

**PART II RULES FOR THE CONSTRUCTION  
AND CLASSIFICATION OF SHIPS  
IDENTIFIED BY THEIR MISSION**

**TITLE 33 CHEMICAL TANKERS**

**INTERNATIONAL CODE FOR THE  
CONSTRUCTION AND EQUIPMENT OF SHIPS  
CARRYING DANGEROUS CHEMICALS IN BULK,  
1983, AS AMENDED 2004**

**ANNEX VII CRITERIA FOR ASSIGNING  
CARRIAGE REQUIREMENTS FOR  
PRODUCTS SUBJECT TO THE IBC  
CODE**

**CHAPTERS**

**A TRANSPORT OF LIQUID CHEMICAL  
WASTE**



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**CHAPTER A (21)  
CRITERIA FOR ASSIGNING CARRIAGE  
REQUIREMENTS FOR PRODUCTS SUBJECT TO  
THE IBC CODE**

**A1. CRITERIA FOR ASSIGNING CARRIAGE  
REQUIREMENTS FOR PRODUCTS SUBJECT  
TO THE IBC CODE**

**A1. CRITERIA FOR ASSIGNING CARRIAGE  
REQUIREMENTS FOR PRODUCTS  
SUBJECT TO THE IBC CODE**

**100. 21.1 Introduction**

101. 21.1.1 The following criteria are guidelines for the determination of pollution classification and assignment of appropriate carriage requirements for bulk liquid cargoes being considered as candidates for entry into the IBC Code or annexes 1, 3 or 4 of MEPC.2/Circs.

102. 21.1.2 In developing such criteria, every effort has been made to follow the criteria and cut off points developed under the Global Harmonized System (GHS).

103. 21.1.3 Although the criteria are intended to be closely defined in order to establish a uniform approach, it must be emphasized that these are guidelines only and, where human experience or other factors indicates the need for alternative arrangements, these shall always be taken into account. Where deviations from the criteria have been recognized, they shall be properly recorded with justifications.

**200. 21.2 Contents**

201. 21.2.1 This chapter contains the following:

- a. .1 minimum safety and pollution criteria for products subject to ANNEX III (chapter 17);
- b. .2 criteria used to assign the minimum carriage requirements for products, which meet the safety or pollution criteria to make them subject to ANNEX III (chapter 17);
- c. .3 criteria used for special requirements in ANNEX I (chapter 15) to be included in column o of ANNEX III (chapter 17);
- d. .4 criteria used for special requirements in ANNEX II (chapter 16) to be included in column o of ANNEX III (chapter 17); and
- e. .5 definitions of properties used within this chapter.

**300. 21.3 Minimum safety and pollution criteria for products subject to ANNEX III (chapter 17)**

301. 21.3.1 Products are deemed to be hazardous and subject to ANNEX III (chapter 17) if they meet one or more of the following criteria:

- a. .1 inhalation LC50  $\leq 20$  mg/l/4 h (see definitions in paragraph A1.701.a);
- b. .2 dermal LD50  $\leq 2000$  mg/kg (see definitions in paragraph A1.701.b);
- c. .3 oral LD50  $\leq 2000$  mg/kg (see definitions in paragraph A1.701.c);
- d. .4 toxic to mammals by prolonged exposure (see definitions in paragraph A1.702);
- e. .5 cause skin sensitization (see definitions in paragraph A1.703);
- f. .6 cause respiratory sensitization (see definitions in paragraph A1.704);
- g. .7 corrosive to skin (see definitions in paragraph A1.705);
- h. .8 have a Water Reactive Index (WRI) of  $\geq 1$  (see definitions in paragraph A1.704);
- i. .9 require inertion, inhibition, stabilization, temperature control or tank environmental control in order to prevent a hazardous reaction (see definitions in paragraph A1.710);
- j. .10 flash point  $< 23^{\circ}\text{C}$ ; and have an explosive/flammability range (expressed as a percentage by volume in air) of  $\geq 20\%$ ;
- k. .11 autoignition temperature of  $\leq 200^{\circ}\text{C}$ ; and
- l. .12 classified as pollution category X or Y or meeting the criteria for rules 11 to 13 under paragraph A1.404.a.

**400. 21.4 Criteria used to assign the minimum carriage requirements for products, which meet the minimum safety or pollution criteria to make them subject to ANNEX III (chapter 17)**

**401. 21.4.1 Column a - Product Name**

- a. 21.4.1.1 The International Union of Pure and Applied Chemistry (IUPAC) name shall be used as far as possible but, where this is unnecessarily complex, then a technically correct and unambiguous alternative chemical name may be used.

402. 21.4.3 **Column c - Pollution Category**

a. 21.4.3.1 Column c identifies the pollution category assigned to each product under Annex II of MARPOL 73/78.

403. 21.4.4 **Column d – Hazards**

a. 21.4.4.1 An "S" is assigned to column d if any of the safety criteria described in paragraphs A1.301.a to A1.301.k (21.3.1.1 to 21.3.1.11) are met.

b. 21.4.4.2 A "P" is assigned to column d if the product meets the criteria for assigning Ship Type 1

to 3 as defined by rules 1 to 14 in paragraph A1.404 (21.4.5).

404. 21.4.5 **Column e - Ship Type**

a. 21.4.5.1 The basic criteria for assigning Ship Types based on the GESAMP Hazard Profile are shown in the table below. An explanation of the details in the columns is provided in appendix 1 of MARPOL Annex II. Selected rules, identified in this table, are specified in section 21.4.5.2 for assigning specific Ship Types.

Rule Number	A1	A2	B1	B2	D3	E2	Ship Type
1			≥5				1
2	≥4	NR	4		CMRTNI		
3	≥4	NR			CMRTNI		
4			4				2
5	≥4		3				
6		NR	3				
7				≥1			
8						Fp	
9					CMRTNI	F	
10			≥2			S	3
11	≥4						
12		NR					
13			≥1				
14	All other category Y Substances						
15	All other category Z Substances All "Other Substances" (OS)						NA

b. 21.4.5.2 The Ship Type is assigned according to the following criteria:

Ship Type 1:

Inhalation LC50 ≤0.5 mg/l/4 h; and/or

Dermal LD50 ≤50 mg/kg; and/or

Oral LD50 ≤5 mg/kg; and/or

Autoignition temperature ≤65°C; and/or

Explosive range ≥50% v/v in air and the flash point <23°C; and/or

Rules 1 or 2 of the table shown in A1.404.a (21.4.5.1)

Ship Type 2:

Inhalation LC50 > 0.5mg/l/4 h = 2mg/l/4 h; and/or

Dermal LD50 > 50mg/kg = 1000 mg/kg; and/or

Oral LD50 > 5mg/kg = 300 mg/kg; and/or

WRI=2;

Autoignition temperature = 200°C; and/or

Explosive range = 40% v/v in air and the flash point < 23°C; and/or

Any of the rules 3 to 10 of the table shown in A1.404.a (21.4.5.1)

Ship Type 3:

Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to ANNEX III (chapter 17) not meeting the requirements for ship types 1 or 2 and not meeting rule 15 of the table shown in A1.404.a (21.4.5.1).

405. 21.4.6 **Column f - Tank type**

a. 21.4.6.1 The tank type is assigned according to the following criteria:

Tank type 1G:

Inhalation LC50  $\leq 0.5$  mg/l/4 h; and/or  
Dermal LD50  $\leq 200$  mg/kg); and/or  
Autoignition temperature  $\leq 65^\circ\text{C}$ ; and/or  
Explosive range  $\geq 40\%$  v/v in air and the  
flash point  $< 23^\circ\text{C}$ ; and/or  
WRI=2

Inert: Autoignition temperature  $\leq 200^\circ\text{C}$ ; and/or  
Reacts with air to cause a hazard; and/or  
Explosive range  $\geq 40\%$  and the flash point  
 $< 23^\circ\text{C}$ .  
Dry: WRI  $\geq 1$   
Pad: Only applies to specific products identified  
on a case by case basis.  
Vent: Only applies to specific products identified  
on a case by case basis.  
No: Where the above criteria do not apply,  
(inerting requirements may be required under  
SOLAS)

Tank type 2G:

Any of the minimum safety or pollution criteria for bulk  
liquid cargoes subject to ANNEX III (chapter 17) not  
meeting the requirements for tank type 1G.

406. 21.4.7 **Column g - Tank vents**

a. 21.4.7.1 The tank venting arrangements are  
assigned according to the following criteria:

Controlled:

Inhalation LC50  $\leq 10$  mg/l/4 h; and/or  
Toxic to mammals by prolonged exposure; and/or  
Respiratory sensitizer; and/or S  
pecial carriage control needed; and/or  
Flash point  $\leq 60^\circ\text{C}$  Corrosive to skin ( $\leq 4$  h  
exposure)

Open:

Any of the minimum safety or pollution criteria for  
bulk liquid cargoes subject to ANNEX III (chapter  
17) not meeting the requirements for controlled  
tank vents.

407. 21.4.8 **Column h - Tank environmental control**

a. 21.4.8.1 The Tank environmental control  
conditions are assigned according to the following  
criteria:

408. 21.4.9 **Column i Electrical equipment**

a. 21.4.9.1 If the flash point of the product is  $\leq 60^\circ\text{C}$   
or the product is heated to within  $15^\circ\text{C}$  of its flash  
point then the electrical equipment required are  
assigned according to the following criteria, else '-'  
is assigned in column 'i' and 'i' ..1 Column i' -  
Temperature class:

409. 21.4.11 **Column k - Vapour detection**

a. 21.4.11.1 The type of vapour detection equipment  
required is determined by the following criteria:

Toxic (T): Inhalation LC50  $\leq 10$  mg/l/4 h,  
and/or

Respiratory sensitizer; and/or

Toxic by prolonged exposure.  
Flammable (F): Flash point  $\leq 60^\circ\text{C}$

No: Where the above criteria do not  
apply.

410. 21.4.12 **Column l - Fire protection equipment**

a. 21.4.12.1 The appropriate fire-fighting media are  
defined as being appropriate according to the  
following criteria related to the properties of the  
product:

Column i' - Temperature class:

T1 Autoignition temperature  $\geq 450^\circ\text{C}$

T2 Autoignition temperature  $\geq 300^\circ\text{C}$  but  $<$   
 $450^\circ\text{C}$

T3 Autoignition temperature  $\geq 200^\circ\text{C}$  but  $<$   
 $300^\circ\text{C}$

T4 Autoignition temperature  $\geq 135^\circ\text{C}$  but  $<$   
 $200^\circ\text{C}$

T5 Autoignition temperature  $\geq 100^\circ\text{C}$  but  $<$   
 $135^\circ\text{C}$

T6 Autoignition temperature  $\geq 85^\circ\text{C}$  but  $<$   
 $100^\circ\text{C}$

Column i " - Apparatus group:

Apparatus group	MESG at 20°C (mm)	MIC product/methane ratio
IIA	≥0.9	>0.8
IIB	>0.5 to <0.9	≥0.45 to ≤0.8
IIC	≤0.5	<0.45

a. The tests shall be carried out in accordance with the procedures described in IEC 60079-1-1:2002 and IEC 79-3

b. For gases and vapours it is sufficient to make only one determination of either the Maximum Experimental Safe Gap (MESG) or the Minimum Igniting Current (MIC) provided that:

for Group IIA: the MESG > 0.9 mm or the MIC ratio >0.9.

for Group IIB: the MESG is ≥0.55 mm and ≤0.9 mm; or

the MIC ratio is ≥0.5 and ≤0.8.

for Group IIC: the MESG is < 0.5 mm or the MIC ratio is <0.45.

c. 2.3 It is necessary to determine both the MESG and the MIC ratio when

c.1. .1 The MIC ratio determination only has been made, and the ratio is between 0.8 and 0.9, when an MESG determination will be required;

c.2. .2 The MIC ratio determination only has been made, and the ratio is between 0.45 and 0.5, when an MESG determination will be required; or

c.3. .3 The MESG only has been found, and is between 0.5 mm and 0.55 mm, when an MIC ratio determination will be required.

412. 21.4.10 **Column j - Gauging**

a. 21.4.10.1 The type of gauging equipment permitted is assigned according to the following criteria:

Closed: Inhalation LC50 ≤2 mg/l/4hr; and/or

Dermal LD50 ≤1000 mg/kg; and/or

Toxic to mammals by prolonged exposure; and/or

Respiratory sensitizer; and/or

Corrosive to skin (≤3 min exposure).

Restricted: Inhalation LC50 >2 - ≤10 mg/l/4h; and/or

Special carriage control indicates Inerting required; and/or

Corrosive to skin (>3 min - ≤1 h exposure); and/or

Flash point ≤60°C.

Open: Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to ANNEX III (chapter 17) not meeting the requirements for closed or restricted gauging.

415. 21.4.11 **Column k - Vapour detection**

a. 21.4.12.1 The appropriate fire-fighting media are defined as being appropriate according to the following criteria related to the properties of the product:

Solubility >10% (>100000 mg/l)	: A	Alcohol-resistant foam.
Solubility <10% (<100000 mg/l)	: A	Alcohol-resistant foam; and/or
	: B	Regular foam.
WRI = 0	: C	Water spray(generally used as a coolant and can be used with A and/or B providing that the WRI=0).
WRI ≥1	: D	Dry chemical.
No	:	No requirements under this Code.

Note: all appropriate media shall be listed. No: indicates that the above criteria do not apply.

411. 21.4.14 **Column n - Emergency Equipment**

a. 21.4.14.1 The requirement to have personnel emergency equipment on board is identified by ' Yes' in column n according to the following criteria:

Inhalation LC50 ≤2 mg/l/4 h; and/or

Respiratory sensitizer; and/or

Corrosive to skin (≤ 3 min exposure); and/or

WRI=2



**500. 21.5 Criteria for special requirements in chapter 15 to be included in column o**

501. 21.5.1 The assignment of special requirements in column o shall normally follow clear criteria based on the data supplied in the reporting form. Where it is considered appropriate to deviate from such criteria, this shall be clearly documented in such a way that it can easily be retrieved on demand.

502. 21.5.2 The criteria for making reference to the special requirements identified in ANNEX I and II (chapters 15 and 16) are defined below with comments where relevant.

**503. 21.5.3 Paragraphs 15.2 to 15.10 and 15.20:**

a. 21.5.3.1 Paragraphs Part II, Title 33, ANNEX I, A1.200 to A2.100 and A3.100 (15.2 to 15.10 and 15.20) identify specific products by name with special carriage requirements that cannot be easily accommodated in any other way.

**504. 21.5.4 Paragraph ANNEX I, A2.200 (15.11) – Acids**

a. 21.5.4.1 Paragraph Part II, Title 33, ANNEX I, A2.200 (15.11) applies to all acids unless they:

a.1. .1 are organic acids - when only paragraphs ANNEX I, A2.202 to 204 (15.11.2 to 15.11.4) and paragraphs ANNEX I, A2.206 to 208 (15.11.6 to 15.11.8) apply; or

a.2. .2 do not evolve hydrogen - when paragraph ANNEX I, A2.205 need not apply.

**505. 21.5.5 Paragraph ANNEX I, A2.300 (15.12) - Toxic products**

a. 21.5.5.1 All of paragraph ANNEX I, A2.300 (15.12) is added to column o according to the following criteria:

Inhalation LC50  $\leq 2$  mg/l/4 h; and/or

the product is a respiratory sensitizer; and/or

the product is toxic to mammals by prolonged exposure.

b. 21.5.5.2 Paragraph ANNEX I, A2.303 (15.12.3) is added to column o according to the following criteria:

Inhalation LC50  $> 2$  -  $\leq 10$  mg/l/4 h; and/or

Dermal LD50  $\leq 1000$  mg/kg; and/or

Oral LD50  $\leq 300$  mg/kg.

c. 21.5.5.3 Paragraph ANNEX I, A2.304 (15.12.4) is added to column o according to the following criterion:

Inhalation LC50  $> 2$  -  $\leq 10$  mg/l/4 h.

**506. 21.5.6 Paragraph ANNEX I, A2.400 (15.13) - Cargoes protected by additives**

a. 21.5.6.1 The requirement to assign paragraph ANNEX I, A2.400 (15.13) to column o is based on the information related to the products tendency to polymerise, decompose, oxidise or undergo other chemical changes which may cause a hazard under normal carriage conditions and which would be prevented by the addition of appropriate additives.

**507. 21.5.7 Paragraph ANNEX I, A2.500 (15.14) - Cargoes with a vapour pressure greater than atmospheric at 37.8°C**

a. 21.5.7.1 The requirement to assign paragraph ANNEX I, A2.500 (15.14) to column o is based on the following criterion:

Boiling point  $\leq 37.8^\circ\text{C}$

**508. 21.5.8 Paragraph ANNEX I, A2.600 (15.16) - Cargo contamination**

a. 21.5.8.1 Paragraph ANNEX I, A2.601 (15.16.1) is deleted.

b. 21.5.8.2 Paragraph ANNEX I, A2.602 (15.16.2) is added to column o according to the following criterion:

WRI  $\geq 1$

**509. 21.5.9 Paragraph ANNEX I, A2.700 (15.17) - Increased ventilation requirements**

a. 21.5.9.1 Paragraph ANNEX I, A2.700 (15.17) shall be added to column o according to the following criteria:

Inhalation LC50  $> 0.5$  -  $\leq 2$  mg/l/4 h; and/or

Respiratory sensitizer; and/or

Toxic to mammals by prolonged exposure; and/or

Corrosive to skin ( $\leq 1$  h exposure time).

**510. 21.5.10 Paragraph ANNEX I, A2.800 15.18 - Special cargo pump room requirements**

a. 21.5.10.1 Paragraph ANNEX I, A2.800 (15.18) shall be added to column o according to the following criterion:

Inhalation LC50  $\leq 0.5$  mg/l/4 h

511. 21.5.11 **Paragraph ANNEX I, A2.900 (15.19) - Overflow control**

a. 21.5.11.1 Paragraph ANNEX I, A2.900 (15.19) shall be added to column o according to the following criteria:

Inhalation LC50  $\leq 2$  mg/l/4 h; and/or

Dermal LD50  $\leq 1000$  mg/kg; and/or

Oral LD50  $\leq 300$  mg/kg; and/or

Respiratory sensitizer; and/or

Corrosive to skin ( $\leq 3$  min exposure); and/or

Autoignition temperature  $\leq 200^\circ\text{C}$ ; and/or

Explosive range  $\geq 40\%$  v/v in air and flash point  $< 23^\circ\text{C}$ ; and/or

Classified as ship type 1 on pollution grounds.

b. 21.5.11.2 Only paragraph ANNEX I, A2.906 (15.19.6) shall apply if the product has any of the following properties:

Inhalation LC50  $> 2$  mg/l/4h -  $\leq 10$  mg/l/4 h; and/or

Dermal LD50  $> 1000$  mg/kg -  $\leq 2000$  mg/kg; and/or

Oral LD50  $> 300$  mg/kg -  $\leq 2000$  mg/kg; and/or

Skin sensitizer; and/or

Corrosive to skin ( $> 3$  min -  $\leq 1$  h exposure); and/or

Flash point  $\leq 60^\circ\text{C}$ ; and/or

Classified as ship type 2 on pollution grounds; and/or

Pollution category X or Y.

512. 21.5.12 **Paragraph ANNEX I, A3.200 (15.21) - Temperature sensors**

a. 21.5.12.1 Paragraph ANNEX I, A3.200 (15.21) is added to column o according to the heat sensitivity of the product. This requirement is related to pumps in cargo pump rooms only.

600. 21.6 **Criteria for special requirements in ANNEX II (chapter 16) to be included in column**

601. 21.6.1 **Paragraphs ANNEX II, A1.100 to 205 and ANNEX II, A1.300 to 500 (16.1 to 16.2.5 and 16.3 to 16.5)**

a. 21.6.1.1 These apply to all cargoes and so are not referenced specifically in column o.

602. 21.6.2 **Paragraph ANNEX II, A1.206 (16.2.6)**

a. 21.6.2.1 Paragraph ANNEX II, A1.206 (16.2.6) is added to column o for products, which meet the following criteria:

Pollution Category X or Y and viscosity  $\geq 50$  mPa.s at  $20^\circ\text{C}$

603. 21.6.3 **Paragraph ANNEX II, A1.207 (16.2.9)**

a. 21.6.3.1 Paragraph ANNEX II, A1.207 (16.2.9) is added to column o for products, which meet the following criterion:

Melting point  $\geq 0^\circ\text{C}$ .

604. 21.6.4 **Paragraph ANNEX II, A1.600 16.6 - Cargo not to be exposed to excessive heat**

a. 21.6.4.1 Paragraphs ANNEX II, A1.602 to 604 (16.6.2 to 16.6.4) are added to column o for products, which are identified as requiring temperature control during carriage.

700. 21.7 **Definitions**

701. 21.7.1 **Acute mammalian toxicity**

a. 21.7.1.1 Acutely toxic by inhalation

All inhalation toxicity data are assumed to be associated with vapours and not mists or sprays, unless indicated otherwise.

Inhalation toxicity (LC50)	
Hazard level	mg/l/4 h
High	$< 0.5$
Moderately high	$> 0.5 - \leq 2$
Moderate	$> 2 - \leq 10$
Slight	$> 10 - \leq 20$
Negligible	$> 20$

b. 21.7.1.2 Acutely toxic in contact with skin

Dermal toxicity (LD50)	
Hazard Level	mg/kg

High	<50
Moderately high	>50 - ≤200
Moderate	>200 - ≤1000
Slight	>1000 - ≤2000
Negligible	>2000

c. 21.7.1.3 Acutely toxic if swallowed

Oral toxicity (LD50)	
Hazard Level	mg/kg
High	≤5
Moderately high	5 - ≤50
Moderate	50 - ≤300
Slight	>300 - ≤2000
Negligible	>2000

702. **21.7.2 Toxic to mammals by prolonged exposure**

- a. 21.7.2.1 A product is classified as toxic by prolonged exposure if it meets any of the following criteria: it is known to be, or suspected of being a carcinogen, mutagen, reprotoxic, neurotoxic, immunotoxic or exposure below the lethal dose is known to cause specific organ oriented systemic toxicity (TOST) or other related effects.
- b. 21.7.2.2 Such effects may be identified from the GESAMP Hazard Profile of the product or other recognized sources of such information.

703. **21.7.3 Skin sensitization**

- a. 21.7.3.1 A product is classified as a skin sensitizer:

<i>Hazard Level</i>	<i>Exposure time to cause full thickness necrosis of skin</i>	<i>Observation time</i>
Severely corrosive to skin	≤3 min	<1 h
Highly corrosive to skin	> 3 min - ≤ 1 h	≤14 days
Moderately corrosive to skin	> 1 h - ≤ 4 h	≤14 days

- a.1. .1 if there is evidence in humans that the substance can induce sensitization by skin contact in a substantial number of persons; or

- a.2. .2 where there are positive results from an appropriate animal test.

- b. 21.7.3.2 When an adjuvant type test method for skin sensitization is used, a response of at least 30% of the animals is considered as positive. For a non-adjuvant test method a response of at least 15% of the animals is considered positive.

- c. 21.7.3.3 When a positive result is obtained from the Mouse Ear Swelling Test (MEST) or the Local Lymph Node Assay (LLNA), this may be sufficient to classify the product as a skin sensitizer.

704. **21.7.4 Respiratory sensitization**

- a. 21.7.4.1 A product is classified as a respiratory sensitizer:

- a.1. .1 if there is evidence in humans that the substance can induce specific respiratory hypersensitivity; and/or

- a.2. .2 where there are positive results from an appropriate animal test; and/or

- a.3. .3 where the product is identified as a skin sensitizer and there is no evidence to show that it is not a respiratory sensitizer.

705. **21.7.5 Corrosive to skin\***

\* Products that are corrosive to skin are, for the purpose of assigning relevant carriage requirements, deemed to be corrosive by inhalation.

706. 21.7.6 **Water reactive substances**

21.7.6.1 These are classified into three groups as follows:

<i>Water reactive index (WRI)</i>	<i>Definition</i>
2	Any chemical which, in contact with water, may produce a toxic, flammable or corrosive gas or aerosol.
1	Any chemical which, in contact with water, may generate heat or produce a non-toxic, non-flammable or non corrosive gas.
0	Any chemical which, in contact with water, would not undergo a reaction to justify a value of 1 or 2.

707. 21.7.7 **Air reactive substances**

a. 21.7.7.1 Air reactive substances are products which react with air to cause a potentially hazardous situation, e.g. the formation of peroxides which may cause an explosive reaction.

708. 21.7.8 **Electrical apparatus - Temperature Class (for products which either have a flashpoint of  $\leq 60^{\circ}\text{C}$  or are heated to within  $15^{\circ}\text{C}$  of their flashpoint)**

a. 21.7.8.1 The Temperature Class is defined by the International Electrotechnical Commission (IEC) as:

The highest temperature attained under practical conditions of operation within the rating of the apparatus (and recognized overloads, if any, associated therewith) by any part of any surface, the exposure of which to an explosive atmosphere may involve a risk.

b. 21.7.8.2 The Temperature Class of the electrical apparatus is assigned by selecting the Maximum Surface Temperature which is closest to, but less than, the product's autoignition temperature (see A1.408.a).

709. 21.7.9 **Electrical apparatus - Apparatus group (for products with a flashpoint of  $\leq 60^{\circ}\text{C}$ )**

a. 21.7.9.1 This refers to intrinsically safe and associated electrical apparatus for explosive gas atmospheres which the IEC divide into the following groups:

Group I: for mines susceptible to firedamp (not used by IMO); and

Group II: for applications in other industries - further sub-divided according to its Maximum Experimental Safe Gap (MESG) and/or the

Minimum Igniting Current (MIC) of the gas/vapour into groups IIA, IIB and IIC.

b. 21.7.9.2 This property cannot be determined from other data associated with the product; it has to be either measured or assigned by assimilation with related products in an homologous series.

710. 21.7.10 **Special carriage control conditions**

a. 21.7.10.1 Special carriage control conditions refer to specific measures that need to be taken in order to either prevent a hazardous reaction. They include:

a.1. .1 *Inhibition*: the addition of a compound (usually organic) that retards or stops an undesired chemical reaction such as corrosion, oxidation or polymerization;

a.2. .2 *Stabilization*: the addition of a substance (stabilizer) that tends to keep a compound, mixture or solution from changing its form or chemical nature. Such stabilizers may retard a reaction rate, preserve a chemical equilibrium, act as antioxidants, keep pigments and other components in emulsion form or prevent the particles in colloidal suspension from precipitating;

a.3. .3 *Inertion*: the addition of a gas (usually nitrogen) in the ullage space of a tank that prevents the formation of a flammable cargo/air mixture;

a.4. .4 *Temperature control*: the maintenance of a specific temperature range for the cargo in order to prevent a hazardous reaction or to keep the viscosity low enough to allow the product to be pumped; and

- a.5. *.5 Padding and venting*: only applies to specific products identified on a case by case basis.

711. **21.7.II Flammable cargoes**

- a. 21.7.11.1 A cargo is defined as flammable according to the following criteria:

<i>IBC Code descriptor</i>	<i>Flash point (°C)</i>
Highly flammable	< 23
Flammable	≤ 60 but ≥ 23

- b. 21.7.11.2 It should be noted that flash points of mixtures and aqueous solutions need to be measured unless all of the components are non-flammable.
- c. 21.7.11.3 It should be noted that the carriage of bulk liquid cargoes which have a flash point of <60°C is subject to other SOLAS regulations.

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