Amendments of the Rule

Pt. 7-2 Ships of Special Service

2022. 01

Hull Rule Development Team

Present	Amendment	Note
〈Rules〉 - Pt 7 Ch 5 **Section 4 Cargo Containment**	**〈Rules〉 - Pt 7 Ch 5** **Section 4 Cargo Containment**	
402. ~ 405. 〈omission〉	402. ~ 405. 〈same as current〉	
406. Design of secondary barriers 【See Rule】	406. Design of secondary barriers 【See Rule】	
1. Standards of secondary barrier	1. Standards of secondary barrier	
(1) For the purpose of the requirements in **406. 2** of the Rule, the secondary barriers of nonmetal material are to conform to the following requirements (A) to (C) : (A) Compatibility with the cargo is to have been verified, and to have necessary mechanical properties at the cargo temperature under the atmospheric pressure. (B) A model test may be required to prove that the secondary barrier has effective performance when the Society deems it necessary. (C) For welded joints, welding procedure tests and production test are to be conducted. The test plans for the above are to have been approved by the Society beforehand.	(1) For the purpose of the requirements in **406. 2** of the Rule, the secondary barriers of nonmetal material are to conform to the following requirements (A) to (C) : (A) Compatibility with the cargo is to have been verified, and to have necessary mechanical properties at the cargo temperature under the atmospheric pressure. (B) A model test may be required to prove that the secondary barrier has effective performance when the Society deems it necessary. (C) For welded joints, welding procedure tests and production test are to be conducted. The test plans for the above are to have been approved by the Society beforehand.	
(2) For the purpose of the requirements in **406. 2** (1) of the Rules, no special analysis of the complete secondary barrier for verifying that "it is capable of containing any envisaged leakage of liquid cargo for a period of 15 days" may be carried out except for cases where the Society deems it specially necessary.	(2) For the purpose of the requirements in **406. 2** (1) of the Rules, no special analysis of the complete secondary barrier for verifying that "it is capable of containing any envisaged leakage of liquid cargo for a period of 15 days" may be carried out except for cases where the Society deems it specially necessary.	
	(3) In principal, openings such as maahole are not to be provided in secondary barriers. *(2022)*	-HUT4000-2505-2021
2. ~3 〈omit〉	2. ~3 〈same as current〉	
407. ~ 428. 〈omit〉	407. ~ 428. 〈same as current〉	

RULES FOR CLASSIFICATION(STEEL SHIPS)

(Rule for Pt 7 Ch 5)

2021.07.

Hull Rule Development Team

- Main Amendments -

(1) Enter into force on 1 July 2022 (the contract date for ship construction)

◉ To reflect Request for Establishment/Revision of Classification Technical Rules

- To reflect the revision item of UR W1

Present	Amendment	Reason
CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK	**CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK**	
Section 1 ~ Section 3 <Omitted>	**Section 1 ~ Section 3 <Same as the present Rule>**	
Section 4 Cargo Containment	**Section 4 Cargo Containment**	
401. ~ 418. 〈Omitted〉	401. ~ 418. 〈Same as the present Rule〉	
419. Materials (IGC Code 4.19) [See Guidance]	419. Materials (IGC Code 4.19) [See Guidance]	Reflection of Request for Revision of Classification Technical Rules
1. Materials forming ship structure	1. Materials forming ship structure	
(1) ~ (3) 〈Omitted〉	(1) ~ (3) 〈Same as the present Rule〉	
(4) The hull material forming the secondary barrier shall be in accordance with Table ~~7.5.5~~. Where the secondary barrier is formed by the deck or side shell plating, the material grade required by Table ~~7.5.5~~ shall be carried into the adjacent deck or side shell plating, where applicable, to a suitable extent.	(4) The hull material forming the secondary barrier shall be in accordance with Table 7.5.5a and 7.5.5b. Where the secondary barrier is formed by the deck or side shell plating, the material grade required by Table 7.5.5a and 7.5.5b shall be carried into the adjacent deck or side shell plating, where applicable, to a suitable extent.	
(5) ~(6) 〈Omitted〉	(5) ~(6) 〈Same as the present Rule〉	
2. Materials of primary and secondary barriers	2. Materials of primary and secondary barriers	
(1) Metallic materials used in the construction of primary and secondary barriers not forming the hull, shall be suitable for the design loads that they may be subjected to, and be in accordance with, Table 7.5.4, ~~7.5.5~~, or 7.5.6.	(1) Metallic materials used in the construction of primary and secondary barriers not forming the hull, shall be suitable for the design loads that they may be subjected to, and be in accordance with, Table 7.5.4, 7.5.5a, 7.5.5b, or 7.5.6.	
(2) Materials, either non-metallic or metallic but not covered by Table 7.5.4, ~~7.5.5~~ and 7.5.6, used in the primary and secondary barriers may be approved by the Society, considering the design loads that they may be subjected to, their properties and their intended use.	(2) Materials, either non-metallic or metallic but not covered by Table 7.5.4, 7.5.5a, 7.5.5b and 7.5.6, used in the primary and secondary barriers may be approved by the Society, considering the design loads that they may be subjected to, their properties and their intended use.	
(3) ~(6) 〈Omitted〉	(3) ~(6) 〈Same as the present Rule〉	
3. 〈Omitted〉	3. 〈Same as the present Rule〉	
420. ~ 428. 〈Omitted〉	420. ~ 428. 〈Same as the present Rule〉	
Section 5 <Omitted>	**Section 5 <Same as the present Rule>**	

Present	Amendment	Reason
Section 6 Materials of Construction and Quality Control	**Section 6 Materials of Construction and Quality Control**	
601. ~ 603. 〈Omitted〉	601. ~ 603. 〈Same as the present Rule〉	
604. Requirements for metallic materials (IGC Code 6.4)	604. Requirements for metallic materials (IGC Code 6.4)	
1. General requirements for metallic materials	1. General requirements for metallic materials	
The requirements for materials of construction are shown in the tables as follows:	The requirements for materials of construction are shown in the tables as follows:	
Table 7.5.4: Plates, pipes (seamless and welded), sections and forgings for cargo tanks and process pressure vessels for design temperatures not lower than 0 °C.	Table 7.5.4: Plates, pipes (seamless and welded), sections and forgings for cargo tanks and process pressure vessels for design temperatures not lower than 0 °C.	Reflection of Request for Revision of Classification Technical Rules
~~Table 7.5.5: Plates, sections and forgings for cargo tanks, secondary barriers and process pressure vessels for design temperatures below 0 °C and down to -55 °C.~~	Table 7.5.5a: Plates, sections and forgings for cargo tanks, secondary barriers and process pressure vessels for design temperatures below 0 °C and down to - 10 °C.	
	Table 7.5.5b: Plates, sections and forgings for cargo tanks, secondary barriers and process pressure vessels for design temperatures below -10 °C and down to -55 °C.	
Table 7.5.6: Plates, sections and forgings for cargo tanks, secondary barriers and process pressure vessels for design temperatures below -55 °C and down to -165 °C.	Table 7.5.6: Plates, sections and forgings for cargo tanks, secondary barriers and process pressure vessels for design temperatures below -55 °C and down to -165 °C.	
Table 7.5.7: 〈Omitted〉	Table 7.5.7: 〈Same as the present Rule〉	
Table 7.5.8: 〈Omitted〉	Table 7.5.8: 〈Same as the present Rule〉	
For cargo tanks using high manganese austenitic steel for cryogenic service, Annex 7A-4 「High manganese austenitic steel for Cryogenic Service」 should be applied. (2021)	For cargo tanks using high manganese austenitic steel for cryogenic service, Annex 7A-4 「High manganese austenitic steel for Cryogenic Service」 should be applied. (2021)	

Present	Amendment	Reason
Table 7.5.4: PLATES, PIPES (SEAMLESS AND WELDED)(1)(2), SECTIONS AND FORGINGS FOR CARGO TANKS AND PROCESS PRESSURE VESSELS FOR DESIGN TEMPERATURES NOT LOWER THAN 0 °C. 【See Guidance】	Table 7.5.4: PLATES, PIPES (SEAMLESS AND WELDED)(1)(2), SECTIONS AND FORGINGS FOR CARGO TANKS AND PROCESS PRESSURE VESSELS FOR DESIGN TEMPERATURES NOT LOWER THAN 0 °C. 【See Guidance】	Reflection of Request for Revision of Classification Technical Rules

1. CHEMICAL COMPOSITION AND HEAT TREATMENT		
〈Omitted〉		
2. TENSILE AND TOUGHNESS (IMPACT) TEST REQUIREMENTS		
2.1 frequency		
Plates	〈Omitted〉	
Sections and forgings	〈Omitted〉	
2.2 Mechanical properties		
Tensile properties	〈Omitted〉	
2.3 Toughness (Charpy V-notch test)		
Plates	〈Omitted〉	
Sections and forgings	〈Omitted〉	
Test temperature	Thickness (mm)	Test temperature (°C)
	$t \leq 20$	0
	$20 < t \leq 40$	-20
Notes: (1)~(2) 〈Omitted〉 (3) This table is generally applicable for material thicknesses up to ~~40~~mm. Proposals for greater thicknesses shall be approved by the Society. (4)~(5) 〈Omitted〉		

1. CHEMICAL COMPOSITION AND HEAT TREATMENT		
〈Omitted〉		
2. TENSILE AND TOUGHNESS (IMPACT) TEST REQUIREMENTS		
2.1 frequency		
Plates	〈Same as the present Rule〉	
Sections and forgings	〈Same as the present Rule〉	
2.2 Mechanical properties		
Tensile properties	〈Same as the present Rule〉	
2.3 Toughness (Charpy V-notch test)		
Plates	〈Same as the present Rule〉	
Sections and forgings	〈Same as the present Rule〉	
Test temperature	Thickness (mm)	Test temperature (°C)
	$t \leq 20$	0
	$20 < t \leq 40$	-20
	$\underline{40 < t \leq 50^{(6)}}$	$\underline{-20^{(7)}}$
	$\underline{40 < t \leq 50^{(6)}}$	$\underline{-30^{(8)}}$
Notes: (1)~(2) 〈Same as the present Rule〉 (3) This table is generally applicable for material thicknesses up to 50mm. Proposals for greater thicknesses shall be approved by the Society. (4)~(5) 〈Same as the present Rule〉 (6) A further set of impact test at mid thickness for products with t〉40mm is required except rolled steels specified in Part 2. (7) Applies to type C independent tanks and process pressure vessels. In addition, post-weld stress relief heat treatment shall be performed. Exemption to post-weld stress relief heat treatment based on alternative approach (e.g. Engineering Critical Assessment) shall be approved by the Classification Society or shall be to recognized standards. (8) Applies to cargo tank other than type C.		

Present

Table 7.5.5: PLATES, SECTIONS AND FORGINGS FOR CARGO TANKS, SECONDARY BARRIERS AND PROCESS PRESSURE VESSELS FOR DESIGN TEMPERATURES BELOW 0°C AND DOWN TO ~~-55°C~~ Maximum thickness 25 mm 【See Guidance】

1. CHEMICAL COMPOSITION AND HEAT TREATMENT	
〈Omitted〉	
2. TENSILE AND TOUGHNESS (IMPACT) TEST REQUIREMENTS	
2.1 Sampling frequency	
Plates	〈Omitted〉
Sections and forgings	〈Omitted〉
2.2 Mechanical properties	
Tensile properties	〈Omitted〉
2.3 Toughness (Charpy V-notch test)	
Plates	〈Omitted〉
Sections and forgings	〈Omitted〉
Test temperature	〈Omitted〉

Notes

(1) 〈Omitted〉

(2) For material thickness of more than 25 mm, Charpy V-notch tests shall be conducted as follows

Material thickness(mm)	Test temperature (°C)
$25 < t \leq 30$	10°C below design temperature or -20°C, whichever is lower
$30 < t \leq 35$	15°C below design temperature or -20°C, whichever is lower
$35 < t \leq 40$	20°C below design temperature
~~$40 < t$~~	~~Temperature approved by the Society~~

〈Omitted〉

(3)~(5) 〈Omitted〉

Amendment

Table 7.5.5a: PLATES, SECTIONS AND FORGINGS FOR CARGO TANKS, SECONDARY BARRIERS AND PROCESS PRESSURE VESSELS FOR DESIGN TEMPERATURES BELOW 0°C AND DOWN TO -10°C Maximum thickness 25 mm 【See Guidance】

1. CHEMICAL COMPOSITION AND HEAT TREATMENT	
〈Omitted〉	
2. TENSILE AND TOUGHNESS (IMPACT) TEST REQUIREMENTS	
2.1 Sampling frequency	
Plates	〈Same as the present Rule〉
Sections and forgings	〈Same as the present Rule〉
2.2 Mechanical properties	
Tensile properties	〈Same as the present Rule〉
2.3 Toughness (Charpy V-notch test)	
Plates	〈Same as the present Rule〉
Sections and forgings	〈Same as the present Rule〉
Test temperature	〈Same as the present Rule〉

Notes

(1) 〈Same as the present Rule〉

(2) For material thickness of more than 25 mm, Charpy V-notch tests shall be conducted as follows

Material thickness(mm)	Test temperature (°C)
$25 < t \leq 30$	10°C below design temperature or -20°C, whichever is lower
$30 < t \leq 35$	15°C below design temperature or -20°C, whichever is lower
$35 < t \leq 40$	20°C below design temperature
$40 < t \leq 50$(6)	5°C below design temperature or -20°C, whichever is lower(7)
$40 < t \leq 45$(6)	25°C below design temperature(8)
$45 < t \leq 50$(6)	30°C below design temperature(8)

〈Same as the present Rule〉

(3)~(5) 〈Same as the present Rule〉

(6) A further set of impact test at mid thickness for products with t〉40mm is required except rolled steels specified in Part 2.

(7) Applies to type C independent tanks and process pressure vessels. In addition, post-weld stress relief heat treatment shall be performed. Exemption to post-weld stress relief heat treatment based on alternative approach (e.g. Engineering Critical Assessment) shall be approved by the Classification Society or shall be to recognized standards.

(8) Applies to cargo tank other than type C.

(9) This table is generally applicable for material thicknesses up to 50mm. Proposals for greater thicknesses shall be approved by the Society.

Reason

Reflection of Request for Revision of Classification Technical Rules

Present	Amendment	Reason
	Table 7.5.5b: PLATES, SECTIONS AND FORGINGS FOR CARGO TANKS, SECONDARY BARRIERS AND PROCESS PRESSURE VESSELS FOR DESIGN TEMPERATURES BELOW -10°C AND DOWN TO -55°C Maximum thickness 25 mm 【See Guidance】	Reflection of Request for Revision of Classification Technical Rules

1. CHEMICAL COMPOSITION AND HEAT TREATMENT	
〈Omitted〉	
2. TENSILE AND TOUGHNESS (IMPACT) TEST REQUIREMENTS	
2.1 Sampling frequency	
Plates	〈Same as the present Rule〉
Sections and forgings	〈Same as the present Rule〉
2.2 Mechanical properties	
Tensile properties	〈Same as the present Rule〉
2.3 Toughness (Charpy V-notch test)	
Plates	〈Same as the present Rule〉
Sections and forgings	〈Same as the present Rule〉
Test temperature	〈Same as the present Rule〉

Notes
(1) 〈Same as the present Rule〉
(2) For material thickness of more than 25 mm, Charpy V-notch tests shall be conducted as follows

Material thickness(mm)	Test temperature (°C)
$25 < t \leq 30$	10°C below design temperature or -20°C, whichever is lower
$30 < t \leq 35$	15°C below design temperature or -20°C, whichever is lower
$35 < t \leq 40$	20°C below design temperature
$40 < t \leq 50$(6)	5°C below design temperature or -20°C, whichever is lower(7)
$40 < t \leq 45$(6)	25°C below design temperature(8)
$45 < t \leq 50$(6)	30°C below design temperature(8)

〈Same as the present Rule〉
(3)~(5) 〈Same as the present Rule〉
(6) A further set of impact test at mid thickness for products with t〉40mm is required except rolled steels specified in Part 2.
(7) 606. 2 (2) applies with regards to post-weld stress relief heat treatment. Exemption to post-weld stress relief heat treatment based on alternative approach(e.g. Engineering Critical Assessment) shall be approved by the Society or shall be to recognized standards.
(8) Applies to cargo tank other than type C.
(9) This table is generally applicable for material thicknesses up to 50mm. Proposals for greater thicknesses shall be approved by the Society.

Present

Table 7.5.6: PLATES, SECTIONS AND FORGINGS FOR CARGO TANKS, SECONDARY BARRIERS AND PROCESS PRESSURE VESSELS FOR DESIGN TEMPERATURES BELOW -55°C AND DOWN TO -165°C Maximum thickness 25 mm(3)(4) 【See Guidance】

Minimum design temp. (°C)	Chemical composition(5) and heat treatment	Impact test temp.(°C)
-60	〈Omitted〉	-65
-65	〈Omitted〉	-70
-90	〈Omitted〉	-95
-105	〈Omitted〉	-110
-165	〈Omitted〉	-196
-165	〈Omitted〉	-196
-165	〈Omitted〉	Not required
-165	〈Omitted〉	Not required
1. TENSILE AND TOUGHNESS (IMPACT) TEST REQUIREMENTS		
1.1 Sampling frequency		
Plates	〈Omitted〉	
Sections and forgings	〈Omitted〉	
1.2 Toughness (Charpy V-notch test)		
Plates	〈Omitted〉	
Sections and forgings	〈Omitted〉	

Notes:

(1)~(2) 〈Omitted〉

(3) For materials 1.5 % Ni, 2.25 % Ni, 3.5 % Ni and 5 % Ni, with thicknesses greater than 25 mm, the impact tests shall be conducted as follows:

Material thickness(mm)	Test temperature
$25 < t \leq 30$	10°C below design temperature
$30 < t \leq 35$	15°C below design temperature
$35 < t \leq 40$	20°C below design temperature

The energy value shall be in accordance with the table for the applicable type of test specimen. For material thickness of more than ~~40~~mm, the Charpy V-notch values shall be specially considered.

(4)~(9) 〈Omitted〉

Amendment

Table 7.5.6: PLATES, SECTIONS AND FORGINGS FOR CARGO TANKS, SECONDARY BARRIERS AND PROCESS PRESSURE VESSELS FOR DESIGN TEMPERATURES BELOW -55°C AND DOWN TO -165°C Maximum thickness 25 mm(3)(4) 【See Guidance】

Minimum design temp. (°C)	Chemical composition(5) and heat treatment	Impact test temp.(°C)
-60	〈Same as the present Rule〉	-65
-65	〈Same as the present Rule〉	-70
-90	〈Same as the present Rule〉	-95
-105	〈Same as the present Rule〉	-110
-165	〈Same as the present Rule〉	-196
-165	〈Same as the present Rule〉	-196
-165	〈Same as the present Rule〉	Not required
-165	〈Same as the present Rule〉	Not required
1. TENSILE AND TOUGHNESS (IMPACT) TEST REQUIREMENTS		
1.1 Sampling frequency		
Plates	〈Same as the present Rule〉	
Sections and forgings	〈Same as the present Rule〉	
1.2 Toughness (Charpy V-notch test)		
Plates	〈Same as the present Rule〉	
Sections and forgings	〈Same as the present Rule〉	

Notes:

(1)~(2) 〈Same as the present Rule〉

(3) For materials 1.5 % Ni, 2.25 % Ni, 3.5 % Ni and 5 % Ni, with thicknesses greater than 25 mm, the impact tests shall be conducted as follows:

Material thickness(mm)	Test temperature
$25 < t \leq 30$	10°C below design temperature
$30 < t \leq 35$	15°C below design temperature
$35 < t \leq 40$	20°C below design temperature
$\underline{40 < t \leq 45^{(10)}}$	<u>25°C below design temperature</u>
$\underline{45 < t \leq 50^{(10)}}$	<u>30°C below design temperature</u>

The energy value shall be in accordance with the table for the applicable type of test specimen. For material thickness of more than <u>50</u>mm, the Charpy V-notch values shall be specially considered.

(4)~(9) 〈Same as the present Rule〉

<u>(10) A further set of impact test at mid thickness for products with t〉40mm is required except rolled steels specified in Part 2.</u>

<u>(11) This table is generally applicable for material thicknesses up to 50mm. Proposals for greater thicknesses shall be approved by the Society.</u>

Reason

Reflection of Request for Revision of Classification Technical Rules

Present	Amendment	Reason
Table 7.5.7 〈Omitted〉 Table 7.5.8 PLATES AND SECTIONS FOR HULL STRUCTURES REQUIRED BY 419. 1 (2) AND 419. 1 (3) Minimum design temperature of hull structure (°C) / Maximum thickness (mm) for steel grades: A, B, D, E, AH, DH, EH, FH 0 and above -5 and above(2) down to -5 down to -10 down to -20 down to -30 Below -30: In accordance with Table ~~7.5.5~~ except that the thickness limitation given in Table ~~7.5.5~~ and in note (2) of that table does not apply. 〈Below Omitted〉	Table 7.5.7 〈Same as the present Rule〉 Table 7.5.8 PLATES AND SECTIONS FOR HULL STRUCTURES REQUIRED BY 419. 1 (2) AND 419. 1 (3) Minimum design temperature of hull structure (°C) / Maximum thickness (mm) for steel grades: A, B, D, E, AH, DH, EH, FH 0 and above -5 and above(2) down to -5 down to -10 down to -20 down to -30 Below -30: In accordance with Table 7.5.5a and 7.5.5b except that the thickness limitation given in Table 7.5.5a and 7.5.5b and in note (2) of that table does not apply. 〈Below Same as the present Rule〉	Reflection of Request for Revision of Classification Technical Rules

GUIDANCE RELATING TO RULES FOR CLASSIFICATION OF STEEL SHIPS

(Development Review : External Opinion Inquiry)

Part 7 Chapter 5 Ships Carrying Liquefied Gases in Bulk

2022. 01.

Machinery Rule Development Team

- Main Amendments -

(1) Reflecting Request for Revision of Classification Technical Rules <ships contracted for construction on or after 2022/07/01>

◉ ENP4800-5800-2021 : Interpretation of Stop valves fitted in a protected location

◉ ULS4800-434-2021 : Noation for Reliquefaction and GCU for LPG carrier

◉ MET4600-784-2021 : proto type test as alternative for type approval

- pumps, valves, expansion bellows

◉ ENP4800-6941-2021 : capacity for relief valves fitted at inter-barrier spaces

Present	Amendment	Reason
Section 11 Fire Protection and Fire Extinction	**Section 11 Fire Protection and Fire Extinction**	
1101. <omitted>	**1101. <same as the present Guidance>**	
1102. Fire main and hydrants	**1102. Fire main and hydrants**	
1. Fire pump and fire main 【See Rule】 For the purpose of the requirements in 1102. 1 of the Rules, the minimum pressure at fire hydrant of the fire main is to be not less than 0.5 MPa gauge irrespective whether the fire pump and water main as used as part of water spray system or not.	1. Fire pump and fire main 【See Rule】 For the purpose of the requirements in 1102. 1 of the Rules, the minimum pressure at fire hydrant of the fire main is to be not less than 0.5 MPa gauge irrespective whether the fire pump and water main as used as part of water spray system or not.	
<newly added>	2. Fire pump and fire main 【See Rule】*(2022)* For the purpose of the requirements in 1102. 3 of the Rules, the complete interpretation of the phrase "Stop valves are to be fitted in a protected location" would be that the valve should be located within an accommodation space, service spaces or control station. However, the valve may be located on the open deck aft of the cargo area provided that the valve is located: (1) at least 5 m aft of the aft end of the aftermost cargo tank; or (2) if the above (1) is not practical, within 5 m aft of the aft end of the aftermost cargo tank provided the valve is protected by a permanent steel obstruction.	- Interpretation of stop valves fitted in a protected location has been added to clarify IGC requirements.
2. Nozzles 【See Rule】 For the purpose of the requirements in 1102. 4 of the Rules, all nozzles provided for fire-fighting are to be in accordance with the relevant requirements of Pt 8, Ch 8 of the Rules.	3. Nozzles 【See Rule】 For the purpose of the requirements in 1102. 4 of the Rules, all nozzles provided for fire-fighting are to be in accordance with the relevant requirements of Pt 8, Ch 8 of the Rules.	

Present	Amendment	Reason
Section 5 Process Pressure Vessels and Liquid, Vapour and Pressure Piping Systems	**Section 5 Process Pressure Vessels and Liquid, Vapour and Pressure Piping Systems**	
501. to 512. <omitted>	**501. to 512. <same as the present Guidance>**	
513. Testing requirements	**513. Testing requirements**	
1. Requirements of type tests 【See Rule】 (1) In application to **513. 1** (1) (B) of the Rules, for valves used for isolation of instrumentation in piping not greater than 25 mm, unit production testing need not be witnessed by the surveyor. Records of testing are to be submitted for review. (2) For the purpose of the requirements in **513. 1** (2) of the Rules, all bellows type expansion joints provided on all cargo piping including the cargo liquid/vapour piping provided both inside and outside the tanks, and vent piping with open ends are to be of the approved ones in accordance with open ends are to be type approved. (3) The "procedure as deemed appropriate by the Society" referred to in **513. 1** (1), (2) and (3) of the Rules means the procedure required in **Ch 3, Sec 15** of "Guidance for approval of Manufacturing Process and Type approval, Etc.".	1. Requirements of type tests 【See Rule】 (1) In application to **513. 1** (1) (B) of the Rules, for valves used for isolation of instrumentation in piping not greater than 25 mm, unit production testing need not be witnessed by the surveyor. Records of testing are to be submitted for review. (2) For the purpose of the requirements in **513. 1** (2) of the Rules, all bellows type expansion joints provided on all cargo piping including the cargo liquid/vapour piping provided both inside and outside the tanks, and vent piping with open ends are to be of the approved ones in accordance with open ends are to be type approved. (3) The "procedure as deemed appropriate by the Society" referred to in **513. 1** (1), (2) and (3) of the Rules means the procedure required in **Ch 3, Sec 15** of "Guidance for approval of Manufacturing Process and Type approval, Etc.". In application to this requirement, prototype test in accordance with Ch 3, Sec 15 of the "Guidance for Approval of Manufacturing Process and Type Approval, Etc." may be accepted instead of type approval. *(2022)*	- to accept proto type test as alternative for type approval to be harmonized with IGC Code.
(4) For the purpose of the requirements in **513. 1** of the Rules, relevant requirements in **Annex 1** of **Rules for the Classification of Ships Using Low-flashpoint Fuels.** are to additionally apply.	(4) For the purpose of the requirements in **513. 1** of the Rules, relevant requirements in **Annex 1** of **Rules for the Classification of Ships Using Low-flashpoint Fuels.** are to additionally apply.v	

Present	Amendment	Reason
Section 7 Cargo Pressure/Temperature Control **701. Methods of control** [See Rule] 1. Gas Combustion Units(GCU) For the purpose of the requirements in 701. 1 of the Rules, a gas combustion unit for disposal of boil-off gas is to be comply with the followings. (1) For LNG carriers fitted with a gas combustion unit, the an additional installation notation of GCU may be assigned. (2) A gas combustion unit is consist of the following systems. (A) Gas supply system (a) Compressor (b) Heat exchanger (c) Automatic gas shut-off valves (d) Piping (e) Gas valve unit and venting system (B) Gas burner system (a) Gas burner unit (b) Combustion chamber (c) Forced draft fans (d) Exhaust gas duct	**Section 7 Cargo Pressure/Temperature Control** **701. Methods of control** [See Rule] 1. Gas Combustion Units(GCU) For the purpose of the requirements in 701. 1 of the Rules, a gas combustion unit for disposal of cargo vapour is to be comply with the followings. *(2022)* (1) For ships carrying liquified gas in bulk fitted with a gas combustion unit, the an additional installation notation of GCU may be assigned. *(2022)* (2) A gas combustion unit is consist of the following systems. (A) Gas supply system (a) Compressor (b) Heat exchanger (c) Automatic gas shut-off valves (d) Piping (e) Gas valve unit and venting system (B) Gas burner system (a) Gas burner unit (b) Combustion chamber (c) Forced draft fans (d) Exhaust gas duct	- to add GCU notation for liquified gas carrier other than LNG carrier.

Present	Amendment	Reason
Section 8 Vent System for Cargo Containment	**Section 8 Vent System for Cargo Containment**	
801. General 【See Rule】 <omitted>	**801. General** 【See Rule】 <same as the present Guidance>	
802. Pressure relief systems 【See Rule】	**802. Pressure relief systems** 【See Rule】	
1. Pressure relief system for interbarrier spaces (1)to (2) <omitted> (3) When, as a pressure relief device referred to in the preceding (1), pressure relief valve and rupture disc are provided in combination, they are to conform to the following requirements (A) to (C) for the cargo tank types indicated in the preceding (2) (A) : (A) The capacity of the pressure relief valve is to be sufficient to relieve the maximum supply capacity of the inerting system. (B) Pressure relief valves are to be in accordance with the requirements in the preceding (2) (B) (b). (C) The total capacity of rupture disc and the pressure relief valve in the preceding (A) is to be sufficient to relieve the volume of cargo evaporation in an event of failure of the cargo tank, and the construction is to be as deemed appropriate by the Society.	1. Pressure relief system for interbarrier spaces (1)to (2) <same as the present Guidance> (3) When, as a pressure relief device referred to in the preceding (1), pressure relief valve and rupture disc are provided in combination, they are to conform to the following requirements (A) to (C) for the cargo tank types indicated in the preceding (2) (A) : *(2022)* ~~(A) The capacity of the pressure relief valve is to be sufficient to relieve the maximum supply capacity of the inerting system.~~ (A) Pressure relief valves are to be in accordance with the requirements in the preceding (2) (B) (b). (B) The total capacity of rupture disc and the pressure relief valve ~~in the preceding (A)~~ is to be sufficient to relieve the volume of cargo evaporation in an event of failure of the cargo tank, and the construction is to be as deemed appropriate by the Society.	– to accept rupture disk as equivalent of relief valve
<hereafter omitted>	<hereafter same as the present Guidance>	

- Main Amendments -

(1) Reflecting Request for Revision of Classification Technical Rules <ships contracted for construction on or after 2022/07/01>

◉ MET4600-784-2021 : proto type test as alternative for type approval

- transfer arms and transfer hoses

◉ <reflect new ISO> : test of QCDC

◉ <bunkering manifold> : terms of manifold in case of transfer arms

◉ <opeatiing > : to delete requirements of ERS activation at receiving vessel.

◉ <ERS> : to accept VSD for ERS actication

◉ <table 1, Alarms and ESD actions> : to clarify 'loss of power'

◉ <table 1, Alarms and ESD actions> : amended for effectiveness of safety action

◉ <Monitoring> : to delete requirements for systems of constant monitoring of the position of arms

<table>
<tr><th>Present</th><th>Amendment</th><th>Reason</th></tr>
<tr>
<td>

Annex 7A-3 LNG Bunkering Systems

Section 1 General

101.to 104. <omitted>

105. Codes and standards

The recognized national, international and industrial standards such as the followings may be adequately referred.

Standard No.	Standard Title
OCIMF/SIGTTO	Ship to Ship Transfer Guide(Liquefied Gases)
OCIMF/SIGTTO	Recommendations for Manifolds for Refrigerated Liquefied Gas
ISO 16904	Petroleum and natural gas industries - Design and testing of LNG marine transfer arms for conventional onshore terminals
EN 1474-2	Installation and equipment for liquefied natural gas - Design and testing of marine transfer systems - Design and testing of transfer hoses
EN 1474-3	Installation and equipment for liquefied natural gas - Design and testing of marine transfer systems - Offshore transfer systems
<newly added>	<newly added>
IACS	LNG Bunkering Guidelines
SIGTTO	ESD Arrangements & Linked Ship/ Shore Systems for Liquefied Gas Carriers
IAPH	LNG Bunkering Checklist - Ship to Ship

<hereafter omitted>

</td>
<td>

Annex 7A-3 LNG Bunkering Systems

Section 1 General

101.to 104. <same as the present Guidance>

105. Codes and standards

The recognized national, international and industrial standards such as the followings may be adequately referred.

Standard No.	Standard Title
OCIMF/SIGTTO	Ship to Ship Transfer Guide(Liquefied Gases)
OCIMF/SIGTTO	Recommendations for Manifolds for Refrigerated Liquefied Gas
ISO 16904	Petroleum and natural gas industries - Design and testing of LNG marine transfer arms for conventional onshore terminals
EN 1474-2	Installation and equipment for liquefied natural gas - Design and testing of marine transfer systems - Design and testing of transfer hoses
EN 1474-3	Installation and equipment for liquefied natural gas - Design and testing of marine transfer systems - Offshore transfer systems
ISO 21593	Technical requirements for dry-disconnect/connect couplings for bunkering liquefied natural gas *(2022)*
IACS	LNG Bunkering Guidelines
SIGTTO	ESD Arrangements & Linked Ship/ Shore Systems for Liquefied Gas Carriers
IAPH	LNG Bunkering Checklist - Ship to Ship

<hereafter same as the present Guidance>

</td>
<td>

- added a new ISO standard

</td>
</tr>
</table>

Present	Amendment	Reason
Section 2 Classification Survey during Construction **201. Submission of plans and documents** At the Classification Survey during Construction, the following plans and documents for bunkering systems are to be submitted to the Society before the work is commenced. (1) Plans and documents for approval (A) Power system and Control system diagram (B) Plans showing hazardous area (C) Electric wiring plans and a table of electrical equipment in hazardous area (D) Arrangements and cause and effect diagram for emergency shutdown systems and fire and gas detection systems (E) Piping diagram (F) Strength analysis for supporting structures and foundations for transfer arm (G) Arrangements for Bunker manifold including protection against low-temperature cargo leaks (H) Bunkering operation manual (2) Plans and documents for reference (A) Arrangements for transfers arms or hoses (B) Working envelope diagram for transfer arms (C) Specification for transfer arms or transfer hoses (D) Cause and effect diagram for bunkering control and monitoring systems (E) Gas trial procedure (F) Where VRS notation is assigned, capacity calculation for vapor return systems required in 505. 7	**Section 2 Classification Survey during Construction** **201. Submission of plans and documents** At the Classification Survey during Construction, the following plans and documents for bunkering systems are to be submitted to the Society before the work is commenced. (1) Plans and documents for approval (A) Power system and Control system diagram (B) Plans showing hazardous area (C) Electric wiring plans and a table of electrical equipment in hazardous area (D) Arrangements and cause and effect diagram for emergency shutdown systems and fire and gas detection systems (E) Piping diagram (F) Strength analysis for supporting structures and foundations for transfer arm (G) Arrangements for Bunker manifold including protection against low-temperature cargo leaks (H) Bunkering operation manual (2) Plans and documents for reference *(2022)* (A) Arrangements for transfers arms or hoses (B) Working envelope diagram for transfer arms (C) Specification for transfer arms or transfer hoses ~~(D) Cause and effect diagram for bunkering control and monitoring systems~~ (D) Gas trial procedure (E) Where VRS notation is assigned, capacity calculation for vapor return systems required in 505. 7	- to delete a practical requirement

Present	Amendment	Reason
202. Tests and surveys	**202. Tests and surveys**	
1. Tests of equipment	**1. Tests of equipment**	
(1) Following equipment is to be type approved and tested for each production in accordance with ISO 16904. (A) swivel (B) emergency release system (C) quick connect disconnect coupler	(1) Following equipment which form the transfer arm is to be type approved and tested for each production correspondingly in accordance with ISO 16904. In application to this requirement, prototype test in accordance with ISO 16904 may be accepted instead of type approval. *(2022)* (A) swivel (B) emergency release system (C) hydraulically operated quick connect disconnect coupler	- to accept proto type test as alternative for type approval to be harmonized with ISO.
(2) After assembly, transfer arms are to be tested in accordance with ISO 16904.	(2) After assembly, transfer arms are to be tested in accordance with ISO 16904.	
(3) Transfer hoses are to be type approved and tested for each production in accordance with EN1474-2.	(3) Transfer hoses are to be type approved and tested for each production correspondingly in accordance with EN1474-2. In application to this requirement, prototype test in accordance with EN1474-2 may be accepted instead of type approval. *(2022)*	
<newly added>	(4) Emergency release systems which are not subject to above (1) (B)(i.e. connected to transfer hoses) are to be type approved and tested for each production correspondingly in accordance with ISO 16904. In application to this requirement, prototype test in accordance with ISO 16904 may be accepted instead of type approval. *(2022)*	- to reflect a new ISO.
	(5) Quick connect disconnect couplers which are not subject to above (1) (B)(i.e. connected to transfer hoses) are to be type approved and tested for each production correspondingly in accordance with ISO 21593. In application to this requirement, prototype test in accordance with ISO 21593 may be accepted instead of type approval. *(2022)*	
(4) Hose cranes are to be test in accordance with Pt 9, Ch 2 of the Rules.	(6) Hose cranes are to be test in accordance with Pt 9, Ch 2 of the Rules.	
(5) Pump and valves are to be test in accordance with Ch 5, 513. of the Rules.	(7) Pump and valves are to be test in accordance with Ch 5, 513. of the Rules.	

Present	Amendment	Reason
Section 5 Arrangements and Design of Bunkering Systems	**Section 5 Arrangements and Design of Bunkering Systems**	
501.to 502. <omitted>	**501.to 502. <same as the present Guidance>**	
503. Bunkering manifold	**503. Bunkering manifold**	
	1. Bunkering manifold is fixed pipe assembly mounted on-board to which the bunkering system connects. For the transfer arm, fixed pipe assembly connected to swivel is re-garded as the bunkering manifold. *(2022)*	- clarify terms of bunkering manifold in case of transfer arms
1. Safe working load of the bunkering manifold is to be de-signed to withstand the external loads during bunkering operation.	2. Safe working load of the bunkering manifold is to be de-signed to withstand the external loads during bunkering operation.	
2. Information about maximum safe working load of bunkering connection is to be detailed in the operation manuals and posted at the bunker station.	3. Information about maximum safe working load of bunkering connection is to be detailed in the operation manuals and posted at the bunker station.	
3. Connections for vapor return from the receiving ship are to be provided.	4. Connections for vapor return from the receiving ship are to be provided.	
4. A manually operated stop valve and a remote operated shutdown valve in series, or a combined manually operated and remote valve, are to be fitted in every bunkering line including vapor line close to the manifold connecting point. The remote valve is to be operable from the control location for bunkering operations or another safe location.	5. A manually operated stop valve and a remote operated shutdown valve in series, or a combined manually operated and remote valve, are to be fitted in every bunkering line including vapor line close to the manifold connecting point. The remote valve is to be operable from the control location for bunkering operations or another safe location.	
5. All pipelines or components which may be isolated in a liquid full condition are to be protected with relief valves for thermal expansion and evaporation.	6. All pipelines or components which may be isolated in a liquid full condition are to be protected with relief valves for thermal expansion and evaporation.	
6. Manifold connections not being used for bunker transfer operations are to be blanked with blind flanges suitable for the design pressure.	7. Manifold connections not being used for bunker transfer op-erations are to be blanked with blind flanges suitable for the design pressure.	
	7. Manifold connections not being used for bunker transfer op-erations are to be blanked with blind flanges suitable for the design pressure.	

Present	Amendment	Reason
504. to 506. <omitted>	**504. to 506. <same as the present Guidance>**	
507. Bunker transfer systems	**507. Bunker transfer systems**	
1. to 3. <omitted>	**1. to 3. <same as the present Guidance>**	
4. Emergency release systems are to be in accordance with 603..	**4.** Emergency release systems are to be in accordance with 604..	

Present	Amendment	Reason
Section 6 Control, Monitoring and Safety Systems	**Section 6 Control, Monitoring and Safety Systems**	
601. General	**601. General** *(2022)*	
1. Control, monitoring and safety Systems are to be provided to maintain operations within preset parameters for bunkering operations	1. Control, monitoring and safety Systems are to be provided to maintain operations within preset parameters for bunkering operations	
2. The bunkering control and monitoring system is to be designed so that no single control system component failure or single fault condition is to lead to loss of control of bunkering operations or result in an unsafe situation. A Failure Modes Effects Analysis (FMEA) is to be carried out and documented.	~~2. The bunkering control and monitoring system is to be designed so that no single control system component failure or single fault condition is to lead to loss of control of bunkering operations or result in an unsafe situation. A Failure Modes Effects Analysis (FMEA) is to be carried out and documented.~~	– to delete a practical requirement
3. Control of bunkering is to be possible from a safe location in regard to bunkering operations.	2. Control of bunkering is to be possible from a safe location in regard to bunkering operations.	
4. Safety function for parameter monitored during bunkering operation is to be in accordance with Table 1.	3 Safety function for parameter monitored during bunkering operation is to be in accordance with Table 1.	

Present	Amendment	Reason

Table 1 Alarms and ESD actions during bunkering operation

Parameters	Alarm	Activation of ESD system
High level in the receiving tank	●[1)]	●
LNG leakage in manifold area	●	●
Gas detection in the ducting around the bunkering lines at 30% LEL	●	
Gas detection in the ducting around the bunkering lines at 60% LEL	●	●
Gas detection in enclosed cargo machinery spaces at 30% LEL	●	
Gas detection in enclosed cargo machinery spaces at 60% LEL	●	●
Manual or automatic activation of the emergency shutdown system	●	●
Manual or automatic activation of the emergency release system	●	●
Safe working envelope of the loading arm exceeded	●	●
Electrical power failure	●	●

Note:
1) Signal need not indicate the event initiating ESD.

Table 1 Alarms and ESD actions during bunkering operation *(2022)*

Parameters	Alarm	Activation of ESD system
High level in the receiving tank	●[1)]	●
Gas detection in an enclosed or semi enclosed manifold area at 30% LEL[2)]	●	
Gas detection in an enclosed or semi enclosed manifold area at 60% LEL[2)]		●
Gas detection in the ducting around the bunkering lines at 30% LEL	●	
Gas detection in the ducting around the bunkering lines at 60% LEL	●	●
Gas detection in enclosed cargo machinery spaces at 30% LEL[4)]	●	
Gas detection in enclosed cargo machinery spaces at 60% LEL[4)]	●	●
Manual or automatic activation of the emergency shutdown system	●	●
Manual or automatic activation of the emergency release system	●	●
Safe working envelope of the loading arm exceeded	●	●
Loss of motive power to ESD valves[3)]	●	●

Note:
1) Signal need not indicate the event initiating ESD.
2) Alarm and ESD system are to be manually activated when LNG leakage is observed at open manifold area.
3) ESD valves are to be fail closed type.
4) For cargo machinery spaces containing machinery used in bunkering operation.

Present	Amendment	Reason
602. Monitoring, alarm and control systems 1. Visible and audible alarms are to be provide on bunkering control station. 2. Alarms are to be activated in accordance with **601. 4, Table 1**. 3. Where transfer arms are used as transfer systems, in addition to **601. 4, Table 1**, the followings are be complied with. (1) A system of constant monitoring of the position of arms is to be installed to provide real time information to the operator and receiving ship. (2) For the hydraulic systems of the transfer arm, visible and audible alarms are to be activated in the following cases. (A) low pressure in hydraulic accumulators; (B) abnormal pressure in actuators chambers; (C) low oil level in tank; (D) low nitrogen pressure in accumulators. <newly added>	**602. Monitoring, alarm and control systems** 1. Visible and audible alarms are to be provide on bunkering control station. 2. Alarms are to be activated in accordance with **601. 4, Table 1**. 3. Where transfer arms are used as transfer systems, in addition to **601. 4, Table 1**, the followings are be complied with. *(2022)* ~~(1) A system of constant monitoring of the position of arms is to be installed to provide real time information to the operator and receiving ship.~~ (1) For the hydraulic systems of the transfer arm, visible and audible alarms are to be activated in the following cases. (A) low pressure in hydraulic accumulators; (B) abnormal pressure in actuators chambers; (C) low oil level in tank; (D) low nitrogen pressure in accumulators. 4. For gas leakage detection during bunkering operation, permanently installed gas detection system is to be fitted in; *(2022)* (1) enclosed or semi enclosed manifold area, (2) ducting around the bunkering lines (3) cargo machinery spaces containing machinery used in bunkering operation.	- to delete a practical requirement - to be harmonized with table 1.

Present	Amendment	Reason
604. Emergency release systems 1. Emergency release systems are to be capable of rapidly and automatically disconnecting the transfer system from the ship to protect the transfer system when exceeding design loads in any direction. 2. Emergency release systems are to be composed with emergency release coupling and two self-closing shutoff valves and each valve is fitted at each side of the coupling to minimize cargo leakage when the coupling is activated. 3. Emergency release systems are to be controllable from both bunkering ship and receiving ship. 4. Emergency release systems is to be of powered type and the actuating power is to have reserve storage of energy sufficient for disconnection of all transfer lines in case the main source of actuating power becomes unavailable (e.g. in case of black-out) 5. Emergency release systems is to be capable to be activated manually on local location and at least two remote locations including bunker control station. 6. to 7. 〈omitted〉	**604. Emergency release systems** 1. Emergency release systems are to be capable of rapidly and automatically disconnecting the transfer system from the ship to protect the transfer system when exceeding design loads in any direction. Vessel Separation Device is acceptable as means of activating emergency release systems. *(2022)* 2. Emergency release systems are to be composed with emergency release coupling and two self-closing shutoff valves and each valve is fitted at each side of the coupling to minimize cargo leakage when the coupling is activated. 3. Emergency release systems are to be controllable from ~~both~~ bunkering ship ~~and receiving ship~~. *(2022)* 4. Emergency release systems is to be of powered type and the actuating power is to have reserve storage of energy(e.g. hydraulic power source) sufficient for disconnection of all transfer lines in case the main source of actuating power becomes unavailable(e.g. in case of black-out) *(2022)* 5. Emergency release systems is to be capable to be activated manually on local location and at least two remote locations including bunker control station. 6. to 7. 〈same as the present Guidance〉	- to accept VRC as means of operating ESS - to delete a practical requirement - to clarify reserve stoage of energy.

- Main Amendments -

(1) Reflecting Request for Revision of Classification Technical Rules<ships contracted for construction on or after 2022/07/01>

◉ ENP4800-7783-2021 : construction of exhaust ventilation fan outlet

◉ ENP4800-4688-2021 : DFDE notation for LPG Carrier

Present	Amendment	Reason
Annex 7A-5 Use of LPG Cargo as Fuel **Section 1 General** **<omitted>** **Section 2 Substituted Requirements for Ch 5, Sec 16 of Rules** **201. to 204. <omitted>** **205. Gas fuel plant and related storage tanks** **1. Provision of gas fuel** (1) to (2) <omitted> (3) If the equipment is in an enclosed space, the space is to be ventilated according to **Ch 5, 1201.** of **Rules** and be equipped with a fixed fire extinguishing system, according to **Ch 5, 1105.** of **Rules**, and with a gas detection system according to **Ch 5, 1306.** of **Rules**, as applicable. Ventilation and gas detection are to comply with the followings; (A) Ventilation (a) to (b) <omitted> (c) Ventilation exhaust ducts from gas-dangerous spaces are to discharge upwards. Air outlets and air inlets for hazardous enclosed spaces are to be arranged to prevent exhausted gas from re-entering to the space through air inlets. Satisfaction of this arrangement is to be demonstrated by dispersion analysis, if necessary. <hereafter omitted>	**Annex 7A-5 Use of LPG Cargo as Fuel** **Section 1 General** **<same as the present Guidance>** **Section 2 Substituted Requirements for Ch 5, Sec 16 of Rules** **201. to 204. <same as the present Guidance>** **205. Gas fuel plant and related storage tanks** **1. Provision of gas fuel** (1) to (2) <omitted> (3) If the equipment is in an enclosed space, the space is to be ventilated according to **Ch 5, 1201.** of **Rules** and be equipped with a fixed fire extinguishing system, according to **Ch 5, 1105.** of **Rules**, and with a gas detection system according to **Ch 5, 1306.** of **Rules**, as applicable. Ventilation and gas detection are to comply with the followings; (A) Ventilation (a) to (b) <same as the present Guidance> (c) ~~Ventilation exhaust ducts from gas-dangerous spaces are to discharge upwards.~~ Air outlets and air inlets for hazardous enclosed spaces are to be arranged to prevent exhausted gas from re-entering to the space through air inlets. Satisfaction of this arrangement is to be demonstrated by dispersion analysis, if necessary. *(2022)* <hereafter same as the present Guidance>	- to be harmonized with IGC Code

GUIDANCE RELATING TO RULES FOR CLASSIFICATION OF STEEL SHIPS

(Development Review : External Opinion Inquiry)

Part 7 Chapter 5 Ships Carrying Liquefied Gases in Bulk

2021. 08.

Machinery Rule Development Team

- Main Amendments -

(1) Reflecting Requests for revision of rules <ships contracted for construction on or after 2021/07/01>

◉ ENP4800-1481-2021 : PRV of cargo piping

◉ ENP4800-2612-2021 : backflow prevention of cargo vapour

◉ <reflecting new ISO> : Survey of QCDC

Present	Amendment	Reason
Section 5 Process Pressure Vessels and Liquid, Vapour and Pressure Piping Systems	**Section 5 Process Pressure Vessels and Liquid, Vapour and Pressure Piping Systems**	
501. <omitted>	**501. <same as the present>**	
502. System requirements [See Rule]	**502. System requirements [See Rule]**	
1. Segregation of cargo piping	1. Segregation of cargo piping *(2022)*	
(1) For the purpose of the requirements in 502. 2 (1) (A) of the Rules, combinations of a screw-down check valve and a check valve or of a spectacle flange and a stop valve are to be provided at the inter-connections of cargo or cargo vapour lines and inert gas lines necessary for the operation. (See Fig 7.5.26-1 of the Guidance)	~~(1) For the purpose of the requirements in 502. 2 (1) (A) of the Rules, combinations of a screw-down check valve and a check valve or of a spectacle flange and a stop valve are to be provided at the inter-connections of cargo or cargo vapour lines and inert gas lines necessary for the operation. (See Fig 7.5.26-1 of the Guidance)~~	

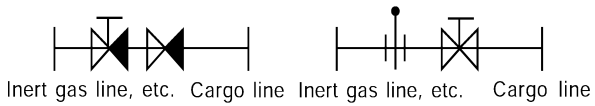
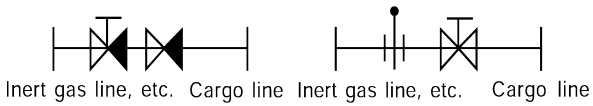

	

Fig 7.5.26-1 Segregation of cargo piping	~~**Fig 7.5.26-1 Segregation of cargo piping**~~	
(2) The screw-down check valve specified in the preceding (1) may be replaced with a combination of check valve and stop valve. Further, the spectacle flange may be replaced with a spool piece.	~~(2) The screw-down check valve specified in the preceding (1) may be replaced with a combination of check valve and stop valve. Further, the spectacle flange may be replaced with a spool piece.~~	
(3) "Vertical trunk-way" referred to in the requirements in 502. 2 (1) (C) of the Rules is to comply with the following requirements (A) through (G) :	(1) "Vertical trunk-way" referred to in the requirements in 502. 2 (1) (C) of the Rules is to comply with the following requirements (A) through (G) :	
<hereafter same as the present>	<hereafter same as the present>	

Present	Amendment	Reason
503. to 504. <omitted>	**503. to 504. <same as the present>**	
505. Cargo system valve requirements	**505. Cargo system valve requirements**	
1. to 2. <omitted>	**1. to 2.** <same as the present>	
3. "All pipelines or components which may be isolated in a liquid full condition" referred to in the requirements in **505. 6** of the Rules means, for example, those pipelines given in the following: **【See Rule】** (1) Pipeline between two adjacent stop valves. (2) Pipeline between stop valve and compressor or pump likely to be liquid full. However, where the relief valve mounted on the compressor or pump is in effective condition, this requirement may be dispensed with. (3) For the pipeline indicated in the preceding **3**, a relief valve is to be provided irrespective of its design pressure. *(2017)*	**3.** "All pipelines or components which may be isolated in a liquid full condition" referred to in the requirements in **505. 6** of the Rules means, for example, those pipelines given in the following: **【See Rule】** (1) Pipeline between two adjacent stop valves. (2) Pipeline between stop valve and compressor or pump likely to be liquid full. However, where the relief valve mounted on the compressor or pump is in effective condition, this requirement may be dispensed with. (3) For the pipeline indicated in the preceding **3**, a relief valve is to be provided irrespective of its design pressure. However for the pipelines or components which may be isolated with a liquid volume of less than 0.05 m^3 entrapped, where installation of a relief valve is impractical due to small space between stop valves or stop valve are normal open with caution plate, a relief valve may not be provided. *(2022)*	
<hereafter same as the present>	<hereafter same as the present>	

Present	Amendment	Reason
506. to 512. <omitted>	**506. to 512. <same as the present>**	
513. Testing requirements	**513. Testing requirements *(2022)***	
1. to 2. <omitted>	1. to 2. <same as the present>	
3. Leak test	~~3. Leak test~~	
For the purpose of the requirements in 513. 2 (3) of the Rules, the leak test of pipelines is to be conducted at a pressure of 90 % of the design pressure of the pipings, The test pressure may be modified, when test is conducted with a liquid of high leak detecting ability.	~~For the purpose of the requirements in 513. 2 (3) of the Rules, the leak test of pipelines is to be conducted at a pressure of 90 % of the design pressure of the pipings, The test pressure may be modified, when test is conducted with a liquid of high leak detecting ability.~~	
4. <omitted>	3. <same as the present>	
<hereafter same as the present>	<hereafter same as the present>	

GUIDANCE RELATING TO RULES FOR CLASSIFICATION OF STEEL SHIPS

(Development Review : External Opinion Inquiry)

Part 7 Chapter 5 Ships Carrying Liquefied Gases in Bulk

2021. 04.

Machinery Rule Development Team

- Main Amendments -

(1) Reflecting IACS UI GCs <ships contracted for construction on or after 2021/07/01>

◉ UI GC32 (New Feb 2021) : design pressure of the outer pipe or duct

◉ UI GC33 (New Feb 2021) : Cargo sampling

◉ UI GC34 (New Feb 2021) : Cargo Filters

◉ UI GC35 (New Feb 2021) : Inhibition of Cargo Pump Operation and Opening of Manifold ESD valves with Level Alarms Overridden

◉ UI GC37 (New Feb 2021) : Suitable Pressure Relief System for Air Inlet, Scavenge Spaces, Exhaust System and Crank Case

(2) Location of ESD2 operation <ships contracted for construction on or after 2021/07/01>

- Requirements for activation location of ESD2

Present	Amendment	Reason
Section 5 Process Pressure Vessels and Liquid, Vapour and Pressure Piping Systems	**Section 5 Process Pressure Vessels and Liquid, Vapour and Pressure Piping Systems**	
501. to 503. <omitted>	**501. to 503. <same as the present Guidance>**	
504. Design pressure [See Rule]	**504. Design pressure [See Rule]**	
1. For the purpose of the requirements in 504. 2 of the Rules, where design vapour temperature higher or lower than 45°C is employed, the requirements in 401. 2 of the Rules apply.	1. For the purpose of the requirements in 504. 2 of the Rules, where design vapour temperature higher or lower than 45°C is employed, the requirements in 401. 2 of the Rules apply.	
<newly added>	2. For the purpose of the requirements in 504. 4 of the Rules, the expression "design pressure of the outer pipe or duct" is either of the following: *(2021)* (1) the maximum pressure that can act on the outer pipe or equipment enclosure after the inner pipe rupture as documented by suitable calculations taking into account the venting arrangements; or (2) for gas fuel systems with inner pipe working pressure greater than 1 MPa, the "maximum built-up pressure arising in the annular space", after the inner pipe rupture, which is to be calculated in accordance with **Ch 9, 802. of Rules for the Classification of Ships Using Low-flashpoint Fuels.**	<UI GC32 (New Feb 2021)>
505. to 512. <omitted>	**505. to 512. <same as the present Guidance>**	
513. Testing requirements	**513. Testing requirements**	
1. to 3. <omitted>	1. to 3. <same as the present Guidance>	
<newly added>	4. Pressure test For the purpose of the requirements in 513. 2 (4) of the Rules, the expression "maximum pressure at gas pipe rupture" is the maximum pressure to which the outer pipe or duct is subjected after the inner pipe rupture and for testing purposes it is the same as the design pressure used in 504. 4 of the Rules. *(2021)*	
4. <omitted>	5. <same as the present Guidance>	

Present	Amendment	Reason
506. Cargo transfer arrangements 【See Rule】	**506. Cargo transfer arrangements** 【See Rule】	
1. to 4. <omitted>	**1. to 4.** <same as the present Guidance>	
<newly added>	5. 506. 5 of the Rules is only applicable if such a sampling system is fitted on board. Connections used for control of atmosphere in cargo tanks during inerting or gassing up are not considered as cargo sampling connections. *(2021)*	<UI GC33 (New Feb 2021)>
	6. For the purpose of the requirements in 506. 6 of the Rules, means to indicate that filters are becoming blocked and filter maintenance is required is to be provided for fixed in-line filter arrangement and portable filter installations where dedicated filter housing piping is provided. Where portable filters for fitting to manifold presentation flanges are used without dedicated filter housing, and these can be visually inspected after each loading and discharging operation, no additional arrangements for indicating blockage or facilitating drainage are required. *(2021)*	< UI GC34 (New Feb 2021)>
<hereafter omitted>	<hereafter same as the present Guidance>	
Section 18 Operating Requirements	**Section 18 Operating Requirements**	
<newly added>	**1809. Cargo sampling**	
	1. 1809. of the Rules is only applicable if such a sampling system is fitted on board. Connections used for control of atmosphere in cargo tanks during inerting or gassing up are not considered as cargo sampling connections.	<UI GC33 (New Feb 2021)>
1810. Cargo emergency shutdown (ESD) system	**1810. Cargo emergency shutdown (ESD) system**	
1. <omitted>	**1. <same as the present Guidance>**	
<newly added>	2. In applying "operation of cargo pumps and the opening of manifold ESD valves is to be inhibited" of **note 4** of **Table 7.5.12**, a hardware system such as an electric or mechanical interlocking device is to be provided to prevent inadvertent operation of cargo pumps and inadvertent opening of manifold ESD valves. *(2021)*	<UI GC35 (New Feb 2021)>
<hereafter omitted>	<hereafter same as the present Guidance>	

Present	Amendment	Reason
Section 16 Use of Cargo as Fuel	**Section 16 Use of Cargo as Fuel**	
1606. <omitted>	**1606. <same as the present Guidance>**	
1607. Special requirements for gas-fired internal combustion engines [See Rule]	**1607. Special requirements for gas-fired internal combustion engines [See Rule]**	
1. For the purpose of the requirements in 1607. of the Rules, dual-fuel diesel engines utilizing Methane gas as fuel(hereinafter referred to as DFD engines) are to comply with the followings. (1) For LNG carriers fitted with DFD engines, the an additional installation notation of DFDE may be assigned. (2) Control and safety systems of DFD engines are to comply with Pt 5, Annex 5-7 of the Guidance.	1. For the purpose of the requirements in 1607. of the Rules, dual-fuel diesel engines utilizing Methane gas as fuel(hereinafter referred to as DFD engines) are to comply with the followings. (1) For LNG carriers fitted with DFD engines, the an additional installation notation of DFDE may be assigned. (2) Control and safety systems of DFD engines are to comply with Pt 5, Annex 5-7 of the Guidance.	
<newly added>	2. A suitable pressure relief system for air inlet manifolds, scavenge spaces and exhaust system is to be provided unless designed to accommodate the worst-case overpressure due to ignited gas leaks or justified by the safety concept of the engine. A detailed evaluation regarding the hazard potential of overpressure in air inlet manifolds, scavenge spaces and exhaust system is to be carried out and reflected in the safety concept of the engine. In the case of crankcases, the explosion relief valves, as required by 1607. 1 (4) of the Rules, are to be considered suitable for the gas operation of the engine. For engines not covered by said Regulation, a detailed evaluation regarding the hazard potential of fuel gas accumulation in the crankcase is to be carried out. *(2021)*	<UI GC37 (New Feb 2021)>
2. For the purpose of the requirements in 1607. 3 (3) of the Rules, gas detection for crankcases may be installed in crankcase vent.	3. For the purpose of the requirements in 1607. 3 (3) of the Rules, gas detection for crankcases may be installed in crankcase vent.	
<hereafter omitted>	<hereafter same as the present Guidance>	

Present	Amendment	Reason
Annex 7A-3 LNG Bunkering Systems	**Annex 7A-3 LNG Bunkering Systems**	
Section 1 to Section 5 **<omitted>**	**Section 1 to Section 5** **<same as the present Guidance>**	
Section 6 Control, Monitoring and Safety Systems	**Section 6 Control, Monitoring and Safety Systems**	
601. to 603. <omitted>	**601. to 603. <same as the present Guidance>**	
604. Emergency release systems	**604. Emergency release systems *(2021)***	
1. to 2. <omitted>	**1. to 2.** <same as the present Guidance>	
3. Emergency release systems are to be controllable from both bunkering ship and receiving ship.	~~**3.** Emergency release systems are to be controllable from both bunkering ship and receiving ship.~~	- Not to require ESD 2 to be activated on receiving vessels.
4. to 7. <omitted>	**3. to 6.** <same as the present Guidance>	
<hereafter omitted>	<hereafter same as the present Guidance>	

GUIDANCE RELATING TO RULES FOR CLASSIFICATION OF STEEL SHIPS

(Development Review : External Opinion Inquiry)

Part 7 Chapter 5 Ships Carrying Liquefied Gases in Bulk

2021. 03.

Machinery Rule Development Team

- Main Amendments -

(1) Reflecting Request from Ulsan branch office <ships contracted for construction on or after 2021/07/01>

◉ to add notation(DFDE) for ships fitted with LPG dual fuel diesel engine

Present	Amendment	Reason
Annex 7A-5 Use of LPG Cargo as Fuel	**Annex 7A-5 Use of LPG Cargo as Fuel**	
Section 1 General	**Section 1 General**	
<omitted>	<same as the present Guidance>	
Section 2 Substituted Requirements for Ch 5, Sec 16 of Rules	**Section 2 Substituted Requirements for Ch 5, Sec 16 of Rules**	
201.to 206. <omitted>	**201.to 206. <same as the present Guidance>**	
207. Special requirements for gas-fired internal combustion engines	**207. Special requirements for gas-fired internal combustion engines**	
Dual fuel engines are those that employ LPG fuel (with pilot oil) and oil fuel. Oil fuels may include distillate and residual fuels. LPG only engines are those that employ LPG fuel only.	Dual fuel engines are those that employ LPG fuel (with pilot oil) and oil fuel. Oil fuels may include distillate and residual fuels. LPG only engines are those that employ LPG fuel only.	
1. to 3. **<omitted>**	1. to 3. **<same as the present Guidance>**	- to add notation(DFDE) for ships fitted with LPG dual fuel diesel engine
	4. For LPG carriers fitted with dual-fuel diesel engines utilizing LPG cargo as fuel, the an additional installation notation of DFDE(LPG) may be assigned. *(2021)*	
<newly added>		
<hereafter omitted>	<hereafter same as the present Guidance>	

Present	Amendment	Reason
Section 16 Use of Cargo as Fuel	**Section 16 Use of Cargo as Fuel**	
1606. Special requirements for main boilers [See Rule]	**1606. Special requirements for main boilers [See Rule]**	
<omitted>	<same as the present Guidance>	
1607. Special requirements for gas-fired internal combustion engines [See Rule]	**1607. Special requirements for gas-fired internal combustion engines [See Rule]**	
1. For the purpose of the requirements in 1607. of the Rules, dual-fuel diesel engines utilizing Methane gas as fuel(hereinafter referred to as DFD engines) are to comply with the followings.	1. For the purpose of the requirements in 1607. of the Rules, dual-fuel diesel engines utilizing Methane gas as fuel(hereinafter referred to as DFD engines) are to comply with the followings.	
(1) For LNG carriers fitted with DFD engines, the an additional installation notation of DFDE may be assigned.	(1) For LNG carriers fitted with DFD engines, the an additional installation notation of DFDE(LNG) may be assigned.*(2021)*	- to distinguish DFDE notation from DFDE(LPG)
(2) Control and safety systems of DFD engines are to comply with Pt 5, Annex 5-7 of the Guidance.	(2) Control and safety systems of DFD engines are to comply with Pt 5, Annex 5-7 of the Guidance.	
2. For the purpose of the requirements in 1607. 3 (3) of the Rules, gas detection for crankcases may be installed in crankcase vent.	2. For the purpose of the requirements in 1607. 3 (3) of the Rules, gas detection for crankcases may be installed in crankcase vent.	
<hereafter omitted>	<hereafter same as the present Guidance>	

Revised Guidance Relating to the Rules for the Classification of Steel Ships

(Development Review : Final)

Part 7 Ships of Special Service

2022. 7.

Machinery Rule Development Team

Effective Date : 1 July 2021

(The contract date for ship construction)

Present	Amendment	Remark
CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK	**CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK**	
Section 1 - 12 〈same as the present Rules〉	**Section 1 - 12 〈same as the present Rules〉**	
Section 13 Instrumentation and Automation Systems	**Section 13 Instrumentation and Automation Systems**	
1301. - 1304. 〈same as the present Rules〉	**1301. - 1304. 〈same as the present Rules〉**	
1306. Gas detection	**1306. Gas detection**	
〈Newly added〉	1. For the purpose of the requirements in 1309. 3 of the Rules, two oxygen sensors are to be positioned at appropriate locations in the space or spaces containing the inert gas system, in accordance with paragraph 15.2.2.4.5.4 of the FSS Code, for all gas carriers, irrespective of the carriage of cargo indicated by an "A" in column "f" in the table in chapter 19 of the Code. *(2021)*	(Newly added) - In reflection of IACS UR GC36 (New), arrangement requirements of oxygen sensor for the space or spaces containing the inert gas system have been newly added.
1. - 3. 〈same as the present Rules〉	~~1. - 3.~~ 2. - 4. 〈same as the present Rules〉	
1307. - 1309. 〈same as the present Rules〉	**1307. - 1309. 〈same as the present Rules〉**	
Section 15 - 19 〈same as the present Rules〉	**Section 15 - 19 〈same as the present Rules〉**	

Amendments of the Guidance Relating to the Rules for Classification of Steel Ships

(For External opinion inquiry)

Pt. 7 Chapter 6 - Ships Carrying Dangerous Chemicals in Bulk

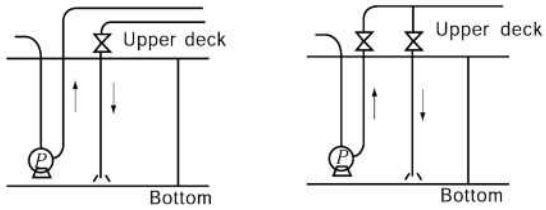
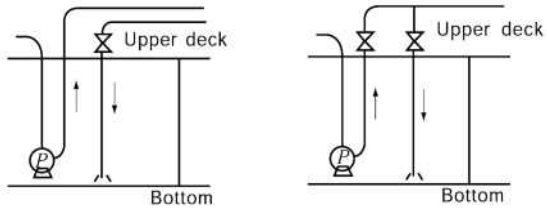
2022.1.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 July 2022 (based on contract date for construction)

◉ reflected of ENP4500-3335-2021

Present	Amendment	Note
Section 5 Cargo Transfer **506. Cargo transfer control systems 【See Rule】** **1. General** (1) 〈Omitted〉 (2) Stop valve is not required at the deck penetration of the discharge piping of deep well pump or submerged pump provided independently in each tank, but a stop valve is to be provided near at each penetration of weather deck as given in Fig **7.6.31** of the Guidance for the direct cargo filling line(piping capable of filling cargo without being led through the cargo pump).  **Fig. 7.6.31** (3) When the "direct cargo filling line" specified in the preceding (2) is provided, the open end of such direct cargo filling line for highly flammable and/or toxic chemicals is to be extended to not more than 10 cm above the tank top or sump surface or the filling pipe radius, whichever is the greater. 〈Omitted below〉	**Section 5 Cargo Transfer** **506. Cargo transfer control systems 【See Rule】** **1. General** (1) 〈Omitted〉 (2) Stop valve is not required at the deck penetration of the discharge piping of deep well pump or submerged pump provided independently in each tank, but a stop valve is to be provided near at each penetration of weather deck as given in Fig **7.6.31** of the Guidance for the direct cargo filling line(piping capable of filling cargo without being led through the cargo pump).  **Fig. 7.6.31** (3) When the "direct cargo filling line" specified in the preceding (2) is provided, the open end of such direct cargo filling line for ~~highly~~ flammable and/or toxic chemicals is to be extended to not more than 10 cm above the tank ~~top~~ bottom or sump surface or the filling pipe radius, whichever is the greater. *(2022)* 〈Omitted below〉	- reflected of EN P4500-3335-2021

Amendments of the Guidance Relating to the Rules for Classification of Steel Ships

(external opinion inquiry)

Pt. 7 Ships of Special Service

2021.01.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 July 2021 (based on contract date for construction)

- ◉ Reflection of ENP-4500-5106-2020 (Environment & Piping Team)
- ◉ Reflection of ENP-4500-5071-2020 (2020.7.2., Environment & Piping Team)
- ◉ Reflection of Res.MSC.460(101) IBC Code Amendments
- ◉ Reflection of Res.MEPC.318(74) IBC Code Amendments

Present

Section 5 Cargo Transfer

501. ~ 503. 〈omitted〉

504. Tests requirements for piping 【See Rule】

1. Application

The classification standard and test requirements for cargo piping are to be in accordance with **Tables 7.6.3** and **7.6.4** of the Guidance.

Table 7.6.3

Ship type	Classification of applicable cargo (See **Table 7.6.4** of the Guidance)	Remark
Type 1	Class I pipes	Irrespective of the design pressure and temperature, the requirements in the left-hand column apply, as a standard. For compatibility between cargo and cargo piping materials, separate investigation is to be made.
Type 2	Class II pipes	
Type 3	Class III pipes	

Notes :
(1) Cargo piping means the piping to transfer liquid cargo and vapour cargo.
(2) Cargo piping for slop tanks arranged in accordance with the requirements of ship type 3 is to be classified into Class III irrespective of the ship type requirements for cargo contained in slop tanks.
(3) Cargo piping passing through the tanks cargo with higher ship type requirements is to comply with the requirements of the piping specified for such cargo.
(4) Open ended pipes(drains, overflows, vents, etc.) belong to Class Ⅲ.

Amendment

Section 5 Cargo Transfer

501. ~ 503. 〈same as the present〉

504. Tests requirements for piping 【See Rule】

1. Application

The classification standard and test requirements for cargo piping are to be in accordance with **Tables 7.6.3** and **7.6.4** of the Guidance.

Table 7.6.3

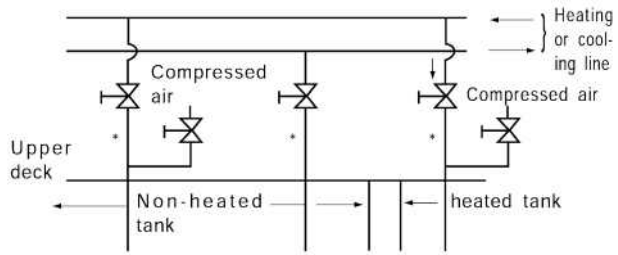
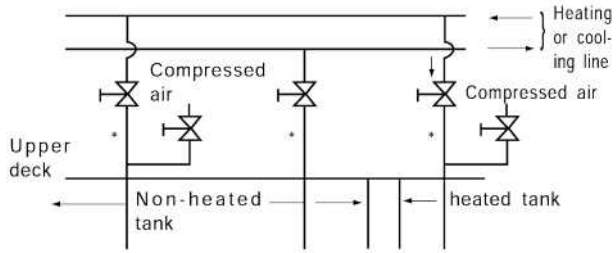
Ship type	Classification of applicable cargo (See **Table 7.6.4** of the Guidance)	Remark
Type 1	Class I pipes	Irrespective of the design pressure and temperature, the requirements in the left-hand column apply, in principle. For compatibility between cargo and cargo piping materials, separate investigation may be made.
Type 2	Class II pipes	
Type 3	Class III pipes	

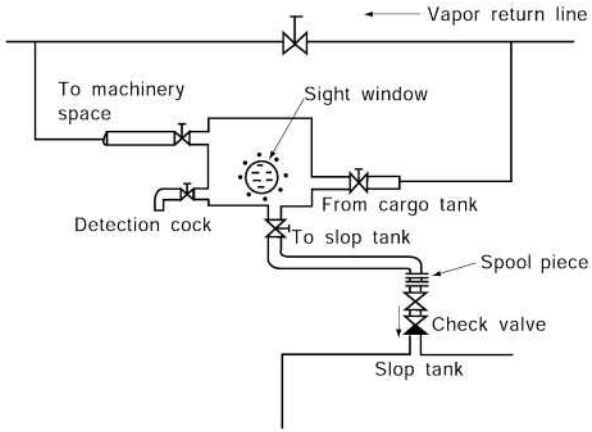
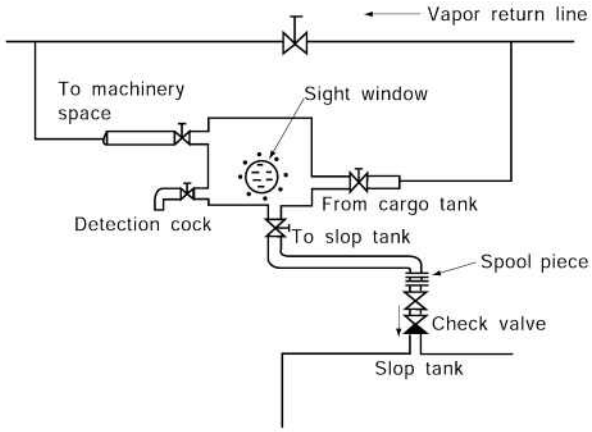
Notes :
(1) Cargo piping means the piping to transfer liquid cargo and vapour cargo.
(2) Cargo piping for slop tanks arranged in accordance with the requirements of ship type 3 is to be classified into Class III irrespective of the ship type requirements for cargo contained in slop tanks.
(3) Cargo piping passing through the tanks cargo with higher ship type requirements is to comply with the requirements of the piping specified for such cargo.
(4) Open ended pipes(drains, overflows, vents, etc.) belong to Class Ⅲ.

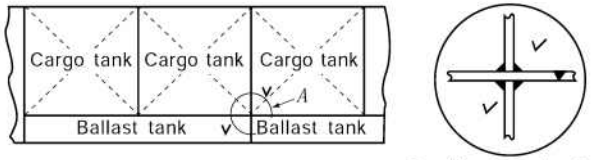
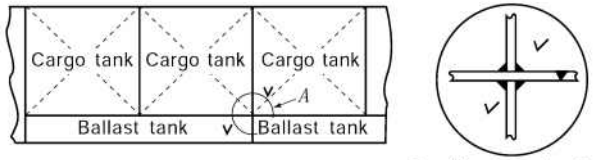
Note

(amendment)

- Reflected ENP4500-5106-2020

Present	Amendment	Note
Section 7 Cargo Temperature Control **701. General** **1. ~ 4. 〈omitted〉**  * For the heating (cooling) lines led to tanks where water prohibiting cargoes are carried, spool pieces are to be provided on the tank side the stop valve. * Where the cargo causing harmful reaction with the thermal medium is carried, the heating (cooling) lines are to be emptied, dried and gases are to be filled before cargo loading.	**Section 7 Cargo Temperature Control** **701. General** **1. ~ 4. 〈same as the present〉**  * For the heating (cooling) lines led to tanks where water prohibiting cargoes are carried, isolating means are to be provided on the tank side the stop valve. * Where the cargo causing harmful reaction with the thermal medium is carried, the heating (cooling) lines are to be emptied, dried and gases are to be filled before cargo loading.	(amendment) - It is identified as excessive requirement compared to other Society

Present	Amendment	Note
5. Circuit operated with heating or cooling medium (1) 〈omitted〉 (2) "where the medium is sampled to check for the presence of cargo" referred to in **701. 6** (3) of the Rules is to be of the detection tank fitted with a detection cock as given in Fig **7.6.33** of the Guidance, as a standard. Although provision of a oil observation tank in the machinery space is required for ordinary tankers according to the requirements in **Pt 7, Ch 1, 1002. 9** of the Rules, in the case of carriers carrying dangerous chemicals in bulk, provision in the machinery space is not permitted and such means is to be provided on the weather deck within the cargo area without exception. Means of detection is to be by an effective toxic gas-detecting tube or suitable testing agent. The suitable testing agent is to have been procured from the manufacturer.  **Fig. 7.6.33**	**5. Circuit operated with heating or cooling medium** (1) 〈same as the present〉 (2) "where the medium is sampled to check for the presence of cargo" referred to in **701. 6** (3) of the Rules is to be of the detection tank fitted with a detection cock as given in Fig **7.6.33** of the Guidance for example. Although provision of a oil observation tank in the machinery space is required for ordinary tankers according to the requirements in **Pt 7, Ch 1, 1002. 9** of the Rules, in the case of carriers carrying dangerous chemicals in bulk, provision in the machinery space is not permitted and such means is to be provided on the weather deck within the cargo area without exception. Means of detection is to be by an effective toxic gas-detecting tube or suitable testing agent. The suitable testing agent is to have been procured from the manufacturer.  **Fig. 7.6.33**	(amendment) - It is identified as excessive require ment compared to other Society

Present	Amendment	Note
Section 15 Special Requirements **1516. Cargo contamination** **1. 〈omitted〉** **2. No contamination with water** (1) The "permanent ballast or water tanks unless the tanks are empty or dry" referred to in **1516. 2** (3) of the Rules means that the tank casings, frames, etc. are free from attachments of water droplets or from moistened condition. In the cargo tanks adjacent to permanent ballast or water tanks not maintained in dry condition, no cargo to which the requirements in **1516. 2** of the Rules apply is to be carried. In this case, none of linear contacts and point contacts are accepted. However, the cross welding such as Fig **7.6.45** may be accepted.  Fig. 7.6.45 Details of section A (2) Where cargo that reacts dangerously with water is carried in the cargo tank adjacent to ballast tanks, the ballast tank is to be fitted with detachable spool pieces (at outside the tank, e.g. pump room, etc.), the said detachable spool pieces are to be removed after discharging the ballast, and then the open ends are to be blanked off. In this case, the ballast tanks are to be made in dry condition and, at the same time, it is to be ensured that there is no possibility of introducing ballast water thereto by erroneous operation. With permanent ballast tanks not in dry condition or cargo tanks adjacent to water tanks, the carriage of cargo to which the requirements in **1516. 2** of the Rules apply is not allowed. In this case, both linear contacts and point contacts may be not accepted. However, the cross welding such as Fig **7.6.45** may be accepted. However, the linear contacts and point contacts divided into the cross welding such as Fig **7.6.45** may be accepted.	**Section 15 Special Requirements** **1516. Cargo contamination** **1. 〈omitted〉** **2. No contamination with water** (1) The "permanent ballast or water tanks unless the tanks are empty or dry" referred to in **1516. 2** (3) of the Rules means that the tank casings, frames, etc. are free from attachments of water droplets or from moistened condition. In the cargo tanks adjacent to permanent ballast or water tanks not maintained in dry condition, no cargo to which the requirements in **1516. 2** of the Rules apply is to be carried. In this case, none of linear contacts and point contacts are accepted. However, the linear contacts and point contacts divided into the cross welding such as Fig **7.6.45** may be accepted.  Fig. 7.6.45 Details of section A (2) Where cargo that reacts dangerously with water is carried in the cargo tank adjacent to ballast tanks, the ballast tank is to be made in dry condition ~~fitted with detachable spool pieces (at outside the tank, e.g. pump room, etc.), the said detachable spool pieces are to be removed after discharging the ballast, and then the open ends are to be blanked off. In this case, the ballast tanks are to be made in dry condition~~ and, at the same time, it is to be ensured that there is no possibility of introducing ballast water thereto by erroneous operation. ~~With permanent ballast tanks not in dry condition or cargo tanks adjacent to water tanks, the carriage of cargo to which the requirements in **1516. 2** of the Rules apply is not allowed. In this case, both linear contacts and point contacts may be not accepted. However, the cross welding such as Fig **7.6.45** may be accepted. However, the linear contacts and point contacts divided into the cross welding such as Fig **7.6.45** may be accepted~~	(amendment) - It is identified as excessive requirement compared to other Society

Present	Amendment	Note
Section 17 Summary of Minimum Requirements In application to **1** of the Rules, "The Guidance specified separatedly" means the Annex 7B-1 of this Guidance. **【See Rule】** **Section 18 List of products to which the Code does not apply** In application to **6** of the Rules, "The Guidance specified separatedly" means the Annex 7B-2 of this Guidance. **【See Rule】** **Section 19 Index of Products Carried in Bulk** "The Guidance specified separatedly" means the Annex 7B-3 of this Guidance. **【See Rule】** **Section 21 Criteria for assigning carriage requirements for products subject to the IBC Code** "The Guidance specified separatedly" means the Annex 7B-4 of the Guidance. **【See Rule】** ⚓	~~**Section 17 Summary of Minimum Requirements**~~ ~~In application to **1** of the Rules, "The Guidance specified separatedly" means the Annex 7B-1 of this Guidance. **【See Rule】**~~ ~~**Section 18 List of products to which the Code does not apply**~~ ~~In application to **6** of the Rules, "The Guidance specified separatedly" means the Annex 7B-2 of this Guidance. **【See Rule】**~~ ~~**Section 19 Index of Products Carried in Bulk**~~ ~~"The Guidance specified separatedly" means the Annex 7B-3 of this Guidance. **【See Rule】**~~ ~~**Section 21 Criteria for assigning carriage requirements for products subject to the IBC Code**~~ ~~"The Guidance specified separatedly" means the Annex 7B-4 of the Guidance. **【See Rule】** ⚓~~	(amendment) - These annexes are mentioned in the rules directly, and these guidances have been deleted.

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Acetic acid	Z	S/P	3	2G	Cont	No	T1	IIA	No	C	F	AC	Yes	1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 1517, 1519, 16.2.9
Acetic anhydride	Z	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AC	Yes	1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 15.12.3, 15.12.4, 1519.6
Acetochlor	X	S/P	2	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.6, 16.2.9
Acetone cyanohydrin	Y	S/P	1	1G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 15.13, 1517, 1519, 16.6.1, 16.6.2, 16.6.3
Acetonitrile	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Acetonitrile (Low purity grade)	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Acid oil mixture from soya bean, corn (maize) and sunflower oil refining	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Acrylamide solution (50% or less)	Y	S/P	3	2G	Cont	No			NF	C	T	No	No	15.12, 15.13, 1517, 1519, 16.2.9, 16.6.1
Acrylic acid	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 15.12.3, 15.12.4, 15.13, 1517, 1519, 16.2.9, 16.6.1
Acrylic acid/ethenesulphonic acid copolymer with phosphonate groups, sodium salt solution	Z	P	3	2G	Open	No			Yes	O	No	ABC	No	
Acrylonitrile	Y	S/P	2	2G	Cont	No	T1	IIB	No	C	FT	AC	Yes	15.12, 15.13, 1517, 1519
Acrylonitrile-Styrene copolymer dispersion in polyether polyol	Y	P	3	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6
Adiponitrile	Z	S/P	2	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
Alachlor technical (90% or more)	X	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519.6, 16.2.9
Alcohol (C9-C11) poly (2.5-9) ethoxylate	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Alcohol (C6-C17) (secondary) poly(3-6) ethoxylates	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
Alcohol (C6-C17) (secondary) poly(7-12) ethoxylates	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.6, 16.2.9
Alcohol (C10-C18) poly(7) ethoxylate	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Alcohol (C12-C16) poly(1-6) ethoxylates	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Alcohol (C12-C16) poly(20+) ethoxylates	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Alcohol (C12-C16) poly(7-19) ethoxylates	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
Alcohols (C13+)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.9
Alcohols (C12+), primary, linear	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Alcohols (C8-C11), primary, linear and essentially linear	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Alcohols (C12-C13), primary, linear and essentially linear	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Alcohols (C14-C18), primary, linear and essentially linear	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6
Alkanes (C6-C9)	X	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	AC	No	15.12, 1517, 1519.6
Iso- and cyclo-alkanes (C10-C11)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
Iso- and cyclo-alkanes (C12+)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
n-Alkanes (C9-C11)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	ABC	No	1519.6
n-Alkanes (C10 - C20)	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Alkaryl polyethers (C9-C20)	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519, 16.2.6
Alkenoic acid, polyhydroxy ester borated	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6
Alkenyl (C11+) amide	X	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Alkenyl (C16-C20) succinic anhydride	Z	S/P	3	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519
Alkyl acrylate/vinylpyridine copolymer in toluene	Y	S/P	2	2G	Cont	No	T1	IIB	No	C	FT	ABC	No	15.12, 1517, 1519.6, 16.2.9
Alkylaryl phosphate mixtures (more than 40% Diphenyl tolyl phosphate, less than 0.02% ortho-isomers)	X	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6
Alkylated (C4-C9) hindered phenols	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Alkylbenzene, alkylindane, alkylindene mixture (each C12-C17)	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Alkyl benzene distillation bottoms	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6
Alkylbenzene mixtures (containing at least 50% of toluene)	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 1517, 1519.6
Alkylbenzenes mixtures (containing naphthalene)	X	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 1517, 1519.6
Alkyl (C3-C4) benzenes	Y	S/P	2	2G	Cont	No	T1	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
Alkyl (C5-C8) benzenes	X	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Alkyl (C9+)benzenes	Y	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6
Alkyl (C11-C17) benzene sulphonic acid	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6
Alkylbenzene sulphonic acid, sodium salt solution	Y	S/P	2	2G	Cont	No	-	-	NF	C	T	No	Yes	15.12, 1517, 1519, 16.2.6, 16.2.9
Alkyl/cyclo (C4-C5) alcohols	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Alkyl (C10-C15, C12 rich) phenol poly (4-12) ethoxylate	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6
Alkyl (C12+) dimethylamine	X	S/P	1	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 1517, 1519
Alkyl dithiocarbamate (C19-C35)	Y	P	3	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Alkyldithiothiadiazole (C6-C24)	Y	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	1519.6, 16.2.6
Alkyl ester copolymer (C4-C20)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Alkyl (C7-C9) nitrates	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519, 15.20, 16.6.1, 16.6.2, 16.6.3
Alkyl (C8-C10)/(C12-C14):(40% or less/60% or more) polyglucoside solution (55% or less)	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.6, 16.2.9
Alkyl (C8-C10)/(C12-C14):(60% or more/40% or less) polyglucoside solution(55% or less)	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Alkyl (C7-C11)phenol poly(4-12) ethoxylate	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Alkyl (C8-C40) phenol sulphide	Z	S/P	3	2G	Open	No			Yes	O	No	ABC	No	
Alkyl (C8-C9) phenylamine in aromatic solvents	Y	S/P	2	2G	Cont	No	T1	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
Alkyl (C9-C15) phenyl propoxylate	Z	S/P	3	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
Alkyl (C8-C10) polyglucoside solution (65% or less)	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6
Alkyl (C8-C10)/(C12-C14):(50%/50%) polyglucoside solution (55% or less)	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.6, 16.2.9
Alkyl (C12-C14) polyglucoside solution (55% or less)	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
Alkyl (C12-C16) propoxyamine ethoxylate	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.6
Alkyl (C10-C20, saturated and unsaturated) phosphite	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.9
Alkyl sulphonic acid ester of phenol	Y	P	3	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6
Alkyl (C18+) toluenes	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.9
Alkyl (C18-C28) toluenesulphonic acid	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 15.12, 1517, 1519, 16.2.6, 16.2.9
Alkyl (C18-C28) toluenesulphonic acid, calcium salts, borated	Y	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6
Alkyl (C18-C28) toluenesulphonic acid, calcium salts, low overbase	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6
Alkyl (C18-C28) toluenesulphonic acid, calcium salts, high overbase	Y	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6
Allyl alcohol	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	AC	Yes	15.12, 1517, 1519
Allyl chloride	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12, 1517, 1519
Aluminium chloride/Hydrogen chloride solution	Y	S/P	2	2G	Cont	No	-	-	NF	C	T	No	Yes	15.11, 15.12, 1517, 1519
Aluminium hydroxide, sodium hydroxide, sodium carbonate solution (40% or less)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.12, 1517, 1519

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Aluminium sulphate solution	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.12, 1517, 1519
2-(2-Aminoethoxy) ethanol	Z	S/P	3	2G	Cont	No			Yes	C	T	AD	Yes	15.12, 1517, 1519
Aminoethyldiethanolamine/Aminoethylethanolamine solution	Z	S/P	3	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
Aminoethyl ethanolamine	Z	S/P	3	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 1517, 1519
N-Aminoethylpiperazine	Z	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519
2-Amino-2-methyl-1-propanol	Z	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519
Ammonia aqueous (28% or less)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.12, 1517, 1519
Ammonium chloride solution (less than 25%) (*)	Z	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	
Ammonium hydrogen phosphate solution	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Ammonium lignosulphonate solutions	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Ammonium nitrate solution (93% or less) (*)	Z	S/P	2	1G	Cont	No			NF	R	T	No	No	15.2, 1511.4, 1511.6, 15.12.3, 15.12.4, 15.18, 1519.6, 16.2.9
Ammonium polyphosphate solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Ammonium sulphate solution	Z	P	3	2G	Open	No			NF	O	No	No	No	
Ammonium sulphide solution (45% or less) (*)	Y	S/P	2	2G	Cont	Inert	T4	IIB	No	C	FT	AC	No	15.12, 1517, 1519, 16.6.1, 16.6.2, 16.6.3
Ammonium thiosulphate solution (60% or less)	Z	S/P	3	2G	Open	No			NF	O	No	No	No	
Amyl acetate (all isomers)	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	1519.6
n-Amyl alcohol	Z	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	ABC	Yes	15.12, 1517, 1519
Amyl alcohol, primary	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
sec-Amyl alcohol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
tert-Amyl alcohol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	1519.6
tert-Amyl ethyl ether	Z	P	3	2G	Cont	No	T3	IIA	No	R	F	ABC	No	1519.6
tert-Amyl methyl ether	X	S/P	2	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Aniline	Y	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	AC	Yes	15.12, 1517, 1519
Aryl polyolefins (C11-C50)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Aviation alkylates (C8 paraffins and iso-paraffins BPT 95 - 120°C)	X	S/P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	1519.6
Barium long chain (C11-C50) alkaryl sulphonate	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519, 16.2.6, 16.2.9
Benzene and mixtures having 10% benzene or more (i)	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 1517, 1519.6, 16.2.9
Benzene sulphonyl chloride	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519, 16.2.9
Benzenetricarboxylic acid, trioctyl ester	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6
Benzyl acetate	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Benzyl alcohol	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Benzyl chloride	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	ABC	Yes	15.12, 15.13, 1517, 1519
Bio-fuel blends of Diesel/gas oil and FAME (〉25% but 〈99% by volume)	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 1517, 1519.6
Bio-fuel blends of Diesel/gas oil and vegetable oil (〉25% but 〈99% by volume)	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 1517, 1519.6
Bio-fuel blends of Gasoline and Ethyl alcohol (〉25% but 〈99% by volume)	X	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	AC	No	15.12, 1517, 1519.6
Bis (2-ethylhexyl) terephthalate	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6
Brake fluid base mix: Poly(2-8)alkylene (C2-C3) glycols/Polyalkylene (C2-C10) glycols monoalkyl (C1-C4) ethers and their borate esters	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Bromochloromethane	Z	P	3	2G	Open	No			NF	O	No	No	No	
Butene oligomer	X	P	2	2G	Cont	No	T4	IIB	No	R	F	ABC	No	1519.6
2-Butoxyethanol (58%)/Hyperbranched polyesteramide (42%) (mixture)	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12.3, 15.12.4, 1519
Butyl acetate (all isomers)	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	1519.6
Butyl acrylate (all isomers)	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	F	ABC	No	15.13, 1519.6, 16.6.1, 16.6.2
tert-Butyl alcohol	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	AC	No	1519.6
Butylamine (all isomers)	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.12, 1517, 1519
Butylbenzene (all isomers)	X	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
Butyl benzyl phthalate	X	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519.6
Butyl butyrate (all isomers)	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	F	ABC	No	1519.6
Butyl/Decyl/Cetyl/Eicosyl methacrylate mixture	Y	S/P	2	2G	Open	No	T3	IIA	No	R	F	ABC	No	15.13, 1519.6, 16.6.1, 16.6.2
Butylene glycol	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	
1,2-Butylene oxide	Y	S/P	3	2G	Cont	Inert	T2	IIB	No	C	FT	AC	No	15.8.1 to 15.8.7, 15.8.12, 15.8.13, 15.8.16, 15.8.17, 15.8.18, 15.8.19, 15.8.21, 15.8.25, 15.8.27, 15.8.29, 15.12, 1517, 1519.6
n-Butyl ether	Y	S/P	3	2G	Cont	Inert	T4	IIB	No	R	F	AC	No	15.4.6, 1519
Butyl methacrylate	Z	S/P	3	2G	Cont	No	T3	IIA	No	R	F	ABC	No	15.13, 1519.6, 16.6.1, 16.6.2
n-Butyl propionate	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	1519.6
Butyraldehyde (all isomers)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
Butyric acid	Y	S/P	3	2G	Cont	No			Yes	O	No	AC	No	1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 1519.6
gamma-Butyrolactone	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	No	15.12, 1517, 1519.6
Calcium alkaryl sulphonate (C11-C50)	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
Calcium alkyl (C10-C28) salicylate	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.9

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Calcium hydroxide slurry	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6,16.2.9
Calcium hypochlorite solution (15% or less)	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 1519.6
Calcium hypochlorite solution (more than 15%)	X	S/P	1	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 1519
Calcium lignosulphonate solutions	Z	P	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Calcium long-chain alkyl (C5-C10) phenate	Y	P	3	2G	Open	No			Yes	O	No	AC	No	1519.6
Calcium long-chain alkyl (C11-C40) phenate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6
Calcium long-chain alkyl phenate sulphide (C8-C40)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6
Calcium long-chain alkyl salicylate (C13+)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Calcium long-chain alkyl (C18-C28) salicylate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Calcium nitrate/Magnesium nitrate/Potassium chloride solution	Z	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Calcium nitrate solution (50% or less)	Z	S	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Camelina oil	Y	S/P	2(k)	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7
epsilon-Caprolactam (molten or aqueous solutions)	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Carbolic oil	Y	S/P	2	2G	Cont	No			Yes	C	FT	ABC	Yes	15.12, 1517, 1519, 16.2.9
Carbon disulphide	Y	S/P	1	1G	Cont	Pad +inert	T6	IIC	No	C	FT	C	Yes	15.3, 15.12, 1517, 15.18, 1519
Carbon tetrachloride	Y	S/P	2	2G	Cont	No			NF	C	T	No	No	15.12, 1517, 1519.6
Cashew nut shell oil (untreated)	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.7, 16.2.9
Castor oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Cesium formate solution (*)	Y	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	1519.6
Cetyl/Eicosyl methacrylate mixture	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.13, 1519.6, 16.2.9, 16.6.1, 16.6.2
Chlorinated paraffins (C10-C13)	X	S/P	1	2G	Cont	No			NF	C	T	No	No	15.12, 1517, 1519, 16.2.6
Chlorinated paraffins (C14-C17) (with 50% chlorine or more, and less than 1% C13 or shorter chains)	X	S/P	1	2G	Cont	No	-	-	Yes	C	T	AC	No	15.12, 1517, 1519
Chloroacetic acid (80% or less)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 15.12, 1517, 15.18, 1519, 16.2.9
Chlorobenzene	Y	S/P	2	2G	Cont	No	T1	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
Chloroform	Y	S/P	3	2G	Cont	No			NF	C	T	No	No	15.12, 1517, 1519.6
Chlorohydrins (crude)	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	AC	Yes	15.12, 1517, 1519
4-Chloro-2-methylphenoxy acetic acid, dimethylamine salt solution	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 1519.6, 16.2.9

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
o-Chloronitrobenzene	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12.3, 15.12.4, 1519, 16.2.6, 16.2.9
1-(4-Chlorophenyl)-4,4-dimethyl-pentan-3-one	Y	S/P	2	2G	Open	No			Yes	O	No	ABD	No	1519.6, 16.2.6, 16.2.9
2- or 3-Chloropropionic acid	Z	S/P	2	2G	Cont	No			Yes	C	T	AC	No	1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 15.12.3, 15.12.4, 1519, 16.2.9
Chlorosulphonic acid	Y	S/P	1	2G	Cont	No			NF	C	T	No	Yes	1511.2, 1511.3, 1511.4, 15.11.5, 1511.6, 1511.7, 1511.8, 15.12, 15.16.2, 1517, 15.18, 1519
m-Chlorotoluene	Y	S/P	2	2G	Cont	No	T4	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519
o-Chlorotoluene	Y	P	2	2G	Cont	No	T1	IIA	No	R	F	ABC	No	1519.6
p-Chlorotoluene	Y	P	2	2G	Cont	No	T1	IIA	No	R	F	ABC	No	1519.6, 16.2.9
Chlorotoluenes (mixed isomers)	Y	P	2	2G	Cont	No	T4	IIA	No	R	F	ABC	No	1519.6
Choline chloride solutions	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Citric acid (70% or less)	Z	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519
Coal tar	X	S/P	2	2G	Cont	No	T2	IIA	Yes	C	T	BD	No	15.12, 1517, 1519.6, 16.2.6, 16.2.9
Coal tar naphtha solvent	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	ABC	No	15.12, 1517, 1519.6, 16.2.9
Coal tar pitch (molten) (*)	X	S/P	2	1G	Cont	No	T2	IIA	Yes	C	T	ABC D	No	15.12, 1517, 1519.6, 16.2.6, 16.2.9
Cocoa butter	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Coconut oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Coconut oil fatty acid	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Coconut oil fatty acid methyl ester	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6
Copper salt of long chain (C17+) alkanoic acid	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Corn Oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Cotton seed oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Creosote (coal tar)	X	S/P	1	2G	Cont	No	T2	IIA	Yes	C	T	AD	No	15.12, 1517, 1519.6, 16.2.6, 16.2.9
Cresols (all isomers)	Y	S/P	1	2G	Cont	No	T1	IIA	Yes	C	T	ABC	Yes	15.12, 15.18, 1519, 16.2.9
Cresol/Phenol/Xylenol mixture	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519
Cresylic acid, dephenolized	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519
Cresylic acid, sodium salt solution	Y	S/P	2	2G	Cont	No	T4	IIB	No	C	FT	AC	Yes	15.12, 1517, 1519, 16.2.9
Crotonaldehyde	X	S/P	1	1G	Cont	No	T3	IIB	No	C	FT	AC	Yes	15.12, 1517, 15.18, 1519
1,5,9-Cyclododecatriene	X	S/P	2	2G	Open	No			Yes	O	No	AC	No	15.13, 1519.6, 16.6.1, 16.6.2
Cycloheptane	X	S/P	2	2G	Cont	No	T4	IIA	No	R	F	AC	No	1519.6
Cyclohexane	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6, 16.2.9

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i"	i"'	j	k	l	n	o
Cyclohexane-1,2-dicarboxylic acid, diisononyl ester	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6
Cyclohexane oxidation products, sodium salts solution	Z	P	3	2G	Open	No			NF	O	No	No	No	
Cyclohexanol	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.9
Cyclohexanone	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	1519.6
Cyclohexanone, Cyclohexanol mixture	Y	S/P	3	2G	Cont	No			Yes	R	F	AC	No	1519.6
Cyclohexyl acetate	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Cyclohexylamine	Y	S/P	3	2G	Cont	No	T3	IIA	No	C	FT	AC	Yes	15.12, 1517, 1519
1,3-Cyclopentadiene dimer (molten)	Y	S/P	2	2G	Cont	No	T1	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 1519, 16.2.6, 16.2.9
Cyclopentane	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	1519.6
Cyclopentene	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	1519.6
p-Cymene	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	1519.6
Decahydronaphthalene	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
Decanoic acid	X	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Decene	X	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
Decyl acrylate	X	S/P	1	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.13, 1519, 16.6.1, 16.6.2
Decyl alcohol (all isomers)	Y	P	2	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.9(e)
Decyl/Dodecyl/Tetradecyl alcohol mixture	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Decyloxytetrahydrothiophene dioxide	X	S/P	2	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.9
Diacetone alcohol	Z	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Dialkyl (C8-C9) diphenylamines	Z	P	3	2G	Open	No			Yes	O	No	ABC	No	
Dialkyl (C7-C13) phthalates	X	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 1517, 1519.6, 16.2.6
Dialkyl (C9-C10) phthalates	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6
Dialkyl thiophosphates sodium salts solution	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
2,6-Diaminohexanoic acid phosphonate mixed salts solution	Z	S/P	3	2G	Cont	No			NF	R	No	No	No	15.11, 1517, 1519.6
Dibromomethane	Y	S/P	2	2G	Open	No			NF	O	No	No	No	1519.6
Dibutylamine	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	ABC	Yes	15.12, 1517, 1519
Dibutyl hydrogen phosphonate	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
2,6-Di-tert-butylphenol	X	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.9
Dibutyl phthalate	X	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519.6
Dibutyl terephthalate	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.9
Dichlorobenzene (all isomers)	X	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	ABD	No	15.12, 1517, 1519.6
3,4-Dichloro-1-butene	Y	S/P	2	2G	Cont	No	T1	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
1,1-Dichloroethane	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	1519.6

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Dichloroethyl ether	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.12, 1517, 15.18, 1519
1,6-Dichlorohexane	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6
2,2'-Dichloroisopropyl ether	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519
Dichloromethane	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 1517, 1519.6
2,4-Dichlorophenol	Y	S/P	2	2G	Cont	Dry			Yes	C	T	AD	Yes	15.12, 15.16.2, 1517, 1519, 16.2.6, 16.2.9
2,4-Dichlorophenoxyacetic acid, diethanolamine salt solution	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 1517, 1519, 16.2.9
2,4-Dichlorophenoxyacetic acid, dimethylamine salt solution (70% or less)	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 1517, 1519, 16.2.9
2,4-Dichlorophenoxyacetic acid, triisopropanolamine salt solution	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 1517, 1519, 16.2.6, 16.2.9
1,1-Dichloropropane	Y	S/P	2	2G	Cont	No	T1	IIA	No	R	F	ABC	No	1519.6
1,2-Dichloropropane	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
1,3-Dichloropropene	X	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	ABC	Yes	15.12, 1517, 1519
Dichloropropene/Dichloropropane mixtures	X	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	ABD	No	15.12, 1517, 1519
2,2-Dichloropropionic acid	Y	S/P	2	2G	Cont	Dry			Yes	C	T	AD	Yes	1511.2, 1511.4, 1511.6, 1511.7, 1511.8, 15.12, 15.16.2, 1517, 1519, 16.2.9
Dicyclopentadiene, Resin Grade, 81-89%	Y	S/P	2	2G	Cont	Inert	T2	IIB	No	C	FT	ABC	Yes	15.12, 15.13, 1517, 1519
Diethanolamine	Y	S/P	3	2G	Cont	No	T1	IIA	Yes	C	T	AC	No	15.12, 1517, 1519.6, 16.2.6, 16.2.9
Diethylamine	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.12, 1517, 1519
Diethylaminoethanol	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
2,6-Diethylaniline	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Diethylbenzene	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Diethylene glycol	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Diethylene glycol dibutyl ether	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Diethylene glycol diethyl ether	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Diethylene glycol phthalate	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6
Diethylenetriamine	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 1517, 1519
Diethylenetriaminepentaacetic acid, pentasodium salt solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Diethyl ether (*)	Z	S/P	2	1G	Cont	Inert	T4	IIB	No	R	F	AC	No	15.4, 15.14, 1519
Di-(2-ethylhexyl) adipate	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 1517, 1519.6
Di-(2-ethylhexyl) phosphoric acid	Y	S/P	2	2G	Cont	No			Yes	R	T	AD	No	15.12.3, 15.12.4, 1519.6
Diethyl phthalate	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	1519.6
Diethyl sulphate	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519
Diglycidyl ether of bisphenol A	X	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Diglycidyl ether of bisphenol F	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519.6, 16.2.6
Diheptyl phthalate	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6
Di-n-hexyl adipate	X	S/P	1	2G	Open	No			Yes	O	No	AC	No	1519
Dihexyl phthalate	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 1517, 1519.6
Diisobutylamine	Y	S/P	2	2G	Cont	No	T4	IIB	No	C	FT	ABC	No	15.12.3, 15.12.4, 1519
Diisobutylene	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	1519.6
Diisobutyl ketone	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Diisobutyl phthalate	X	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519.6
Diisononyl adipate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	1519.6
Diisooctyl phthalate	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6
Diisopropanolamine	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Diisopropylamine	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1517, 1519.6
Diisopropylbenzene (all isomers)	X	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Diisopropylnaphthalene	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	1519.6
N,N-Dimethylacetamide	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
N,N-Dimethylacetamide solution (40% or less)	Z	S/P	3	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 1519.6
Dimethyl adipate	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.9
Dimethylamine solution (45% or less)	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519
Dimethylamine solution (greater than 45% but not greater than 55%)	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 1519
Dimethylamine solution (greater than 55% but not greater than 65%)	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 15.14, 1519
N,N-Dimethylcyclohexylamine	Y	S/P	2	2G	Cont	No	T3	IIB	No	C	FT	AC	Yes	15.12, 1517, 1519
Dimethyl disulphide	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
N,N-Dimethyldodecylamine	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519
Dimethylethanolamine	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Dimethylformamide	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12, 1517, 1519.6
Dimethyl glutarate	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Dimethyl hydrogen phosphite	Y	S/P	3	2G	Cont	No	T4	IIB	No	R	F	AC	No	1519.6
Dimethyl octanoic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Dimethyl phthalate	Y	S/P	3	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.9
Dimethylpolysiloxane	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6
2,2-Dimethylpropane-1,3-diol (molten or solution)	Z	P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	16.2.9
Dimethyl succinate	Y	P	2	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.9
Dinitrotoluene (molten)	X	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519, 15.21, 16.2.6, 16.2.9, 16.6.4
Dinonyl phthalate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	1519.6

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Dioctyl phthalate	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6
1,4-Dioxane	Y	S/P	3	2G	Cont	No	T2	IIB	No	C	FT	AC	No	15.12, 1517, 1519.6, 16.2.9
Dipentene	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	AC	No	15.12.3, 15.12.4, 1519.6
Diphenyl	X	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Diphenylamine (molten)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Diphenylamine, reaction product with 2,2,4-Trimethylpentene	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	1519, 16.2.6
Diphenylamines, alkylated	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	1519, 16.2.6, 16.2.9
Diphenyl/Diphenyl ether mixtures	X	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.9
Diphenyl ether	X	P	2	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.9
Diphenyl ether/Diphenyl phenyl ether mixture	X	P	2	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.9
Diphenylmethane diisocyanate	Y	S/P	2	2G	Cont	Dry	-	-	Yes(a)	C	T(a)	AB(b)D	Yes	15.12, 15.16.2, 1517, 1519, 16.2.6, 16.2.9
Diphenylol propane-epichlorohydrin resins	X	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Di-n-propylamine	Y	S/P	2	2G	Cont	No	T3	IIB	No	C	FT	AC	Yes	15.12.3, 15.12.4, 1517, 1519.6
Dipropylene glycol	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Dithiocarbamate ester (C7-C35)	X	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6
Ditridecyl adipate	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6
Ditridecyl phthalate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	1519.6
Diundecyl phthalate	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Dodecane (all isomers)	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	1519.6
tert-Dodecanethiol	Y	S/P	3	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
1-Dodecene	Y	S/P	3	2G	Open	No			Yes	O	No	ABC	No	1519.6
Dodecene (all isomers)	X	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
Dodecyl alcohol	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.9
n-Dodecyl mercaptan	X	S/P	1	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519
Dodecylamine/Tetradecylamine mixture	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519, 16.2.9
Dodecylbenzene	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
Dodecyl diphenyl ether disulphonate solution	X	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.12, 1517, 1519, 16.2.6
Dodecyl hydroxypropyl sulphide	X	P	2	2G	Open	No			Yes	O	No	AC	No	1519.6
Dodecyl methacrylate	Y	S/P	3	2G	Open	No			Yes	O	No	AC	No	15.13, 1519.6
Dodecyl/Octadecyl methacrylate mixture	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	15.13, 1519.6, 16.2.6, 16.6.1, 16.6.2
Dodecyl/Pentadecyl methacrylate mixture	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	15.13, 1519.6, 16.6.1, 16.6.2
Dodecyl phenol	X	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.6
Dodecyl Xylene	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i"	i"'	j	k	l	n	o
Drilling brines (containing zinc chloride)	X	S/P	2	2G	Open	No			NF	O	No	No	Yes	1519.6
Drilling brines (containing calcium bromide)	Z	S/P	3	2G	Open	No			NF	O	No	No	No	1519.6
Epichlorohydrin	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	AC	Yes	15.12, 1517, 1519
Ethanolamine	Y	S/P	3	2G	Cont	No	T2	IIA	Yes	C	FT	AC	Yes	15.12, 1517, 1519, 16.2.9
2-Ethoxyethyl acetate	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12, 1517, 1519.6
Ethoxylated long chain (C16+) alkyloxyalkylamine	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 1517, 1519, 16.2.9
Ethoxylated tallow amine (>95%)	X	S/P	2	2G	Cont	Inert	-	-	Yes	C	T	ABC	Yes	15.12, 1517, 1519, 16.2.6, 16.2.9
Ethyl acetate	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	1519.6
Ethyl acetoacetate	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	
Ethyl acrylate	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	AC	No	15.12, 15.13, 1517, 1519, 16.6.1, 16.6.2
Ethylamine (*)	Y	S/P	2	1G	Cont	No	T2	IIA	No	C	F	AC	No	15.12.3.2, 15.14, 1519
Ethylamine solutions (72% or less)	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	F	AC	No	15.12.3.2, 15.14, 1519
Ethyl amyl ketone	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Ethylbenzene	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12, 1517, 1519.6
Ethyl tert-butyl ether	Y	S/P	2	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Ethyl butyrate	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Ethylcyclohexane	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
N-Ethylcyclohexylamine	Y	S/P	2	2G	Cont	No	T3	IIB	No	C	FT	AC	No	15.12.3, 15.12.4, 1519
S-Ethyl dipropylthiocarbamate	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519.6, 16.2.9
Ethylene carbonate	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Ethylene chlorohydrin	Y	S/P	1	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.12, 1517, 15.18, 1519
Ethylene cyanohydrin	Y	S/P	2	2G	Cont	No		IIB	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Ethylenediamine	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.12, 1517, 1519, 16.2.9
Ethylenediaminetetraacetic acid, tetrasodium salt solution	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Ethylene dibromide	Y	S/P	2	2G	Cont	No			NF	C	T	No	No	15.12, 1517, 1519, 16.2.9
Ethylene dichloride	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	ABC	No	15.12, 1517, 1519
Ethylene glycol	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	1519.6
Ethylene glycol acetate	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 1517, 1519
Ethylene glycol butyl ether acetate	Y	S/P	3	2G	Open	No			Yes	O	No	AC	No	1519.6
Ethylene glycol diacetate	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	1519.6
Ethylene glycol methyl ether acetate	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519.6
Ethylene glycol monoalkyl ethers	Y	S/P	3	2G	Cont	No	T2	IIB	No	C	FT	AC	No	15.12.3, 15.12.4, 1519, 16.2.9
Ethylene glycol phenyl ether	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Ethylene glycol phenyl ether/Diethylene glycol phenyl ether mixture	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Ethylene glycol (>75%)/sodium alkyl carboxylates/borax mixture	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519.6
Ethylene glycol (>85%)/sodium alkyl carboxylates mixture	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	1519.6
Ethylene oxide/Propylene oxide mixture with an ethylene oxide content of not more than 30% by mass	Y	S/P	2	1G	Cont	Inert	T2	IIB	No	C	FT	AC	Yes	15.8, 15.12, 15.14, 1517, 1519
Ethylene-vinyl acetate copolymer (emulsion)	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Ethyl-3-ethoxypropionate	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	1519.6
2-Ethylhexanoic acid	Y	S/P	3	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
2-Ethylhexyl acrylate	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 15.13, 1519.6, 16.6.1, 16.6.2
2-Ethylhexylamine	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	AC	Yes	15.12, 1517, 1519.6
2-Ethyl-2-(hydroxymethyl) propane-1,3-diol (C8-C10) ester	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Ethylidene norbornene	Y	S/P	2	2G	Cont	No	T3	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
Ethyl methacrylate	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	15.13, 1519.6, 16.6.1, 16.6.2
N-Ethylmethylallylamine	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	AC	No	15.12.3, 15.12.4, 1519
Ethyl propionate	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
2-Ethyl-3-propylacrolein	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6, 16.2.9
Ethyl toluene	Y	P	2	2G	Cont	No	T1	IIA	No	R	F	ABC	No	1519.6
Fatty acid (saturated C13+)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.9
Fatty acid methyl esters (m)	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Fatty acids, (C8-C10)	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 1517, 1519, 16.2.6, 16.2.9
Fatty acids, (C12+)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Fatty acids, (C16+)	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6
Fatty acids, essentially linear (C6-C18) 2-ethylhexyl ester	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6
Ferric chloride solutions	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 1517, 1519, 16.2.9
Ferric nitrate/Nitric acid solution	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 1517, 1519
Fish oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Fish silage protein concentrate (containing 4% or less formic acid)	Y	P	2	2G	Open	No			NF	O	No	No	No	1519.6, 16.2.6
Fish protein concentrate (containing 4% or less formic acid)	Z	P	3	2G	Open	No	-	-	NF	O	No	No	No	
Fluorosilicic acid solution (20-30%)	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 1517, 1519

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i"	i"'	j	k	l	n	o
Formaldehyde solutions (45% or less)	Y	S/P	3	2G	Cont	No	T2	IIB	No	C	FT	AC	Yes	15.12, 1517, 1519, 16.2.9
Formamide	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519.6, 16.2.9
Formic acid (85% or less acid)	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T(g)	AC	Yes	1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 15.12.3, 15.12.4, 1517, 1519, 16.2.9
Formic acid (over 85%)	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT(g)	AC	Yes	1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 15.12.3, 15.12.4, 1517, 1519, 16.2.9
Formic acid mixture (containing up to 18% propionic acid and up to 25% sodium formate)	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T(g)	AC	No	1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 15.12.3, 15.12.4, 1519.6
Furfural	Y	S/P	3	2G	Cont	No	T2	IIB	No	C	FT	AC	Yes	15.12, 1517, 1519
Furfuryl alcohol	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 1517, 1519
Glucitol/glycerol blend propoxylated (containing less than 10% amines)	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
Glucitol/glycerol blend propoxylated (containing 10% or more amines)	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6
Glutaraldehyde solutions (50% or less)	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 1517, 1519
Glycerine	Z	S	3	2G	Open	No			Yes	O	No	AC	No	16.2.9
Glycerol monooleate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	1519.6, 16.2.6, 16.2.9
Glycerol propoxylated	Z	S/P	3	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
Glycerol, propoxylated and ethoxylated	Z	P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
Glycerol/sucrose blend propoxylated and ethoxylated	Z	P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
Glyceryl triacetate	Z	S/P	3	2G	Open	No			Yes	O	No	ABC	No	1519.6
Glycidyl ester of C10 trialkylacetic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Glycine, sodium salt solution	Z	S/P	3	2G	Open	No			NF	O	No	No	No	
Glycolic acid solution (70% or less)	Z	S/P	3	2G	Cont	No	-	-	NF	C	T	No	Yes	15.12.3, 15.12.4, 1517, 1519, 16.2.9
Glyoxal solution (40% or less)	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
Glyoxylic acid solution (50% or less)	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	ACD	Yes	1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 15.12, 1517, 1519, 16.2.9, 16.6.1, 16.6.2, 16.6.3
Glyphosate solution (not containing surfactant)	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
Grape Seed Oil	Y	S/P	2(k)	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7
Groundnut oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Heptane (all isomers)	X	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
n-Heptanoic acid	Z	S/P	3	2G	Cont	No			Yes	R	No	ABC	No	1519.6, 1517
Heptanol (all isomers) (d)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
Heptene (all isomers)	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	1519.6

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Heptyl acetate	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
1-Hexadecylnaphthalene / 1,4-bis(hexadecyl)naphthalene mixture	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6
Hexamethylenediamine (molten)	Y	S/P	3	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
Hexamethylenediamine adipate (50% in water)	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Hexamethylenediamine solution	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519
Hexamethylene diisocyanate	Y	S/P	2	2G	Cont	Dry	T1	IIB	Yes	C	T	AC(b)D	Yes	15.12, 15.16.2, 1517, 15.18, 1519
Hexamethylene glycol	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	
Hexamethyleneimine	Y	S/P	2	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 1519
Hexamethylenetetramine solutions	Z	S	3	2G	Open	No			Yes	O	No	AC	No	1519.6
Hexane (all isomers)	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	AC	No	15.12, 1517, 1519.6
1,6-Hexanediol, distillation overheads	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Hexanoic acid	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519
Hexanol	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519
Hexene (all isomers)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
Hexyl acetate	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	1519.6
Hexylene glycol	Z	S	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519
Hydrocarbon wax	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 1517, 1519.6, 16.2.6, 16.2.9
Hydrochloric acid (*)	Z	S/P	3	1G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 1517, 1519
Hydrogen peroxide solutions (over 60% but not over 70% by mass)	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.5.1, 15.12.3, 15.12.4, 1519.6
Hydrogen peroxide solutions (over 8% but not over 60% by mass)	Y	S/P	3	2G	Cont	No			NF	R	T	No	No	15.5.2, 15.18, 15.12.3, 15.12.4, 1519.6
2-Hydroxyethyl acrylate	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 15.13, 1517, 1519, 16.6.1, 16.6.2
N-(Hydroxyethyl)ethylenediaminetriacetic acid, trisodium salt solution	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519.6
2-Hydroxy-4-(methylthio)butanoic acid	Z	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519
Illipe oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Isoamyl alcohol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
Isobutyl alcohol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	1519.6
Isobutyl formate	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	1519.6
Isobutyl methacrylate	Z	S/P	3	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.13, 1519.6, 16.6.1, 16.6.2
Isophorone	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Isophoronediamine	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
Isophorone diisocyanate	Y	S/P	2	2G	Cont	Dry			Yes	C	T	ABD	Yes	15.12, 15.16.2, 1517, 1519

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Isoprene	Y	S/P	2	2G	Cont	No	T3	IIB	No	C	FT	ABC	No	15.12, 15.13, 15.14, 1517, 1519.6, 16.6.1, 16.6.2
Isopropanolamine	Y	S/P	3	2G	Cont	No	T2	IIA	Yes	R	No	AC	No	1519.6, 16.2.6, 16.2.9
Isopropyl acetate	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	ABC	No	1519.6
Isopropylamine	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12.3.2, 15.14, 1519
Isopropylamine (70% or less) solution	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12.3.2, 1519
Isopropylcyclohexane	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6, 16.2.9
Isopropyl ether	Y	S/P	3	2G	Cont	Inert	T2	IIA	No	R	F	AC	No	15.4.6, 15.13, 1519.6, 16.6.1, 16.6.2
Jatropha oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7
Lactic acid	Z	S/P	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519
Lactonitrile solution (80% or less)	Y	S/P	1	1G	Cont	No			NF	C	T	No	Yes	15.12, 15.13, 1517, 15.18, 1519, 16.6.1, 16.6.2, 16.6.3
Lard	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Latex, ammonia (1% or less)- inhibited	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	1519.6, 16.2.6, 16.2.9
Latex: Carboxylated styrene-Butadiene copolymer; Styrene-Butadiene rubber	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Lauric acid	X	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Ligninsulphonic acid, magnesium salt solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Ligninsulphonic acid, sodium salt solution	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Linseed oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Liquid chemical wastes	X	S/P	2	2G	Cont	No			No	C	FT	AC	No	15.12, 1517, 1519, 20.5.1, 20.7
Long-chain alkaryl polyether (C11-C20)	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Long-chain alkaryl sulphonic acid (C16-C60)	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Long-chain alkylphenate/Phenol sulphide mixture	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Long-chain alkylphenol (C14-C18)	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6
Long-chain alkylphenol (C18-C30)	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6
L-Lysine solution (60% or less)	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Magnesium chloride solution	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Magnesium hydroxide slurry	Z	S	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Magnesium long-chain alkaryl sulphonate (C11-C50)	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Magnesium long-chain alkyl salicylate (C11+)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Maleic anhydride	Y	S/P	3	2G	Cont	No			Yes	C	T	AC(f)	Yes	15.12, 1517, 1519, 16.2.9
Maleic anhydride-sodium allylsulphonate copolymer solution	Z	P	3	2G	Open	No			Yes	O	No	ABC	No	
Mango kernel oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Mercaptobenzothiazol, sodium salt solution	X	S/P	2	2G	Open	No			NF	O	No	No	No	1519.6, 16.2.9
Mesityl oxide	Z	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Metam sodium solution	X	S/P	2	2G	Cont	No	-	-	NF	C	T	No	No	15.12.3, 15.12.4, 1519
Methacrylic acid	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.13, 15.12.3, 15.12.4, 1519, 16.2.9, 16.6.1
Methacrylic acid - alkoxypoly (alkylene oxide) methacrylate copolymer, sodium salt aqueous solution (45% or less)	Z	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Methacrylic resin in ethylene dichloride	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	ABC	No	15.12, 1517, 1519, 16.2.9
Methacrylonitrile	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	AC	Yes	15.12, 15.13, 1517, 1519
3-Methoxy-1-butanol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	1519.6
3-Methoxybutyl acetate	Y	S/P	3	2G	Open	No			Yes	O	No	ABC	No	1519.6
N-(2-Methoxy-1-methyl ethyl)-2-ethyl-6-methyl chloroacetanilide	X	S/P	1	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519, 16.2.6
Methyl acetate	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	AC	No	1519.6
Methyl acetoacetate	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Methyl acrylate	Y	S/P	3	2G	Cont	No	T1	IIB	No	C	FT	AC	No	15.12, 1517, 15.13, 1519
Methyl alcohol (*)	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	AC	No	15.12.1, 15.12.2, 15.12.3.2, 15.12.3.3, 15.12.4, 1517, 1519
Methylamine solutions (42% or less)	Y	S/P	2	2G	Cont	No	T2	IIA	No	C	FT	AC	Yes	15.12, 1517, 1519
Methylamyl acetate	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	ABC	No	1519.6
Methylamyl alcohol	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
Methyl amyl ketone	Z	S/P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	1519.6
N-Methylaniline	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
alpha-Methylbenzyl alcohol with acetophenone (15% or less)	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 1517, 1519, 16.2.6, 16.2.9
Methylbutenol	Y	S/P	3	2G	Cont	No	T4	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Methyl tert-butyl ether	Z	P	3	2G	Cont	No	T1	IIA	No	R	F	ABC	No	1519.6
Methyl butyl ketone	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	ABC	No	15.12, 1517, 1519.6
Methylbutynol	Z	S/P	3	2G	Cont	No	T4	IIB	No	R	F	AC	No	1519.6
Methyl butyrate	Y	S/P	3	2G	Cont	No	T4	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Methylcyclohexane	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
Methylcyclopentadiene dimer	Y	S/P	2	2G	Cont	No	T4	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Methylcyclopentadienyl manganese tricarbonyl	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 1517, 15.18, 1519, 16.2.9
Methyl diethanolamine	Y	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6
2-Methyl-6-ethyl aniline	Y	S/P	3	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
Methyl ethyl ketone	Z	S/P	3	2G	Cont	No	T1	IIA	No	R	F	AC	No	1519.6
2-Methyl-5-ethyl pyridine	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 1517, 1519
Methyl formate	Z	S/P	2	2G	Cont	No	T1	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 15.14, 1519.6
2-Methylglutaronitrile with 2-Ethylsuccinonitrile (12% or less)	Z	S/P	3	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 1517, 1519
2-Methyl-2-hydroxy-3-butyne	Z	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6, 16.2.9
Methyl isobutyl ketone	Z	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
Methyl methacrylate	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.13, 1519.6
3-Methyl-3-methoxybutanol	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Methyl naphthalene (molten)	X	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
N-Methylglucamine solution (70% or less)	Z	S	3	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
2-Methyl-1,3-propanediol	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
2-Methylpyridine	Z	S/P	3	2G	Cont	No	T1	IIA	No	C	F	AC	No	15.12.3.2, 1519
3-Methylpyridine	Z	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	AC	No	15.12.3, 15.12.4, 1519
4-Methylpyridine	Z	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	AC	No	15.12.3, 15.12.4, 1519, 16.2.9
N-Methyl-2-pyrrolidone	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519.6
Methyl propyl ketone	Z	S	3	2G	Cont	No	T1	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
Methyl salicylate	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519.6
alpha-Methylstyrene	Y	S/P	2	2G	Cont	No	T1	IIB	No	C	FT	AD(j)	No	15.12, 15.13, 1517, 1519.6, 16.6.1, 16.6.2
3-(methylthio)propionaldehyde	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	ABC	No	15.12, 1517, 1519.6
Molybdenum polysulphide long chain alkyl dithiocarbamide complex	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Morpholine	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12.3, 15.12.4, 1519
Motor fuel anti-knock compound (containing lead alkyls)	X	S/P	1	1G	Cont	Inert	T4	IIA	No	C	FT	AC	Yes	15.6, 15.12, 1517, 15.18, 1519
Myrcene	X	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Naphthalene (molten)	X	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	ABC	No	15.12, 1517, 1519.6, 16.2.9
Naphthalene crude (molten)	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 1517, 1519.6, 16.2.6, 16.2.9
Naphthalenesulphonic acid-Formaldehyde copolymer, sodium salt solution	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Neodecanoic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i"	i"'	j	k	l	n	o
Nitrating acid (mixture of sulphuric and nitric acids)	Y	S/P	1	1G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 15.16.2, 1517, 15.18, 1519
Nitric acid (70% and over)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 15.16.2, 1517, 1519
Nitric acid (less than 70%)	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 1517, 1519
Nitrilotriacetic acid, trisodium salt solution	Y	S/P	3	2G	Cont	No			Yes	C	T	AC	No	15.12, 1517, 1519.6
Nitrobenzene	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 1517, 1519, 16.2.9
Nitroethane	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	ABC(f)	No	15.12.3, 15.12.4, 1519.6, 16.6.1, 16.6.2, 16.6.4
Nitroethane (80%)/ Nitropropane(20%)	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	ABC(f)	No	15.12.3, 15.12.4, 1519.6, 16.6.1, 16.6.2, 16.6.3
Nitroethane, 1-Nitropropane (each 15% or more) mixture	Y	S/P	3	2G	Cont	No	T2	IIB	No	R	FT	ABC(f)	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.6.1, 16.6.2, 16.6.3
o-Nitrophenol (molten)	Y	S/P	2	2G	Cont	No	T4	IIB	No	R	F	ABC	No	1519.6, 16.2.6, 16.2.9
1- or 2-Nitropropane	Y	S/P	3	2G	Cont	No	T2	IIB	No	C	FT	AC	No	15.12, 1517, 1519
Nitropropane (60%)/Nitroethane (40%) mixture	Y	S/P	2	2G	Cont	No	T2	IIB	No	C	FT	ABC(f)	No	15.12, 1517, 1519.6
o- or p-Nitrotoluenes	Y	S/P	2	2G	Cont	No		IIB	Yes	C	T	ABC	No	15.12, 1517, 1519.6
Nonane (all isomers)	X	S/P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	1519.6
Nonanoic acid (all isomers)	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519, 16.2.9
Non-edible industrial grade palm oil	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.7, 16.2.9
Nonene (all isomers)	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
Nonyl alcohol (all isomers)	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Nonyl methacrylate monomer	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.9
Nonylphenol	X	S/P	1	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.6, 16.2.9
Nonylphenol poly(4+)ethoxylate	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6
Noxious liquid, NF, (1) n.o.s. (trade name ...., contains ....) ST1, Cat. X	X	P	1	2G	Open	No	-	-	Yes	O	No	AC	No	1519, 16.2.6
Noxious liquid, F, (2) n.o.s. (trade name ...., contains ....) ST1, Cat. X	X	P	1	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519, 16.2.6
Noxious liquid, NF, (3) n.o.s. (trade name ...., contains ....) ST2, Cat. X	X	P	2	2G	Open	No	-		Yes	O	No	AC	No	1519, 16.2.6
Noxious liquid, F, (4) n.o.s. (trade name ...., contains ....) ST2, Cat. X	X	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519, 16.2.6
Noxious liquid, NF, (5) n.o.s. (trade name ...., contains ....) ST2, Cat. Y	Y	P	2	2G	Open	No	-		Yes	O	No	AC	No	1519, 16.2.6, 16.2.9(l)
Noxious liquid, F, (6) n.o.s. (trade name ...., contains ....) ST2, Cat. Y	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519, 16.2.6, 16.2.9(l)
Noxious liquid, NF, (7) n.o.s. (trade name ...., contains ....) ST3, Cat. Y	Y	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	1519, 16.2.6, 16.2.9(l)

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i"	i"'	j	k	l	n	o
Noxious liquid, F, (8) n.o.s. (trade name ...., contains ....) ST3, Cat. Y	Y	P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519, 16.2.6, 16.2.9(l)
Noxious liquid, NF, (9) n.o.s. (trade name ...., contains ....) ST3, Cat. Z	Z	P	3	2G	Open	No	-		Yes	O	No	AC	No	
Noxious liquid, F, (10) n.o.s. (trade name ...., contains ....) ST3, Cat. Z	Z	P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
Octamethylcyclotetrasiloxane	Y	P	2	2G	Cont	No	T2	IIA	No	R	F	AC	No	1519.6, 16.2.9
Octane (all isomers)	X	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
Octanoic acid (all isomers)	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	Yes	15.12, 1517, 1519
Octanol (all isomers)	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Octene (all isomers)	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
n-Octyl acetate	Y	S/P	3	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.9
Octyl aldehydes	Y	S/P	2	2G	Cont	No	T4	IIB	No	R	F	AC	No	1519.6, 16.2.9
Octyl decyl adipate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	AC	No	1519.6, 16.2.9
n-Octyl mercaptan	X	S/P	1	2G	Open	No			Yes	O	No	ABC	No	1519
Offshore contaminated bulk liquid P (o)	X	P	2	2G	Open	No	-	-	Yes	O	No	AC	No	1519.6
Offshore contaminated bulk liquid S (o)	X	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	AC	Yes	15.12, 15.15, 1517, 1519
Olefin-Alkyl ester copolymer (molecular weight 2000+)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Olefin Mixture (C7-C9) C8 rich, stabilised	X	P	2	2G	Cont	No	T3	IIB	No	R	F	ABC	No	15.13, 1519.6
Olefin mixtures (C5-C7)	Y	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
Olefin mixtures (C5-C15)	X	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Olefins (C13+, all isomers)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.9
alpha-Olefins (C6-C18) mixtures	X	S/P	2	2G	Cont	No	T4	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Oleic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Oleum	Y	S/P	2	2G	Cont	Dry	-	-	NF	C	T	No	Yes	1511.2 to 1511.8, 15.12, 15.16.2, 1517, 1519, 16.2.6
Oleylamine	X	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
Olive oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Oxygenated aliphatic hydrocarbon mixture	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
Palm acid oil	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Palm fatty acid distillate	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Palm kernel acid oil	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.7, 16.2.9
Palm kernel fatty acid distillate	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.7, 16.2.9
Palm kernel oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i"	i"'	j	k	l	n	o
Palm kernel olein	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Palm kernel stearin	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Palm mid-fraction	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Palm oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Palm oil fatty acid methyl ester	Y	P	2	2G	Open	No	-	-	Yes	O	No	AC	No	1519.6, 16.2.9
Palm olein	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Palm stearin	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Paraffin wax, highly-refined	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Paraffin wax, semi-refined	X	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 1517, 1519.6, 16.2.6, 16.2.9
Paraldehyde	Z	S/P	3	2G	Cont	No	T3	IIB	No	R	F	AC	No	1519.6, 16.2.9
Paraldehyde-ammonia reaction product	Y	S/P	2	2G	Cont	No	T1	IIB	No	C	FT	ABC	Yes	15.12, 1517, 1519
Pentachloroethane	Y	S/P	2	2G	Cont	No			NF	C	T	No	No	15.12, 1517, 1519.6
1,3-Pentadiene	Y	P	3	2G	Cont	No	T1	IIA	No	R	F	ABC	No	15.13, 1519.6, 16.6.1, 16.6.2, 16.6.3
1,3-Pentadiene (greater than 50%), cyclopentene and isomers, mixtures	Y	S/P	2	2G	Cont	Inert	T3	IIB	No	C	FT	ABC	Yes	15.12, 15.13, 1517, 1519
Pentaethylenehexamine	X	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519
Pentane (all isomers)	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	15.14, 1519.6
Pentanoic acid	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519
n-Pentanoic acid (64%)/2-Methyl butyric acid (36%) mixture	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 15.12, 1517, 1519
Pentene (all isomers)	Y	P	2	2G	Cont	No	T3	IIA	No	R	F	AC	No	15.14, 1519.6
n-Pentyl propionate	Y	S/P	3	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
Perchloroethylene	Y	S/P	2	2G	Cont	No			NF	C	T	No	No	15.12, 1517, 1519.6
Phenol	Y	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
1-Phenyl-1-xylyl ethane	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6
Phosphate esters, alkyl (C12-C14) amine	Y	S/P	2	2G	Cont	No	T4	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Phosphoric acid	Z	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.11.1, 1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 15.12, 1517, 1519, 16.2.9
Phosphorus, yellow or white (*)	X	S/P	1	1G	Cont	Pad +(vent or inert)			No(c)	C	No	ABC	No	15.7, 1519, 16.2.9
Phthalic anhydride (molten)	Y	S/P	2	2G	Cont	No	T1	IIA	Yes	C	T	ABC	Yes	15.12, 1517, 1519, 16.2.6, 16.2.9
alpha-Pinene	X	S/P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	1519.6
beta-Pinene	X	S/P	2	2G	Cont	No	T1	IIB	No	R	F	ABC	No	1519.6

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i"	i"'	j	k	l	n	o
Pine oil	X	S/P	2	2G	Open	No			Yes	O		ABC	No	1519.6, 16.2.6, 16.2.9
Piperazine, 68% solution	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.6, 16.2.9
Polyacrylic acid solution (40% or less)	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Polyalkyl (C18-C22) acrylate in xylene	Y	S/P	2	2G	Cont	No	T1	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6,16.2.9
Polyalkylalkenaminesuccinimide, molybdenum oxysulphide	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6
Poly(2-8)alkylene glycol monoalkyl(C1-C6) ether	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Poly(2-8)alkylene glycol monoalkyl (C1-C6) ether acetate	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6
Polyalkyl (C10-C20) methacrylate	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Polyalkyl (C10-C18) methacrylate/ethylene-propylene copolymer mixture	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Polyaluminium chloride solution	Z	S	3	2G	Open	No			NF	O	No	No	No	
Polybutene	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6
Polybutenyl succinimide	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Poly(2+)cyclic aromatics	X	S/P	1	2G	Cont	No			Yes	C	T	ABC	No	15.12, 1517, 1519, 16.2.6, 16.2.9
Polyether (molecular weight 1350+)	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6
Polyethylene glycol	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Polyethylene glycol dimethyl ether	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	
Poly(ethylene glycol) methylbutenyl ether (MW〉1000)	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Polyethylene polyamines	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.6, 16.2.9
Polyethylene polyamines (more than 50% C5 -C20 paraffin oil)	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
Polyferric sulphate solution	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 1517, 1519
Poly(iminoethylene)-graft-N-poly(ethyleneoxy) solution (90% or less)	Z	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Polyisobutenamine in aliphatic (C10-C14) solvent	Y	S/P	2	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
(Polyisobutene) amino products in aliphatic hydrocarbons	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6
Polyisobutenyl anhydride adduct	Z	S/P	3	2G	Open	No			Yes	O	No	ABC	No	
Poly(4+)isobutylene (MW〉224)	X	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Polyisobutylene (MW≤Â224)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.9
Polyglycerin, sodium salt solution (containing less than 3% sodium hydroxide)	Z	S	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519. 16.2.9

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i"	i"'	j	k	l	n	o
Polymethylene polyphenyl isocyanate	Y	S/P	3	2G	Cont	Dry			Yes(a)	C	T(a)	AD	Yes	15.12, 15.16.2, 1517, 1519.6, 16.2.9
Polyolefin (molecular weight 300+)	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Polyolefin amide alkeneamine (C17+)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6
Polyolefin amide alkeneamine borate (C28-C250)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Polyolefin amide alkeneamine polyol	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Polyolefinamine (C28-C250)	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Polyolefinamine in alkyl (C2-C4) benzenes	Y	S/P	2	2G	Cont	No	T2	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Polyolefinamine in aromatic solvent	Y	S/P	2	2G	Cont	No	T2	IIB	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Polyolefin aminoester salts (molecular weight 2000+)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Polyolefin anhydride	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Polyolefin ester (C28-C250)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Polyolefin phenolic amine (C28-C250)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Polyolefin phosphorosulphide, barium derivative (C28-C250)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Poly(20)oxyethylene sorbitan monooleate	Y	P	3	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.6, 16.2.9
Poly(5+)propylene	Y	P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.9
Polypropylene glycol	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	1519.6
Polysiloxane	Y	P	2	2G	Cont	No	T2	IIB	No	R	F	ABC	No	1519.6, 16.2.9
Potassium chloride solution	Z	P	3	2G	Open	No	-	-	NF	O	No	No	No	16.2.9
Potassium hydroxide solution (*)	Y	S/P	3	2G	Open	No			NF	C	No	No	No	15.12.3.2, 1519
Potassium formate solutions (*)	Z	S	3	2G	Open	No			NF	R	No	No	No	1519.6
Potassium oleate	Y	S/P	2	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.6, 16.2.9
Potassium thiosulphate (50% or less)	Y	S/P	3	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 1519.6, 16.2.9
n-Propanolamine	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519, 16.2.9
2-Propene-1-aminium, N,N-dimethyl-N-2-propenyl-, chloride, homopolymer solution	Y	P	3	2G	Open	No	-	-	NF	O	No	No	No	1519.6
beta-Propiolactone	Y	S/P	1	2G	Cont	No		IIA	Yes	C	T	AC	Yes	15.12, 1517, 15.18, 1519
Propionaldehyde	Y	S/P	3	2G	Cont	Inert	T4	IIB	No	R	F	AC	No	1519.6
Propionic acid	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	AC	Yes	1511.2, 1511.3, 1511.4, 1511.6, 1511.7, 1511.8, 15.12, 1517, 1519
Propionic anhydride	Y	S/P	2	2G	Cont	No	T2	IIA	Yes	C	T	AC	Yes	15.12, 1517, 1519
Propionitrile	Y	S/P	1	1G	Cont	No	T1	IIB	No	C	FT	AC	Yes	15.12, 1517, 15.18, 1519
n-Propyl acetate	Y	P	3	2G	Cont	No	T1	IIA	No	R	F	ABC	No	1519.6

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
n-Propyl alcohol	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	AC	No	15.12, 1517, 1519.6
n-Propylamine	Z	S/P	2	2G	Cont	Inert	T2	IIA	No	C	FT	AC	Yes	15.12, 1517, 1519
Propylbenzene (all isomers)	Y	P	3	2G	Cont	No	T2	IIA	No	R	F	ABC	No	1519.6
Propylene carbonate	Z	S	3	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519
Propylene glycol methyl ether acetate	Z	P	3	2G	Cont	No	T2	IIA	No	R	F	AC	No	
Propylene glycol monoalkyl ether	Z	S/P	3	2G	Cont	No	T3	IIA	No	R	F	AC	No	1519.6
Propylene glycol phenyl ether	Z	S/P	3	2G	Open	No			Yes	O	No	ABC	No	
Propylene oxide	Y	S/P	2	2G	Cont	Inert	T2	IIB	No	C	FT	AC	No	15.8, 15.12, 15.14, 1517, 1519
Propylene tetramer	X	S/P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	1519.6
Propylene trimer	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	F	ABC	No	1519.6
Pyridine	Y	S/P	3	2G	Cont	No	T1	IIA	No	R	FT	AC	No	15.12.3, 15.12.4, 1519.6
Pyrolysis gasoline (containing benzene)	Y	S/P	2	2G	Cont	No	T3	IIA	No	C	FT	ABC	No	15.12, 1517, 1519.6
Rapeseed oil	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Rapeseed oil (low erucic acid containing less than 4% free fatty acids)	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Rape seed oil fatty acid methyl esters	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6
Resin oil, distilled	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 1517, 1519.6
Rice bran oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Rosin	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Safflower oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Shea butter	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Sodium alkyl (C14-C17) sulphonates (60-65% solution)	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Sodium aluminosilicate slurry	Z	P	3	2G	Open	No			NF	O	No	No	No	16.2.9
Sodium benzoate	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	16.2.9
Sodium borohydride (15% or less)/Sodium hydroxide solution (*)	Y	S/P	3	2G	Open	No			NF	C	No	No	No	1519, 16.2.6, 16.2.9
Sodium bromide solution (less than 50%) (*)	Y	S/P	3	2G	Open	No	-	-	NF	R	No	No	No	1519.6
Sodium carbonate solution (*)	Z	S/P	3	2G	Open	No			NF	R	No	No	No	1519.6
Sodium chlorate solution (50% or less) (*)	Z	S/P	3	2G	Open	No			NF	R	No	No	No	15.9, 15.12, 1519, 16.2.9
Sodium dichromate solution (70% or less)	Y	S/P	1	1G	Cont	No			NF	C	T	No	Yes	15.12, 1517, 15.18, 1519
Sodium hydrogen sulphide (6% or less)/Sodium carbonate (3% or less) solution	Z	S/P	3	2G	Open	No			NF	O	No	No	No	1519.6, 16.2.9

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Sodium hydrogen sulphite solution (45% or less)	Z	P	3	2G	Open	No			NF	O	No	No	No	16.2.9
Sodium hydrosulphide/Ammonium sulphide solution (*)	Y	S/P	2	2G	Cont	No	T4	IIB	No	C	FT	AC	Yes	15.12, 15.15, 1517, 1519, 16.6.1, 16.6.2, 16.6.3
Sodium hydrosulphide solution (45% or less) (*)	Z	S/P	3	2G	Cont	Vent or pad (gas)			NF	R	T	No	Yes	15.12, 15.15, 1519.6, 16.2.9
Sodium hydroxide solution (*)	Y	S/P	3	2G	Open	No			NF	C	No	No	No	1519, 16.2.6, 16.2.9
Sodium hypochlorite solution (15% or less)	Y	S/P	2	2G	Cont	No	-	-	NF	R	No	No	No	1517, 1519.6
Sodium methylate 21-30% in methyl alcohol	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	AC	Yes	15.12, 1517, 1519, 16.2.6(only if >28%), 16.2.9
Sodium nitrite solution	Y	S/P	3	2G	Cont	No			NF	C	T	No	No	15.12.3, 15.12.4, 1519, 16.2.6, 16.2.9
Sodium petroleum sulphonate	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	Yes	15.12.3, 15.12.4, 1519.6, 16.2.6
Sodium poly(4+)acrylate solutions	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	AC	No	16.2.9
Sodium silicate solution	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 1517, 1519, 16.2.9
Sodium sulphate solutions	Z	S	3	2G	Open	No			NF	O	No	No	No	16.2.9,
Sodium sulphide solution (15% or less)	Y	S/P	3	2G	Cont	No			NF	C	T	No	Yes	15.12, 1517, 1519, 16.2.9
Sodium sulphite solution (25% or less)	Y	S/P	3	2G	Open	No			NF	O	No	No	No	1519.6, 16.2.9
Sodium thiocyanate solution (56% or less)	Y	S/P	3	2G	Open	No			NF	O	No	No	No	1519.6, 16.2.9
Soyabean oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Soybean Oil Fatty Acid Methyl Ester	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.9
Styrene monomer	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 15.13, 1517, 1519.6, 16.6.1, 16.6.2
Sulphohydrocarbon (C3-C88)	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Sulpholane	Y	S/P	3	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.9
Sulphur (molten) (*)	Z	S	3	1G	Open	Vent or pad (gas)	T3		Yes	O	FT	No	No	15.10, 16.2.9
Sulphuric acid	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 15.16.2, 1517, 1519, 16.2.9
Sulphuric acid, spent	Y	S/P	2	2G	Cont	No			NF	C	T	No	Yes	15.11, 15.12, 15.16.2, 1517, 1519
Sulphurized fat (C14-C20)	Z	S/P	3	2G	Open	No			Yes	O	No	ABC	No	
Sulphurized polyolefinamide alkene (C28-C250) amine	Z	P	3	2G	Open	No	-	-	Yes	O	No	AC	No	
Sunflower seed oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Tall oil, crude	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6
Tall oil, distilled	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6
Tall oil fatty acid (resin acids less than 20%)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Tall oil pitch	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6,16.2.6, 16.2.9
Tall oil soap, crude	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 1519, 16.2.6
Tallow	Y	P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Tallow fatty acid	Y	P	2	2G	Open	No	-	-	Yes	O	No	AC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Tetrachloroethane	Y	S/P	2	2G	Cont	No			NF	R	T	No	No	15.12.3, 15.12.4, 1519
Tetraethylene glycol	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Tetraethylene pentamine	Y	S/P	2	2G	Cont	No			Yes	C	T	AC	Yes	15.12, 1517, 1519
Tetrahydrofuran	Z	S	3	2G	Cont	No	T3	IIB	No	R	F	AC	No	1519.6
Tetrahydronaphthalene	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
Tetramethylbenzene (all isomers)	X	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.9
Titanium dioxide slurry	Z	P	3	2G	Open	No			NF	O	No	No	No	
Toluene	Y	S/P	3	2G	Cont	No	T1	IIA	No	C	FT	AC	No	15.12, 1517, 1519.6
Toluenediamine	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 1517, 15.18, 1519, 16.2.6, 16.2.9
Toluene diisocyanate	Y	S/P	2	2G	Cont	Dry	-	-	Yes	C	T	ABC(b)D	Yes	15.12, 15.16.2, 1517, 15.18, 1519, 16.2.9
o-Toluidine	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 1517, 1519
Tributyl phosphate	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	No	15.12.3, 15.12.4, 1519.6
1,2,3-Trichlorobenzene (molten)	X	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
1,2,4-Trichlorobenzene	X	S/P	1	2G	Cont	No			Yes	C	T	ABC	No	15.12, 1517, 1519, 16.2.9
1,1,1-Trichloroethane	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6
1,1,2-Trichloroethane	Y	S/P	3	2G	Open	No			NF	O	No	No	No	1519.6
Trichloroethylene	Y	S/P	2	2G	Cont	No	-	-	NF	C	T	No	No	15.12, 1517, 1519.6
1,2,3-Trichloropropane	Y	S/P	3	2G	Cont	No			Yes	C	T	ABC	No	15.12, 1517, 1519
1,1,2-Trichloro-1,2,2-Trifluoroethane	Y	P	2	2G	Open	No			NF	O	No	No	No	1519.6
Tricresyl phosphate (containing 1% or more ortho-isomer)	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	ABC	No	15.12, 1517, 1519, 16.2.6
Tricresyl phosphate (containing less than 1% ortho-isomer)	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	No	15.12, 1517, 1519.6, 16.2.6
Tridecane	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6
Tridecanoic acid	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Tridecyl acetate	Y	S/P	3	2G	Cont	No	-	-	Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
Triethanolamine	Z	S/P	3	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Triethylamine	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	ABC	No	15.12.3, 15.12.4, 1519
Triethylbenzene	X	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6
Triethylenetetramine	Y	S/P	2	2G	Cont	No	-	-	Yes	C	T	AC	Yes	15.12, 1517, 1519, 16.2.9
Triethyl phosphate	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	1519.6
Triethyl phosphite	Z	S/P	3	2G	Cont	No	T3	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.9

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Triisopropanolamine	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.9
Triisopropylated phenyl phosphates	X	P	2	2G	Open	No			Yes	O	No	AC	No	1519.6, 16.2.6
Trimethylacetic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.11, 15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
Trimethylamine solution (30% or less)	Z	S/P	2	2G	Cont	No	T3	IIB	No	R	FT	AC	No	15.12.3, 15.12.4, 15.14, 1519.6
Trimethylbenzene (all isomers)	X	S/P	2	2G	Cont	No	T1	IIA	No	R	F	ABC	No	1519.6
Trimethylol propane propoxylated	Z	S/P	3	2G	Open	No	-	-	Yes	O	No	ABC	No	
2,2,4-Trimethyl-1,3-pentan ediol diisobutyrate	Y	S/P	3	2G	Open	No			Yes	O	No	ABC	No	1519.6
2,2,4-Trimethyl-1,3-pentan ediol-1-isobutyrate	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6
1,3,5-Trioxane	Y	S/P	3	2G	Cont	No	T2	IIB	No	C	FT	AC	No	15.12, 1517, 1519.6, 16.2.9
Tripropylene glycol	Z	P	3	2G	Open	No			Yes	O	No	AC	No	
Trixylyl phosphate	X	S/P	1	2G	Cont	No			Yes	C	T	ABC	No	15.12, 1517, 1519.6, 16.2.6
Tung oil	Y	S/P	2(k)	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Turpentine	X	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	AC	No	1519.6
Undecanoic acid	Y	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.6, 16.2.9
1-Undecene	X	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6
Undecyl alcohol	X	S/P	2	2G	Cont	No			Yes	R	T	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Urea/Ammonium nitrate solution	Y	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	1519.6
Urea/Ammonium phosphate solution	Y	S/P	2	2G	Cont	No			Yes	R	T	AC	No	15.12.3, 15.12.4, 1519.6
Urea solution	Z	S/P	3	2G	Open	No			Yes	O	No	AC	No	16.2.9,
Used cooking oil (m)	X	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Used cooking oil (Triglycerides, C16-C18 and C18 unsaturated) (m) (n)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Valeraldehyde (all isomers)	Y	S/P	3	2G	Cont	Inert	T3	IIB	No	R	F	ABC	No	15.4.6, 15.13, 1519.6, 16.6.1, 16.6.2
Vegetable acid oils (m)	Y	S/P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Vegetable fatty acid distillates (m)	Y	P	2	2G	Open	No	-	-	Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Vegetable oil mixtures, containing less than 15% free fatty acid (m)	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.7, 16.2.9
Vinyl acetate	Y	S/P	3	2G	Cont	No	T2	IIA	No	C	FT	ABC	No	15.12, 15.13, 1517, 1519.6, 16.6.1, 16.6.2
Vinyl ethyl ether	Z	S/P	2	2G	Cont	Inert	T3	IIB	No	R	F	ABC	No	15.4, 15.13, 15.14, 1519.6, 16.6.1, 16.6.2
Vinylidene chloride	Y	S/P	2	2G	Cont	Inert	T2	IIA	No	C	FT	ABC	No	15.12, 15.13, 15.14, 1517, 1519, 16.6.1, 16.6.2
Vinyl neodecanoate	Y	S/P	2	2G	Cont	No			Yes	C	T	ABC	Yes	15.12, 15.13, 1517, 1519, 16.6.1, 16.6.2

〈Amendment〉 Annex 7B-1 Table of Summary of Minimum Requirements

a	c	d	e	f	g	h	i'	i''	i'''	j	k	l	n	o
Vinyltoluene	Y	S/P	2	2G	Cont	No	T1	IIA	No	C	FT	ABC	No	15.12, 15.13, 1517, 1519.6, 16.6.1, 16.6.2
White spirit, low (15-20%) aromatic	Y	S/P	2	2G	Cont	No	T3	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6, 16.2.9
Wood lignin with sodium acetate/oxalate	Z	S/P	3	2G	Open	No	-	-	NF	O	No	No	No	
Xylenes	Y	P	2	2G	Cont	No	T1	IIA	No	R	F	ABC	No	1519.6, 16.2.9 (h)
Xylenes/ethylbenzene (10% or more) mixture	Y	S/P	2	2G	Cont	No	T2	IIA	No	R	FT	ABC	No	15.12.3, 15.12.4, 1519.6
Xylenol	Y	S/P	2	2G	Cont	No	-	IIA	Yes	C	T	ABC	Yes	15.12, 1517, 1519, 16.2.9
Zinc alkaryl dithiophosphate (C7-C16)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6, 16.2.9
Zinc alkenyl carboxamide	Y	S/P	2	2G	Open	No			Yes	O	No	ABC	No	1519.6, 16.2.6
Zinc alkyl dithiophosphate (C3-C14)	Y	P	2	2G	Open	No			Yes	O	No	ABC	No	

Note ;	
Subindex a) ~ (m)	〈omitted〉
Subindex (n)	Confirmation that the product is composed of Triglycerides, C16-C18 and C18 un-saturated shall be required in order for the entry to be used. Otherwise, the more generic entry "Used cooking oil (m)" must be used.
Subindex (o)	Indicates that the entries are to be used solely for backloading of contaminated bulk liquids from offshore installations used in the search and exploitation of seabed mineral resources.
Subindex (*)	Indicates that with reference to Annex 7B-4(101.3), deviations from the normal assignment criteria used for some carriage requirements have been implemented.

Amendment	Note
Annex 7B-2 List of products to which the Code does not apply (see table below)	(amendment) - has been reflected Res.MSC.460(101) (14 June 2019)

Product name	Pollution Category
Acetone	Z
Alcoholic beverages, n.o.s.	Z
Apple juice	OS
n-Butyl alcohol	Z
sec-Butyl alcohol	Z
Calcium carbonate slurry	OS
Clay slurry	OS
Coal slurry	OS
Ethyl alcohol	Z
Glucose solution	OS
Glycerol ethoxylated	OS
Hydrogenated starch hydrolysate	OS
Isopropyl alcohol	Z
Kaolin slurry	OS
Lecithin	OS
Maltitol solution	OS
Microsilica slurry	OS
Molasses	OS
Noxious liquid, (11) n.o.s. (trade name ...., contains ....) Cat. Z	Z
Non-noxious liquid, (12) n.o.s. (trade name ...., contains ....) Cat. OS	OS
Orange juice (concentrated)	OS
Orange juice (not concentrated)	OS
Potassium chloride solution (less than 26%)	OS
Propylene glycol	OS
Sodium acetate solutions	Z
Sodium bicarbonate solution (less than 10%)	OS
Sorbitol solution	OS
Sulphonated polyacrylate solution	Z
Tetraethyl silicate monomer/oligomer (20% in ethanol)	Z
Triethylene glycol	OS
Vegetable protein solution (hydrolysed)	OS
Water	OS

Present	Amendment	Note
Annex 7B-4 Criteria for assigning carriage requirements for products subject to the IBC Code	**Annex 7B-4 Criteria for assigning carriage requirements for products subject to the IBC Code**	
101. Introduction **1. ~ 3. 〈omitted〉**	**101. Introduction** **1. ~ 3. 〈same as the present〉**	
102. Contents This chapter contains the following: (1) minimum safety and pollution criteria for products subject to chapter 17 of the IBC Code; (2) criteria used to assign the minimum carriage requirements for products, which meet the safety or pollution criteria to make them subject to chapter 17 of the IBC Code; (3) criteria used for special requirements in chapter 15 of the IBC Code to be included in column o of chapter 17 of the IBC Code; (4) criteria used for special requirements in chapter 16 of the IBC Code to be included in column o of chapter 17 of the IBC Code; and (5) definitions of properties used within this chapter. (6) 〈newly added〉 **2.** 〈newly added〉	**102. Contents** **1.** This **Annex** contains the following: *(2021)* (1) minimum safety and pollution criteria for products subject to **Sec. 17**; (2) criteria used to assign the minimum carriage requirements for products that meet the safety or pollution criteria to make them subject to **Sec. 17**; (3) criteria used for determining special requirements in **Sec. 15** to be included in column o of **Sec. 17**; (4) criteria used for determining special requirements in **Sec. 16** to be included in column o of **Sec. 17**; (5) definitions of properties used within this **Annex**; (6) information on the use of the GESAMP Hazard Ratings; and .7 information on the application of the SVC/LC50 ratio method. **2.** The information included in parentheses following the classification criteria throughout this chapter refers to the GESAMP Hazard Profile ratings set out in appendix I of MARPOL Annex II under the "Abbreviated legend to the revised GESAMP Hazard Evaluation procedure". The full listing of GESAMP Hazard Profile ratings for evaluated substances are published annually in the GESAMP Composite List as a PPR Circular. It should be noted that ratings in parentheses (based on estimation methods applied by GESAMP) are considered as equivalent to ratings without parentheses for the purpose of assigning carriage requirements. *(2021)*	

Present	Amendment	Note
103. Minimum safety and pollution criteria for products subject to chapter 17 of the IBC Code Products are deemed to be hazardous and subject to chapter 17 of the IBC Code if they meet one or more of the following criteria: (1) inhalation $LC_{50} \leq 20\ mg/l/4h$ (see definitions in **107. 1** (1)); (2) dermal $LD_{50} \leq 2000\ mg/kg$ (see definitions in **107. 1** (2)); (3) oral $LD_{50} \leq 2000\ mg/kg$ (see definitions in **107. 1** (3)); (4) toxic to mammals by prolonged exposure (see definitions in **107. 2**); (5) cause skin sensitization (see definitions in **107. 3**); (6) cause respiratory sensitization (see definitions in **107.4**); (7) corrosive to skin (see definitions in **107.5**); (8) have a Water Reactive Index (WRI) of ≥ 1 (see definitions in **107. 6**); (9) require inertion, inhibition, stabilization, temperature control or tank environmental control in order to prevent a hazardous reaction (see definitions in **107. 10**); (10) flash point 〈 23℃; and have an explosive/flammability range (expressed as a percentage by volume in air) of ≥ 20%; (11) autoignition temperature of ≤ 200℃; and (12) classified as pollution category X or Y or meeting the criteria for rules 11 to 13 under **104. 5** (1). **104. Criteria used to assign the minimum carriage requirements for products, which meet the minimum safety or pollution criteria to make them subject to chapter 17 of the IBC Code** **1. Column a - Product Name** 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.	**103. Minimum safety and pollution criteria for products subject to chapter 17 of the IBC Code** **1.** Products are deemed to be hazardous and subject to chapter 17 of the IBC Code if they meet one or more of the following criteria: *(2021)* (1) inhalation $LC_{50} \leq 20\ mg/l/4h$ (see definitions in **107. 1** (1)) (C3 = 1, 2, 3 or 4); (2) dermal $LD_{50} \leq 2000\ mg/kg$ (see definitions in **107. 1** (2)) (C2 = 1, 2, 3 or 4); (3) oral $LD_{50} \leq 2000\ mg/kg$ (see definitions in **107. 1** (3)) (C1 = 1, 2, 3 or 4); (4) toxic to mammals by prolonged exposure (see definitions in **107. 2**) (D3 = C, M, R, N, T, or I); (5) cause skin sensitization (see definitions in **107. 3**) (D3 = Ss); (6) cause respiratory sensitization (see definitions in **107.4**) (D3 = Sr); (7) corrosive to skin (see definitions in **107.5**) (D1 = 3, 3A, 3B, or 3C); (8) have a Water Reactive Index (WRI) of ≥ 1 (see definitions in **107. 6**); (9) require inertion, inhibition, stabilization, temperature control or tank environmental control in order to prevent a hazardous reaction (see definitions in **107. 10**); (10) flash point 〈 23℃; and have an explosive/flammability range (expressed as a percentage by volume in air) of ≥ 20%; (11) autoignition temperature of ≤ 200℃; and (12) classified as pollution category X or Y or meeting the criteria for rules 11 to 13 under **104. 5** (1). **104. Criteria used to assign the minimum carriage requirements for products, which meet the minimum safety or pollution criteria to make them subject to chapter 17 of the IBC Code** **1. Column a - Product Name** A standardized chemical name, preferably assigned on the basis of the Chemical Abstracts Service (CAS) or the International Union of Pure and Applied Chemistry (IUPAC) system, shall be used as far as possible. However, where this is unnecessarily complex, then a technically correct and unambiguous alternative name may be used.*(2021)*	

Present	Amendment	Note
2. Column b . Deleted	**2. Column b . Deleted**	
3. Column c – Pollution Category	**3. Column c – Pollution Category**	
Column c identifies the pollution category assigned to each product under Annex II of MARPOL 73/78.	Column c identifies the pollution category assigned to each product under Annex II of MARPOL 73/78.	
Table 〈newly added〉	**Table 1 Pollution Category *(2021)***	

Rule	A1 Bio accumulation	A2 Bio degradation	B1 Acute toxicity	B2 Chronic toxicity	D3 Long-term health effects	E2 Effects on marine wildlife and on benthic habitats	Cat
1			≥ 5				X
2	≥ 4		4				
3		NR	4				
4	≥ 4	NR			CMRTNI[1]		
5			4				Y
6			3				
7			2				
8	≥ 4	NR		Not 0			
9				9 ≥ 1			
10						Fp, F or S If not Inorganic	
11							
12	Any product not meeting the criteria of rules 1 to 11 and 13						Z
13	All products identified as: ≤ 2 in column A1; R in column A2; blank in column D3; not Fp, F or S (if not organic) in column E2; and 0 (zero) in all other columns of the GESAMP Hazard Profile						OS

footnote)

1 Applies if the D3 rating contains any of these letters or any combination thereof.

4. Column d – Hazards	**4. Column d – Hazards**	
An .S. is assigned to column d if any of the safety criteria described in **103. 1** (1) to **103. 1** (11) are met. 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 **104. 5**.	(1) An "S" is assigned to column d if any of the safety criteria described in **103. 1** (1) to **103. 1** (11) are met. (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 the **table 2** of **104. 5**. *(2021)*	

Present	Amendment	Note
5. Column e – Ship Type (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 (2) for assigning specific Ship Types. (2) The Ship Type is assigned according to the following criteria: (A) Ship Type 1: Inhalation LC_{50} ≤ 0.5 mg/l/4h; and/or Dermal LD_{50} ≤ 50 mg/kg; and/or Oral LD_{50} ≤ 5 mg/kg; and/or Autoignition temperature ≤ 65℃; and/or Explosive range ≥ 50% v/v in air and the flash point 〈 23℃; and/or Rules 1 or 2 of the table shown in (1) (B) Ship Type 2: Inhalation LC_{50} 〉 0.5 mg/l/4h ≤ 2 mg/l/4h; and/or Dermal LD_{50} 〉 50 mg/kg ≤ 1000 mg/kg; and/or OralLD50 〉 5 mg/kg ≤ 300 mg/kg; and/or WRI=2; Autoignition temperature ≤ 200℃; and/or Explosive range ≥ 40% v/v in air and the flash point 〈 23℃; and/or Any of the rules 3 to 10 of the table shown in (1) (C) Ship Type 3: Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to chapter 17 of the IBC Code not meeting the requirements for ship types 1 or 2 and not meeting rule 15 of the table shown in (1).	**5. Column e – Ship Type** (1) Assignment of Ship Types is carried out from both a pollution and safety perspective. The basic criteria for assigning Ship Types from a pollution perspective is carried out based on the GESAMP Hazard Profile, shown in table 2. An explanation of the details in the columns is provided in appendix I of MARPOL Annex II.*(2021)* (2) The following criteria are used to assign the Ship Type:*(2021)* (A) Ship Type 1: – Inhalation LC_{50}/ATE≤ 0.5 mg/L/4h (C3 = 4) and SVC/LC_{50} ≥ 20; and/or – Dermal LD_{50}/ATE ≤ 50 mg/kg (C2 = 4); and/or – WRI = 3; and/or – Auto-ignition temperature ≤ 65°C; and/or – Explosive range ≥ 50% v/v in air and the flashpoint 〈 23°C; and/or – Rules 1 or 2 of the table 2. (B) Ship Type 2: – Inhalation LC_{50}/ATE ≤ 0.5 mg/L/4h (C3 = 4) and SVC/LC_{50} 〈 20; or – Inhalation LC_{50}/ATE 〉 0.5 mg/L/4h – ≤ 2mg/L/4h (C3 = 3) and SVC/LC_{50} ≥ 2 (see note); and/or – Dermal LD_{50}/ATE 〉 50 mg/kg – ≤ 200 mg/kg (C2 = 3); and/or – WRI = 2; and/or – Auto-ignition temperature ≤ 200°C; and/or – Explosive range ≥ 40% v/v in air and the flashpoint 〈 23°C; and/or – Any product meeting the criteria of rules 3 to 10 in table 2. Note: Products with a density 〉1025 kg/m^3 (sinkers) or a water solubility of 〉50% (dissolvers) that are assigned to Ship Type 2 based on the inhalation toxicity criteria, may be re-assigned to Ship Type 3. (C) Ship Type 3: – Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to **Sec.17** not meeting the requirements for Ship Types 1 or 2 and not meeting rule 15 of table 2.	

Present

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

Amendment

Table 2 Assignment of Ship Types based on the GESAMP Hazard Profile (2021)

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

footnote)
2 Applies if the D3 rating contains any of these letters or any combination thereof.

Note

Present	Amendment	Note
6. Column f – Tank type (1) The tank type is assigned according to the following criteria: (A) Tank type 1G: Inhalation LC_{50} ≤ 0.5 ㎎/l/4h; and/or Dermal LD_{50} ≤ 200 ㎎/㎏; and/or Autoignition temperature ≤ 65℃; and/or Explosive range ≥ 40% v/v in air and the flash point 〈 23℃; and/or WRI=2 (B) Tank type 2G: Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to chapter 17 or the IBC Code not meeting the requirements for tank type 1G. **7. Column g – Tank vents** (1) The tank venting arrangements are assigned according to the following criteria: (A) Controlled: Inhalation LC_{50} ≤ 10 ㎎/l/4h; and/or Toxic to mammals by prolonged exposure; and/or Respiratory sensitizer; and/or Special carriage control needed; and/or Flash point ≤ 60℃ Corrosive to skin (≤ 4 h exposure) (B) Open: Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to chapter 17 or the IBC Code not meeting the requirements for controlled tank vents. **8. 〈omitted〉**	**6. Column f – Tank type** (1) The tank type is assigned according to the following criteria: (A) Tank type 1G: – Inhalation LC_{50}/ATE ≤ 0.5 mg/L/4h (C3 = 4) and SVC/LC_{50} ≥ 1000; and/or – Dermal LD_{50}/ATE ≤ 50 mg/kg (C2 = 4); and/or; – WRI=3; and/or – Auto-ignition temperature ≤ 65°C; and/or – Explosive range ≥ 40% v/v in air and the flashpoint 〈 23°C. – Based on expert judgement, tank type 1G may be required for specific products (e.g. for molten sulphur, hydrochloric acid) (B) Tank type 2G: Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to **Sec.17** or the IBC Code not meeting the requirements for tank type 1G. **7. Column g – Tank vents** (1) The tank venting arrangements are assigned according to the following criteria: (A) Controlled: – Inhalation LC_{50}/ATE ≤ 10 mg/L/4h (C3 = 2, 3 or 4), unless in accordance with **107. 4**; and/or – Toxic to mammals by prolonged exposure (D3 = C, M, R, T, N, or I); and/or – Respiratory sensitizer (D3 = Sr, see also paragraph 21.7.4); and/or – Special carriage control needed; and/or – Flashpoint ≤ 60°C; and Corrosive to skin (≤ 4h exposure). (D1 = 3A, 3B, or 3C). (B) Open: Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to **Sec.17** or the IBC Code not meeting the requirements for controlled tank vents. **8. 〈same as the present〉**	

Present

9. Column i – Electrical equipment

(1) If the flash point of the product is ≤ 60℃ or the product is heated to within 15℃ of its flash point then the electrical equipment required are assigned according to the following criteria, else .–. is assigned in column i' and i".

(A) 〈omitted〉

(B) Column i" – Apparatus group:

Apparatus group	MESG at 20 ℃ (㎜)	MIC ratio product/methane
IIA	≥ 0.9	〉0.8
IIB	0.5 〈 but 〈 0.9	0.45 ≤ but ≤ 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:

(i) for Group IIA: the MESG 〉 0.9㎜ or the MIC ratio 〉 0.9.

(ii) for Group IIB: the MESG is ≥ 0.55㎜ and ≤ 0.9㎜; or the MIC ratio is ≥ 0.5 and ≤0.8.

(iii) for Group IIC: the MESG is 〈 0.5㎜ or the MIC ratio is ≤0.45.

(c) 〈omitted〉

(C) 〈omitted〉

Amendment

9. Column i – Electrical equipment

(1) If the flashpoint of the product is ≤ 60°C or the product is heated to within 15°C of its flashpoint then the electrical equipment required are assigned according to the following criteria, otherwise "–" is assigned in column i' and i":

(A) 〈same as the present〉

(B) Column i" – Apparatus group:

Apparatus group	MESG at 20 ℃ (㎜)	MIC ratio product/methane
IIA	〉0.9	〉0.8
IIB	〉0.50 to ≤ 0.90	〉0.45 to ≤ 0.80
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:

(i) for Group IIA: the MESG 〉 0.90 mm or the MIC ratio 〉 0.80

(ii) for Group IIB: the MESG is 〉 0.50 mm and ≤ 0.90 mm; or the MIC ratio is 〉 0.50 and ≤ 0.80 ≥ 0.5 and ≤0.8.

(iii) for Group IIC: the MESG is ≤ 0.50 mm or the MIC ratio is ≤ 0.45

(c) 〈same as the present〉

(C) 〈same as the present〉

Note

Present	Amendment	Note
10. Column j – Gauging (1) The type of gauging equipment permitted is assigned according to the following criteria: (A) Closed: Inhalation LC_{50} ≤ 2 mg/l/4h; and/or Dermal LD_{50} ≤ 1000 mg/kg; and/or Toxic to mammals by prolonged exposure; and/or Respiratory sensitizer; and/or Corrosive to skin (≤ 3 min exposure). (B) 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 chapter 17 or the IBC Code not meeting the requirements for closed or restricted gauging.	**10. Column j – Gauging** (1) The gauging equipment is assigned according to the following criteria: *(2021)* (A) Closed: – Inhalation LC_{50}/ATE ≤ 2 mg/L/4h (C3 = 3 or 4), unless in accordance with 21.7.12; and/or – Dermal LD50/ATE ≤ 1000 mg/kg (C2 = 2, 3 or 4); and/or – Toxic to mammals by prolonged exposure (D3 = C, M, R, T, N, or I); and/or – Respiratory sensitizer (D3 = Sr, see also paragraph 21.7.4); and/or – Severely corrosive to skin (≤ 3 min exposure) (D1= 3C). (B) Restricted: – Inhalation LC_{50}/ATE 〉2 – ≤10 mg/L/4h (C3 = 2), unless in accordance with 21.7.12; and/or – Special carriage control indicates inerting required; and/or – Highly corrosive to skin (〉 3 min – ≤1h exposure) (D1 = 3B); and/or – Flashpoint ≤ 60°C. – Open: Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to **Sec.17** or the IBC Code not meeting the requirements for closed or restricted gauging. (C) Open: Any of the minimum safety or pollution criteria for bulk liquid cargoes subject to **Sec.17** or the IBC Code not meeting the requirements for closed or restricted gauging.	
11. Column k – Vapour detection (1) The type of vapour detection equipment required is determined by the following criteria: (A) Toxic (T) : Inhalation LC_{50} ≤ 10 mg/l/4h, and/or Respiratory sensitizer; and/or Toxic by prolonged exposure. (B) ~ (C) 〈omitted〉	**11. Column k – Vapour detection** (1) The vapour detection equipment is assigned according to the following criteria: *(2021)* (A) Toxic (T) : – Inhalation LC_{50}/ATE ≤ 10 mg/L/4h (C3 = 2, 3, or 4), unless in accordance with **107. 12**, and/or – Respiratory sensitizer (D3 = Sr, see also paragraph **107. 4**); and/or – Toxic to mammals by prolonged exposure (D3 = C, M, R, T, N, or I) (B) ~ (C) 〈same as the present〉	

Present	Amendment	Note
12. Column l – Fire protection equipment (1) The appropriate fire-fighting media are defined as being appropriate according to the following criteria related to the properties of the product: (A) Solubility 〉 10% (〉100000 mg/l) : A Alcohol-resistant foam. (B) Solubility 〈 10% (〈100000 mg/l/4h) : A Alcohol-resistant foam; and/or : B Regular foam. (C) WRI = 0 : C Water spray (generally used as a coolant and can be used with A and/or B providing that the WRI=0). (D) WRI ≥1 : D Dry chemical. (E) No : No requirements under this Code. (2) Note: all appropriate media shall be listed.	**12. Column l – Fire protection equipment** (1) The appropriate fire-fighting media are defined as being appropriate according to the following criteria related to the properties of the product: (A) Solubility 〉 10% (〉 100000 mg/L) A Alcohol-resistant foam (B) Solubility ≤ 10% (≤ 100000 mg/L) A Alcohol-resistant foam; and/or B Regular foam Water spray (generally used as a coolant and can be used with A and/or B providing that the WRI = 0) WRI = 0 C Regular foam WRI ≥1 D Dry chemical No requirements under this Code. This applies where a product as identified as NF in column i"' (see paragraph 21.4.9.1.3). (2) Note: all appropriate media shall be listed.	
13. deleted.	**13. deleted.**	
14. Column n – Emergency Equipment (1) The requirement to have personnel emergency equipment on board is identified by .Yes. in column n according to the following criteria: Inhalation LC_{50} ≤ 2 mg/l/4h; and/or Respiratory sensitizer; and/or Corrosive to skin (≤ 3 min exposure); and/or WRI=2 (2) No: indicates that the above criteria do not apply.	**14. Column n – Emergency Equipment** (1) The requirement to have personnel emergency equipment on board is identified by "Yes" in column n according to the following criteria: – Inhalation LC_{50}/ATE ≤ 2 mg/L/4h (C3 = 3 or 4); unless in accordance with **107.12** and/or – Respiratory sensitizer (D3 = Sr, see also paragraph **107.4**); and/or – Severely corrosive to skin (≤ 3 min exposure) (D1 = 3C); and/or – WRI = 2 (2) No: indicates that the above criteria do not apply.	

Present	Amendment	Note
105. Criteria for special requirements in chapter 15 to be included in column o	**105. Criteria for special requirements in Sec.15 to be included in column o**	
1. ~ 4. 〈omitted〉	**1. ~ 4. 〈same as the present〉**	
5. 1512. – Toxic products	**5. 1512.** – Toxic products	
(1) All of **1512.** is added to column o according to the following criteria: Inhalation LC_{50} ≤ 2 mg/l/4h; and/or the product is a respiratory sensitizer; and/or the product is toxic to mammals by prolonged exposure.	(1) All of **1512.** is added to column o according to the following criteria: – Inhalation LC_{50}/ATE ≤ 2 mg/L/4h (C3 = 3 or 4), unless in accordance with **107. 12**; and/or – the product is a respiratory sensitizer (D3 = Sr, see also **107. 4**); and/or – the product is toxic to mammals by prolonged exposure (D3 = C, M, R, T, N, or I).	
(2) **1512. 3** is added to column o according to the following criteria: Inhalation LC_{50} 〉 2 – ≤ 10 mg/l/4h; and/or Dermal LD_{50} ≤ 1000 mg/kg; and/or Oral LD_{50} ≤ 300 mg/kg. (3) **1512. 4** is added to column o according to the following criterion: Inhalation LC_{50} 〉 2 – ≤ 10 mg/l/4h.	(2) Paragraphs **1512. 3** and **1512.4** are added to column o according to the following criterion: – Inhalation LC_{50}/ATE 〉 2 – ≤ 10 mg/L/4h (C3 = 2), unless in accordance with **107.12**. (3) Paragraph **1512. 3** (2) is added to column o according to the following criteria: – Dermal LD_{50}/ATE ≤ 1000 mg/kg (C2 = 2, 3, or 4); and/or – Oral LD_{50}/ATE ≤ 300 mg/kg (C1 = 2, 3, or 4).	
6. ~ 8. 〈omitted〉	**6. ~ 8. 〈same as the present〉**	
9. 1517. – Increased ventilation requirements	**9. 1517.** – Increased ventilation requirements	
1517. shall be added to column o according to the following criteria: Inhalation LC_{50} 〉 0.5 – ≤ 2 mg/l/4h; and/or Respiratory sensitizer; and/or Toxic to mammals by prolonged exposure; and/or Corrosive to skin (≤ 1 h exposure time).	(1) **1517.** shall be added to column o according to the following criteria: – Inhalation LC_{50}/ATE 〉 0.5 – ≤ 2 mg/L/4h (C3 = 3), unless in accordance with **107.12**; and/or – Respiratory sensitizer (D3 = Sr, see also paragraph 21.7.4); and/or – Toxic to mammals by prolonged exposure (D3 = C, M, R, T, N, or I); and/or – Highly to severely corrosive to skin (≤ 1h exposure time) (D1 = 3B or 3C).	
10. 1518. – Special cargo pump-room requirements	**10. 1518.** – Special cargo pump-room requirements	
1518. shall be added to column o according to the following criterion: Inhalation LC_{50} ≤ 0.5 mg/l/4h	(1) **1518.** shall be added to column o according to the following criterion: Inhalation LC_{50}//ATE ≤ 0.5 mg/L/4h (C3 = 4), unless in accordance with **107.12.**	

Present	Amendment	Note
11. 1519. - Overflow control (1) 〈omitted〉 Inhalation LC_{50} ≤ 2 mg/l/4h; and/or Dermal LD_{50} ≤ 1000 mg/kg; and/or Oral LD_{50} ≤ 300 mg/kg; and/or Respiratory sensitizer; and/or Corrosive to skin (≤ 3 min exposure); and/or Autoignition temperature ≤ 200℃; and/or Explosive range ≥ 40% v/v in air and flash point 〈 23℃; and/or Classified as ship type 1 on pollution grounds. (2) 〈omitted〉 Inhalation LC_{50} 〉 2 mg/l/4h - ≤ 10 mg/l/4h; and/or Dermal LD_{50} 〉 1000 mg/kg - ≤ 2000 mg/kg; and/or Oral LD_{50} 〉 300 mg/kg - ≤ 2000 mg/kg; and/or Skin sensitizer; and/or Corrosive to skin (〉 3 min - ≤ 1 h exposure); and/or Flash point ≤ 60℃; and/or Classified as ship type 2 on pollution grounds; and/or Pollution category X or Y. **12.** 〈omitted〉 **106. Criteria for special requirements in chapter 16 to be included in column o** **1 ~ 2.** 〈omitted〉 **3. 1602. 7** **1602. 7** is added to column o for products, which meet the following criterion: **4.** 〈omitted〉 **5.** 〈newly added〉	**11. 1519.** - Overflow control (1) 〈same as the present〉 - Inhalation LC_{50}/ATE ≤ 2 mg/L/4h (C3 = 3 or 4), unless in accordance with **107.12**; and/or - Dermal LD_{50}/ATE ≤ 1000 mg/kg (C2 = 2, 3, or 4); and/or - Oral LD_{50}/ATE ≤ 300 mg/kg (C1 = 2, 3, or 4); and/or - Respiratory sensitizer (D3 = Sr, see also paragraph **107.4**); and/or - Severely corrosive to skin (≤ 3 min exposure) (D1 = 3C); and/or - Auto-ignition temperature ≤ 200oC; and/or - Explosive range ≥ 40% v/v in air and flashpoint 〈 23°C; and/or - Classified as Ship Type 1 on pollution grounds. (2) 〈same as the present〉 - Inhalation LC_{50}/ATE 〉 2 mg/L/4h - ≤10 mg/L/4h (C3 = 2), unless in accordance with 21.7.12; and/or - Dermal LD_{50}/ATE 〉 1000 mg/kg - ≤ 2000 mg/kg (C2 = 1); and/or - Oral LD_{50}/ATE 〉 300 mg/kg - ≤ 2000 mg/kg (C1 = 1); and/or - Skin sensitizer (D3='Ss'); and/or - Highly corrosive to skin (〉 3 min - ≤ 1h exposure) (D1 = 3B); and/or - Flashpoint ≤ 60°C; and/or - Classified as Ship Type 2 on pollution grounds; and/or - Pollution category X or Y. **12.** 〈same as the present〉 **106. Criteria for special requirements in Sec.16 to be included in column o** **1 ~ 2.** 〈same as the present〉 **3. 1602. 9** **1602. 9** is added to column o for products, which meet the following criterion: **4.** 〈same as the present〉 **5.1602. 7** **1602. 7** is added to column o for products which meet the following criteria: Pollution Category Y that are persistent floaters (E2 = Fp) with a viscosity greater than or equal to 50 mPa s at 20 °C and/or with a melting point greater than or equal to 0°C	

Present

107. Definitions

1. Acute mammalian toxicity

(1) Acutely toxic by inhalation*

Inhalation toxicity (LC_{50})	
Hazard level	mg/l/4h
High	≤ 0.5
Moderately high	0.5 〈 but ≤ 2
Moderate	2 〈 but ≤ 10
Slight	10 〈 but ≤ 20
Negligible	20 〈

(2) Acutely toxic in contact with skin

Dermal toxicity (LD_{50})	
Hazard Level	mg/kg
High	≤ 50
Moderately high	50 〈 but ≤ 200
Moderate	200 〈 but ≤ 1000
Slight	1000 〈 but ≤ 2000
Negligible	2000 〈

Amendment

107. Definitions

1. Acute mammalian toxicity

LC50is the concentration in air, LD 50is the amount (dose) of test substance, which causes mortality to 50% of a test species. ATE refers to a dose (concentration) range or extrapolated dose (concentration) leading to lethal effects in mammals, equivalent to an LC50or LD50.

(1) Acutely toxic if swallowed

Oral toxicity (LD50/ATE)		GESAMP Hazard Profile Rating C1
Hazard level	mg/kg	
High	≤ 0.5	4
Moderately high	〉5 ≤ 50	3
Moderate	〉50 ≤ 300	2
Slight	〉300 ≤ 2000	1
Negligible	〉2000	0

(2) Acutely toxic in contact with skin

Dermal toxicity (LD50/ATE)		GESAMP Hazard Profile Rating C2
Hazard level	mg/kg	
High	≤ 50	4
Moderately high	〉50 ≤ 200	3
Moderate	〉200 ≤ 1000	2
Slight	〉1000 ≤ 2000	1
Negligible	〉2000	0

Note

Present	Amendment	Note
(3) Acutely toxic if swallowed Oral toxicity (LD_{50}) Hazard Level / mg/kg High / ≤ 5 Moderately high / 5 〈 but ≤ 50 Moderate / 50 〈 but ≤ 300 Slight / 300 〈 but ≤ 2000 Negligible / 2000 〈 **2.** Toxic to mammals by prolonged exposure (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. (2) Such effects may be identified from the GESAMP Hazard Profile of the product or other recognized sources of such information. **3.** Skin sensitization (1) A product is classified as a skin sensitizer: if there is evidence in humans that the substance can induce sensitization by skin contact in a substantial number of persons; or where there are positive results from an appropriate animal test. (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. (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.	(3) Acutely toxic by inhalation Dermal toxicity (LD50/ATE) / GESAMP Hazard Profile Rating C Hazard level / mg/kg / GESAMP Hazard Profile Rating C High / ≤ 50 / 4 Moderately high / 〉 0.5 ≤ 2 / 3 Moderate / 〉 2 ≤ 10 / 2 Slight / 〉 10 ≤ 20 / 1 Negligible / 〉 20 / 0 **2.** Toxic to mammals by prolonged exposure (1) A product is classified as toxic to mammals by prolonged exposure if it meets any of the following criteria: it is known to be, or suspected of being carcinogenic, mutagenic, reprotoxic, neurotoxic, immunotoxic or exposure below the lethal dose is known to cause Specific Target Organ Toxicity. (2) Such effects may be identified from the GESAMP Hazard Profile of the product (D3 = C, M, R, T, N, or I) or other recognized sources of such information. **3.** Skin sensitization (1) A product is classified as a skin sensitizer: (A) if there is evidence in humans that the substance can induce sensitization by skin contact in a substantial number of persons; or (B) where there are positive results from an appropriate animal test. (2) Such effects are identified in the GESAMP Hazard Profile for the product (D3 = Ss). (3) 〈deleted〉	

Present

4. Respiratory sensitization

A product is classified as a respiratory sensitizer:

(1) if there is evidence in humans that the substance can induce specific respiratory hypersensitivity; and/or
(2) where there are positive results from an appropriate animal test; and/or
(3) where the product is identified as a skin sensitizer and there is no evidence to show that it is not a respiratory sensitizer.

5. Corrosive to skin*

Hazard Level	Exposure time to cause full thickness necrosis of skin	Observation time
Severely corrosive to skin	≤ 3 min	≤ 1 h
Highly corrosive to skin	3 min 〈 but ≤ 1 h	≤ 14 days
Moderately corrosive to skin	1 h 〈 but ≤ 4 h	≤ 14 days

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

6. Water reactive substances

These are classified into three groups as follows:

Water reactive index (WRI)	Definition
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 valve of 1 or 2.

Amendment

4. Respiratory sensitization

A product is classified as a respiratory sensitizer:

(1) if there is evidence in humans that the substance can induce specific respiratory hypersensitivity; and/or
(2) where there are positive results from an appropriate test; and/or
(3) where the product does not have a GESAMP Hazard Profile and is identified as a skin sensitizer and there is no evidence to show that it is not a respiratory sensitizer.

5. Corrosive to skin*

Hazard Level	Exposure time to cause full thickness necrosis of skin	GESAMP Hazard Profile Rating D1
Severely corrosive to skin	≤ 3 min	3C
Highly corrosive to skin	〉 3 min ≤ 1h	3B
Moderately corrosive to skin	〉 1h ≤ 4h	3A

Note *: A rating of 3 or (3) in the D1 column of the GESAMP Hazard Profile without any additional letter notation (A, B or C), means that the severity of corrosivity has not been established. For such cases, a rating of 3 or (3) is understood to be equivalent to a rating of 3B for the purpose of assigning carriage requirements.

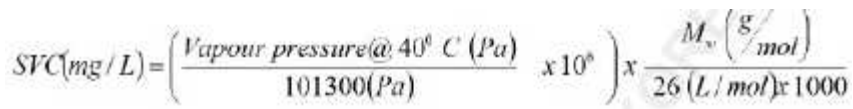
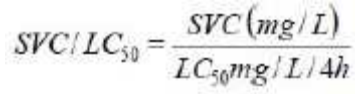
6. Water reactive substances

These are classified as follows:

Water reactive index (WRI)	Definition
3	Any chemical which is extremely reactive with water and produces large quantities of flammable, toxic or corrosive gas or aerosol
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 nontoxic, nonflammable or noncorrosive gas
0	Any chemical which, in contact with water, would not undergo a reaction to justify a value of 1, 2 or 3

Note

Present	Amendment	Note
6 ~ 11. 〈omitted〉	**6 ~ 11.** 〈same as the present〉 **12. Application of the SVC/LC50 ratio method** (1) If the vapour pressure and the molecular weight of a substance are known, an estimate of the maximum vapour concentration in a closed compartment (e.g. a tank) can be calculated. This is called the Saturated Vapour Concentration (SVC). (2) The hazard quotient SVC/LC 50 is a substance specific value for the velocity of a vapour for achieving a hazardous concentration when emerging from a liquid source (e.g. leak, spillage or tank ventilation), and can be used in the assignment of specific carriage requirements related to inhalation toxicity. ATE values can be considered as equivalent to LC50 values. See **107. 1**. (3) If a solid substance is transported in an aqueous solution, the vapour pressure of this solid rather than that of water may be used in the calculation of the SVC/LC50 ratio. If this data is not available, an estimate may be used. (4) Application of the SVC/LC50ratio for assigning Ship Type and Tank type (A) For the assignment of Ship Type and tank type, as set out in **104. 5** and **104. 6**, the application of the SVC/LC50 ratio method is optional. Should this method be used, the vapour pressure at 20°C shall be used when calculating the SVC/LC50 ratio. (B) The SVC mg/L of a substance should be calculated as follows: $$SVC(mg/L) = \left(\frac{Vapour\ pressure\ @\ 20^{\circ}C\ (Pa)}{101300\ (Pa)} \times 10^{6} \right) \times \frac{M_w \left(g/mol \right)}{24(L/mol) \times 1000}$$ where MW is the molecular weight of the substance. (C) The SVC/LC50 ratio should be calculated as follows: $$SVC/LC_{50} = \frac{SVC(mg/L)}{LC_{50} mg/L/4h}$$ (5) Application of the SVC/LC50 ratio for assigning carriage requirements (A) For the carriage requirements listed in 21.7.12.5.5, the application of the SVC/LC 50 ratio method is optional. If the SVC/LC 50 ratio method is used in the assignment of these carriage requirements, the vapour pressure at 40°C shall be used when calculating the SVC/LC 50 ratio. If the carriage temperature is higher than 40°C, then the SVC/LC50 ratio should be calculated at that temperature. ——	

Present	Amendment	Note
	(B) The SVC (mg/l) of a substance should be calculated as follows:  where MW is the molecular weight of the substance. (C) The SVC/LC50 ratio should be calculated as follows:  (D) The SVC (mg/L) formula described in 21.7.12.5.2 is standardized for calculations at 40°C. When using the vapour pressure at higher temperatures in the calculations, the formula must be amended accordingly. (E) For the following carriage requirements, the SVC/LC 50 ratio method, calculated at 40°C or higher, may be used as an alternative to the acute inhalation toxicity criteria given in paragraphs 21.4 and 21.5: (a) Column g - Tank vents Assignment of controlled venting is not required based on the inhalation hazard only, if: Inhalation LC50/ATE ≤ 10 mg/L/4h (C3 = 2, 3, or 4) and SVC/LC50 〈 0.2 (b) Column j - Gauging Closed gauging is not required based on the inhalation hazard only, if: Inhalation LC50/ATE ≤ 2 mg/L/4h (C3 = 3 or 4) and SVC/LC50 〈 0.2 but restricted gauging is required. Restricted gauging is not required based on the inhalation hazard only, if: Inhalation LC50/ATE 〉 2 - ≤ 10 mg/L/4h (C3 = 2) and SVC/LC50 〈 0.2 (c) Column k - Vapour detection Assignment of toxic vapour detection is not required based on the inhalation hazard only, if: Inhalation LC50/ATE ≤ 10 mg/L/4h (C3 = 2, 3, or 4) and SVC/LC50 〈 0.2 (d) Column n - Emergency Equipment Inhalation LC50/ATE ≤ 2 mg/L/4h (C3 = 3 or 4) and SVC/LC50 〈 0.2	

Present	Amendment	Note
	(e) Column o - Special requirements in **Sec.15** (i) **1512. 1** and **1512. 2** are not required based on the inhalation hazard only, if: Inhalation LC50/ATE ≤ 2 mg/L/4h (C3 = 3 or 4) and SVC/LC50 〈 0.2 (ii) **1512. 3** and **1512. 4** are not required based on the inhalation hazard only, if: Inhalation LC50/ATE 〉2 - ≤ 10 mg/L/4h (C3 = 2) and SVC/LC50 〈 0.2 (iii) **1517.** is not required based on the inhalation hazard only, if: Inhalation LC50/ATE ≤ 0.5 mg/L/4h (C3 = 4) and SVC/LC50 〈 0.2 (iv) **1518.** is not required based on the inhalation hazard only if: Inhalation LC50/ATE ≤ 0.5 mg/L/4h (C3 = 4) and SVC/LC50 〈 0.2 (v) **1519.** is not required based on the inhalation hazard only, if: Inhalation LC50/ATE ≤ 2 mg/L/4h (C3 = 3 or 4) and SVC/LC50 〈 0.2, but 15.19.6 applies (vi) **1519. 6** is not required based on the inhalation hazard only, if: Inhalation LC50/ATE 〉 2 - ≤ 10 mg/L/4h (C3 = 2) and SVC/LC50 〈 0.2"	

Amendments of the Rules / Guidance

(External review)

Pt.7 Ships of Special Services

2020. 09.

Hull Rule Development Team

Present	Amendment	Note
〈Rules〉 **CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK** **Section 1 General** **101. Application (IGC Code 1.1)** 【See Guidance】 **1.** 〈omit〉 **2.** (1) (2) 〈omit〉 (3) Unless expressly provided otherwise, for ships constructed on or after 1 July 1986 and before 1 July 2016, the Society is to ensure that the requirements which are applicable under this Chapter, as adopted by resolution MSC.5(48) as amended by resolutions MSC.17(58), MSC.30(61), MSC.32(63), MSC.59(67), MSC.103(73), MSC.177(79) and MSC.220(82), are complied with. **3. ~ 7.** 〈omit〉	**〈Rules〉** **CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK** **Section 1 General** **101. Application (IGC Code 1.1)** 【See Guidance】 **1.** 〈same as current〉 **2.** (1), (2) 〈same as current〉 (3) For ships constructed on or after 1 July 1986 and before 1 July 2016, the Society is to ensure that the requirements which are applicable under this Chapter, as adopted by resolution MSC.5(48) as amended by resolutions MSC.17(58), MSC.30(61), MSC.32(63), MSC.59(67), MSC.103(73), MSC.177(79) and MSC.220(82), are complied with. (4) The requirements for ships constructed before 1 July 1986 and not having the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk shall be complied with **Annex 7A-1** 「**Requirements for Ships not having the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk**」. *(2021)* **3. ~ 7.** 〈omit〉	- move from the Guidelines to the Rule
〈Guidance〉 **CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK** **Section 1 General** **101. Application** 【See Rule】 In application to **101.** of the Rules, requirements for ships constructed before 1 July 1986 and not having the International Certificate of Fitness for the Carriage of Liquefied Gases in Bulk shall be complied with **Annex 7A-1** of this guidance.	**〈Guidance〉** **CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK** **Section 1 General** 〈delete〉	- move from the Guidelines to the Rule

Present	Amendment	Note
〈Rules〉	**〈Rules〉**	
101. Application (IGC Code 1.1) 【See Guidance】	**101. Application (IGC Code 1.1)** 【See Guidance】	
	8. For ships fitted with systems for for delivering LNG bunker to ships using LNG as fuel, the requirement in **Annex 7A-3 「LNG Bunkering Systems」** is applied. *(2021)*	〈newly added〉
Section 6 Materials of Construction and Quality Control	**Section 6 Materials of Construction and Quality Control**	
604. Requirements for metallic materials (IGC Code 6.4)	**604. Requirements for metallic materials (IGC Code 6.4)**	
1. General requirements for metallic materials The requirements for materials of construction are shown in the tables as follows: **Table 7.5.4**: Plates, pipes (seamless and welded), sections and forgings for cargo tanks and process pressure vessels for design temperatures not lower than 0 °C. **Table 7.5.5**: Plates, sections and forgings for cargo tanks, secondary barriers and process pressure vessels for design temperatures below 0 °C and down to −55 °C. **Table 7.5.6**: Plates, sections and forgings for cargo tanks, secondary barriers and process pressure vessels for design temperatures below −55 °C and down to −165 °C. **Table 7.5.7**: Pipes (seamless and welded), forgings and castings for cargo and process piping for design temperatures below 0 °C and down to −165 °C. **Table 7.5.8**: Plates and sections for hull structures required by **419. 1** (2) and **419. 1** (3).	**1. General requirements for metallic materials** The requirements for materials of construction are shown in the tables as follows: Table 7.5.4 ~ Table 7.5.8 〈same as current〉	
	For cargo tanks using high manganese austenitic steel for cryogenic service, **Annex 7A-4 「High manganese austenitic steel for Cryogenic Service」** should be applied. *(2021)*	〈newly added〉

Present	Amendment	Note
〈Guidance〉 **CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK** **Section 4 Cargo Containment**	〈Guidance〉 **CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK** **Section 4 Cargo Containment**	
	402. Application 【See Rule】 (2020) The requirements of this section of the **Rule** and **Guidance** do not cover all aspects of the design, fabrication and installation of Cargo Containment System.	〈newly added〉
403. Functional requirements 【See Rule】 1. Corrosion allowances (1) The corrosion allowance "where there is no environmental control around the cargo tank, such as inerting" referred to in the requirements in **403. 5** of the Rules, in the case of steel, is to be 1 ㎜. Except for tanks carrying cargoes containing considerable amounts of impurities or corrosive substances such as chlorine and sulfur dioxide, no corrosion allowance may be required for aluminum alloys and stainless steel. 2. Environmental conditions (1) "North Atlantic environmental conditions and relevant long-term sea state scatter diagrams" referred in the requirements in **403. 2 of the Rules** is in accordance with the wave data in **Pt 3, Annex 3-2 II 5** of the Guidance. (**IACS Rec.34 "Standard wave data"**)*(2018)*	403. Functional requirements 【See Rule】 1. Corrosion allowances (1) The corrosion allowance "where there is no environmental control around the cargo tank, such as inerting" referred to in the requirements in **403. 5** of the Rules, in the case of steel, is to be 1 ㎜. Except for tanks carrying cargoes containing considerable amounts of impurities or corrosive substances such as chlorine and sulfur dioxide, no corrosion allowance may be required for aluminum alloys and stainless steel. 2. Environmental conditions (1) "North Atlantic environmental conditions and relevant long-term sea state scatter diagrams" referred in the requirements in **403. 2 of the Rules** is in accordance with the wave data in **Pt 3, Annex 3-2 II 5** of the Guidance. (**IACS Rec.34 "Standard wave data"**)*(2018)*	
405. ~ 428. 〈omit〉	405. ~ 428. 〈omit〉	

Present	Amendment	Note
〈Guidance〉 # Ch.5 SHIPS CARRYING LIQUEFIED GASES IN BULK ## Section 4 Cargo Containment 422. Type B independent tanks 【See Rule】 1. 〈omit〉 2. Allowable stresses (1) For the purpose of the requirements in **422. 3** (1) (B) of the Rules, the allowable stress for the primary stress of the prismatic Type B independent tanks is to be in accordance with the requirements in **422. 3** (1) (A) of the Rules. (2) For the purpose of the requirements in **418. 1** (3) of the Rules, the values of R_e and R_m when the strength of welds is less than that of the parent metal as in the case of 9 % nickel steel are to be of the required values of mechanical properties of the weld metal. For welded joints of aluminium alloys R5083-O and R5083/5183 and 9 % nickel steel, the values of R_e and R_m may be modified in consideration of the increase in the yield stress and tensile stress at low temperature after taking into account the welding procedure employed. 3. 〈omit〉	〈Guidance〉 # Ch.5 SHIPS CARRYING LIQUEFIED GASES IN BULK ## Section 4 Cargo Containment 422. Type B independent tanks 【See Rule】 1. 〈omit〉 2. Allowable stresses (1) For the purpose of the requirements in **422. 3** (1) (B) of the Rules, the allowable stress for the primary stress of the prismatic Type B independent tanks is to be in accordance with the requirements in **422. 3** (1) (A) of the Rules. (2) For the purpose of the requirements in **418. 1** (3) of the Rules, the values of R_e and R_m when the strength of welds is less than that of the parent metal as in the case of 9 % nickel steel are to be of the required values of mechanical properties of the weld metal. For welded joints of aluminium alloys R5083-O and R5083/5183 and 9 % nickel steel, the values of R_e and R_m may be modified in consideration of the increase in the yield stress and tensile stress at low temperature after taking into account the welding procedure employed. (3) For the purpose of the requirements in **422. 3** (1) (C) of the Rules, if 9% nickel steel is used for the plates of the cargo tank, the allowable stress $R_e/1.33$ is applied to the calculation of the tank plates. 3. 〈omit〉	

Present	Amendment	Note
⟨Guidance⟩	⟨Guidance⟩	
# Ch.5 SHIPS CARRYING LIQUEFIED GASES IN BULK	# Ch.5 SHIPS CARRYING LIQUEFIED GASES IN BULK	
## Section 4 Cargo Containment	## Section 4 Cargo Containment	
428. Guidance notes for Sec 4 【See Rule】	428. Guidance notes for Sec 4 【See Rule】	
1. Internal pressure	1. Internal pressure	
(1) As the "Equivalent calculation procedures" referred to in the requirements in **428. 1** (1) of the Rules, the following (A) to (B) may be based upon :	(1) As the "Equivalent calculation procedures" referred to in the requirements in **428. 1** (1) of the Rules, the following (A) to (B) may be based upon :	
(A) In the case of square tanks, the water head at arbitrary point j on the tank plate is to be obtained from the following equations :	(A) In the case of square tanks, the water head at arbitrary point j on the tank plate is to be obtained from the following equations :	
$h_j = h_{j \cdot st} + h_{j \cdot dym}$ (MPa)	$h_j = h_{j \cdot st} + h_{j \cdot dym}$ (MPa)	
$h_{j \cdot st} = \frac{P_0 + \rho \cdot z_j}{1.02 \times 10^5}$ (MPa)	$h_{j \cdot st} = P_0 + \frac{\rho \cdot z_j}{1.02 \times 10^5}$ (MPa)	
$h_{j \cdot dym} = \frac{\rho \sqrt{(x_j \cdot a_x)^2 + (y_j \cdot a_y)^2 + (z_j \cdot a_z)^2}}{1.02 \times 10^5}$ (MPa)	$h_{j \cdot dym} = \frac{\rho \sqrt{(x_j \cdot a_x)^2 + (y_j \cdot a_y)^2 + (z_j \cdot a_z)^2}}{1.02 \times 10^5}$ (MPa)	
P_0 and ρ : as specified in **428. 1** of the Rules.	P_0 and ρ : as specified in **428. 1** of the Rules.	
a_x, a_y and a_z : as specified in Fig **7.5.23** of the Guidance and in **428. 1** of the Rules.	a_x, a_y and a_z : as specified in Fig **7.5.23** of the Guidance and in **428. 1** of the Rules.	
x_j, y_j and z_j (m) : as specified in Fig **7.5.23** of the Guidance.	x_j, y_j and z_j (m) : as specified in Fig **7.5.23** of the Guidance.	

Present	Amendment	Note
(B) 〈omission〉 (C) In the case of cylindrical tank arranged horizontally along the longitudinal direction of the ship, pressure $P(x_j, \phi)$ at an arbitrary point on the tank plate is to be obtained from the following equation : (a) $P(x_j,\phi) = P(x_j,\phi)_{st} + P(x_j,\phi)_{dyn}$ $P(x_j,\phi)_{st} = P_0 + \rho R(1-\cos\phi)/(1.02\times10^5)$ (MPa) $P(x_j,\phi)_{dyn} = \sqrt{P_1^2+P_2^2+P_3^2}$ (MPa) $P_1 = \rho \cdot x_j \cdot a_x/(1.02\times10^7)$ (MPa) $P_2 = \rho \cdot R(\sqrt{1+a_y^2}-a_y\sin\phi-1)/(1.02\times10^5)$ (MPa) $P_3 = \rho \cdot R \cdot a_z(1-\cos\phi)/(1.02\times10^5)$ (MPa) where; P_0, ρ, a_x, a_y and a_z : as specified in the preceding (B) R : inner radius of cylinder (m) ϕ, x_j : as specified in Fig **7.5.25** of the Guidance. <omission>	(B) 〈omission〉 (C) In the case of cylindrical tank arranged horizontally along the longitudinal direction of the ship, pressure $P(x_j, \phi)$ at an arbitrary point on the tank plate is to be obtained from the following equation : (a) $P(x_j,\phi) = P(x_j,\phi)_{st} + P(x_j,\phi)_{dyn}$ $P(x_j,\phi)_{st} = P_0 + \rho R(1-\cos\phi)/(1.02\times10^5)$ (MPa) $P(x_j,\phi)_{dyn} = \sqrt{P_1^2+P_2^2+P_3^2}$ (MPa) $P_1 = \rho \cdot x_j \cdot a_x/(1.02\times10^5)$ (MPa) $P_2 = \rho \cdot R(\sqrt{1+a_y^2}-a_y\sin\phi-1)/(1.02\times10^5)$ (MPa) $P_3 = \rho \cdot R \cdot a_z(1-\cos\phi)/(1.02\times10^5)$ (MPa) where; P_0, ρ, a_x, a_y and a_z : as specified in the preceding (B) R : inner radius of cylinder (m) ϕ, x_j : as specified in Fig **7.5.25** of the Guidance. <omission>	

Present	Amendment	Note
〈Rule〉 # CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK ## Section 4 Cargo Containment 419. Materials (IGC Code 4.19) 【See Guidance】 1. 〈omit〉 2. Materials of primary and secondary barriers (1) ~(4) 〈omit〉 (5) (A) Where non-metallic materials, including composites, are used for the primary and secondary barriers, the joining processes shall also be tested as described above. (B) Guidance on the use of non-metallic materials in the construction of primary and secondary barriers is provided in 'IGC Code Appendix 4' of the Guidance. (6) 〈omit〉 3. 〈omit〉 602. Scope and general requirements (IGC Code 6.2) 1. This Section gives the requirements for metallic and non-metallic materials used in the construction of the cargo system. This includes requirements for joining processes, production process, personnel qualification, NDT and inspection and testing including production testing. The requirements for rolled materials, forgings and castings are given in **604.** and **Tables 7.5.4** to **7.5.8**. The requirements for weldments are given in **605.** A quality assurance/quality control programme shall be implemented to ensure that the requirements of **602.** are complied with.	〈Rule〉 # CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK ## Section 4 Cargo Containment 419. Materials (IGC Code 4.19) 【See Guidance】 1. 〈same as current〉 2. Materials of primary and secondary barriers (1) ~(4) 〈same as current〉 (5) (A) Where non-metallic materials, including composites, are used for the primary and secondary barriers, the joining processes shall also be tested as described above. (B) Guidance on the use of non-metallic materials in the construction of primary and secondary barriers is provided in Annex 「 7A-6 Non-Metallic Materials 」 of the Guidance. (6) 〈same as current〉 3. 〈same as currentt〉 602. Scope and general requirements (IGC Code 6.2) 1. This Section gives the requirements for metallic and non-metallic materials used in the construction of the cargo system. This includes requirements for joining processes, production process, personnel qualification, NDT and inspection and testing including production testing. The requirements for rolled materials, forgings and castings are given in **604.** and **Tables 7.5.4** to **7.5.8**. The requirements for weldments are given in **605.** and the requirements for non-metallic materials are given in Annex 「 7A-6 Non-Metallic Materials 」. A quality assurance/quality ~ 〈same as current〉	

Present	Amendment	Note
607. Non-metallic materials (IGC Code 6.7) **1. General** Guidance in the selection and use of these materials, what is deemed appropriate by the Society.	**607. Non-metallic materials (IGC Code 6.7)** **1. General** Guidance in the selection and use of these materials is given in **Annex 「 7A-6 Non-Metallic Materials 」.**	

Present	Amendment	Note
	〈Guidance〉 # Annex 7A-6 Non-Metallic Materials(IGC Code Appendix 4) (2021) **101. General** **1.** The Annex is in addition to the requirements of **Ch 5, 419** of the Rules, where applicable to nonmetallic materials. **2.** The manufacture, testing, inspection and documentation of non-metallic materials should in general comply with recognized standards, and with the specific requirements of this Annex, as applicable. **3.** When selecting a non-metallic material, the designer should ensure that it has properties appropriate to the analysis and specification of the system requirements. A material can be selected to fulfil one or more requirements. **4.** A wide range of non-metallic materials may be considered. Therefore, the section below on material selection criteria cannot cover every eventuality and should be considered as guidance. **102. Material selection criteria** **1.** Non-metallic materials may be selected for use in various parts of liquefied gas carrier cargo systems based on consideration of the following basic properties: (1) insulation - the ability to limit heat flow; (2) load bearing - the ability to contribute to the strength of the containment system; (3) tightness - the ability to provide liquid and vapour tight barriers; (4) joining - the ability to be joined (for example by bonding, welding or fastening). **2.** Additional considerations may apply depending on the specific system design. **103. Properties of materials** **1.** Flexibility of insulating material is the ability of an insulating material to be bent or shaped easily without damage or breakage. **2.** Loose fill material is a homogeneous solid generally in the form of fine particles, such as a powder or beads, normally used to fill the voids in an inaccessible space to provide an effective insulation.	〈newly added〉

Present	Amendment	Note

3. Nano-material is a material with properties derived from its specific microscopic structure.

4. Cellular material is a material type containing cells that are either open, closed or both and which are dispersed throughout its mass.

5. Adhesive material is a product that joins or bonds two adjacent surfaces together by an adhesive process.

6. Other materials are materials that are not characterized in this Annex and should be identified and listed. The relevant tests used to evaluate the suitability of material for use in the cargo system should be identified and documented.

104. Material selection and testing requirements

1. Material specification

(1) When the initial selection of a material has been made, tests should be conducted to validate the suitability of this material for the use intended.
(2) The material used should clearly be identified and the relevant tests should be fully documented.
(3) Materials should be selected according to their intended use. They should:
(A) be compatible with all the products that may be carried;
(B) not be contaminated by any cargo nor react with it;
(C) not have any characteristics or properties affected by the cargo; and
(D) be capable to withstand thermal shocks within the operating temperature range.

2. Material testing

The tests required for a particular material depend on the design analysis, specification and intended duty. The list of tests below is for illustration. Any additional tests required, for example in respect of sliding, damping and galvanic insulation, should be identified clearly and documented. Materials selected according to **1.** of this Annex should be tested further according to the following **Table 1.1**:

Table 1.1

Function	Insulation	Load bearing structural	Tightness	Joining
Mechanical tests		V	V	V
Tightness tests			V	
Thermal tests	V			

Thermal shock testing should submit the material and/or assembly to the most extreme thermal gradient it will experience when in service.

Present	Amendment	Note
	(1) Inherent properties of materials (A) Tests should be carried out to ensure that the inherent properties of the material selected will not have any negative impact in respect of the use intended. (B) For all selected materials, the following properties should be evaluated: (a) density; example standard **ISO 845**; and (b) linear coefficient of thermal expansion (LCTE); example standard **ISO 11359** across the widest specified operating temperature range. However, for loose fill material the volumetric coefficient of thermal expansion (VCTE) should be evaluated, as this is more relevant. (C) Irrespective of its inherent properties and intended duty, all materials selected should be tested for the design service temperature range down to 5°C below the minimum design temperature, but not lower than -196°C. (D) Each property evaluation test should be performed in accordance with recognized standards. Where there are no such standards, the test procedure proposed should be fully detailed and submitted to the Society for acceptance. Sampling should be sufficient to ensure a true representation of the properties of the material selected. (2) Mechanical tests (A) The mechanical tests should be performed in accordance with the following **Table 1.2**.	

Table 1.2

Mechanical tests	Load bearing structural
Tensile	ISO 527 ISO 1421 ISO 3346 ISO 1926
Shearing	ISO 4587 ISO 3347 ISO 1922 ISO 6237
Compressive	ISO 604 ISO 844 ISO 3132
Bending	ISO 3133 ISO 14679
Creep	ISO 7850

Present	Amendment	Note

(B) If the chosen function for a material relies on particular properties such as tensile, compressive and shear strength, yield stress, modulus or elongation, these properties should be tested to a recognized standard. If the properties required are assessed by numerical simulation according to a high order behaviour law, the testing should be performed to the satisfaction of the Society.

(C) Creep may be caused by sustained loads, for example cargo pressure or structural loads. Creep testing should be conducted based on the loads expected to be encountered during the design life of the containment system.

(3) Tightness tests

(A) The tightness requirement for the material should relate to its operational functionality.

(B) Tightness tests should be conducted to give a measurement of the material's permeability in the configuration corresponding to the application envisaged (e.g. thickness and stress conditions) using the fluid to be retained (e.g. cargo, water vapour or trace gas).

(C) The tightness tests should be based on the tests indicated as examples in the following **Table 1.3**.

Table 1.3

Tightness tests	Tightness
Porosity/Permeability	ISO 15106 ISO 2528 ISO 2782

(4) Thermal conductivity tests

(A) Thermal conductivity tests should be representative of the lifecycle of the insulation material so its properties over the design life of the cargo system can be assessed. If these properties are likely to deteriorate over time, the material should be aged as best possible in an environment corresponding to its lifecycle, for example operating temperature, light, vapour and installation (e.g. packaging, bags, boxes, etc.).

(B) Requirements for the absolute value and acceptable range of thermal conductivity and heat capacity should be chosen taking into account the effect on the operational efficiency of the cargo containment system. Particular attention should also be paid to the sizing of the associated cargo handling system and components such as safety relief valves plus vapour return and handling equipment.

(C) Thermal tests should be based on the tests indicated as examples in the following **Table 1.4** or their equivalents:

Present	Amendment	Note

Table 1.4

Thermal tests	Insulation
Thermal conductivity	ISO 8301 ISO 8302
Heat capacity	V

(5) Physical tests

(A) In addition to the requirements of **419. 2.** (3) and **419. 3.** (2) of the Rule, the following **Table 1.5** provides guidance and information on some of the additional physical tests that may be considered.

(B) Requirements for loose fill material segregation should be chosen considering its potential adverse effect on the material properties (density, thermal conductivity) when subjected to environmental variations such as thermal cycling and vibration.

(C) Requirements for a material with closed cell structures should be based on its eventual impact on gas flow and buffering capacity during transient thermal phases.

(D) Similarly, adsorption and absorption requirements should take into account the potential adverse effect an uncontrolled buffering of liquid or gas may have on the system.

Table 1.5

Physical tests	Flexible insulating	Loose fill	Nano-material	Cellular	Adhesive
Particle size		V			
Closed cells content				ISO 4590	
Absorption/Desorption	ISO 12571	V	V	ISO 2896	
Viscosity					ISO 2555 ISO 2431
Open time					ISO 10364
Thixotropic properties					V
Hardness					ISO 868

Present	Amendment	Note
	105. Quality assurance and quality control (QA/QC) **1.** General (1) Once a material has been selected, after testing as outlined in **104.**, a detailed quality assurance/quality control(QA/QC) programme should be applied to ensure the continued conformity of the material during installation and service. This programme should consider the material starting from the manufacturer's quality manual(QM) and then follow it throughout the construction of the cargo system. (2) The QA/QC programme should include the procedure for fabrication, storage, handling and preventive actions to guard against exposure of a material to harmful effects. These may include, for example, the effect of sunlight on some insulation materials or the contamination of material surfaces by contact with personal products such as hand creams. The sampling methods and the frequency of testing in the QA/QC programme should be specified to ensure the continued conformity of the material selected throughout its production and installation. (3) Where powder or granulated insulation is produced, arrangements should be made to prevent compacting of the material due to vibrations. **2.** QA/QC during component manufacture The QA/QC programme in respect of component manufacture should include, as a minimum but not limited to, the following items. (1) Component identification (A) For each material, the manufacturer should implement a marking system to clearly identify the production batch. The marking system should not interfere, in any way, with the properties of the product. (B) The marking system should ensure complete traceability of the component and should include: (a) date of production and potential expiry date (b) manufacturer's references (c) reference specification (d) reference order (e) when necessary, any potential environmental parameters to be maintained during transportation and storage	

Present	Amendment	Note
	(2) Production sampling and audit method (A) Regular sampling is required during production to ensure the quality level and continued conformity of a selected material. (B) The frequency, the method and the tests to be performed should be defined in QA/QC programme; for example, these tests will usually cover, inter alia, raw materials, process parameters and component checks. (C) Process parameters and results of the production QC tests should be in strict accordance with those detailed in the QM for the material selected. (D) The objective of the audit method as described in the QM is to control the repeatability of the process and the efficacy of the QA/QC programme. (E) During auditing, auditors should be provided with free access to all production and QC areas. Audit results should be in accordance with the values and tolerances as stated in the relevant QM. **106 Bonding and joining process requirement and testing** **1.** Bonding procedure qualification (1) The bonding procedure specification and qualification test should be defined in accordance with recognized standards. (2) The bonding procedures should be fully documented before work commences to ensure the properties of the bond are acceptable. (3) The following parameters should be considered when developing a bonding procedure specification: (A) surface preparation (B) materials storage and handling prior to installation (C) covering-time (D) open-time (E) mixing ratio, deposited quantity (F) environmental parameters (temperature, humidity) (G) curing pressure, temperature and time (4) Additional requirements may be included as necessary to ensure acceptable results. (5) The bonding procedures specification should be validated by an appropriate procedure qualification testing programme. **2.** Personnel qualifications (1) Personnel involved in bonding processes should be trained and qualified to recognized standards. (2) Regular tests should be made to ensure the continued performance of people carrying out bonding operations to ensure a consistent quality of bonding.	

Present	Amendment	Note
	107. Production bonding tests and controls **1.** Destructive testing During production, representative samples should be taken and tested to check that they correspond to the required level of strength as required for the design. **2.** Non-destructive testing (1) During production, tests which are not detrimental to bond integrity should be performed using an appropriate technique such as: (A) visual examination; (B) internal defects detection (for example acoustic, ultrasonic or shear test); and (C) local tightness testing. (2) If the bonds have to provide tightness as part of their design function, a global tightness test of the cargo containment system should be completed after the end of the erection in accordance with the designer's and QA/QC programme. (3) The QA/QC standards should include acceptance standards for the tightness of the bonded components when built and during the lifecycle of the containment system. ⚓	

Present	Amendment	Note
⟨Rule⟩ # CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK ## Section 4 Cargo Containment **427. Limit state design for novel concepts (IGC Code 4.27)** **1. ~ 3.** ⟨omit⟩ **4.** The procedure and relevant design parameters of the limit state design shall comply with the Standards for the Use of limit state methodologies in the design of cargo containment systems of novel configuration (LSD Standard).	⟨Rule⟩ # CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK ## Section 4 Cargo Containment **427. Limit state design for novel concepts (IGC Code 4.27)** **1. ~ 3.** ⟨same as current⟩ **4.** The procedure and relevant design parameters of the limit state design shall comply with the 'Standards for the Use of Limit State Methodologies in the Design of Cargo Containment Systems of Novel Configuration' (LSD Standard) **Annex 7A-7 「 Standard for the Use of Limit State Methodologies in the Design of Cargo Containment Systems of Novel Configuration 」.***(2021)*	

Present	Amendment	Note
	〈Guidance〉 **Annex 7A-7 Standard for the Use of Limit State Methodologies in the Design of Cargo Containment Systems of Novel Configuration(IGC Code Appendix 5) (2021)** **101. General** **1.** The purpose of this standard is to provide procedures and relevant design parameters of limit state design of cargo containment systems of a novel configuration in accordance with **Ch 5, 427.** of the Rule. **2.** Limit state design is a systematic approach where each structural element is evaluated with respect to possible failure modes related to the design conditions identified in **Ch 5, 403. 4** of the Rule. A limit state can be defined as a condition beyond which the structure, or part of a structure, no longer satisfies the requirements. **3.** The limit states are divided into the three following categories: (1) Ultimate Limit States (ULS), which correspond to the maximum load carrying capacity or, in some cases, to the maximum applicable strain, deformation or instability in structure resulting from buckling and plastic collapse; under intact (undamaged) conditions; (2) Fatigue Limit States (FLS), which correspond to degradation due to the effect of cyclic loading; and (3) Accident Limit States (ALS), which concern the ability of the structure to resist accident situations. **4. Ch 5, 401.** through to **420.** of the Rule are to be complied with as applicable depending on the cargo containment system concept. **102. Design format** **1.** The design format in this standard is based on a Load and Resistance Factor Design format. The fundamental principle of the Load and Resistance Factor Design format is to verify that design load effects, L_d, do not exceed design resistances, R_d, for any of the considered failure modes in any scenario: $L_d \leq R_d$	

Present	Amendment	Note
	(1) A design load F_{dk} is obtained by multiplying the characteristic load by a load factor relevant for the given load category: $F_{dk} = \gamma_f \cdot F_k$ where: γ_f = load factor; and F_k = the characteristic load as specified in **Ch 5, 411.** through to **418.** of the Rule A design load effect L_d (e.g. stresses, strains, displacements and vibrations) is the most unfavorable combined load effect derived from the design loads, and may be expressed by: $L_d = q(F_{d1}, F_{d2}, \cdots, F_{dN})$ where q = the functional relationship between load and load effect determined by structural analysis. (2) The design resistance R_d is determined as follows: $R_d = \frac{R_k}{\gamma_R \cdot \gamma_C}$ where: R_k = the characteristic resistance. In case of materials covered by **Ch 5 Sec 6** of the Rule, it may be, but not limited to, specified minimum yield stress, specified minimum tensile strength, plastic resistance of cross sections, and ultimate buckling strength γ_R = the resistance factor, which is determined as follows; $\gamma_R = \gamma_m \cdot \gamma_s$ where γ_m = the partial resistance factor to take account of the probabilistic distribution of the material properties(material factor) γ_s = the partial resistance factor to take account of the uncertainties on the capacity of the structure, such as the quality of the construction, method considered for determination of the capacity including accuracy of analysis γ_C = the consequence class factor, which accounts for the potential results of failure with regard to release of cargo and possible human injury.	

Present	Amendment	Note
	2. Cargo containment design is to take into account potential failure consequences. Consequence classes are defined in **Table 1.1**, to specify the consequences of failure when the mode of failure is related to the Ultimate Limit State, the Fatigue Limit State, or the Accident Limit State. **Table 1.1 – Consequence classes** Consequence class / Definition Low / Failure implies minor release of the cargo. Medium / Failure implies release of cargo and potential for human injury. High / Failure implies significant release of the cargo and high potential for human injury /fatality **103. Required analyses** **1.** Three-dimensional finite element analyses are to be carried out as an integrated model of the tank and the ship hull, including supports and keying system as applicable. All the failure modes are to be identified to avoid unexpected failures. Hydrodynamic analyses are to be carried out to determine the particular ship accelerations and motions in irregular waves, and the response of the ship and its cargo containment systems to these forces and motions. **2.** Buckling strength analyses of cargo tanks subject to external pressure and other loads causing compressive stresses are to be carried out in accordance with recognized standards. The method is to adequately account for the difference in theoretical and actual buckling stress as a result of plate out of flatness, plate edge misalignment, straightness, ovality and deviation from true circular form over a specified arc or chord length, as relevant. **3.** Fatigue and crack propagation analysis is to be carried out in accordance with **105. 1**. **104. Ultimate limit states** **1.** Structural resistance may be established by testing or by complete analysis taking account of both elastic and plastic material properties. Safety margins for ultimate strength are to be introduced by partial factors of safety taking account of the contribution of stochastic nature of loads and resistance (dynamic loads, pressure loads, gravity loads, material strength, and buckling capacities). **2.** Appropriate combinations of permanent loads, functional loads and environmental loads including sloshing loads are to be considered in the analysis. At least two load combinations with partial load factors as given in **Table 1.2** are to be used for the assessment of the ultimate limit states.	

Present	Amendment	Note

Table 1.2 Partial load factors

Load combination	Permanent loads	Functional loads	Environmental loads
'a'	1.1	1.1	0.7
'b'	1.0	1.0	1.3

The load factors for permanent and functional loads in load combination 'a' are relevant for the normally well-controlled and/or specified loads applicable to cargo containment systems such as vapour pressure, cargo weight, system self-weight, etc. Higher load factors may be relevant for permanent and functional loads where the inherent variability and/or uncertainties in the prediction models are higher.

3. For sloshing loads, depending on the reliability of the estimation method, a larger load factor may be required by the Society.

4. In cases where structural failure of the cargo containment system are considered to imply high potential for human injury and significant release of cargo, the consequence class factor is to be taken as γ_C = 1.2. This value may be reduced if it is justified through risk analysis and subject to the approval by the Society. The risk analysis is to take account of factors including, but not limited to, provision of complete or partial secondary barrier to protect hull structure from the leakage and less hazards associated with intended cargo. Conversely, higher values may be fixed by the Society, for example, for ships carrying more hazardous or higher pressure cargo. The consequence class factor is to in any case not be less than 1.0.

5. The load factors and the resistance factors used are to be such that the level of safety is equivalent to that of the cargo containment systems as described in sections **Ch 5, 421.** to **426.** of the Rule. This may be carried out by calibrating the factors against known successful designs.

6. The material factor γ_m is to in general reflect the statistical distribution of the mechanical properties of the material, and needs to be interpreted in combination with the specified characteristic mechanical properties. For the materials defined in **Ch 5 Sec 6** of the Rule, the material factor γ_m may be taken as:

1.1 when the characteristic mechanical properties specified by the Society typically represents the lower 2.5% quantile in the statistical distribution of the mechanical properties; or

1.0 when the characteristic mechanical properties specified by the Society represents a sufficiently small quantile such that the probability of lower mechanical properties than specified is extremely low and can be neglected.

Present	Amendment	Note
	7. The partial resistance factors γ_{si} are to in general be established based on the uncertainties in the capacity of the structure considering construction tolerances, quality of construction, the accuracy of the analysis method applied, etc. (1) For design against excessive plastic deformation using the limit state criteria given in **8**, the partial resistance factors γ_{si} are to be taken as follows: $\gamma_{s1} = 0.76 \cdot \frac{B}{\kappa 1}$ $\gamma_{s2} = 0.76 \cdot \frac{D}{\kappa 2}$ $\kappa_1 = Min\left(\frac{R_m}{R_e} \cdot \frac{B}{A}; 1.0\right)$ $\kappa_2 = Min\left(\frac{R_m}{R_e} \cdot \frac{D}{C}; 1.0\right)$ where A, B, C and D = defined in **Ch 5, 422. 3** (1) of the Rule. R_m and R_e = defined in **Ch 5, 418. 1** (3) of the Rule. The partial resistance factors given above are the results of calibration to conventional type B independent tanks. **8.** Design against excessive plastic deformation (1) Stress acceptance criteria given below refer to elastic stress analyses. (2) Parts of cargo containment systems where loads are primarily carried by membrane response in the structure are to satisfy the following limit state criteria: $\sigma_m \leq f$ $\sigma_L \leq 1.5f$ $\sigma_b \leq 1.5F$ $\sigma_L + \sigma_b \leq 1.5F$ $\sigma_m + \sigma_b \leq 1.5F$ $\sigma_m + \sigma_b + \sigma_g \leq 3.0F$ $\sigma_L + \sigma_b + \sigma_g \leq 3.0F$	

Present	Amendment	Note
	where: σ_m = equivalent primary general membrane stress σ_L = equivalent primary local membrane stress σ_b = equivalent primary bending stress σ_g = equivalent secondary stress $f = \frac{R_e}{\gamma_{s1} \cdot \gamma_m \cdot \gamma_c}$ $F = \frac{R_e}{\gamma_{s2} \cdot \gamma_m \cdot \gamma_c}$ The stress summation described above is to be carried out by summing up each stress component (σ_x, σ_y, τ_{xy}), and subsequently the equivalent stress is to be calculated based on the resulting stress components as shown in the example below. $\sigma_L + \sigma_b = \sqrt{(\sigma_{Lx} + \sigma_{bx})^2 - (\sigma_{Lx} + \sigma_{bx})(\sigma_{Ly} + \sigma_{by}) + (\sigma_{Ly} + \sigma_{by})^2 + 3(\tau_{Lxy} + \tau_{bxy})^2}$ (3) Parts of cargo containment systems where loads are primarily carried by bending of girders, stiffeners and plates, are to satisfy the following limit state criteria: $\sigma_{ms} + \sigma_{bp} \leq 1.25F$ (See notes 1,2) $\sigma_{ms} + \sigma_{bp} + \sigma_{bs} \leq 1.25F$ (See note 2) $\sigma_{ms} + \sigma_{bp} + \sigma_{bs} + \sigma_{bt} + \sigma_g \leq 3.0F$ where: σ_{ms} = equivalent section membrane stress in primary structure σ_{bp} = equivalent membrane stress in primary structure and stress in secondary and tertiary structure caused by bending of primary structure σ_{bs} = section bending stress in secondary structure and stress in tertiary structure caused by bending of secondary structure σ_{bt} = section bending stress in tertiary structure σ_g = equivalent secondary stress	

Present	Amendment	Note

$$F = \frac{R_e}{\gamma_{s2} \cdot \gamma_m \cdot \gamma_c}$$

σ_{ms}, σ_{bp}, σ_{bs} and σ_{bt} = defined in (4).

Note 1: The sum of equivalent section membrane stress and equivalent membrane stress in primary structure ($\sigma_{ms}+\sigma_{bp}$) will normally be directly available from three-dimensional finite element analyses.

Note 2: The coefficient, 1.25, may be modified by the Society considering the design concept, configuration of the structure, and the methodology used for calculation of stresses.

Skin plates are to be designed in accordance with the requirements of the Society. When membrane stress is significant, the effect of the membrane stress on the plate bending capacity shall be appropriately considered in addition.

(4) Section stress categories

(A) Normal stress is the component of stress normal to the plane of reference.

(B) Equivalent section membrane stress is the component of the normal stress that is uniformly distributed and equal to the average value of the stress across the cross section of the structure under consideration. If this is a simple shell section, the section membrane stress is identical to the membrane stress defined in (2).

(C) Section bending stress is the component of the normal stress that is linearly distributed over a structural section exposed to bending action, as illustrated in **Fig 1.1**.

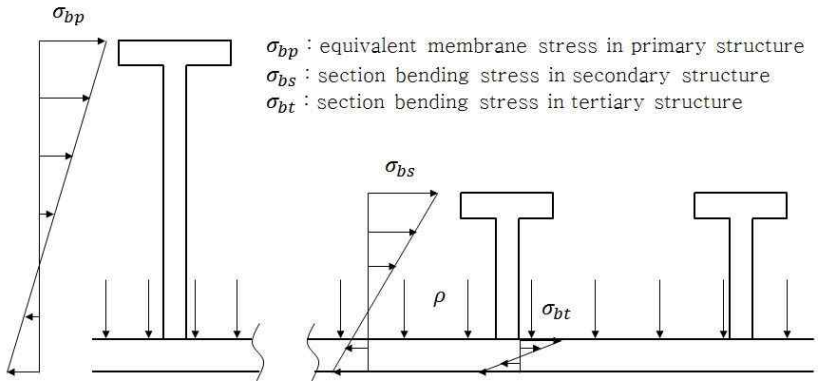


Fig 1.1: Definition of the three categories of section stress (Stresses σ_{bp} and σ_{bs} are normal to the cross section shown.)

Present	Amendment	Note

9. The same factors γ_C, γ_m, γ_{si} shall be used for design against buckling unless otherwise stated in the applied recognized buckling standard. In any case the overall level of safety shall not be less than given by these factors.

105. Fatigue limit states

1. Fatigue design condition as described in **Ch 5, 418. 2** of the Rule shall be complied with as applicable depending on the cargo containment system concept. Fatigue analysis is required for the cargo containment system designed under **Ch 5 427.** and this standard.

2. The load factors for fatigue limit states shall be taken as 1.0 for all load categories.

3. Consequence class factor γ_C and resistance factor γ_R shall be taken as 1.0.

4. Fatigue damage shall be calculated as described in **Ch 5, 418. 2** (2) to (5) of the Rule. The calculated cumulative fatigue damage ratio for the cargo containment systems shall be less than or equal to the values given in **Table 1.3**.

Table 1.3 – Maximum allowable cumulative fatigue damage ratio

	Consequence class		
C_W	Low	Medium	High
	1.0	0.5	0.5*
* Lower value shall be used in accordance with **Ch 5, 418. 2** (7) to (9) of the Rule, depending on the detectability of defect or crack, etc.			

5. Lower values may be fixed by the Society.

6. Crack propagation analyses are required in accordance with **Ch 5, 418. 2** (6) to (9) of the Rule.

Present	Amendment	Note
	106. Accident Limit States **1.** Accident design condition as described in **Ch 5, 418. 3** of the Rule is to be complied with as applicable, depending on the cargo containment system concept. **2.** Load and resistance factors may be relaxed compared to the ultimate limit state considering that damages and deformations can be accepted as long as this does not escalate the accident scenario. **3.** The load factors for accident limit states are to be taken as 1.0 for permanent loads, functional loads and environmental loads. **4.** Loads mentioned in **Ch 5, 413. 9** and **415.1** of th Rule need not be combined with each other or with environmental loads, as defined in **Ch 5, 414.** of the Rule. **5.** Resistance factor γ_R is to in general be taken as 1.0. **6.** Consequence class factors γ_C are to in general be taken as defined in **104. 4** of this standard, but may be relaxed considering the nature of the accident scenario. **7.** The characteristic resistance R_k is to in general be taken as for the ultimate limit state, but may be relaxed considering the nature of the accident scenario. **8.** Additional relevant accident scenarios are to be determined based on a risk analysis. **107. Testing** **1.** Cargo containment systems designed according to this standard are to be tested to the same extent as described in **Ch 5, 420. 3** as applicable depending on the cargo containment system concept. ⚓	

Present	Amendment	Note
⟨Rule⟩ # CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK ## Section 1 General **101. Application (IGC Code 1.1)** 【See Guidance】 **1. ~ 6.** ⟨omit⟩ **7.** Where a risk assessment or study of similar intent is utilized within this Chapter, the results are also to include, but not be limited to, the following as evidence of effectiveness: (1) description of methodology and standards applied; (2) potential variation in scenario interpretation or sources of error in the study; (3) validation of the risk assessment process by an independent and suitable third party; (4) quality system under which the risk assessment was developed; (5) the source, suitability and validity of data used within the assessment; (6) the knowledge base of persons involved within the assessment; (7) system of distribution of results to relevant parties; and (8) validation of results by an independent and suitable third party. **102. ~ 106.** ⟨omit⟩	⟨Rule⟩ # CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK ## Section 1 General **101. Application (IGC Code 1.1)** 【See Guidance】 **1. ~ 6.** ⟨same as current⟩ **7.** Where a risk assessment or study of similar intent is utilized within this Chapter, the results are also to include, but not be limited to, the following as evidence of effectiveness: (1) ~ (8) ＜same as current⟩ **8.** The ship's hull, machinery and equipment not specified in this Chapter are generally to comply with the requirements in the relevant Parts of the **Rules and Guidance for the Classification of Steel Rules.** *(2021)* **9.** As ships with a length of 150m or more and with membrane-type LNG cargo containment systems contracted for construction after January 1 2021, **Pt 15** of **the Classification and Steel Ship Rules** should be complied. *(2021)* **102. ~ 106.** ⟨same as current⟩	- newly added - newly added

Present	Amendment	Note
Section 4 Cargo Containment	**Section 4 Cargo Containment**	
404. ~ 423. 〈omit〉	**404. ~ 423.** 〈same as current〉	
424. Membrane tanks (IGC Code 4.24) 【See Guidance】 **1. ~ 4.** 〈omit〉 **5. Ultimate design condition** (1) ~ (2) 〈omit〉 (3) The inner hull scantlings shall meet the requirements of **Pt 3, Ch 15** of the Rules for deep tanks, taking into account the internal pressure as indicated in **413. 2** and the specified appropriate requirements for sloshing load as defined in **414. 3**. **6. ~ 9.** 〈omit〉	**424. Membrane tanks (IGC Code 4.24)** 【See Guidance】 **1. ~ 4.** 〈same as current〉 **5. Ultimate design condition** (1) ~ (2) 〈same as current〉 (3) The inner hull scantlings shall meet the requirements for deep tanks taking into account the internal pressure as indicated in **413. 2** and the specified appropriate requirements for sloshing load as defined in **414. 3**. **6. ~ 9.** 〈same as current〉	
425. ~ 428. 〈omit〉	**425. ~ 428.** 〈same as current〉	

Present	Amendment	Note
⟨Guidance⟩ **Section 4 Cargo Containment** 403. ~ 423. ⟨omit⟩ 424. Membrane tanks 【See Rule】 1. ~ 2. ⟨omit⟩ 3. Structural analyses (1) For the purpose of the requirements in **424. 4** (2) of the Rules, the hull structure adjacent to membrane tanks is to comply with the requirements in **Pt 3, Ch 15** of the Rules and, in addition, the stress in the hull structure is to be restricted in consideration of the structural strength of membrane tanks, if necessary. The allowable stresses of the membrane, membrane supporting structures and insulation materials are to be determined in each case according to the mechanical properties of materials, records of construction, product specifications and levels of product quality control practice. 4. ⟨omit⟩ 425. ~ 428. ⟨omit⟩	⟨Guidance⟩ **Section 4 Cargo Containment** 403. ~ 423. ⟨same as current⟩ 424. Membrane tanks 【See Rule】 1. ~ 2. ⟨same as current⟩ 3. Structural analyses (1) For the purpose of the requirements in **424. 4** (2) of the Rules, the hull structure adjacent to membrane tanks is to comply with the requirements of relevant rules and, in addition, the stress in the hull structure is to be restricted in consideration of the structural strength of membrane tanks, if necessary. The allowable stresses of the membrane, membrane supporting structures and insulation materials are to be determined in each case according to the mechanical properties of materials, records of construction, product specifications and levels of product quality control practice. 4. ⟨same as current⟩ 425. ~ 428. ⟨same ascurrent⟩	

Present	Amendment	Reason
〈Guidance〉 **Chapter 5 Ships Carrying Liquefied Gases in Bulk** **Section 1 ~ Section 5 〈Omitted〉** **Section 6 Materials of Construction and Quality Control** **603. ~ 604. 〈Omitted〉** **605. Welding of metallic materials and non-destructive testing** 1. ~ 4. 〈Omitted〉 5. Non-destructive testing (1) For the purpose of the requirements in 605. 6(2) of the Rules, the following requirements are to be complied with. (A)~(B) 〈Omitted〉 (a) 〈Omitted〉 (b) For ultrasonic tests, the requirements in KS D 0250 apply correspondingly. (c) ~(d) 〈Omitted〉 (C) 〈Omitted〉 (2) ~(3) 〈Omitted〉 〈omitted〉	〈Guidance〉 **Chapter 5 Ships Carrying Liquefied Gases in Bulk** **Section 1 ~ Section 5 〈Same as current〉** **Section 6 Materials of Construction and Quality Control** **603. ~ 604. 〈Same as current〉** **605. Welding of metallic materials and non-destructive testing** 1. ~ 4. 〈Same as current〉 5. Non-destructive testing (1) For the purpose of the requirements in 605. 6(2) of the Rules, the following requirements are to be complied with. (A)~(B) 〈same as current〉 (a) 〈same as current〉 (b) For ultrasonic tests, the requirements in KS B 0896 for cargo tanks and process pressure vessels and in KS D 0250 for piping apply correspondingly. *(2021)* (c) ~(d) 〈same as current〉 (C) 〈same as current〉 (2) ~(3) 〈same as current〉 〈Below same as current〉	Reflection of Request for Revision of Classification Technical Rules

Amendments of the Guidance

(draft)

Pt. 7 Ships of Special Service-2

2021. 01

Hull Rule Development Team

Present	Amendment	Note
〈Guidance〉 **Ch.5 Ships Carrying Liquefied Gases in Bulk** **Section 4 Cargo Containment** **403. ~ 419. 〈omission〉** **420. Construction processes 【See Rule】** **1. ~ 5. 〈omission〉** **6. Examination before and after the first loaded voyage (Only if the LNG Vessels)** In accordance with the requirements in **420. 3** (5) & (7) of the Rules, it is preferred that Gas Trial and Cargo Loading Tests are finished at the shipyard, but either or both of these may be post-poned until after entering into a voyage and the survey requirements are as follows (1) First Loading (Considered to be full loading) : 〈omission〉 (2) First Unloading : 〈omission〉 **421. ~ 428. 〈omission〉**	〈Guidance〉 **Ch.5 Ships Carrying Liquefied Gases in Bulk** **Section 4 Cargo Containment** **403. ~ 419. 〈same as current〉** **420. Construction processes 【See Rule】** **1. ~ 5. 〈same as current〉** **6. Examination before and after the first loaded voyage (Only if the LNG, LPG Vessels)** In accordance with the requirements in **420. 3** (5) & (7) of the Rules, it is preferred that Cargo Loading Tests are finished at the shipyard, but either or both of these may be postponed until after entering into a voyage and the survey requirements are as follows (1) First Loading (Considered to be full loading) : 〈same as current〉 (2) First Unloading : 〈same as current〉 **421. ~ 428. 〈same as current〉**	

Amendments of the Guidance

(draft)

Pt. 7 Ships of Special Service-2

2021. 01

Hull Rule Development Team

현 행	개 정 안	개 정 사 유
〈Guidance〉 **Ch. 5 SHIPS CARRYING LIQUEFIED GASES IN BULK** **Section 6 Materials of Construction and Quality Control** **603, 604. 〈omission〉** **605. Welding of metallic materials and non-destructive testing** **1. ~ 3.** 〈omission〉 **4. Production weld tests** (1) 〈omission〉 (2) For the purpose of the requirements in **605. 5** (1) of the Rules, the number of test specimens for production weld tests of secondary barriers may be reduced to the extent as deemed appropriate by the Society considering the experience of same welding procedures in past, workmanship and quality control. In general, intervals of production weld tests for secondary barriers may be approximately 200 ㎜ of butt weld joints and the tests are to be representative of each welding position. Test requirements are to be in accordance with **605. 3** (5). of Rules. *(2017)* (3) 〈omission〉 **5. 〈omission〉** **606. 〈omission〉**	**〈Guidance〉** **Ch. 5 SHIPS CARRYING LIQUEFIED GASES IN BULK** **Section 6 Materials of Construction and Quality Control** **603, 604. 〈omission〉** **605. Welding of metallic materials and non-destructive testing** **1. ~ 3.** 〈omission〉 **4. Production weld tests** (1) 〈omission〉 (2) For the purpose of the requirements in **605. 5** (1) of the Rules, the number of test specimens for production weld tests of secondary barriers may be reduced to the extent as deemed appropriate by the Society considering the experience of same welding procedures in past, workmanship and quality control. In general, intervals of production weld tests for secondary barriers may be approximately 200 ㎜ of butt weld joints and the tests are to be representative of each welding position. Test requirements are to be in accordance with **605. 3** (5). of Rules. *(2017)* (3) 〈omission〉 **5. 〈omission〉** **606. 〈omission〉**	

Guidance Relating to Rules for the Classification of Steel Ships(Draft)

(Part 7 Ships of Special Service (Ch 5, 6) Guidance)

- For internal opinion inquiry -

Hull Rule Development Team

- Main Amendments -

(1) Effective date : 15 April 2021

◉ Pt. 7 Ships of Special Service (Ch 5, 6) Guidance
- 403.3 newly added
- 414.1.(3) newly added
- 423.2 (3) newly added

Present	Amendment	Reason
CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK Section 1 ~ 3 〈omitted〉 Section 4 Cargo Containment 402. 〈omitted〉 403. Functional requirements 【See Rule】 1. ~ 2. 〈omitted〉	CHAPTER 5 SHIPS CARRYING LIQUEFIED GASES IN BULK Section 1 ~ 3 〈omitted〉 Section 4 Cargo Containment 402. 〈omitted〉 403. Functional requirements【See Rule】 1. ~ 2. 〈omitted〉 3. Suitable safety margin (2021) If the requirements specified in the following (1) and (2) are satisfied, the cargo containment system is complied with suitable safety margin of the Society. (1) Environmental load (A) Under intact condition, an assessment of the structural strength of the cargo containment system is to be performed for the environmental conditions expected during the design life as defined in 403.2 in Guidance. For new concept cargo containment systems, if the load-resistance factor design (LRFD) is followed, the combined load may be recommended to secure a safety margin in accordance with 104.2 of Pt 7 Annex 7A-7. (B) The environmental load due to ship motion is determined by using the long-term distribution of irregular loads during the life cycle of the ship. Each component of acceleration is to be determined according to 428.2 in Rules or direct motion analysis. In the case of direct motion analysis, the acceleration components are to be calculated according to II.5, Annex 3-2 in Pt 3 and the internal pressure for static design is to be determined according to 428.1 in Rules by using these accelerations. (C) The sloshing load due to partial filling is to be complied with the 414.1 in Guidance.	〈newly Add〉

Present	Amendment	Reason
	(2) Other requirements (A) structural modeling Structural analysis of cargo containment system is to be in accordance with 417. Rules. The finite element modeling can be referred to the followings for each type of cargo containment system under approval of the Society. - Pt 3, Appendix 3-2 III.2 Liquefied gas carrier (independent tank type A) - Guidance for Assessment of Sloshing Load/Strength of Cargo Containment System - Pt 7 Ch 5,6 Annex 7A-7 Standard for the Use of Limit State Methodologies in the Design of Cargo Containment Systems of Novel Configuration(IGC Code Appendix 5) The structural modeling for type C independent tanks can be referred to 423.2 (3) in Guidance. (B) fatigue Fatigue analysis of cargo containment system is to be in accordance with 418.2 in Rules and 418.1 in Guidance. When performing the crack propagation analysis according to 418.2 (6) of Rules, the "Guidelines on Assessment of Fatigue and Crack Propagation" is to be applied. (C) corrosion The corrosion addition is to be followed 403.1 in Guidance. (D) Thermal effect The assessment of thermal effects due to thermal loads is to be complied with 413.1 and 419 in Guidance. The heat transfer analysis that satisfies the temperature distribution calculation condition defined in 419.1 of Guidance is to be performed by "Guidance of Heat Transfer Analysis for Ships Carrying Liquefied Gases in Bulk/Ships Using Liquefied Gases as Fuels".	〈newly Add〉

Present	Amendment	Reason
	(E) Material variability and aging The assessment of the variability and aging of thermal insulation in 419.3 of Rules is to be complied with 419.6 in Guidance. (F) Construction tolerance Construction tolerance of membrane type is to be complied with 420.2 in Guidance and the tolerance of independent tank types is to be in accordance with IACS Rec.47.	〈newly Add〉
405 ~ 413. 〈omitted〉 414. Environmental loads 1. Sloshing load【See Rules】 (1)~(2) 〈omitted〉	405 ~ 413. 〈omitted〉 414. Environmental loads 1. Sloshing load【See Rules】 (1)~(2) 〈omitted〉 (3) In the case of the membrane type, the calculation of the impact pressure by sloshing is to be performed in accordance with "Guidance for Assessment of Sloshing Load/Strength of Cargo Containment System".	

Present	Amendment	Reason
418. ~ 422. 〈omitted〉 423. Type C independent tanks 【See Rule】 1. 〈omitted〉 2. (1) ~ (2) 〈omitted〉 〈omitted〉	418. ~ 422. 〈omitted〉 423. Type C independent tanks 【See Rule】 1. 〈omitted〉 2. (1) ~ (2) 〈omitted〉 (3) The buckling assessment for cargo tank based on international standard (ex: Div.1 VIII, ASME) or equivalent regulation can be approved by the Society. Alternatively, if the analysis according to Sec 4. in "Guidelines for Buckling Strength Assessment by NL.FEA" is applied, the formular as below shall be satisfied; $P_c / P_e \geq 3.0$ where: P_c : collapse external pressure, N/mm^2 P_e : design external pressure, N/mm^2, defined in 423.2.(3) in Rules 〈omitted〉	〈newly Add〉

RULES FOR CLASSIFICATION(STEEL SHIPS)

(Guidance for Pt 7 Ch 5)

- External Opinion Inquiry -

2020.09.

Hull Rule Development Team

- Main Amendments -

(1) Enter into force on 1 July 2021 (the contract date for ship construction)

◉ To reflect Request for Establishment/Revision of Classification Technical Rules

- To insert UT standard

Present	Amendment	Reason
Chapter 5 Ships Carrying Liquefied Gases in Bulk **Section 1 ~ Section 5 <Omitted>** **Section 6 Materials of Construction and Quality Control** 603. ~ 604. 〈Omitted〉 605. Welding of metallic materials and non-destructive testing 1. ~ 4. 〈Omitted〉 5. Non-destructive testing (1) For the purpose of the requirements in 605. 6(2) of the Rules, the following requirements are to be complied with. (A)~(B) 〈Omitted〉 (a) 〈Omitted〉 (b) For ultrasonic tests, the requirements in KS D 0250 apply correspondingly. (c) ~(d) 〈Omitted〉 (C) 〈Omitted〉 (2) ~(3) 〈Omitted〉 〈Below Omitted〉	**Chapter 5 Ships Carrying Liquefied Gases in Bulk** **Section 1 ~ Section 5 <Same as the present Guidance>** **Section 6 Materials of Construction and Quality Control** 603. ~ 604. 〈Same as the present Guidance〉 605. Welding of metallic materials and non-destructive testing 1. ~ 4. 〈Same as the present Guidance〉 5. Non-destructive testing (1) For the purpose of the requirements in 605. 6(2) of the Rules, the following requirements are to be complied with. (A)~(B) 〈same as the present Guidance〉 (a) 〈same as the present Guidance〉 (b) For ultrasonic tests, the requirements in KS B 0896 for cargo tanks and process pressure vessels and in KS D 0250 for piping apply correspondingly. (c) ~(d) 〈same as the present Guidance〉 (C) 〈same as the present Guidance〉 (2) ~(3) 〈same as the present Guidance〉 〈Below same as the present Guidance〉	Reflection of Request for Revision of Classification Technical Rules

RULES FOR CLASSIFICATION(STEEL SHIPS)

(Guidance for Pt 7 Ch 5)

- External Opinion Inquiry -

2021.02.

Hull Rule Development Team

- Main Amendments -

(1) Enter into force on 1 July 2021 (the contract date for ship construction)

◉ To reflect Request for Establishment/Revision of Classification Technical Rules

- To describe the application of High Manganese Austenitic Steel

Present	Amendment	Reason
Annex 7A-4 High manganese austenitic steel for Cryogenic Service **Section 1 General** 101. <Omitted> 102. Application 1. <Omitted> 2. <New> 103. <Below Omitted>	**Annex 7A-4 High manganese austenitic steel for Cryogenic Service** **Section 1 General** 101. <Same as the present Guidance> 102. Application 1. <Same as the present Guidance> 2. High manganese austenitic steel for cryogenic service is used for only domestic voyage. When high manganese austenitic steel for cryogenic service is used for international voyage, it is to be approved by the relevant administration. 103. <Below same as the present Guidance>	Reflection of Request for Revision of Classification Technical Rules

Present	Amendment	Reason
Section 16 Use of Cargo as Fuel	**Section 16 Use of Cargo as Fuel**	
1601. to 1602. 〈omitted〉	**1601. to 1602. 〈omitted〉**	
1609. Alternative fuels and technologies (IGC Code 16.9)	**1609. Alternative fuels and technologies (IGC Code 16.9)**	
1. If acceptable to the Society, other cargo gases may be used as fuel, providing that the same level of safety as natural gas in this Chapter is ensured.	**1.** If acceptable to the Society, other cargo gases may be used as fuel, providing that the same level of safety as natural gas in this Chapter is ensured. Where LPG cargo is used as fuel, Annex 7A-5 is to apply.	
〈hereafter, omitted〉	〈hereafter, same as the present〉	

〈부록 신설〉
Annex 7A-5 Use of LPG Cargo as Fuel

Section 1 General

101. Application

1. This Annex, as a substitution for **Ch 5, Sec 16** of **Rules** and **Guidance,** applies to LPG carriers using LPG cargo as fuel and complying with **Ch 5** of **Rules**.
2. Except **Ch 5, Sec 16** of **Rules, Ch 5** of **Rules** applies.

102. Goal

The goal of this Annex is to ensure safe and reliable distribution of fuel to the consumers and operation of consumers for use of LPG cargo as fuel.

103. Functional Requirements

1. Single failure is not to cause leakage into the space where LPG fuel consumers are installed.
2. Effectiveness of the ventilation and detection for LPG leakage is to be ensured taking into account characteristics of LPG.
3. Sources of release (i.e. vent masts, ventilation outlets of hazardous spaces, vent outlets of fuel piping) are to be located to prevent released gas from entering the gas safe spaces(e.g. accommodations, machinery spaces) through openings. Gas detectors, if necessary, are to be fitted at the openings of those spaces.
4. Since LPG has different properties depending on the composition ratio of propane and butane, the composition ratio of fuel LPG is to be suitable for normal operation of the fuel consumer.
5. Fuel supply systems are design to be prevented unintended phase changes in processing of fuel supply to consumers considering vapour pressure at the working temperature as the followings;
   (1)Where fuel is supplied in the gaseous state, measures are to be taken so that the temperature of fuel is not lowered to the dew point at the working pressure.
   (2)Where fuel is supplied in the liquid state, measures are to be taken so that the pressure of fuel is not lowered to the vapour pressure at the working temperature.
6. Vent, purging and bleed lines of fuel supply systems are to be so designed as to prevent LPG liquid from being released to the atmosphere.

104. Risk assessment

1. A risk assessment is to be conducted to ensure that risks arising from use of LPG fuel affecting the person on board, the environment and the ship are addressed. Consideration is to be given to the hazards associated with physical layout, operation and maintenance, following any reasonably foreseeable failure.
2. The risk assessment is to address the possible leakage of the fuel and the consequences thereof. In particular, considering the properties of LPG gas heavier than air, consideration is to be given to the possibility of gas accumulation at the bottom and escape of gas into other space.
3. In risk assessment, the followings are to be as a minimum considered, but not limited to:
   (1)Leakage potential of LPG and its consequence
   (2)Dispersion characteristics of leaked LPG in ship
   (3)For the following areas/spaces, but not limited to, the risk assessment is to address the possibility of leakage gas entering the non-hazardous area and its consequence. If necessary, analysis of dispersion and/or ventilation is to be conducted to demonstrate the dispersion characteristics and ventilation characteristics of the leakage gas in the area/space.
      (A)LPG fuel service tank
      (B) fuel preparation room

(C) a space where single walled fuel pipes are installed.
(D) gas valve unit room
(E) in the way of vent mast
(F) ventilation outlet of hazardous spaces

(4) The gas leakage in the gas turbine space according to **208. 1 (1)**

(5) Possibility of staying of the LPG fuel in the vent pipe

(6) The purging and venting of the LPG liquid in the fuel pipe where high pressure liquid fuel is supplied to the engine,

(7) Drainage of leaked LPG liquid in annular space of a double walled pipe

Section 2 Substituted Requirements for Ch 5, Sec 16 of Rules

201. General

1. Application

This Chapter specifies requirements for use of LPG cargo as fuel which are substituted for **Ch 5, Sec 16** of **Rules.**

2. General

(1) LPG may be utilized in machinery spaces of category A, and, in these spaces, it may be utilized only in systems such as boilers, inert gas generators, internal combustion engines, gas combustion unit and gas turbines.

(2) LPG in this Part means liquefied petroleum gas. It is mainly composed of propane, butane or a mixture of propane (C_3H_8) and butane (C_4H_{10}) and contains small amounts of propylene and butylene. In this Part, not only liquid but also gaseous petroleum gas is referred to as LPG. However, when it is necessary to distinguish between the liquid state and the gas state, LPG in the liquid state is referred to as LPG liquid, and LPG in the gaseous state is referred to as LPG gas.

202. Use of cargo vapour as fuel

1. This Article addresses the use of cargo vapour as fuel in systems such as boilers, inert gas generators, internal combustion engines, gas combustion units and gas turbines.

(1) LPG may be used as fuel both in liquid state and gas state.

(2) Fuel consumers are to be suitably designed for operation with possible composition of intended LPG fuel.

(3) The fuel supply system is to comply with the requirements of **204. 1**, to **204. 3**.

(4) Gas consumers are to exhibit no visible flame and are to maintain the uptake exhaust temperature below auto-ignition temperature of LPG fuel in use to prevent spontaneous combustion of unburned gas in the exhaust system. Temperature monitoring of exhaust gas is to be provided.

203. Arrangement of spaces containing gas consumers

1. A single failure of fuel systems in the machinery space is not to lead to a gas release in the machinery space. Therefore, fuel piping is of a double-wall design and outer pipe or duct is to be continuous. Air inlet of outer pipe or duct is not to be the machinary space.

2. Spaces in which gas consumers are located are to be fitted with a mechanical ventilation system that is arranged to avoid areas where gas may accumulate, taking into account the density of the vapour and potential ignition sources. The ventilation system is to be separated from those serving other spaces.

3. Gas detectors are to be fitted in these spaces, particularly where air circulation is reduced. The gas detection system is to comply with the requirements of **Ch 5, Sec 13** of **Rules.**

4. Electrical equipment located in the double wall pipe or duct specified in **104. 3** is to comply with the requirements of **Ch 5, Sec 10** of **Rules.**

5. All vents and bleed lines that may contain or be contaminated by LPG fuel are to be routed to a

safe location external to the machinery space and be fitted with a flame screen. LPG liquid is not to be released to the atmosphere through vent pipe and bleed pipe.

204. Gas fuel supply

1. General

(1)The requirements of this Article are to apply to LPG fuel supply piping outside of the cargo area. LPG Fuel piping is not to pass through accommodation spaces, service spaces, electrical equipment rooms or control stations. The routeing of the pipeline is to take into account potential hazards, due to mechanical damage, in areas such as stores or machinery handling areas.

(2)Provision is to be made for inerting and gas-freeing that portion of the LPG fuel piping systems located in the machinery space. To prevent the return of LPG fuel to inert gas piping, the inert gas supply line connected to LPG fuel piping is to be fitted with double block and bleed valves.

2. Leak detection

Continuous monitoring and alarms are to be provided to indicate a leak in the piping system in enclosed spaces and shut down the relevant gas fuel supply.

3. Routeing of fuel supply pipes

Fuel piping may pass through or extend into enclosed spaces other than those mentioned in **Para 1**, provided it fulfills one of the following conditions:

(1) it is of a double-wall design with the space between the concentric pipes pressurized with inert gas at a pressure greater than the LPG fuel pressure. The master fuel valve, as required by **Para 6**, closes automatically upon loss of inert gas pressure; or

(2) it is installed in a pipe or duct equipped with mechanical exhaust ventilation having a capacity of at least 30 air changes per hour and is arranged to maintain a pressure less than the atmospheric pressure. Ventilation is to be in accordance with the followings;

(A)The mechanical ventilation is in accordance with **Ch 5, Sec 12** of **Rules**, as applicable.

(B)The ventilation is always in operation when there is fuel in the piping and the master gas fuel valve, as required by **Para 6**, closes automatically if the required air flow is not established and maintained by the exhaust ventilation system.

(C)The ventilation inlets for the double wall piping and ducts are always to be located in a non-hazardous open area away from ignition sources and ventilation outlets for the double wall piping and ducts are in the cargo area.

(D)Ventilation inlets and outlets of double wall piping and ducts are to be located so that negative pressures is maintained in the whole space between inner pipes and outer ducts/pipes.

4. Requirements for gas fuel with pressure greater than 1 MPa

(1) Fuel delivery lines between the high-pressure fuel pumps/compressors and consumers are to be protected with a double-walled piping system capable of containing a high pressure line failure, taking into account the effects of both pressure and low temperature. A single-walled pipe in the cargo area up to the isolating valve(s) required by **Para 6** is acceptable.

(2)In application of above (1), when fuel is of ordinary temperature, single wall pipe in the cargo area after the isolating valve(s) required by **Para 6** may be accepted by risk assessment in accordance with **104. 3 (1).**

5. Gas consumer isolation

(1) The supply piping of each gas consumer unit is to be provided with gas fuel isolation by automatic double block and bleed, vented to a safe location, under both normal and emergency operation. The automatic valves are to be arranged to fail to the closed position on loss of actuating power. In a space containing multiple consumers, the shutdown of one is not to affect the gas supply to the others.

(2)Where fuel supply systems supply LPG in the liquid state, vent lines are to be led to a gas liquid separator such as knock out drum to prevent LPG liquid from being released to the atmosphere. A gas liquid separator is to be equipped with heating means if required based on the risk assessment

(3)A purging line is to be connected between two block valves to prevent heavy gas from remaining in bleed line by automatically purging bleed line when a bleed valve is open.

6. Spaces containing gas consumers

(1) It is to be possible to isolate the gas fuel supply to each individual space containing a gas consumer(s) or through which fuel gas supply piping is run, with an individual master valve, which is located within the cargo area. The isolation of gas fuel supply to a space is not to affect the gas supply to other spaces containing gas consumers if they are located in two or more spaces, and it is not to cause loss of propulsion or electrical power. An individual master valve located in the cargo area may be provided for each gas consumer or each group of gas consumers of inside the space.

(2)The master valve is to operate under the following circumstances:

(A) automatically by:

(a) leak detection in the annular space of a double-walled pipe served by that master valve;

(b) leak detection in other compartments containing single-walled gas piping that is part of the supply system served by the master valve; and

(c) loss of ventilation or loss of pressure in the annular space of a double-walled pipe and other compartments containing single-walled gas piping; and

(B) manually from within the space, and at least one remote location.

7. Piping and ducting construction

Gas fuel piping in machinery spaces is to comply with **Ch 5, 501.** to **509.** of **Rules**, as applicable. The piping is to, as far as practicable, have welded joints. Those parts of the gas fuel piping that are not enclosed in a ventilated pipe or duct according to **3**, and are on the weather decks outside the cargo area, is to have full penetration butt-welded joints and is to be fully radiographed.

8. Gas detection

Gas detection systems provided in accordance with the requirements of this Section are to activate the alarm at 30 % LFL and shut down the master gas fuel valve required by **Para 6** at not more than 60 % LFL (see **Ch 5, 1306. 17** of **Rules**).

9. Purging of vent pipes

Vent masts are to be fitted with means of purging to purge away gas from the vent masts.

205. Gas fuel plant and related storage tanks

1. Provision of gas fuel

(1)All equipment (heaters, compressors, vaporizers, filters, etc.) for conditioning the cargo and/or cargo boil off vapour for its use as fuel, and any related storage tanks, is to be located in the cargo area with sufficient distance from the gas safe spaces(e.g. accommodations, machinery spaces) to prevent released gas from entering the spaces(e.g. machinery spaces, accommodations) through openings.

(2)Fuel service tanks are to be in accordance with requirements for cargo tanks. Where tank connections and tank valves are not located on the open deck, these connection and valves are to be enclosed in a gas tight tank connection spaces. Tank connection spaces are to comply with **Rules for the Classification of Ships Using Low-flashpoint Fuels**.

(3)If the equipment is in an enclosed space, the space is to be ventilated according to **Ch 5, 1201.** of **Rules** and be equipped with a fixed fire extinguishing system, according to **Ch 5, 1105.** of **Rules**, and with a gas detection system according to **Ch 5, 1306.** of **Rules**, as applicable. Ventilation and gas detection are to comply with the followings;

(A)Ventilation

(a) Spaces in which LPG fuel supply systems are located are to be fitted with a mechanical ventilation system that is arranged to avoid areas where gas may accumulate, taking into account the density of the vapour and potential ignition sources. The ventilation suction of hazardous spaces are to be located at the lowest part of the space and close to the bottom as far as ventilation is not interfered considering LPG gas is heavier than air. The ventilation system is to be separated from those serving other spaces. However, alternative duct arrangement may be accepted provided it can be demonstrated that effectiveness of ventilation is equivalent to duct arrangement located at the lowest part of the space.

(b) The ventilation system is to be separated from those serving other spaces.

(c) Ventilation exhaust ducts from gas-dangerous spaces are to discharge upwards. Air outlets and air inlets for hazardous enclosed spaces are to be arranged to prevent exhausted gas from re-entering to the space through air inlets. Satisfaction of this arrangement is to be demonstrated by dispersion analysis, if necessary.

(B) Gas detectors are to be located in the followings;

(a) where gas may be accumulated in the space such as location where air circulation is reduced and is near bottom, and

(b) ventilation outlet

2. Remote stops

(1) All rotating equipment utilized for conditioning the cargo for its use as fuel is to be arranged for manual remote stop from the engine-room. Additional remote stops are to be located in areas that are always easily accessible, typically cargo control room, navigation bridge and fire control station.

(2) The fuel supply equipment is to be automatically stopped in the case of low suction pressure or fire detection. Unless expressly provided otherwise, the requirements of Ch 5, 1810. of Rules need not apply to gas fuel compressors or pumps when used to supply gas consumers.

3. Heating and cooling mediums

If the heating or cooling medium for the gas fuel conditioning system is returned to spaces outside the cargo area, provisions are to be made to detect and alarm the presence of cargo/cargo vapour in the medium. Any vent outlet is to be in a safe position and fitted with an effective flame screen of an approved type.

4. Piping and pressure vessels

Piping or pressure vessels fitted in the gas fuel supply system are to comply with Ch 5, Sec 5 of Rules.

206. Special requirements for boilers

1. Arrangements

(1) Each boiler is to have a separate exhaust uptake.

(2) Each boiler is to have a dedicated forced draught system. A crossover between boiler force draught systems may be fitted for emergency use providing that any relevant safety functions are maintained.

(3) Combustion chambers and uptakes of boilers are to be designed to prevent any accumulation of gaseous fuel.

2. Combustion equipment

(1) The burner systems are to be of dual type, suitable to burn either: oil fuel or gas fuel alone, or oil and gas fuel simultaneously.

(2) Burners are to be designed to maintain stable combustion under all firing conditions.

(3) An automatic system is to be fitted to change over from gas fuel operation to oil fuel operation without interruption of the boiler firing, in the event of loss of gas fuel supply.

(4) Gas nozzles and the burner control system are to be configured such that gas fuel can only be ignited by an established oil fuel flame, unless the boiler and combustion equipment is designed and approved by Society to light on gas fuel.

3. Safety

(1) There are to be arrangements to ensure that gas fuel flow to the burner is automatically cut-off, unless satisfactory ignition has been established and maintained.

(2) On the pipe of each gas-burner, a manually operated shut-off valve is to be fitted.

(3) Provisions are to be made for automatically purging the gas supply piping to the burners, by means of an inert gas, after the extinguishing of these burners.

(4) The automatic fuel changeover system required by 2 (3) is to be monitored with alarms to ensure continuous availability.

(5) Arrangements are to be made that, in case of flame failure of all operating burners, the combustion chambers of the boilers are automatically purged before relighting.

(6) Arrangements are to be made to enable the boilers to be manually purged.

207. Special requirements for gas-fired internal combustion engines

Dual fuel engines are those that employ LPG fuel (with pilot oil) and oil fuel. Oil fuels may include distillate and residual fuels. LPG only engines are those that employ LPG fuel only.

1. Arrangements

(1) When gas is supplied in a mixture with air through a common manifold, flame arrestors are to be installed before each cylinder head.
(2) Each engine is to have its own separate exhaust.
(3) The exhausts are to be configured to prevent any accumulation of unburnt LPG fuel.
(4) Unless designed with the strength to withstand the worst case overpressure due to ignited gas leaks, air inlet manifolds, scavenge spaces, exhaust system and crank cases are to be fitted with suitable pressure relief systems. Pressure relief systems are to lead to a safe location, away from personnel.
(5) Each engine is to be fitted with vent systems independent of other engines for crankcases, sumps and cooling systems.

2. Combustion equipment

(1) Prior to admission of gas fuel, correct operation of the pilot oil injection system on each unit is to be verified.
(2) For a spark ignition engine, if ignition has not been detected by the engine monitoring system within an engine specific time after opening of the gas supply valve, this is to be automatically shut off and the starting sequence terminated. It is to be ensured that any unburnt gas mixture is purged from the exhaust system.
(3) For dual-fuel engines fitted with a pilot oil injection system, an automatic system is to be fitted to change over from gas fuel operation to oil fuel operation with minimum fluctuation of the engine power.
(4) In the case of unstable operation on engines with the arrangement in (3) when gas firing, the engine is to automatically change to oil fuel mode.

3. Safety

(1) During stopping of the engine, the gas fuel is to be automatically shut off before the ignition source.
(2) Arrangements are to be provided to ensure that there is no unburnt gas fuel in the exhaust gas system prior to ignition.
(3) Crankcases, sumps, scavenge spaces and cooling system vents are to be provided with gas detection (see **Ch 5, 1306. 17** of **Rules.**).
(4) Provision is to be made within the design of the engine to permit continuous monitoring of possible sources of ignition within the crank case. Instrumentation fitted inside the crankcase is to be in accordance with the requirements of **Ch 5, Sec 10** of **Rules**.
(5)For engines where the space below the piston is in direct communication with the crankcase a detailed evaluation regarding the hazard potential of fuel gas accumulation in the crankcase is to be carried out and reflected in the safety concept of the engine. Measures to prevent accumulation of LPG gas in the space below the piston and extract LPG gas in the space are to be provided taking into account of heavy density of LPG gas.
(6) A means is to be provided to monitor and detect poor combustion or misfiring that may lead to unburnt gas fuel in the exhaust system during operation. In the event that it is detected, the gas fuel supply is to be shut down. Instrumentation fitted inside the exhaust system is to be in accordance with the requirements of **Ch 5, Sec 10** of **Rules**. Measures to extract unburned gas caused by poor combustion or misfiring are to be provided.

208. Special requirements for gas turbine

1. Arrangements

(1) The gas turbine is to be fitted in a gas-tight enclosure arranged in accordance with the ESD principle outlined in **Rules for the Classification of Ships Using Low-flashpoint Fuels.** Gas leakage in the gas-tight enclosure and the consequence are to be evaluated based on the risk assessment.
(2) Ventilation for the enclosure is to be arranged with full redundancy (2 x 100 % capacity fans from different electrical circuits).
(3) Each turbine is to have its own separate exhaust.

(4) The exhausts are to be appropriately configured to prevent any accumulation of unburnt gas fuel.
(5) Unless designed with the strength to withstand the worst case overpressure due to ignited gas leaks, pressure relief systems are to be suitably designed and fitted to the exhaust system, taking into consideration explosions due to gas leaks. Pressure relief systems within the exhaust uptakes are to be lead to a nonhazardous location, away from personnel.

2. Combustion equipment

An automatic system is to be fitted to change over easily and quickly from gas fuel operation to oil fuel operation with minimum fluctuation of the engine power.

3. Safety

(1) Means is to be provided to monitor and detect poor combustion that may lead to unburnt gas fuel in the exhaust system during operation. In the event that it is detected, the gas fuel supply is to be shut down.
(2) Each turbine is to be fitted with an automatic shutdown device for high exhaust temperatures.

209. Signboards

A readily visible notice giving instruction to caution and action for gas shutdown in case of gas leakage shall be placed in machinery space. ⚓

RULES FOR CLASSIFICATION(STEEL SHIPS)

(Development Review : For external opinion inquiry)

Part 7 SHIPS OF SPECIAL SERVICE

Chater 6 Ships Carrying Dangerous Chemicals in Bulk

2020. 9.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 January 2021 (Date of which contracts for construction are signed)

◉ In reflection of the Resolution MSC.460(101)(14 June 2019)

◉ In reflection of the Request for Establishment or revision of Classification Technical Rules(EAT4800-1319-2020), the requirements have been matched to IBC Code)

Present	Amendment	Note
CHAPTER 6 SHIPS CARRYING DANGEROUS CHEMICALS IN BULK	**CHAPTER 6 SHIPS CARRYING DANGEROUS CHEMICALS IN BULK**	
Section 1 ~ Section 7 〈omitted〉	**Section 1 ~ Section 7 〈same as the present〉**	
Section 8 Cargo Tank Venting and Gas-freeing Arrangements	**Section 8 Cargo Tank Venting and Gas-freeing Arrangements**	
801. ~ 805. 〈omitted〉	**801. ~ 805. 〈same as the present〉**	(amendment)
806. Cargo tank gas-freeing (IBC Code 8.5) 【See Guidance】	**806. Cargo tank gas-freeing (IBC Code 8.5)** 【See Guidance】	-correction
1. 〈omitted〉	**1. 〈omitted〉**	
(1) through the vent outlets specified in **803. 3** and **803. 4;** or 〈hereafter, omitted〉	(1) through the vent outlets specified in **803. 4** and **803. 5;** or 〈hereafter, same as the present〉	
Section 15 Special Requirements	**Section 15 Special Requirements**	
1503. Carbon disulphide (IBC Code 15.3)	**1503. Carbon disulphide (IBC Code 15.3)**	
1. ~ 9. 〈omitted〉	**1. ~ 9. 〈omitted〉**	
10. Because of its low ignition temperature and close clearances required to arrest its flame propagation, only intrinsically safe system and circuits are permitted in the hazardous location described in **1002. 3.**	**10.** Because of its low ignition temperature and close clearances required to arrest its flame propagation, only intrinsically safe systems and circuits are permitted in the hazardous locations ~~described in 1002. 3.~~ *(2021)*	-reflected EAT4800-1319-2020
1504. ~ 1507. 〈omitted〉	**1504. ~ 1507. 〈same as the present〉**	
1508. Propylene oxide and mixtures of ethylene oxide/propylene oxide with an ethylene oxide content of not more than 30 % by weight (IBC Code 15.8)	**1508. Propylene oxide and mixtures of ethylene oxide/propylene oxide with an ethylene oxide content of not more than 30 % by weight (IBC Code 15.8)**	-matched number of rules numbers to IBC Code
1. ~ 13. 〈omitted〉	**1. ~ 13.** 〈same as the present〉	
14. 〈omitted〉	**14.1** 〈same as the present〉	
15. 〈omitted〉	**14.2** 〈same as the present〉	
16. 〈omitted〉	**14.3** 〈same as the present〉	
17. ~ 23. 〈omitted〉	**15. ~ 21.** 〈same as the present〉	

Present	Amendment	Note
24. 〈omitted〉	**22.1** 〈same as the present〉	(amendment) -Has been matched number of rules numbers to IBC Code
25. 〈omitted〉	**22.2** 〈same as the present〉	
26. 〈omitted〉	**23.1** 〈same as the present〉	
27. 〈omitted〉	**23.2** 〈same as the present〉	
28. 〈omitted〉	**23.3** 〈same as the present〉	
29. 〈omitted〉	**23.4** 〈same as the present〉	
30. 〈omitted〉	**24.** 〈same as the present〉	
31. The piping system for tanks to be loaded with these products should be separated from piping systems for all other tanks, including empty tanks. If the piping system for the tanks to be loaded is not independent, the required piping separation should be accomplished by the removal of spool pieces, valves, or other pipe sections, and the installation of blank flanges at these locations. The required separation applies to all liquid and vapour piping, liquid and vapour vent lines and any other possible connections, such as common inert gas supply lines.	**25.1** The piping system for tanks to be loaded with these products are to be separated (as defined in **301. 4**) from piping systems for all other tanks, including empty tanks. If the piping system for the tanks to be loaded is not independent (as defined in **106. 18**), the required piping separation are to be accomplished by the removal of spool-pieces, valves, or other pipe section and the installation of blank flanges at these locations. The required separation applies to all liquid and vapour piping, liquid and vapour vent lines and any other possible connections, such as common inert-gas supply lines. *(2021)*	- Resolution MSC.460(101)(14 June 2019)
32. 〈omitted〉	**25.2** 〈same as the present〉	
33. 〈omitted〉	**25.3** 〈same as the present〉	
34. (1) 〈omitted〉	**26.1** 〈same as the present〉	
34. (2) 〈omitted〉	**26.2** 〈same as the present〉	
34. (3) 〈omitted〉	**26.3** 〈same as the present〉	
35. ~**38.** 〈omitted〉	**27.** ~**30.** 〈same as the present〉	
1509. ~ 1514. 〈omitted〉	**1509. ~ 1514. 〈same as the present〉**	
1515. Cargoes with low ignition temperature and wide flammability range (IBC Code 15.15) Deleted.	**1515. Hydrogen sulphide (H_2S) detection equipment for bulk liquids (IBC Code 15.15)** *(2021)* Hydrogen sulphide (H_2S) detection equipment shall be provided on board ships carrying bulk liquids prone to H_2S formation. It should be noted that scavengers and biocides, when used, may not be 100% effective in controlling the formation of H2S. Toxic vapour detection instruments complying with the requirement in **1302. 1** of the Code for testing for H_2S may be used to satisfy this requirement."	- Resolution MSC.460(101)(14 June 2019)

Present	Amendment	Note
1516. Cargo contamination (IBC Code 15.16) 【See Guidance】 **1.** Where column "o" in the table of **Sec 17** refers to this Article, water should not be allowed to contaminate this cargo. In addition, the following provisions apply: (1) ~ (4) 〈omitted〉	**1516. Cargo contamination (IBC Code 15.16)** 【See Guidance】 **1.** Deleted. **2.** Where column "o" in the table of **Sec 17** refers to this Article, water should not be allowed to contaminate this cargo. In addition, the following provisions apply: (1) ~ (4) 〈same as the present〉	(amendment) - Resolution MSC.460(101)(14 June 2019)
Section 16 Operational Requirements	**Section 16 Operational Requirements**	
1601. 〈omitted〉 **1602. Cargo information (IBC Code 16.2)** **1. ~ 6.** 〈omitted〉 **7.** Where column "o" in the table of **Sec 17** refers to this paragraph, the cargo's melting point shall be indicated in the shipping document. **8.** 〈newly added〉 **9.** 〈newly added〉	**1601. 〈same as the present〉** **1602. Cargo information (IBC Code 16.2)** **1. ~ 6.** 〈same as the present〉 **7.** Where column o in the table of **Sec 17** refers to this paragraph, the cargo is subject to the prewash requirements in regulation 13.7.1.4 of Annex II of MARPOL. *(2021)* **8.** Deleted. **9.** Where column "o" in the table of **Sec 17** refers to this paragraph, the cargo's melting point shall be indicated in the shipping document. *(2021)*	- Resolution MSC.460(101)(14 June 2019)
Section 17 Summary of Minimum Requirements	**Section 17 Summary of Minimum Requirements**	
1. The list of the products applied to this Section shall refer to the summary of minimum requirements in chapter 17 of the IBC Code, as amended, which shall be in accordance with the guidances specified separatedly. 【See Guidance】 2. 〈omitted〉	1. The list of the products applied to this Section shall refer to the summary of minimum requirements in chapter 17 of the IBC Code, as amended, which shall be in accordance with the **Annex 7B-1** specified separatedly. *(2021)* 【See Guidance】 2. 〈same as the present〉	

Present	Amendment	Note
Section 18 List of Chemicals to which this Chapter does not apply	**Section 18 List of Chemicals to which this Chapter does not apply**	
1. ~ 5. 〈omitted〉	**1. ~ 5.** 〈same as the present〉	(amendment) -The Guidance have been deleted and the appendix is directly quoted from the rules.
6. The list of products shall be in accordance with the guidances specified separatedly. **【See Guidance】**	**6.** The list of products shall be in accordance with the **Annex 7B-2** specified separatedly. *(2021)* **【See Guidance】**	
Section 19 Index of Products Carried in Bulk	**Section 19 Index of Products Carried in Bulk**	
The index of products shall be in accordance with the guidances specified separatedly. **【See Guidance】**	The index of products shall be in accordance with the **Annex 7B-3** specified separatedly. **【See Guidance】**	
Section 20 〈omitted〉	**Section 20 〈same as the present〉**	
Section 21 Criteria for assigning carriage requirements for products subject to the IBC Code	**Section 21 Criteria for assigning carriage requirements for products subject to the IBC Code**	
This Criteria is to be in accordance with the guidances specified separatedly. **【See Guidance】** ⚓	This Criteria is to be in accordance with the **Annex 7B-4** specified separatedly. **【See Guidance】** ⚓	