in the Guidelines on Inert Gas Systems\*\* are complied with.

2. 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 per cent 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;
4. Purging empty cargo tanks of hydrocarbon gas, so that subsequent gas freeing operations will at no time create a flammable atmosphere within the tank.

\* Throughout this regulation the term "cargo tank" includes also "slop tanks".

\*\* Reference is made to Guidelines for Inert Gas Systems, adopted by the Maritime Safety Committee at its forty-second session in May 1980 (MSC/Circ.282).

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

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

4. 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 should, as far as practicable, comply with the requirements of this regulation. 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.

5. 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 gastight 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.

6.1. A flue gas scrubber shall be fitted which will effectively cool the volume of gas specified in paragraph 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.

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

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

7.1. At least two blowers shall be fitted which together shall be capable of delivering to the cargo tanks at least the volume of gas required by paragraph 3. In the system with gas generator the Administration may permit only one blower if that system is capable of delivering the total volume of gas required by paragraph 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.

7.2. 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.

7.3. 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 shut-off arrangements shall be provided on the suction and discharge connexions 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.

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

8.1. 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.

8.2. 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.



9.1. A gas regulating valve shall be fitted in the inert gas supply main. This valve shall be automatically controlled to close as required in paragraphs [19.3] and [19.4]. 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 7.

9.2. The valve referred to in paragraph 9.1 shall be located at the forward bulkhead of the forwardmost gas safe space\* through which the inert gas supply main passes.

10.1. 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 9.1 and the aftermost connexion to any cargo tank or cargo pipeline.

10.2. The devices referred to in paragraph 10.1 shall be located in the cargo [ ] area on deck.

10.3. The water seal referred to in paragraph 10.1 shall be capable of being supplied by two separate pumps, each of which shall be capable of maintaining an adequate supply at all times.

10.4. 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.

10.5. 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.

10.6. 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.

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

10.8. 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 10.1. 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.

10.9. 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 10.8 and the valve referred to in paragraph 9 to be vented in a safe manner when the first of these valves is closed.

11.1. The inert gas main may be divided into two or more branches forward of the non-return devices required by paragraph 10.

11.2.1. The inert gas supply mains 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.

11.2.2. 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.

11.3. 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.

\* Gas safe space is a space in which the entry of hydrocarbon gases would produce hazards with regard to flammability or toxicity.

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

11.5. Suitable arrangements shall be provided to enable the inert gas main to be connected to an external supply of inert gas.

12. The arrangements for the venting of all vapours displaced from the cargo tanks during loading and ballasting shall comply with regulation 59.1 and shall consist of either one or more mast risers, or a number of high velocity vents. The inert gas supply mains may be used for such venting.

13. The arrangements for inerting, purging or gas freeing of empty tanks as required in paragraph 2 shall be to the satisfaction of the Administration and shall be such that the accumulation of hydrocarbon vapours in pockets formed by the internal structural members in a tank is minimized and that:

1. On individual cargo tanks the gas outlet pipe, if fitted, shall be positioned as far as practicable from the inert gas/air inlet and in accordance with regulation 59.1. The inlet of such outlet pipes may be located either at deck level or at not more than 1 m above the bottom of the tank;
2. The cross sectional area of such gas outlet pipe referred to in paragraph 13.1 shall be such that an exit velocity of at least 20 m/sec can be maintained when any three tanks are being simultaneously supplied with inert gas. Their outlets shall extend not less than 2 m above deck level;
3. Each gas outlet referred to in paragraph 13.2 shall be fitted with suitable blanking arrangements;
  - 4.1. If a connexion is fitted between the inert gas supply mains 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 shut-off 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;
  - 4.2. 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.

14.1. One or more pressure-vacuum breaking devices shall be provided on the inert gas supply main to prevent the cargo tanks from being subject to:

1. A positive pressure in excess of the test pressure of the cargo tank if the cargo were to be loaded at the maximum specified rate and all other outlets were left shut; or
2. A negative pressure in excess of 700 mm water gauge if cargo were to be discharged at the maximum rated capacity of the cargo pumps and the inert gas blowers were to fail.

14.2. The location and design of the devices referred to in paragraph 14.1 shall be in accordance with regulation 59.1.

15. 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.

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

1. The pressure of the inert gas supply mains forward of the non-return devices required by paragraph 10.1; and
2. The oxygen content of the inert gas in the inert gas supply mains on the discharge side of the gas blowers.

16.2. The devices referred to in paragraph 16.1 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.

**16.3.** In addition, meters shall be fitted:

1. In the navigating bridge to indicate at all times the pressure referred to in paragraph 16.1.1 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 16.1.2.

17. 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.

18. Suitable means shall be provided for the zero and span calibration of both fixed and portable gas concentration measurement instruments, referred to in paragraphs 16 and 17.

19.1. 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 6.1;
2. High water level in the flue gas scrubber as referred to in paragraph 6.1;
3. High gas temperature as referred to in paragraph 15;
4. Failure of the inert gas blowers referred to in paragraph 7;
5. Oxygen content in excess of 8 per cent by volume as referred to in paragraph 16.1.2;
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 9 and 16.1;
7. Low water level in the water seal as referred to in paragraph 10.1;
8. Gas pressure less than 100 mm water gauge as referred to in paragraph 16.1.1. 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 16.1.1.

19.2. In the system with gas generators audible and visual alarms shall be provided in accordance with 19.1.1, 19.1.3, 19.1.5 to 19.1.9 and additional alarms to indicate:

1. Insufficient fuel oil supply;
2. Failure of the power supply to the generator;
3. Failure of the power supply to the automatic control system for the generator.

19.3. Automatic shut-down of the inert gas blowers and gas regulating valve shall be arranged on predetermined limits being reached in respect of paragraphs 19.1.1, 19.1.2 and 19.1.3.

19.4. Automatic shut-down of the gas regulating valve shall be arranged in respect of paragraph 19.1.4.

19.5. In respect of paragraph 19.1.5, when the oxygen content of the inert gas exceeds 8 per cent 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 in to the tanks and the isolation valve referred to in paragraph 10.8 shall be closed.

19.6. The alarms required in paragraphs 19.1.5, 19.1.6 and 19.1.8 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.

19.7. In respect of paragraph 19.1.7 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.

19.8. An audible alarm system independent of that required in paragraph 19.1.8 or automatic shut-down of cargo pumps shall be provided to operate on predetermined limits of low pressure in the inert gas mains being reached.

20. Tankers constructed before 1 September 1984 which are required to have an inert gas system shall at least comply with the requirements of regulation 62 of chapter II-2 of the International Convention for the Safety of Life at Sea, 1974.\* In addition they shall comply with the requirements of this regulation, except that:

1. Inert gas systems fitted on board such tankers before 1 June 1981 need not comply with the following paragraphs: 3.2, 6.3, 7.4, 8, 9.2, 10.2, 10.7, 10.9, 11.3, 11.4, [12, 13.1,] 13.2, 13.4.2 [, 14.2] and 19.8;
2. Inert gas systems fitted on board such tankers on or after 1 June 1981 need not comply with the following paragraphs: 3.2, 6.3, 7.4 [12, 13.1, 13.2 and 14.2.]

21. 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.

#### *Regulation 63. CARGO PUMP ROOMS*

1. Each cargo pump room shall be provided with one of the following fixed fire extinguishing systems operated from a readily accessible position outside the pump room. Cargo pump rooms should be provided with a system suitable for machinery spaces of category A.

1.1. Either a carbon dioxide or a halogenated hydrocarbon system complying with the provisions of regulation 5 and with the following:

1. The alarms referred to in regulation 5.1.6 shall be safe for use in a flammable cargo vapour/air mixture;
2. A notice shall be exhibited at the controls stating that due to the electrostatic ignition hazard, the system is to be used only for fire extinguishing and not for inerting purposes.

1.2. A high expansion foam system complying with the provisions of regulation 9, provided that the foam concentrate supply is suitable for extinguishing fires involving the cargoes carried.

1.3. A fixed pressure water-spraying system complying with the provisions of regulation 10.

2. Where the extinguishing medium used in the cargo pump room system is also used in systems serving other spaces, the quantity of medium provided or its delivery rate need not be more than the maximum required for the largest compartment.

### CHAPTER III. LIFE-SAVING APPLIANCES, ETC.

#### *Regulation 1. APPLICATION*

The existing text of sub-paragraph (c)(iii)(2) is replaced by the following:

- (2) Regulations II-2/28.1.5 and II-2/28.1.6; and

#### *Regulation 27. LIFEBOATS, LIFERAFTS AND BUOYANT APPARATUS*

In sub-paragraph (c)(iii), reference to "paragraph (d) of regulation 1 of chapter II-1" is amended to read: regulation II-1/1.5

In sub-paragraph (c)(vii), the reference to "paragraph (d) of regulation 1 of chapter II-1" is amended to read: regulation II-1/1.5

\* The text as adopted by the International Conference on Safety of Life at Sea, 1974.

\*\* Reference is made to Guidelines for Inert Gas Systems, adopted by the Maritime Safety Committee at its forty-second session in May 1980 (MSC/Circ.282).

**Regulation 30. LIGHTING FOR DECK, LIFEBOATS, LIFERAFTS, ETC.**

In paragraph (a), the reference to “regulation 25 of chapter II-1” is amended to read: regulation II-1/42

**Regulation 38. EMERGENCY LIGHTING**

The reference to “regulation 26 of chapter II-1” is amended to read: regulation II-1/43

**CHAPTER IV. RADIOTELEGRAPHY AND RADIOTELEPHONY**

The following new regulation is added:

**Regulation 4-1. VHF RADIOTELEPHONE INSTALLATION**

(a) Passenger ships irrespective of size and cargo ships of 300 tons gross tonnage and upwards shall be fitted with a VHF radiotelephone installation complying with the provisions of regulation 17.

(b) The provisions of regulation 17 shall also apply for VHF radiotelephone installations required by a Contracting Government for all ships to which chapter V applies navigating in an area under its jurisdiction and for which a VHF radiotelephone installation is not made compulsory by paragraph (a).

The existing text of regulation 7 is replaced by the following:

**Regulation 7. WATCHES — RADIOTELEPHONE**

(a) Each ship which is fitted with a radiotelephone station in accordance with regulation 4 shall, for safety purposes while at sea, maintain continuous watch on the radiotelephone distress frequency in the place on board from which the ship is usually navigated, by use of a radiotelephone distress frequency watch receiver, using a loudspeaker, a filtered loudspeaker or radiotelephone auto alarm.

(b) Each ship referred to in paragraph (a) shall carry qualified radiotelephone operators (who may be the master, an officer or a member of the crew) as follows:

- (i) If of 300 tons gross tonnage and upwards but less than 500 tons gross tonnage, at least one operator;
- (ii) If of 500 tons gross tonnage and upwards but less than 1,600 tons gross tonnage, at least two operators. If such a ship carries one radiotelephone operator exclusively employed for duties related to radiotelephony, a second operator is not obligatory.

(c) Each ship which in accordance with regulation 3 or regulation 4 is fitted with a radiotelegraph station shall, while at sea, maintain continuous watch on the radiotelephone distress frequency in a place to be determined by the Administration, by use of a radiotelephone distress frequency watch receiver, using a loudspeaker, a filtered loudspeaker or radiotelephone auto alarm.

The existing text of regulation 8 is replaced by the following:

**Regulation 8. WATCHES — VHF RADIOTELEPHONE**

Each ship which is fitted with a VHF radiotelephone installation in accordance with regulation 4-1 shall at sea maintain a continuous listening watch on the navigating bridge:

- (i) On 156.8 MHz (channel 16) when practicable; and/or
- (ii) For such periods and on such channels as may be required by the Contracting Government referred to in regulation 4-1(b).



**Regulation 10. RADIOTELEGRAPH INSTALLATIONS**

The existing text of paragraph (g) is replaced by the following:

(g-1) The main and reserve transmitters shall, when connected to the main antenna, have a minimum normal range as specified below, that is to say, they must be capable of transmitting clearly perceptible signals from ship to ship by day and under normal conditions and circumstances over the specified type ranges.\* (Clearly perceptible signals will normally be received if the R.M.S. value of the field strength at the receiver is at least 50 microvolts per metre.)

	Minimum normal range in miles	
	Main transmitter	Reserve transmitter
All passenger ships and cargo ships of 1,600 tons gross tonnage and upwards	150	100
Cargo ships below 1,600 tons gross tonnage	100	75

(g-2) The radiotelegraph installation shall include facilities for radiotelephone transmission and reception on the radiotelephone distress frequency. This requirement may be fulfilled by including such facilities in the main or reserve installation or other installed equipment. The transmitter power and receiver sensitivity of the radiotelephony part of the installation shall comply with regulation 16(c)(i) and (j) respectively if that part is fitted after 1 September 1986.

\* In the absence of a direct measurement of the field strength the following data may be used as a guide for approximately determining the normal range:

A. In the case of antennae other than self-supporting types:

Normal range in miles	Metre-amperes <sup>1</sup>
200	128
175	102
150	76
125	58
100	45
75	34

<sup>1</sup> The product of the distance (in metres) from the highest part of the antenna to the deepest load water-line and the antenna current (in amperes).

The values given in the second column of the table correspond to an average value of the ratio

$$\frac{\text{effective antenna height}}{\text{maximum antenna height}} = 0.47$$

This ratio varies with local conditions of the antenna and may vary between about 0.3 and 0.7.

B. In the case of self-supporting transmitting antennae:

Normal range in miles	Metre-amperes <sup>2</sup>
200	305
175	215
150	150
125	110
100	85
75	55

<sup>2</sup> The product of the distance (in metres) from the highest part of the antenna to the deepest load water-line and the current (in amperes) measured at the base of the radiating portion of the antenna. The values given in the second column are based on the propagation curves given in CCIR Recommendation 368-2 and also the method, experimental results and calculation in CCIR Report 502-1 and Opinion 43-1. The necessary value of metre-amperes varies considerably with local conditions of the antenna.



For installations fitted prior to that date, such transmitter power and receiver sensitivity shall be as determined by the Administration. The location and other conditions of the radiotelephony facilities required by this regulation shall be as determined by the Administration, except when they form part of the main or reserve radiotelegraph installation.

The existing text of sub-paragraph (h)(iv) is replaced by the following:

(h)(iv)(1) The radiotelephone transmitting facility required by paragraph (g-2) shall be fitted with an automatic device for generating the radiotelephone alarm signal, so designed as to prevent actuation by mistake, and complying with the requirements of regulation 16(e). The device shall be capable of being taken out of operation at any time in order to permit the immediate transmission of a distress message. For installations fitted prior to 1 September 1986, the fitting of automatic devices for generating the radiotelephone alarm signal shall be as determined by the Administration.

(2) Arrangements shall be made to check periodically the proper functioning of the automatic device for generating the radiotelephone alarm signal on frequencies other than the radiotelephone distress frequency using a suitable artificial antenna. An exception shall be made for radiotelephone emergency equipment having only the radiotelephone distress frequency in which case a suitable artificial antenna shall be employed.

NOTE: While all reasonable steps shall be taken to maintain the apparatus in an efficient condition, malfunction of the radiotelephone transmitting facilities required by this regulation shall not be considered as making the ship unseaworthy or as a reason for delaying the ship in ports where repair facilities are not readily available.

The existing text of sub-paragraph (l)(ii) is deleted.

The existing text of sub-paragraph (m)(iv) is replaced by the following:

(m)(iv) The VHF installation in accordance with the provisions of regulation 17(c);

#### *Regulation 16. RADIOTELEPHONE INSTALLATIONS*

The existing text of paragraph (b) is amended by deleting A3H, A3A and A3J.

The existing text of paragraph (c) is replaced by the following:

(c)(i) In the case of cargo ships of 300 tons gross tonnage and upwards but less than 1,600 tons gross tonnage the transmitter shall have a minimum normal range of 150 miles, i.e., it shall be capable of transmitting clearly perceptible signals from ship to ship by day and under normal conditions and circumstances over this range.\* (Clearly perceptible signals will normally be received if the R.M.S. value of the field strength produced at the receiver by an unmodulated carrier is at least 25 microvolts per metre for double sideband and single sideband full carrier emissions.)

(ii) In the case of existing installations using double sideband emissions on cargo ships of 300 tons gross tonnage and upwards but less than 500 tons gross tonnage, the transmitter shall have a minimum normal range of at least 75 miles.

The existing text of sub-paragraph (j)(iv) is replaced by:

(iv) The VHF installation in accordance with the provisions of regulation 17(c).

The existing text of regulation 17 is replaced by the following:

#### *Regulation 17. VHF RADIOTELEPHONE INSTALLATION*

(a) The VHF radiotelephone installation shall be in the upper part of the ship complying with the provisions of this regulation and comprising a transmitter and receiver, a source of

\* In the absence of field strength measurements, it may be assumed that this range will be obtained by power in the antenna of 15 watts (unmodulated carrier) with an antenna efficiency of 27 per cent for double sideband emissions or 60 watts peak envelope power for single sideband full carrier emissions when 100 per cent modulated by a single sinusoidal oscillation.

energy capable of actuating them at their rated power levels, and an antenna suitable for efficient radiating and receiving signals at the operating frequencies.

(b) On board passenger ships irrespective of size and cargo ships of 500 tons gross tonnage and upwards it shall be possible to operate the VHF radiotelephone installation from a source of energy which is situated in the upper part of the ship and has sufficient capacity for at least six hours of operation.

(c) The Administration may authorize the use of the reserve source of energy of the radiotelegraph installation or the radiotelephone installation respectively referred to in regulation 10(m) and regulation 16(j) to supply the VHF radiotelephone installation. In this case the reserve source of energy is required to be of a capacity sufficient to operate simultaneously the VHF radiotelephone installation and:

- (i) The reserve radiotelegraph transmitter and receiver for at least six hours unless a switching device is fitted to ensure alternate operation only; or
- (ii) The radiotelephone transmitter and receiver for at least six hours unless a switching device is fitted to ensure alternate operation only.

(d) The VHF radiotelephone installation shall conform to the requirements laid down in the Radio Regulations<sup>1</sup> for equipment used in the VHF maritime mobile radiotelephone service and shall be capable of operation on those channels specified by the Radio Regulations and as may be required by the Contracting Government referred to in regulation 4-1(b).

(e) The Contracting Government referred to in regulation 4-1(b) shall not require the transmitter R.F. carrier power output to be greater than 10 watts. The antenna shall, in so far as is practicable, have an unobstructed view in all directions.\*

(f) Control of the channels required for navigational safety shall be immediately available on the navigating bridge convenient to the conning position and, where necessary, facilities should be available to permit radiocommunications from the wings of the navigating bridge.

#### *Regulation 19. RADIO LOGS*

The following paragraph is added to the existing text and the existing paragraph (c) is re-lettered as paragraph (d):

(c) On each ship fitted with a VHF radiotelephone installation in accordance with regulation 4-1:

- (i) The entries required by the Radio Regulations shall be recorded in the radio log in accordance with the requirements of the Administration;
- (ii) A summary of all communications relating to distress, urgency and safety traffic shall be recorded in the ship's log.

### CHAPTER V. SAFETY OF NAVIGATION

The existing text of regulation 12 is replaced by the following:

#### *Regulation 12. SHIPBORNE NAVIGATIONAL EQUIPMENT*

(a) For the purpose of this regulation, "constructed" in respect of a ship means a stage of construction where:

- (i) The keel is laid; or
- (ii) Construction identifiable with a specific ship begins; or

\* For guidance purposes, it is assumed that each ship is fitted with a vertically polarized unity gain antenna at a nominal height of 9.15 m above water, a transmitter R.F. power output of 10 watts, and a receiver sensitivity of 2 microvolts across the input terminals for 20 dB signal-to-noise ratio.

- (iii) Assembly of that ship has commenced comprising at least 50 tonnes or 1 per cent of the estimated mass of all structural material, whichever is less.
- (b) (i) Ships of 150 tons gross tonnage and upwards shall be fitted with:
- (1) A standard magnetic compass, except as provided in sub-paragraph (iv);
  - (2) A steering magnetic compass, unless heading information provided by the standard compass required under (1) is made available and is clearly readable by the helmsman at the main steering position;
  - (3) Adequate means of communication between the standard compass position and the normal navigation control position to the satisfaction of the Administration; and
  - (4) Means for taking bearings as nearly as practicable over an arc of the horizon of 360°.
- (ii) Each magnetic compass referred to in sub-paragraph (i) shall be properly adjusted and its table or curve of residual deviations shall be available at all times.
- (iii) A spare magnetic compass, interchangeable with the standard compass, shall be carried, unless the steering compass mentioned in sub-paragraph (i)(2) or a gyro compass is fitted.
- (iv) The Administration, if it considers it unreasonable or unnecessary to require a standard magnetic compass, may exempt individual ships or classes of ships from these requirements if the nature of the voyage, the ship's proximity to land or the type of ship does not warrant a standard compass, provided that a suitable steering compass is in all cases carried.
- (c) Ships of less than 150 tons gross tonnage shall, as far as the Administration considers it reasonable and practicable, be fitted with a steering compass and have means for taking bearings.
- (d) Ships of 500 tons gross tonnage and upwards constructed on or after 1 September 1984 shall be fitted with a gyro compass complying with the following requirements:
- (i) The master gyro compass or a gyro repeater shall be clearly readable by the helmsman at the main steering position;
  - (ii) On ships of 1,600 tons gross tonnage and upwards a gyro repeater or gyro repeaters shall be provided and shall be suitably placed for taking bearings as nearly as practicable over an arc of the horizon of 360°.
- (e) Ships of 1,600 tons gross tonnage and upwards, constructed before 1 September 1984 when engaged on international voyages, shall be fitted with a gyro compass complying with the requirements of paragraph (d).
- (f) On ships provided with emergency steering positions, arrangements shall be made to supply heading information to such positions.
- (g) Ships of 500 tons gross tonnage and upwards constructed on or after 1 September 1984 and ships of 1,600 tons gross tonnage and upwards constructed before 1 September 1984 shall be fitted with a radar installation.
- (h) Ships of 10,000 tons gross tonnage and upwards shall be fitted with two radar installations, each capable of being operated independently\* of the other.
- (i) Facilities for plotting radar readings shall be provided on the navigating bridge of ships required by paragraph (g) or (h) to be fitted with a radar installation. In ships of 1,600 tons gross tonnage and upwards constructed on or after 1 September 1984 the plotting facilities shall be at least as effective as a reflection plotter.
- (j) (i) An automatic radar plotting aid shall be fitted on:
- (1) Ships of 10,000 tons gross tonnage and upwards, constructed on or after 1 September 1984;

\* Reference is made to section 4 of the Recommendation on Performance Standards for Radar Equipment, adopted by the Organization by resolution A.477(XII).

- (2) Tankers constructed before 1 September 1984 as follows:
- (aa) If of 40,000 tons gross tonnage and upwards by 1 January 1985;
  - (bb) If of 10,000 tons gross tonnage and upwards but less than 40,000 tons gross tonnage, by 1 January 1986;
- (3) Ships constructed before 1 September 1984 that are not tankers, as follows:
- (aa) If of 40,000 tons gross tonnage and upwards by 1 September 1986;
  - (bb) If of 20,000 tons gross tonnage and upwards, but less than 40,000 tons gross tonnage, by 1 September 1987;
  - (cc) If of 15,000 tons gross tonnage and upwards, but less than 20,000 tons gross tonnage, by 1 September 1988.
- (ii) Automatic radar plotting aids fitted prior to 1 September 1984 which do not fully conform to the performance standards adopted by the Organization may, at the discretion of the Administration, be retained until 1 January 1991.
- (iii) The Administration may exempt ships from the requirements of this paragraph, in cases where it considers it unreasonable or unnecessary for such equipment to be carried, or when the ships will be taken permanently out of service within two years of the appropriate implementation date.
- (k) When engaged on international voyages ships of 1,600 tons gross tonnage and upwards constructed before 25 May 1980 and ships of 500 tons gross tonnage and upwards constructed on or after 25 May 1980 shall be fitted with an echo-sounding device.
- (l) When engaged on international voyages ships of 500 tons gross tonnage and upwards constructed on or after 1 September 1984 shall be fitted with a device to indicate speed and distance. Ships required by paragraph (j) to be fitted with an automatic radar plotting aid shall be fitted with a device to indicate speed and distance through the water.
- (m) Ships of 1,600 tons gross tonnage and upwards constructed before 1 September 1984 and [ ] ships of 500 tons gross tonnage and upwards constructed on or after 1 September 1984 shall be fitted with indicators showing the rudder angle, the rate of revolution of each propeller and in addition, if fitted with variable pitch propellers or lateral thrust propellers, the pitch and operational mode of such propellers. All these indicators shall be readable from the conning position.
- (n) Ships of 100,000 tons gross tonnage and upwards constructed on or after 1 September 1984 shall be fitted with a rate-of-turn indicator.
- (o) Except as provided in regulations I/7(b)(ii), I/8 and I/9, while all reasonable steps shall be taken to maintain the apparatus referred to in paragraphs (d) to (n) in efficient working order, malfunctions of the equipment shall not be considered as making a ship unseaworthy or as a reason for delaying the ship in ports where repair facilities are not readily available.
- (p) When engaged on international voyages ships of 1,600 tons gross tonnage and upwards shall be fitted with a radio direction-finding apparatus complying with the provisions of regulation IV/12(a). The Administration may, in areas where it considers it unreasonable or unnecessary for such apparatus to be carried, exempt any ship of less than 5,000 tons gross tonnage from this requirement, due regard being had to the fact that radio direction-finding apparatus is of value both as a navigational instrument and as an aid to locating ships, aircraft or survival craft.
- (q) When engaged on international voyages ships of 1,600 tons gross tonnage and upwards constructed on or after 25 May 1980 shall be fitted with radio equipment for homing on the radiotelephone distress frequency, complying with the relevant provisions of regulation IV/12(b).
- (r) All equipment fitted in compliance with this regulation shall be of a type approved by the Administration. Equipment installed on board ships on or after 1 September 1984 shall



conform to appropriate performance standards not inferior to those adopted by the Organization. Equipment fitted prior to the adoption of related performance standards may be exempted from full compliance with those standards at the discretion of the Administration, having due regard to the recommended criteria which the Organization might adopt in connexion with the standards concerned.

(s) A rigidly connected composite unit of a pushing vessel and associated pushed vessel, when designed as a dedicated and integrated tug and barge combination, shall be regarded as a single ship for the purpose of this regulation.

(t) If the application of the requirements of this regulation necessitates structural alterations to a ship constructed before 1 September 1984, the Administration may allow extension of the time limit for fitting the required equipment not later than 1 September 1989, taking into account the first scheduled dry-docking of such a ship required by the present regulations.

(u) Except as provided elsewhere in this regulation, the Administration may grant to individual ships exemptions of a partial or conditional nature, when any such ship is engaged on a voyage where the maximum distance of the ship from the shore, the length and nature of the voyage, the absence of general navigation hazards, and other conditions affecting safety are such as to render the full application of this regulation unreasonable or unnecessary. When deciding whether or not to grant exemptions to an individual ship, the Administration shall have regard to the effect that an exemption may have upon the safety of all other ships.

#### *Regulation 16. LIFE-SAVING SIGNALS*

The existing text of paragraph (d) is replaced by the following:

(d) Signals used by aircraft engaged on search and rescue operations to direct ships towards an aircraft, ship or person in distress:

(i) The following manoeuvres performed in sequence by an aircraft mean that the aircraft wishes to direct a surface craft towards an aircraft or a surface craft in distress:

- (1) Circling the surface craft at least once;
- (2) Crossing the projected course of the surface craft close ahead at low altitude, and:
  - Rocking the wings; or
  - Opening and closing the throttle; or
  - Changing the propeller pitch;

(Due to high noise level on board surface craft, the sound signals may be less effective than the visual signal and are regarded as alternative means of attracting attention.)

(3) Heading in the direction in which the surface craft is to be directed.

Repetition of such manoeuvres has the same meaning.

(ii) The following manoeuvre by an aircraft means that the assistance of the surface craft to which the signal is directed is no longer required:

- Crossing the wake of the surface craft close astern at a low altitude, and:
  - Rocking the wings; or
  - Opening and closing the throttle; or
  - Changing the propeller pitch.

(Due to high noise level on board surface craft, the sound signals may be less effective than the visual signal and are regarded as an alternative means of attracting attention.)

NOTE. Advance notification of changes in these signals will be given by the Organization as necessary.

**Regulation 18. VHF RADIOTELEPHONE STATIONS**

The existing text of this regulation is deleted (see regulation IV/4-1(b)).

**Regulation 19. USE OF THE AUTOMATIC PILOT**

The following paragraph is added to the existing text:

(d) The manual steering shall be tested after prolonged use of the automatic pilot, and before entering areas where navigation demands special caution.

The following regulations are added to this chapter:

**Regulation 19-1. OPERATION OF STEERING GEAR**

In areas where navigation demands special caution, ships shall have more than one steering gear power unit in operation when such units are capable of simultaneous operation.

**Regulation 19-2. STEERING GEAR — TESTING AND DRILLS**

(a) Within 12 hours before departure, the ship's steering gear shall be checked and tested by the ship's crew. The test procedure shall include, where applicable, the operation of the following:

- (i) The main steering gear;
- (ii) The auxiliary steering gear;
- (iii) The remote steering gear control systems;
- (iv) The steering positions located on the navigating bridge;
- (v) The emergency power supply;
- (vi) The rudder angle indicators in relation to the actual position of the rudder;
- (vii) The remote steering gear control system power failure alarms;
- (viii) The steering gear power unit failure alarms; and
- (ix) Automatic isolating arrangements and other automatic equipment.

(b) The checks and tests shall include:

- (i) The full movement of the rudder according to the required capabilities of the steering gear;
- (ii) A visual inspection of the steering gear and its connecting linkage; and
- (iii) The operation of the means of communication between the navigating bridge and steering gear compartment.

(c) (i) Simple operating instructions with a block diagram showing the change-over procedures for remote steering gear control systems and steering gear power units shall be permanently displayed on the navigating bridge and in the steering gear compartment.

(ii) All ships' officers concerned with the operation or maintenance of steering gear shall be familiar with the operation of the steering systems fitted on the ship and with the procedures for changing from one system to another.

(d) In addition to the routine checks and tests prescribed in paragraphs (a) and (b), emergency steering drills shall take place at least once every three months in order to practise emergency steering procedures. These drills shall include direct control from within the steering gear compartment, the communications procedure with the navigating bridge and, where applicable, the operation of alternative power supplies.

(e) The Administration may waive the requirement to carry out the checks and tests prescribed in paragraphs (a) and (b) for ships which regularly engage on voyages of short duration. Such ships shall carry out these checks and tests at least once every week.



(f) The date upon which the checks and tests prescribed in paragraphs (a) and (b) are carried out and the date and details of emergency steering drills carried out under paragraph (d), shall be recorded in the log book as may be prescribed by the Administration.

## CHAPTER VI. CARRIAGE OF GRAIN

### PART A. GENERAL PROVISIONS

The existing text of regulation 1 is replaced by the following:

#### *Regulation 1. APPLICATION*

Unless expressly provided otherwise this chapter applies to the carriage of gain in all ships to which the present regulations apply and in cargo ships of less than 500 tons gross tonnage.

### PART B. CALCULATION OF ASSUMED HEELING MOMENTS

#### Section V. *Alternative loading arrangements for existing ships*

##### (A) *General*

Amend the second paragraph to read:

For the purpose of this part the term “existing ship” means “a ship, the keel of which is laid before 25 May 1980.”

##### (B) *Stowage of specially suitable ships*

The existing text of sub-paragraph (a)(ii)(2) is replaced by the following:

- (2) In partly filled compartments or holds free grain surfaces settle and shift as in sub-paragraph (1) or to such larger angle as may be deemed necessary by the Administration, or by a Contracting Government on behalf of the Administration, and grain surfaces, if overstowed, with the bulk grain levelled and topped off with bagged grain or other suitable cargo tightly stowed and extending to a height of not less than 1.22 m above the top of the bulk grain within spaces divided by a longitudinal bulkhead or shifting board, and not less than 1.52 m within spaces not so divided and the bagged grain or other suitable cargo supported on suitable platforms laid over the whole surface of the bulk grain, such platforms consisting of bearers spaced not more than 1.22 m apart and 25 mm boards laid thereon spaced not more than 0.10 m apart or of strong separation cloths with adequate overlapping, will shift to an angle of 8 degrees with the original levelled surfaces. For the purpose of this paragraph shifting boards, if fitted, will be considered to limit the transverse shift of the surface of the grain;