

## **Part B - Prevention of Fire and Explosion**

### **Regulation 5 - Fire Growth Potential**

#### **1. Purpose**

*The purpose of this regulation is to limit the fire growth potential in every space of the ship. For this purpose, the following functional requirements shall be met:*

*1.1 means of control for the air supply to the space shall be provided;*

*1.2 means of control for flammable liquids in the space shall be provided; and*

*1.3 the use of combustibile materials shall be restricted.*

#### **2. Control of air supply and flammable liquid to the space**

##### *2.1 Closing appliances and stopping devices of ventilation*

*2.1.1 The main inlets and outlets of all ventilation systems shall be capable of being closed from outside the spaces being ventilated. The means of closing shall be easily accessible as well as prominently and permanently marked and shall indicate whether the shut-off is open or closed.*

*2.1.2 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 shall not be readily cut off in the event of a fire in the spaces served.*

*2.1.3 In passenger ships carrying more than 36 passengers, power ventilation, except machinery space and cargo space ventilation and any alternative system which may be required under regulation 8.2, 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. Fans serving power ventilation systems to cargo spaces shall be capable of being stopped from a safe position outside such spaces.*

##### *2.2 Means of control in machinery spaces*

*2.2.1 Means of control shall be provided for opening and closure of skylights, closure of openings in funnels which normally allow exhaust ventilation and closure of ventilator dampers.*

*2.2.2 Means of control shall be provided for stopping ventilating fans. Controls provided for the power ventilation serving machinery spaces shall be grouped so as to be operable from two positions, one of which shall be outside such spaces. 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.*

*2.2.3 Means of control shall be provided for stopping forced and induced draught fans, oil fuel transfer pumps, oil fuel unit pumps, lubricating oil service pumps, thermal oil circulating pumps and oil separators (purifiers). However, paragraphs 2.2.4 and 2.2.5 need not apply to oily water separators.*

2.2.4 *The controls required in paragraphs 2.2.1 to 2.2.3 and in regulation 4.2.2.3.4 shall be located outside the space concerned so they will not be cut off in the event of fire in the space they serve.*

2.2.5 *In passenger ships, the controls required in paragraphs 2.2.1 to 2.2.4 and in regulations 8.3.3 and 9.5.2.3 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.*

2.3 *Additional requirements for means of control in periodically unattended machinery spaces*

2.3.1 *For periodically unattended machinery spaces, the Administration shall give special consideration to maintaining the fire integrity of the machinery spaces, the location and centralization of the fire-extinguishing system controls, the required shutdown arrangements (e.g., ventilation, fuel pumps, etc.) and that additional fire-extinguishing appliances and other fire-fighting equipment and breathing apparatus may be required.*

2.3.2 *In passenger ships, these requirements shall be at least equivalent to those of machinery spaces normally attended*

### **3. Fire protection materials**

#### **3.1 Use of non-combustible materials**

##### **3.1.1 Insulating materials**

*Insulating materials shall be non-combustible, except in cargo spaces, mail rooms, baggage rooms and refrigerated compartments of service spaces. 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 low flame-spread characteristics.*

##### **3.1.2 Ceilings and linings**

3.1.2.1 *In passenger ships, except in cargo spaces, all linings, grounds, draught stops and ceilings shall be of non-combustible material except in mail rooms, baggage rooms, saunas or refrigerated compartments of service spaces. Partial bulkheads or decks used to subdivide a space for utility or artistic treatment shall also be of non-combustible materials.*

3.1.2.2 *In cargo ships, all linings, ceilings, draught stops and their associated grounds shall be of non-combustible materials in the following spaces:*

3.1.2.2.1 *in accommodation and service spaces and control stations for ships where method IC is specified as referred to in regulation 9.2.3.1; and*

3.1.2.2.2 *in corridors and stairway enclosures serving accommodation and service spaces and control stations for ships where method IIC and IIIC are specified as referred to in regulation 9.2.3.1.*

##### **3.2 Use of combustible materials**

### 3.2.1 General

3.2.1.1 *In passenger ships, "A", "B" or "C" class divisions in accommodation and service spaces which are faced with combustible materials, facings, mouldings, decorations and veneers shall comply with the provisions of paragraphs 3.2.2 to 3.2.4 and regulation 6. However, traditional wooden benches and wooden linings on bulkheads and ceilings are permitted in saunas and such materials need not be subject to the calculations prescribed in paragraphs 3.2.2 and 3.2.3.*

3.2.1.2 *In cargo ships, non-combustible bulkheads, ceilings and linings fitted in accommodation and service spaces may be faced with combustible materials, facings, mouldings, decorations and veneers provided such spaces are bounded by non-combustible bulkheads, ceilings and linings in accordance with the provisions of paragraphs 3.2.2 to 3.2.4 and regulation 6.*

### 3.2.2 Maximum calorific value of combustible materials

*Combustible materials used on the surfaces and linings specified in paragraph 3.2.1 shall have a calorific value\* not exceeding 45 MJ/m<sup>2</sup> of the area for the thickness used. The requirements of this paragraph are not applicable to the surfaces of furniture fixed to linings or bulkheads.*

*\* Refer to the recommendations published by the International Organization for Standardization, in particular publication ISO 1716:2002, Determination of calorific potential.*

### 3.2.3 Total volume of combustible materials

*Where combustible materials are used in accordance with paragraph 3.2.1, they shall comply with the following requirements:*

3.2.3.1 *The total volume of combustible facings, mouldings, decorations and veneers in accommodation and service spaces shall not exceed a volume equivalent to 2.5 mm veneer on the combined area of the walls and ceiling linings. Furniture fixed to linings, bulkheads or decks need not be included in the calculation of the total volume of combustible materials; and*

3.2.3.2 *In the case of ships fitted with an automatic sprinkler system complying with the provisions of the Fire Safety Systems Code, the above volume may include some combustible material used for erection of "C" class divisions.*

### 3.2.4 Low flame-spread characteristics of exposed surfaces

*The following surfaces shall have low flame-spread characteristics in accordance with the Fire Test Procedures Code:*

3.2.4.1 *In passenger ships:*

3.2.4.1.1 *exposed surfaces in corridors and stairway enclosures and of bulkhead and ceiling linings in accommodation and service spaces (except saunas) and control stations; and*

3.2.4.1.2 *surfaces and grounds in concealed or inaccessible spaces in accommodation and service spaces and control stations.*

3.2.4.2 *In cargo ships:*

3.2.4.2.1 *exposed surfaces in corridors and stairway enclosures and of ceilings in accommodation and service spaces (except saunas) and control stations; and*

3.2.4.2.2 *surfaces and grounds in concealed or inaccessible spaces in accommodation and service spaces and control stations.*

### 3.3 Furniture in stairway enclosures of passenger ships

*Furniture in stairway enclosures shall be limited to seating. It shall be fixed, limited to six seats on each deck in each stairway enclosure, be of restricted fire risk determined in accordance with the Fire Test Procedure Code, and shall not restrict the passenger escape route. The Administration may permit additional seating in the main reception area within a stairway enclosure if it is fixed, non-combustible and does not restrict the passenger escape route. Furniture shall not be permitted in passenger and crew corridors forming escape routes in cabin areas. In addition to the above, lockers of non-combustible material, providing storage for non-hazardous safety equipment required by these regulations, may be permitted. Drinking water dispensers and ice cube machines may be permitted in corridors provided they are fixed and do not restrict the width of the escape routes. This applies as well to decorative flower or plant arrangements, statues or other objects of art such as paintings and tapestries in corridors and stairways.*

## **MCA Guidance**

### **G1 Remote means of control**

G1.1 Controls required for the closure of certain oil fuel suction valves, closing of openings, stopping of ventilation and forced draft fans etc., should be centralised as far as is reasonable and practicable. In respect of oil fuel suction valves, means should be provided at the remote station to show when the closure of the valve has been initiated. Where the means for the remote closing of oil valves is by extended spindle, no special fire protection need be fitted, provided no low melting point materials are used. Otherwise and where the means of closing is electric, pneumatic or hydraulic, the operating system should be capable of withstanding the appropriate fire test. The source of power to effect the closure of such power operated systems should be located outside the space in which the valves are situated.

G1.2 Power operated means for the closure of openings should, if they are the only means, be treated in a similar manner to power operated means provided for the closure of oil fuel. With regard to the remote means provided for stopping oil fuel pressure pumps, surveyors should ensure that such a facility is not merely part of a remote control system, i.e. designed to stop and start the said pumps, unless a manual reset is provided which must be operated before starting can be effected.

G1.3 The remote controls for stopping ventilation fans serving accommodation spaces should be extended to include remote stops for fans used in conjunction with air conditioning units. Any controls for operating the re-circulation of air should be capable of being rapidly put into the non-recirculation mode. This is to enable the units to be rapidly stopped from the centralised position to prevent circulation of smoke throughout the accommodation.

### **G2 Insulating materials**

G2.1 The 'exception' referred to in paragraph 3.1.1 regarding insulation of pipe fittings for cold service systems, may include the refrigerating machinery. When considering exposed surfaces in connection with insulating materials such surfaces should include the substrate

insulation in the thickness used, or the greatest thickness permitted by the test method for the specimen construction, whichever is greatest.

G2.2 Where organic foam, cork or other highly flammable materials or materials known to readily emit toxic products when decomposing are used to insulate refrigerated compartments, the compartments should be located as remotely as practicable from the accommodation spaces. However when such spaces are adjacent to accommodation spaces the bulkheads and their supporting decks separating the compartments from the accommodation should be of gastight construction and any door in such bulkheads should be of gastight construction in compliance with the Merchant Shipping (Crew Accommodation) Regulations 1997 (Regulation 31 refers).

### **G3 Ceilings, linings etc**

G3.1 In paragraph 3.1.2 a ceiling which is the insulating medium for an 'A' Class deck should not be penetrated by bulkheads and linings which are 'B' Class or 'C' Class divisions or combustible divisions nor should it rely on support afforded by such bulkheads and linings. The ceiling should be supported in accordance with the approved drawing at the ships side, deckhouse side or 'A' Class bulkheads and also from the deckhead by steel hangers and/or on the flanges of the top channel profiles of bulkheads and linings, the profiles being supported by steel hangers from the deckhead. Such top channel profiles should be unperforated as indicated in the guidance G9.2.5.5.

G3.2 Any material which is required by paragraph 3.1 to be non-combustible should be of an approved type except where such materials are not required to be tested as indicated in regulation 3.33 by the Fire Test Procedures Code.

G3.3 Combustible primary deck coverings should not be laid under 'A' Class insulations 'B' Class bulkheads or linings and 'C' Class bulkheads or linings.

G3.4 The ceilings and linings within accommodation spaces, service spaces, control stations and machinery spaces except in mail rooms, baggage rooms and refrigerated compartments, required by this regulation to be constructed of non-combustible materials may be the insulating media for 'A' Class divisions and/or 'B' Class divisions or 'C' Class divisions depending on the arrangements of the ship.

### **G4 Window and sidescuttle boxes**

G4.1 Linings at the ships side, deck side or end in the way of windows or side scuttle openings should be boxed in. The boxes should generally be of the same material and thickness as the adjacent lining, except that where this is a B-0 or 'C' Class division, sheet steel may be used.

G4.2 The construction of the boxes should be similar to that of the lining as shown on the approved drawing relating to the boards or panels used and to the satisfaction of the surveyor.

G4.3 Notwithstanding the above comments when the structure is of steel the non-combustible boxes may be dispensed within:

G4.3.1 a space not exceeding 6m in length measured along the lining at the ships side or deckhouse side; or

G4.3.2 a space of any length containing furniture and furnishings of restricted fire risk provided that in either case the bulkheads and ceilings bounding the space are carried to the ships side or deckhouse side.

G4.4 Draught stops should be fitted when spaces behind the linings exceed 14m in length.

G4.5 GRP window or sidescuttle boxes may be fitted in addition to, but not instead of, the non-combustible boxes and in the case of a passenger ship the GRP boxes should be included in the total volume of combustible facings, mouldings etc. referred to in paragraph 3.2.3.

G4.6 However GRP window and sidescuttle boxes should not be fitted on tankers around windows and sidescuttles in the exterior boundaries of superstructures and deckhouses referred to in regulation 9.2.4.2.5.

## **G5 Surface floor coverings**

G5.1 In addition to the surfaces referred to in paragraph 3.2.4.1 surface floor coverings including carpets and carpet underlays, which are to be used in rooms containing furniture and furnishings of restricted fire risk, should be of an approved type having low flame spread characteristics determined in accordance with the Fire Test Procedure Code.

G5.2 Surface floor coverings should not be laid under 'A' Class insulation, 'B' Class bulkheads or and 'C' Class divisions.

G5.3 See regulation 4.4 for further information relating to surface deck coverings.

## **G6 Organic foams in furniture**

G6.1 Organic foams should not be used in the construction of furniture other than in upholstered parts and mattresses. It is recommended that Combustion Modified High Resilient (CMHR) foams are used in the upholstered parts of furniture and mattresses on United Kingdom registered ships but, in any case, the upholstered parts of furniture in rooms on passenger ships containing 'furniture and furnishings of restricted fire risk' and in stairway enclosures of passenger ships, should be of restricted fire risk as referred to in regulation 3.40.6 and paragraph 3.3 respectively.

G6.2 Approved non-combustible materials which are used without any surface finishes may be accepted as having low flame spread characteristics without having been subjected to a test.

## **G7 Total volume of combustibles**

G7.1 The total volume of combustibles from which the thickness of equivalent veneer is obtained should include laminates, wallcoverings, veneers, paints or any other finishes; skirtings; architraves and covings; mouldings and frames around mirrors, pictures and light fittings; window boxes and any other combustibles used for decorative or other purposes on the bulkheads, ceilings and linings of a space. Any wood dance floors should also be included. See guidance G11.1 to regulation 11.2.

G7.2 The total volume of combustibles should not include any textile materials, floor coverings or any part of built-in or free-standing furniture including any wood or chipboard backing board separating adjacent built-in seats provided that the board does not extend more than 300mm above the upholstery on the seat backs. In no case should a 'B' Class or 'C' Class bulkhead, ceiling or linings, or a lining or ceiling used respectively as the insulating medium for an 'A' Class bulkhead or deck be dispensed with in way of built-in furniture or any feature referred to in the previous paragraph.

G7.3 In the case of a ship protected by a sprinkler system where it is not possible to incorporate a decorative feature in a 'C' Class division using non-combustible materials e.g. a

radiused corner or shaped portion, the decorative feature may be constructed of wood or composite wood products. This is provided that it is of minimum dimensions compatible with the design and is included in the total volume of combustibles.

G7.4 Each partial bulkhead or partition of any height or partial deck used to divide a space for utility or artistic purposes excluding any backing board referred to in the second paragraph, should be constructed as 'C' Class divisions and any of the features referred to in the first paragraph which are on the divisions should be included in the total volume of combustibles. In the case of a sprinkler protected ship any such divider, partial bulkhead or partition of full height may be included in the combined area of bulkheads, ceilings and linings for the purpose of obtaining the thickness of veneer equivalent to the total volume of combustibles.

### **G8 Surface finishes - gross calorific potential**

G8.1 For the purpose of paragraph 3.2.2 veneers shall include laminates, wallcoverings or any other surface finishes. Approved surface finishes will satisfy this requirement.

### **G9 Adhesives**

G9.1 Combustible adhesives are not required to be tested individually or approved. The type of adhesive which is used in practice to bond the surface finish materials referred to in paragraphs 3.2.4.1 and 3.2.4.2 to substrates is required to be the same as that used to bond the samples of the finish materials subjected to the low flame spread tests in the Fire Test Procedures Code.

### **G10 Details of construction for cargo ships and tankers**

#### **G10.1 Method IC**

G10.1.1 Note: Regulation 9.2.4.1 states only method IC shall be used on tankers

G10.1.2 Paragraph 3.1.2.2.1 requires ceilings, linings, draught stops and their associated grounds in accommodation spaces, service spaces and control stations to be non-combustible. Consequently any ceiling or lining which is neither the insulating medium for an 'A' Class division nor a 'B' Class division, should be of 'C' Class standard i.e. constructed of non-combustible materials but having no fire integrity and insulation standards. 'C' Class divisions should be constructed as indicated in the guidance G9.3.

G10.1.3 Window and sidescuttle boxes should be constructed as indicated in the guidance G9.56

G10.1.4 The construction of window and sidescuttle boxes on tankers should be compatible with the standards of the linings in which they are fitted. See paragraph and guidance G9.43 and G9.56 on exterior boundaries of tankers after Regulations 9.2 and 9.4.

#### **G10.2 Methods IIC and IIIC**

G10.2.1 Paragraph 3.1.2.2.2 requires ceilings, linings, draught stops and their associated grounds in corridors and stairway enclosures serving accommodation spaces, service spaces and control stations to be non-combustible. Consequently any such ceiling or lining which is neither the insulating medium for an 'A' Class division nor a 'B' Class division, should be of 'C' Class standard i.e. constructed of non-combustible materials but having no fire integrity and insulation standards. 'C' Class divisions should be constructed as indicated in the guidance G9.3.

G10.2.2 Ceilings, linings, draught stops and their associated grounds, other than those fitted in corridors and stairway enclosures serving accommodation spaces, service spaces and control stations, may be combustible except when such ceilings and linings are either the insulating media for 'A' Class divisions or continuous 'B' Class divisions. There are no restrictions applied to combustible ceilings and linings subject to compliance with the Merchant Shipping (Crew Accommodation) Regulations 1997 and provided that:

G10.2.2.1 ceilings and linings are not constructed of organic foams, cork or other highly flammable materials capable of producing large quantities of smoke or toxic products; and

G10.2.2.2 ceilings are not constructed of sheets of polyvinyl chloride or similar materials which will soften at relatively low elevated temperatures and may collapse on sleeping cabin occupants during the early stages of a fire situation. Such materials may not necessarily contain highly flammable base products.

G10.2.3 However, these provisions do not apply to ceilings constructed of plywood, chipboard, steel or aluminium alloy either unfaced or faced with decorative laminates, paints or other surface finishes.

### **G11 Application of surface finish**

G11.1 In no case should a surface flammability test pass be accepted if the surface finish is applied to a different non-combustible substrate from that on which it was tested, unless the non-combustible substrate has a similar or higher density or is of greater thickness if the density is more than 400kg/m<sup>3</sup> (as per MSC/Circ.1004).

### **G12 Approved paint schemes**

G12.1 An approved paint scheme may be subsequently overcoated with paints from the same scheme or any other approved paint scheme, provided that:

G12.1.1 the paints are compatible when the paint scheme is to be over-coated with a different approved paint scheme; and

G12.1.2 the surface of the original scheme is properly prepared before overcoating e.g. flaking paint to be removed; grease, dirt and oil to be removed etc.