

## ANNEX 2

### AMENDMENTS TO THE INTERNATIONAL CODE FOR FIRE SAFETY SYSTEMS

#### CHAPTER 9 FIXED FIRE DETECTION AND FIRE ALARM SYSTEMS

- 1 The following new paragraph 2.1.5 is added after the existing paragraph 2.1.4:  
  
“2.1.5 In passenger ships, the fixed fire detection and fire alarm system shall be capable of remotely and individually identifying each detector and manually operated call point.”
- 2 The existing text of paragraph 2.4.1.4 is replaced by the following:  
  
“2.4.1.4 A section of fire detectors and manually operated call points shall not be situated in more than one main vertical zone.”

#### 第 15/2015 號行政長官公告

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

國際海事組織海上安全委員會於二零一零年十二月三日透過第MSC.311(88)號決議通過了《國際消防安全系統規則》修正案，該修正案自二零一二年七月一日起適用於澳門特別行政區；

基於此，行政長官根據澳門特別行政區第3/1999號法律第六條第一款的規定，命令公佈包含上指修正案的MSC.311(88)號決議的中文及英文文本。

二零一五年三月五日發佈。

代理行政長官 陳海帆

#### Aviso do Chefe do Executivo n.º 15/2015

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

Considerando igualmente que, em 3 de Dezembro de 2010, o Comité de Segurança Marítima da Organização Marítima Internacional, através da resolução MSC.311(88), adoptou emendas ao Código Internacional dos Sistemas de Segurança Contra Incêndios, e que tais emendas são aplicáveis na Região Administrativa Especial de Macau desde 1 de Julho de 2012;

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.311(88), que contém as referidas emendas, nos seus textos em línguas chinesa e inglesa.

Promulgado em 5 de Março de 2015.

A Chefe do Executivo, interina, *Chan Hoi Fan*.

## 第MSC.311（88）號決議

（2010年12月3日通過）

### 《國際消防安全系統規則》修正案

海上安全委員會，

憶及《國際海事組織公約》第28（b）條關於本委員會的職能，

注意到本委員會以第MSC.98（73）號決議通過的《國際消防安全系統規則》（以下簡稱“消防規則”），根據《1974年國際海上人命安全公約》（以下簡稱“該公約”）第II-2章已成為強制性文件，

還注意到該公約第VIII（b）條和第II-2/3.22條關於《消防規則》修正程序的規定，

在其第88屆會議上審議了按該公約第VIII（b）（i）條提出和分發的《消防規則》修正案，

1. 按該公約第VIII（b）（iv）條規定，通過《國際消防安全系統規則》的修正案，其文本載於本決議附件中；
2. 按該公約第VIII（b）（vi）（2）（bb）條規定，決定該修正案應於2012年1月1日視為已被接受，除非在此日期之前，有三分之一以上的該公約締約國政府或擁有商船合計噸位數不少於世界商船總噸數50%的締約國政府通報其反對該修正案；

3. **提請**《安全公約》各締約國政府注意，按該公約第VIII（b）（vii）（2）條規定，該修正案在按上述第2段被接受後，應於2012年7月1日生效；
4. **要求**秘書長按該公約第VIII（b）（v）條規定，將本決議及其附件中的修正案文本的核證無誤副本分發給該公約所有締約國政府；
5. **進一步要求**秘書長將本決議及其附件的副本分發給非該公約締約國的本組織會員國。

## 附件

### 《國際消防安全系統規則》修正案

現有第 9 章由以下替代：

#### “第 9 章 固定式探火和失火報警系統

##### 1 適用範圍

1.1 本章詳細規定了公約第 II-2 章所要求的固定式探火和失火報警系統的技術要求。除另有明文規定外，本章要求應適用於 2012 年 7 月 1 日或以後建造的船舶。

##### 1.2 定義

1.2.1 分區係指指示裝置標示的一組火警探測器和手動報警按鈕。

1.2.2 分區識別能力係指系統具有識別已觸發的探測器或手動報警按鈕所在分區的能力。

1.2.3 可逐一識別係指系統有能力識別已觸發的探測器或手動報警按鈕的準確位置和類型，並且能將該設備信號與所有其他信號區分。

##### 2 技術要求

###### 2.1 一般要求

2.1.1 任何所要求的具有手動報警按鈕的固定式探火和失火報警系統應能在任何時候立即工作（這並不要求設有備用控制板）。儘管有此要求，還可切斷特定處所的探火系統，例如正在進行熱作業的車間和正在裝卸的滾裝處所。切斷探測器的方式應設計成在與所述操作

相應的預定時間後，自動將系統恢復到正常監視狀態。當按規定要求的探測器切斷時，該處所應有人值班或設有消防巡邏。所有其他處所內的探測器應保持可工作狀態。

#### 2.1.2 探火系統應設計成：

- .1 控制和監測所有與之相連的火警探測器和感煙探測器以及手動報警按鈕的輸入信號；
- .2 向駕駛室、連續有人值班的中央控制站或船上安全中心提供輸出信號，以告知船員火情和故障情況；
- .3 監控系統運行所必需的電源和電路的斷電和故障情況；和
- .4 可將系統佈置成將信號輸出至其他消防安全系統，包括：
  - .1 傳呼系統、失火報警或公共廣播系統；
  - .2 風扇停止裝置；
  - .3 防火門；
  - .4 擋火閘；
  - .5 噴水器系統；
  - .6 抽煙系統；
  - .7 低位照明系統；
  - .8 固定式局部使用滅火系統；
  - .9 閉路電視（CCTV）系統；和
  - .10 其他消防安全系統。

2.1.3 探火系統可與決策管理系統連接，但：

- .1 決策管理系統經驗證與探火系統相兼容；
- .2 決策管理系統能被切斷而不喪失本章對探火系統所要求的任何功能；和
- .3 接口設備和連接設備的任何故障在任何情況下不應影響探火系統。

2.1.4 探測器和手動報警按鈕應與探火系統的專用分區連接。獨立分區可允許有其他消防安全功能，如噴水器閥門的報警信號。

2.1.5 系統和設備應適當地設計成能承受船舶通常遭遇的電壓變化和瞬時波動、環境溫度變化、振動、濕度、衝擊、碰撞和腐蝕。駕駛室內或鄰近的所有電氣和電子設備應作電磁兼容性試驗，並考慮到本組織制定的建議案。

2.1.6 具有可逐一識別火警探測器的固定式探火和失火報警系統，應按如下要求佈置：

- .1 設有措施以確保分區發生的任何故障（例如切斷動力、短路、接地等）不會妨礙對分區其餘相連探測器的持續逐一識別；
- .2 整個佈置應能使系統在發生故障（例如電氣的、電子的、信息的等）時恢復到最初設置狀態；
- .3 最先發出的失火報警信號應不妨礙任何其他探測器激發另外的失火報警信號；和
- .4 分區不應兩次通過某一處所。當這不切實際時（例如對於大的公共處所），則必須第二次通過該處所的分區部分在安裝時應盡量遠離分區的其他部分。

2.1.7 對於客船，固定式探火和失火報警系統應能遠程逐一識別每一探測器和手動報警按鈕。當安裝在客船客艙內的火警探測器觸發時，還應能在其所在處所內發出或促使發出聽覺報警。在貨船上和客船的客艙陽台上，固定式探火和失火報警系統應至少具備分區識別能力。

## 2.2 電源

2.2.1 固定式探火和失火報警系統運行所用的電氣設備的電源應不少於 2 套，其中 1 套應為應急電源。應由專用的獨立饋電線供電。這些饋電線應接至一個位於或鄰近於探火系統控制板上的自動轉換開關。主饋電線（各應急饋電線）應從主配電板（各應急配電板）接至轉換開關，且不穿過任何其他分配電板。

2.2.2 應有充足的電源供系統在所有探測器觸發的情況下持續運行，但其數量不超過 100（如探測器總數超過此數時）。

2.2.3 上述第 2.2.1 段規定的應急電源應足以按公約第 II-1/42 和 43 條要求的時間維持探火和失火報警系統的運行，並且在該要求的時間結束時，應能操作所有連接的視覺和聽覺失火報警信號裝置至少 30 分鐘。

## 2.3 部件要求

### 2.3.1 探測器

2.3.1.1 探測器應通過熱、煙或其他燃燒產物、火焰或這些因素的任何組合而工作。主管機關可考慮採用感應早期火災的其他因素而工作的探測器，但其靈敏度應不低於此類探測器。

2.3.1.2 起居處所內的所有梯道、走廊和脫險通道所要求的感煙探測器都應經驗證，在煙密度超過每米 12.5% 的減光率之前工作，但在按 EN 54：2001 和 IEC 60092-505：2001 標準進行試驗時，在煙密度超過每米 2% 的減光率之前不應工作。經主管機關確定，也可使用替代試驗標準。安裝在其他處所的感煙探測器應符合主管機關關於避免探測器不靈敏或過度靈敏的要求，在靈敏度限制範圍內工作。

2.3.1.3 感溫探測器應經驗證，當溫度以每分鐘不大於 1°C 的速率升高時，應在溫度超過 78°C 之前工作，但在按 EN 54：2001 和 IEC 60092-505：2001 標準進行試驗時，在超過 54°C 之前不應工作。經主管機關確定，也可使用替代試驗標準。溫升率更大時，感溫探測器應符合主管機關關於避免探測器不靈敏或過度靈敏的要求，在溫度限制範圍內工作。

2.3.1.4 感溫探測器的工作溫度在乾燥室和通常處於高溫環境的類似處所內可以到 130°C，在桑拿室內可到 140°C。

2.3.1.5 應按 EN 54-10：2001 和 IEC 60092-505：2001 標準對火焰探測器進行試驗。經主管機關確定，也可使用替代試驗標準。

2.3.1.6 所有探測器應是此種類型，其能按正確工作進行試驗，並能恢復到正常監視狀態而不更換任何部件。

2.3.1.7 客艙陽台的固定式探火和失火報警系統應由主管機關根據本組織制定的指南予以認可。

2.3.1.8 危險區域內安裝的探測器應經試驗和認可。公約第 II-2/20.4 條所要求且在符合第 II-2/20.3.2.2 條的處所內安裝的探測器，不需適合於危險區域。公約第 II-2/19 條表 19.3 要求的安裝在載運危險貨物處所內的以符合第 II-2/19.3.2 條的探測器，應適合於危險區域。



### 2.3.2 控制板

應按 EN 54-2 : 1997、EN 54-4 : 1997 和 IEC 60092-504 : 2001 標準對探火系統的控制板進行試驗。經主管機關確定，也可使用替代試驗標準。

### 2.3.3 電纜

在電路中使用的電纜應為符合 IEC 60332-1 標準的阻燃型。在客船上，穿過所服務的其他主豎區的電纜和接至無人值班消防控制站內的控制板的電纜，應為符合 IEC 60331 標準的耐火型，否則應設有雙套電纜並互相隔離。

## 2.4 安裝要求

### 2.4.1 分區

2.4.1.1 探測器和手動報警按鈕應分成若干分區。

2.4.1.2 覆蓋一個控制站、一個服務處所或一個起居處所的探測器的一個分區，不應包括 A 類機器處所或滾裝處所。覆蓋一個滾裝處所的探測器的一個分區，不應包括 A 類機器處所。對於設有遠程可逐一識別的火警探測器的固定式探火系統，其覆蓋起居處所、服務處所和控制站火警探測器的分區不應包括 A 類機器處所或滾裝處所的火警探測器。

2.4.1.3 如固定式探火和失火報警系統不包括遠程逐一識別每一探測器的裝置，一般不允許起居處所、服務處所和控制站內的一個分區的覆蓋範圍超過一層甲板，但覆蓋一個圍閉梯道的分區除外。為避免延誤識別火源，經主管機關確定，應對包括在每一分區內的圍閉處所

的數量予以限制。如果探火系統設有遠程可逐一識別的火警探測器，則分區可覆蓋幾層甲板，且所服務的圍閉處所數量不受限制。

2.4.1.4 在客船上，探測器和手動報警按鈕的一個分區包括範圍不應超過一個主豎區，但客艙陽台除外。

## 2.4.2 探測器的位置

2.4.2.1 探測器應安裝在可發揮最佳功能的位置。靠近橫樑和通風管道的位置，或氣流走向對探測器性能有不利影響的其他位置，或有可能產生衝擊或物理性損壞的位置都應避開。探測器應位於頂部，與艙壁的距離至少為 0.5 米，但在走廊、小儲藏室和梯道內的除外。

2.4.2.2 探測器的最大間距應符合下表：

表 9.1 探測器的間距

| 探測器類型 | 每一探測器的最大地板面積 (m <sup>2</sup> ) | 探測器間的最大中心間距 (m) | 與艙壁的最大距離 (m) |
|-------|--------------------------------|-----------------|--------------|
| 感溫式   | 37                             | 9               | 4.5          |
| 感煙式   | 74                             | 11              | 5.5          |

主管機關可根據證明探測器特性的試驗資料，要求或允許其他間距。安裝在移動式滾裝甲板以下的探測器應符合上述要求。

2.4.2.3 梯道的探測器應至少在扶梯的頂層和以下每隔一層安裝。

2.4.2.4 當火警探測器安裝在冷凍室、乾燥室、桑拿室、廚房用於加熱食物的部分、洗衣間和產生蒸氣和煙氣的其他處所內時，可使用感溫式探測器。

2.4.2.5 對於公約第 II-2/7.5 條要求的固定式探火和失火報警系統，極少或無失火危險的處所不必安裝探測器。此類處所包括不儲存可燃物品的空艙、客房內的盥洗室、公共盥洗室、滅火劑儲存室、清潔用具儲藏室（不存放易燃液體）、開敞甲板處所和失火危險極少或無失火危險並通過固定開口自然通風的圍蔽遊步甲板處所。

#### 2.4.3 電纜佈置

2.4.3.1 作為系統組成部分的電纜應避免佈置在廚房、A 類機器處所以及具有高度失火危險的其他圍閉處所，但有必要在此類處所配置探火或失火報警或接通相應的電源者除外。

2.4.3.2 具有可逐一識別能力的分區應佈置成某一火災對其造成的損壞點不會超過一個。

### 2.5 系統控制要求

#### 2.5.1 視覺和聽覺失火信號

2.5.1.1 任何探測器或手動報警按鈕動作時，應在控制板和指示裝置上發出視覺和聽覺失火報警信號。如在 2 分鐘內信號未予應答，則應向所有船員起居處所和服務處所、控制站以及 A 類機器處所自動發出聽覺失火報警。該聽覺報警系統不必作為探測系統的組成部分。

2.5.1.2 對於客船，控制板應位於船上安全中心內。對於貨船，控制板應位於駕駛室或消防控制站內。

2.5.1.3 對於客船，一套能逐一識別已被觸發的探測器或已經工作的手動報警按鈕的指示裝置應位於駕駛室內。對於貨船，如控制板位於消防控制站內，則應在駕駛室設有一套指示裝置。在貨船上和客船的

客艙陽台上，指示裝置應至少顯示已經觸發的探測器或已經工作的手動報警按鈕所在的分區。

2.5.1.4 在每一指示裝置上或其附近應有明確的信息表明其所覆蓋的處所和分區的位置。

2.5.1.5 應對系統運行所必需的電源和電路的斷電和故障情況進行適當監控，包括：

- .1 電線斷開引起的單一開路故障或切斷動力故障；
- .2 電線導體接觸金屬部件引起的單一接地故障；和
- .3 兩個或更多電線導體接觸引起的線對線單一故障。

故障情況發生時應在控制板上發出視覺和聽覺故障信號，這一信號應有別於失火信號。

2.5.1.6 控制板應設有手動應答所有報警和故障信號的方式。控制板和指示裝置上的聽覺報警器可手動消聲。控制板應明確區分正常、報警、報警應答、故障和消聲狀態。

2.5.1.7 系統應佈置成在消除報警和故障情況後自動復位到正常運行狀態。

2.5.1.8 當要求系統對探測器所在客艙發出局部聽覺報警時，應不允許設有從控制板將局部聽覺報警消聲的方式。

2.5.1.9 在客艙睡眠位置處和距離聲源 1 米處，聽覺報警的聲壓級一般應至少為 75dB (A)，且應至少比船舶在溫和天氣下航行時設備正常操作期間的環境噪聲級高出 10dB (A)。聲壓級應在基本頻率附近 1/3 倍頻帶內。聽覺報警信號不應超過 120dB (A)。

### 2.5.2 試驗

應備有適當的說明書及試驗和維修用的備件。應使用合適的探測器所設計響應的火災類型的設備，定期對探測器進行試驗。設有自我診斷系統且對其探頭可能易於污染的區域備有清潔制度的船舶，可按主管機關的要求進行試驗。”

**RESOLUTION MSC.311(88)**  
**(adopted on 3 December 2010)**

**AMENDMENTS TO THE INTERNATIONAL CODE  
FOR FIRE SAFETY SYSTEMS**

THE MARITIME SAFETY COMMITTEE,

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

NOTING resolution MSC.98(73) by which it adopted the International Code for Fire Safety Systems (hereinafter referred to as "the FSS Code"), which has become mandatory under chapter II-2 of the International Convention for the Safety of Life at Sea, 1974 (hereinafter referred to as "the Convention"),

NOTING ALSO article VIII(b) and regulation II-2/3.22 of the Convention concerning the procedure for amending the FSS Code,

HAVING CONSIDERED, at its eighty-eighth session, amendments to the FSS Code, proposed and circulated in accordance with article VIII(b)(i) of the Convention,

1. ADOPTS, in accordance with article VIII(b)(iv) of the Convention, amendments to the International Code for Fire Safety Systems, the text of which is set out in the Annex to the present resolution;
2. DETERMINES, in accordance with article VIII(b)(vi)(2)(bb) of the Convention, that the amendments shall be deemed to have been accepted on 1 January 2012, unless, prior to that date, more than one third of the Contracting Governments to the Convention or Contracting Governments the combined merchant fleets of which constitute not less than 50% of the gross tonnage of the world's merchant fleet, have notified their objections to the amendments;
3. INVITES SOLAS Contracting Governments to note that, in accordance with article VIII(b)(vii)(2) of the Convention the amendments shall enter into force on 1 July 2012 upon their acceptance in accordance with paragraph 2 above;
4. REQUESTS the Secretary-General, in conformity with article VIII(b)(v) of the Convention, to transmit certified copies of the present resolution and the text of the amendments contained in the Annex to all Contracting Governments to the Convention;
5. FURTHER REQUESTS the Secretary-General to transmit copies of this resolution and its Annex to Members of the Organization, which are not Contracting Governments to the Convention.

**ANNEX****AMENDMENTS TO THE INTERNATIONAL CODE  
FOR FIRE SAFETY SYSTEMS**

The existing chapter 9 is replaced by the following:

**"Chapter 9****Fixed fire detection and fire alarm systems****1 Application**

1.1 This chapter details the specification of fixed fire detection and fire alarm systems as required by chapter II-2 of the Convention. Unless expressly provided otherwise, the requirements of this chapter shall apply to ships constructed on or after 1 July 2012.

**1.2 Definitions**

1.2.1 *Section* means a group of fire detectors and manually operated call points as reported in the indicating unit(s).

1.2.2 *Section identification capability* means a system with the capability of identifying the section in which a detector or manually operated call point has activated.

1.2.3 *Individually identifiable* means a system with the capability to identify the exact location and type of detector or manually activated call point which has activated, and which can differentiate the signal of that device from all others.

**2 Engineering specifications****2.1 General requirements**

2.1.1 Any required fixed fire detection and fire alarm system with manually operated call points shall be capable of immediate operation at all times (this does not require a backup control panel). Notwithstanding this, particular spaces may be disconnected, for example, workshops during hot work and ro-ro spaces during on and off-loading. The means for disconnecting the detectors shall be designed to automatically restore the system to normal surveillance after a predetermined time that is appropriate for the operation in question. The space shall be manned or provided with a fire patrol when detectors required by regulation are disconnected. Detectors in all other spaces shall remain operational.

2.1.2 The fire detection system shall be designed to:

- .1 control and monitor input signals from all connected fire and smoke detectors and manual call points;
- .2 provide output signals to the navigation bridge, continuously manned central control station or onboard safety centre to notify the crew of fire and fault conditions;
- .3 monitor power supplies and circuits necessary for the operation of the system for loss of power and fault conditions; and

- .4 the system may be arranged with output signals to other fire safety systems including:
  - .1 paging systems, fire alarm or public address systems;
  - .2 fan stops;
  - .3 fire doors;
  - .4 fire dampers;
  - .5 sprinkler systems;
  - .6 smoke extraction systems;
  - .7 low-location lighting systems;
  - .8 fixed local application fire-extinguishing systems;
  - .9 closed circuit television (CCTV) systems; and
  - .10 other fire safety systems.

2.1.3 The fire detection system may be connected to a decision management system provided that:

- .1 the decision management system is proven to be compatible with the fire detection system;
- .2 the decision management system can be disconnected without losing any of the functions required by this chapter for the fire detection system; and
- .3 any malfunction of the interfaced and connected equipment should not propagate under any circumstance to the fire detection system.

2.1.4 Detectors and manual call points shall be connected to dedicated sections of the fire detection system. Other fire safety functions, such as alarm signals from the sprinkler valves, may be permitted if in separate sections.

2.1.5 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. All electrical and electronic equipment on the bridge or in the vicinity of the bridge shall be tested for electromagnetic compatibility, taking into account the recommendations developed by the Organization.

2.1.6 Fixed fire detection and fire alarm systems with individually identifiable fire detectors shall be so arranged that:

- .1 means are provided to ensure that any fault (e.g., power break, short circuit, earth, etc.) occurring in the section will not prevent the continued individual identification of the remainder of the connected detectors in the section;



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

2.1.7 In passenger ships, the fixed fire detection and fire alarm system shall be capable of remotely and individually identifying each detector and manually operated call point. Fire detectors fitted in passenger ship cabins, when activated, shall also be capable of emitting, or cause to be emitted, an audible alarm within the space where they are located. In cargo ships and on passenger ship cabin balconies the fixed fire detection and fire alarm system shall, as a minimum, have section identification capability.

## 2.2 *Sources of power supply*

2.2.1 There shall be not less than two sources of power supply for the electrical equipment used in the operation of the fixed fire detection and fire alarm system, one of which shall be an emergency source of power. 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. The main (respective emergency) feeder shall run from the main (respective emergency) switchboard to the change-over switch without passing through any other distributing switchboard.

2.2.2 There shall be sufficient power to permit the continued operation of the system with all detectors activated, but not more than 100 if the total exceeds this figure.

2.2.3 The emergency source of power specified in paragraph 2.2.1 above shall be sufficient to maintain the operation of the fire detection and fire alarm system for the periods required under regulations II-1/42 and 43 of the Convention, and at the end of that period, shall be capable of operating all connected visual and audible fire alarm signals for a period of at least 30 min.

## 2.3 *Component requirements*

### 2.3.1 Detectors

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

2.3.1.2 Smoke detectors required in all stairways, corridors and escape routes within accommodation spaces shall be certified to operate before the smoke density exceeds 12.5% obscuration per metre, but not until the smoke density exceeds 2% obscuration per metre, when tested according to standards EN 54:2001 and IEC 60092-505:2001. Alternative testing standards may be used as determined by the Administration. Smoke detectors to be installed in other spaces shall operate within sensitivity limits to the satisfaction of the Administration having regard to the avoidance of detector insensitivity or oversensitivity.

2.3.1.3 Heat detectors shall be certified to operate before the temperature exceeds 78°C but not until the temperature exceeds 54°C, when the temperature is raised to those limits at a rate less than 1°C per min, when tested according to standards EN 54:2001 and IEC 60092-505:2001. Alternative testing standards may be used as determined by the Administration. At higher rates of temperature rise, the heat detector shall operate within temperature limits to the satisfaction of the Administration having regard to the avoidance of detector insensitivity or oversensitivity.

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

2.3.1.5 Flame detectors shall be tested according to standards EN 54-10:2001 and IEC 60092-505:2001. Alternative testing standards may be used as determined by the Administration.

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

2.3.1.7 Fixed fire detection and fire alarm systems for cabin balconies shall be approved by the Administration, based on the guidelines developed by the Organization.

2.3.1.8 Detectors fitted in hazardous areas shall be tested and approved for such service. Detectors required by regulation II-2/20.4 and installed in spaces that comply with regulation II-2/20.3.2.2 of the Convention need not be suitable for hazardous areas. Detectors fitted in spaces carrying dangerous goods, required by regulation II-2/19, table 19.3, of the Convention to comply with regulation II-2/19.3.2 of the Convention, shall be suitable for hazardous areas.

### 2.3.2 Control panel

The control panel for the fire detection system shall be tested according to standards EN 54-2:1997, EN 54-4:1997 and IEC 60092-504:2001. Alternative standards may be used as determined by the Administration.

### 2.3.3 Cables

Cables used in the electrical circuits shall be flame retardant according to standard IEC 60332-1. On passenger ships, cables routed through other main vertical zones that they serve, and cables to control panels in an unattended fire control station shall be fire resisting according to standard IEC 60331, unless duplicated and well separated.

## 2.4 *Installation requirements*

### 2.4.1 Sections

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

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

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

2.4.1.4 In passenger ships, a section of detectors and manually operated call points shall not be situated in more than one main vertical zone, except on cabin balconies.

### 2.4.2 Positioning of detectors

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

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

**Table 9.1 – Spacing of detectors**

| Type of detector | Maximum floor area per detector (m <sup>2</sup> ) | Maximum distance apart between centres (m) | Maximum distance away from bulkheads (m) |
|------------------|---|--|--|
| Heat             | 37  | 9  | 4.5                                      |
| Smoke            | 74  | 11   | 5.5                                      |

The Administration may require or permit other spacing based upon test data which demonstrate the characteristics of the detectors. Detectors located below moveable ro-ro decks shall be in accordance with the above.

2.4.2.3 Detectors in stairways shall be located at least at the top level of the stair and at every second level beneath.

2.4.2.4 When fire detectors are installed in freezers, drying rooms, saunas, parts of galleys used to heat food, laundries and other spaces where steam and fumes are produced, heat detectors may be used.

2.4.2.5 Where a fixed fire detection and fire alarm system is required by regulation II-2/7.5 of the Convention, spaces having little or no fire risk need not be fitted with detectors. Such spaces include void spaces with no storage of combustibles, private bathrooms, public toilets, fire-extinguishing medium storage rooms, cleaning gear lockers (in which flammable liquids are not stowed), open deck spaces and enclosed promenades having little or no fire risk and that are naturally ventilated by permanent openings.

#### 2.4.3 Arrangement of cables

2.4.3.1 Cables which form 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 alarms in such spaces or to connect to the appropriate power supply.

2.4.3.2 A section with individually identifiable capability shall be arranged so that it cannot be damaged at more than one point by a fire.

### 2.5 **System control requirements**

#### 2.5.1 Visual and audible fire signals

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

2.5.1.2 In passenger ships, the control panel shall be located in the onboard safety centre. In cargo ships, the control panel shall be located on the navigation bridge or in the fire control station.

2.5.1.3 In passenger ships, an indicating unit that is capable of individually identifying each detector that has been activated or manually operated call point that has operated shall be located on the navigation bridge. In cargo ships, an indicating unit shall be located on the navigation bridge if the control panel is located in the fire control station. In cargo ships and on passenger cabin balconies, indicating units shall, as a minimum, denote the section in which a detector has activated or manually operated call point has operated.

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

2.5.1.5 Power supplies and electric circuits necessary for the operation of the system shall be monitored for loss of power and fault conditions as appropriate including:

- .1 a single open or power break fault caused by a broken wire;
- .2 a single ground fault caused by the contact of a wiring conductor to a metal component; and
- .3 a single wire to wire fault caused by the contact of two or more wiring conductors.

Occurrence of a fault condition shall initiate a visual and audible fault signal at the control panel which shall be distinct from a fire signal.

2.5.1.6 Means to manually acknowledge all alarm and fault signals shall be provided at the control panel. The audible alarm sounders on the control panel and indicating units may be manually silenced. The control panel shall clearly distinguish between normal, alarm, acknowledged alarm, fault and silenced conditions.

2.5.1.7 The system shall be arranged to automatically reset to the normal operating condition after alarm and fault conditions are cleared.

2.5.1.8 When the system is required to sound a local audible alarm within the cabins where the detectors are located, a means to silence the local audible alarms from the control panel shall not be permitted.

2.5.1.9 In general, audible alarm sound pressure levels at the sleeping positions in the cabins and 1 m from the source shall be at least 75 dB(A) and at least 10 dB(A) above ambient noise levels existing during normal equipment operation with the ship under way in moderate weather. The sound pressure level should be in the 1/3 octave band about the fundamental frequency. Audible alarm signals shall not exceed 120 dB(A).

#### 2.5.2 Testing

Suitable instructions and component spares for testing and maintenance shall be provided. Detectors shall be periodically tested using equipment suitable for the types of fires to which the detector is designed to respond. Ships with self-diagnostic systems that have in place a cleaning regime for areas where heads may be prone to contamination may carry out testing in accordance with the requirements of the Administration."