

Amendments of the Rules for Classification of Steel Ships

Pt. 5 Machinery Installations – Chapter 6

(For External opinion inquiry)



2022.8.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Jan 2023 (based on contract date for construction)

- reflected of IACS UR M61 Rev.1

(2) Effective date : 1 July 2023 (based on contract date for construction)

- Clarification of the cleaning method for sea chest grating (ENP4500-800-2022)
- Clarification of the expression of bilge system (ENP4800-4814-2022)
- Correction for the expression of hydraulic system (TST4800-319-2021)

(3) Effective date : on or after 1 Jan. 2024 (conditions below as per SOLAS Reg. II-1/1.3.2)

- .1 for which the building contract is placed on or after 1 January 2024; or
- .2 in the absence of a building contract, the keel of which is laid or which are at a similar stage of construction on or after 1 July 2024; or
- .3 the delivery of which is on or after 1 January 2028.

- Reflected of Res. MSC.482(103) : Pt.7 Annex 7-6-1 “Water Level Detectors on Multiple Hold Cargo Ships other than Bulk Carriers and Tankers” is newly added and reference made in Pt.5 Ch.6 101.

Present	Amendment	Note
<p style="text-align: center;">CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT</p> <p style="text-align: center;">Section 1 General</p> <p>101. General</p> <p>1. Application [See Guidance]</p> <p>(1) The requirements in this Chapter apply to the materials, design, fabrication, tests and piping arrangement of auxiliaries and piping systems.</p> <p>(2) The requirements in this Chapter may be modified for ships having special limitation for their service and usage and for small ships.</p> <p>2. Related requirements</p> <p>In addition to the requirements in this Chapter, the following relevant requirements are to be complied with.</p> <p>(1) For piping systems of ships to be registered as those strengthened for navigation in ice, Ch 1 of Guidance for Ships for Navigation in Ice; For piping systems of the ships for navigation in polar waters, Ch 2 of Guidance for Ships for Navigation in Ice; For piping systems of the vessels for polar and ice breaking service, Ch 3 of Guidance for Ships for Navigation in Ice.</p> <p>(2) For steering gears, Pt 5, Ch 7; For windlasses and mooring winches, Pt 5, Ch 8.</p> <p>(3) For automatic and remote control systems, Pt 6, Ch 2.</p> <p>(4) For pumping arrangements of oil tankers, Pt 7, Ch 1, Sec. 10; For drainage of ore holds of ore carriers, Pt 7, Ch 2 Sec. 2; For water level detection & alarms and drainage & pumping systems for bulk carriers and single hold cargo ships, Pt 7, Ch 3 Sec. 14; For cargo handling facilities and piping systems of liquefied gas carriers and chemical carriers, Pt 7, Ch 5 and Ch 6.</p> <p>⟨Omitted⟩</p>	<p style="text-align: center;">CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT</p> <p style="text-align: center;">Section 1 General</p> <p>101. General</p> <p>1. Application [See Guidance]</p> <p>(1) The requirements in this Chapter apply to the materials, design, fabrication, tests and piping arrangement of auxiliaries and piping systems.</p> <p>(2) The requirements in this Chapter may be modified for ships having special limitation for their service and usage and for small ships.</p> <p>2. Related requirements</p> <p>In addition to the requirements in this Chapter, the following relevant requirements are to be complied with.</p> <p>(1) For piping systems of ships to be registered as those strengthened for navigation in ice, Ch 1 of Guidance for Ships for Navigation in Ice; For piping systems of the ships for navigation in polar waters, Ch 2 of Guidance for Ships for Navigation in Ice; For piping systems of the vessels for polar and ice breaking service, Ch 3 of Guidance for Ships for Navigation in Ice.</p> <p>(2) For steering gears, Pt 5, Ch 7; For windlasses and mooring winches, Pt 5, Ch 8.</p> <p>(3) For automatic and remote control systems, Pt 6, Ch 2.</p> <p>(4) For pumping arrangements of oil tankers, Pt 7, Ch 1, Sec. 10; For drainage of ore holds of ore carriers, Pt 7, Ch 2 Sec. 2; For water level detection & alarms and drainage & pumping systems for bulk carriers and single hold cargo ships, Pt 7, Ch 3 Sec. 14; <u>For water level detectors on multiple hold cargo ships other than bulk carriers and tankers, Pt 7, Annex 7-6-1</u>; For cargo handling facilities and piping systems of liquefied gas carriers and chemical carriers, Pt 7, Ch 5 and Ch 6. (2023)</p> <p>⟨Omitted⟩</p>	<p>– Reflected of new annex 7-6-1 of Pt.7</p>

Present	Amendment	Note
<p>CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT</p> <p>Section 3 Sea Suction and Overboard Discharge</p> <p>302. Construction of sea chests</p> <ol style="list-style-type: none"> 1. Sea chests forming part of the ship's structure are to be as compact as possible and of rigid construction with no air to stay inside. 2. Gratings are to be fitted at all openings in the ship's side for sea inlet valves or sea chest. The net area through the gratings is to be not less than twice that of the valves connected to the sea inlets, and provision is to be made for clearing the gratings by use of low pressure steam <u>or</u> compressed air. 	<p>CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT</p> <p>Section 3 Sea Suction and Overboard Discharge</p> <p>302. Construction of sea chests</p> <ol style="list-style-type: none"> 1. Sea chests forming part of the ship's structure are to be as compact as possible and of rigid construction with no air to stay inside. 2. Gratings are to be fitted at all openings in the ship's side for sea inlet valves or sea chest. The net area through the gratings is to be not less than twice that of the valves connected to the sea inlets, and provision is to be made for clearing the gratings by use of low pressure steam <u>or</u>, compressed air, <u>etc.</u> <u>(2023)</u> 	<p>- ENP4500-800-2022</p>

Present	Amendment	Note
<p style="text-align: center;">CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT</p> <p style="text-align: center;">Section 4 Bilge and Ballast System</p> <p>402. Drainage of compartment other than machinery spaces 【See Guidance】 <Omitted></p> <p>3. Dry compartment other than cargo holds</p> <p>(1) Bilge of chain lockers, fore and after peaks not used as tanks or deck forming the top of these tanks may be drained by eductors or hand pumps. These eductors or hand pumps are to be capable of being operated at any time from accessible position above the summer load water line.</p> <p>(2) If steering gear compartments or <u>other small enclosed spaces</u> situated <u>in</u> the after peak compartment are adequately isolated from the adjacent decks and are capable of draining by gravity, they may be drained to the shaft tunnel or the machinery space by scuppers. In this cases, these pipes are not to be more than 65 A in nominal diameter and are to be provided with a quick-acting self-closing valve located in an accessible position. <Omitted></p> <p>404. Size of bilge suction pipes. 【See Guidance】 <Omitted></p> <p>5. Peak tanks and shaft tunnels</p> <p>The internal diameter of bilge pipes in peak tanks and shaft tunnels is not to be less than 65 mm. However, in ships of 60 m or less in length, the internal diameter may be reduced to 50 mm. <Omitted></p>	<p style="text-align: center;">CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT</p> <p style="text-align: center;">Section 4 Bilge and Ballast System</p> <p>402. Drainage of compartment other than machinery spaces 【See Guidance】 <Omitted></p> <p>3. Dry compartment other than cargo holds</p> <p>(1) Bilge of chain lockers, fore and after peaks not used as tanks or deck forming the top of these tanks may be drained by eductors or hand pumps. These eductors or hand pumps are to be capable of being operated at any time from accessible position above the summer load water line.</p> <p>(2) If steering gear compartments or <u>other small enclosed spaces</u> situated <u>in above</u> the after peak compartment are adequately isolated from the adjacent decks and are capable of draining by gravity, they may be drained to the shaft tunnel or the machinery space by scuppers. In this cases, these pipes are not to be more than 65 A in nominal diameter and are to be provided with a quick-acting self-closing valve located in an accessible position. <u>(2023)</u> <Omitted></p> <p>404. Size of bilge suction pipes. 【See Guidance】 <Omitted></p> <p>5. Peak tanks and shaft tunnels</p> <p>The internal diameter of bilge pipes in peak tanks and shaft tunnels is not to be less than 65 mm. However, in ships of 60 m or less in length, the internal diameter may be reduced to 50 mm. <Omitted></p>	<p>- ENP4800-4814 -2022</p>

Present	Amendment	Note
<p style="text-align: center;">CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT</p> <p style="text-align: center;">Section 11 Compressed Air System</p> <p>1101. Compressed air starting devices [See Guidance]</p> <p>1. Number and capacity of main air reservoirs</p> <p>(1) Where the main engines are arranged for starting by compressed air, at least two starting air reservoirs of about equal capacity are to be fitted. These reservoirs are to be connected ready for use.</p> <p>(2) The total capacity of air reservoirs is to be sufficient to provide, without their being replenished, not less than 12 consecutive starts altering between Ahead and Astern of each main engine of the reversible type, and not less than 6 consecutive starts of each main non-reversible type engine. <u>The number of starts refers to engine in cold and ready to start conditions.</u></p> <p>(3) Where the auxiliary engines are designed for starting by compressed air, two separate auxiliary air reservoirs which are to be sufficient for at least three starts for each auxiliary engine <u>when in cold and ready to start conditions</u> are to be fitted, or starting air for auxiliary engines is to be supplied by separate piping from main air reservoirs. In case where only one auxiliary reservoir is fitted, starting air pipes are to be connected with main air reservoir.</p> <p>(4) Where the auxiliary engines are designed for starting by the main air reservoirs, the capacity of the main air reservoirs is to be more than sum of the capacity required in (2) and (3) above, and the amount consumed for engine control systems, whistle, etc.</p> <p>(5) For multi-engine installations, the number of starts required for each engine is to be determined as deemed appropriate by the Society.</p> <p>⟨Omitted⟩</p>	<p style="text-align: center;">CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT</p> <p style="text-align: center;">Section 11 Compressed Air System</p> <p>1101. Compressed air starting devices [See Guidance]</p> <p>1. Number and capacity of main air reservoirs <u>(2023)</u></p> <p>(1) Where the main engines are arranged for starting by compressed air, at least two starting air reservoirs of about equal capacity are to be fitted. These reservoirs are to be connected ready for use.</p> <p>(2) The total capacity of air reservoirs is to be sufficient to provide, without their being replenished, not less than 12 consecutive starts altering between Ahead and Astern of each main engine of the reversible type, and not less than 6 consecutive starts of each main non-reversible type engine. <u>The number of starts refers to engine in cold and ready to start conditions.</u></p> <p>(3) Where the auxiliary engines are designed for starting by compressed air, two separate auxiliary air reservoirs which are to be sufficient for at least three starts for each auxiliary engine <u>when in cold and ready to start conditions</u> are to be fitted, or starting air for auxiliary engines is to be supplied by separate piping from main air reservoirs. In case where only one auxiliary reservoir is fitted, starting air pipes are to be connected with main air reservoir.</p> <p>(4) Where the auxiliary engines are designed for starting by the main air reservoirs, the capacity of the main air reservoirs is to be more than sum of the capacity required in (2) and (3) above, and the amount consumed for engine control systems, whistle, etc.</p> <p>(5) For multi-engine installations, the number of starts required for each engine is to be determined as deemed appropriate by the Society.</p> <p>⟨Omitted⟩</p>	<p>– UR M61 Rev.1</p>

Present	Amendment	Note
<p style="text-align: center;">CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT</p> <p style="text-align: center;">Section 13 Hydraulic System (2017)</p> <p>1301. General <Omitted></p> <p>1302. System design</p> <p>(1) Hydraulic pipings are to be separate from other piping system except lubricating oil systems.</p> <p>(2) Hydraulic unit having working pressure above 1.5 MPa and having potential of oil leakage coming contact with hot surfaces, electrical installations or other sources of ignition, is to preferably be placed in separate spaces. If it is impracticable to locate such units in a separate space, adequate shielding is to be provided.</p> <p>(3) Relief valves are to be fitted to protect the system from overpressure. Setting pressure of it <u>is not</u> to be <u>less</u> than the design pressure of <u>it</u> and relieving capacity is not to be less than full pump flow with a maximum pressure rise in the system of not more than 10% of the relief valve setting. <Omitted></p>	<p style="text-align: center;">CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT</p> <p style="text-align: center;">Section 13 Hydraulic System (2017)</p> <p>1301. General <Omitted></p> <p>1302. System design</p> <p>(1) Hydraulic pipings are to be separate from other piping system except lubricating oil systems.</p> <p>(2) Hydraulic unit having working pressure above 1.5 MPa and having potential of oil leakage coming contact with hot surfaces, electrical installations or other sources of ignition, is to preferably be placed in separate spaces. If it is impracticable to locate such units in a separate space, adequate shielding is to be provided.</p> <p>(3) Relief valves are to be fitted to protect the system from overpressure. Setting pressure of it <u>is not</u> to be <u>less higher</u> than the design pressure of <u>it the system</u> and relieving capacity is not to be less than full pump flow with a maximum pressure rise in the system of not more than 10% of the relief valve setting. <u>(2023)</u> <Omitted></p> <div style="border: 1px solid black; padding: 5px; margin-top: 10px;"> <p><참고 : 국문판 인용></p> <p>(3) 과압이 발생할 수 있는 유압관 장치의 모든 부분에는 압력도출밸브가 설치되어야 한다. 이 도출밸브의 조정압력은 설계압력을 <u>초과하여서는 아니 되며</u>, 총도출능력은 조정압력의 <u>110%를 초과하는 압력 상승이 발생하지 않는 것</u>이어야 한다.</p> </div>	<p>- Correction and clarification for the expressions.</p>

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

Pt. 5 Machinery Installations – Chapter 6

(For External opinion inquiry)



2022.8.

Machinery Rule Development Team

- Main Amendments -

(1) Effective date : 1 Jan 2023 (based on contract date for construction)

- Standard reference for distance piece construction updated as per KS V 7142

(2) Effective date : 1 July 2023 (based on application date for type approval and contract date for construction)

- Requirements for plastic piping system updated as per IACS UR P4 Rev.7

Present	Amendment	Note
<p style="text-align: center;">CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT</p> <p style="text-align: center;">Section 3 Sea inlet and Overboard Discharge</p> <p>301. Ship-side valves and fittings</p> <p>1. Construction of distance pieces In application to 301. 2 of the Rules, distance pieces are to be complied with <u>the national standard</u> or equivalent standards and it is to be of the butt welded joints. The flanged joints may be omitted under the approval of the Society where distance pieces are comply with the below requirements and documents demonstrating it are submitted.(2017) 【See Rule】</p> <p>(1) It is to be passed through above load line.</p> <p>(2) It is not to be affect to ship's safety where distance pieces is damaged.</p> <p>(3) Piping system corresponding to a nominal pressure one rank higher than that according to the design pressure are to be used.</p> <p>⟨Omitted⟩</p>	<p style="text-align: center;">CHAPTER 6 AUXILIARIES AND PIPING ARRANGEMENT</p> <p style="text-align: center;">Section 3 Sea inlet and Overboard Discharge</p> <p>301. Ship-side valves and fittings</p> <p>1. Construction of distance pieces In application to 301. 2 of the Rules, distance pieces are to be complied with <u>the national standard “KS V 7141 (distance pieces for ship's hull)”</u> or equivalent standards and it is to be of the butt welded joints. The flanged joints may be omitted under the approval of the Society where distance pieces are comply with the below requirements and documents demonstrating it are submitted.(2017) <u>(2023)</u> 【See Rule】</p> <p>(1) It is to be passed through above load line.</p> <p>(2) It is not to be affect to ship's safety where distance pieces is damaged.</p> <p>(3) Piping system corresponding to a nominal pressure one rank higher than that according to the design pressure are to be used.</p> <p>⟨Omitted⟩</p>	<p>– Reference Standards updated</p>

Present	Amendment	Note
<p align="center">Annex 5-6 Plastic Piping System</p> <p>1. Application</p> <p>(1) The requirements in this Annex apply to plastic pipes/piping systems on ships.</p> <p>(2) Plastic pipes may be used for Class III piping system. Proposals for the use of plastic pipes in Class I and Class II piping system will be specially considered.</p> <p>(3) The requirements in this Annex are not applicable to flexible pipes and hoses and mechanical couplings used in metallic piping systems.</p> <p>2. Definitions</p> <p>(1) <u>Plastic(s)</u> is both thermoplastic and thermosetting plastic materials with or without reinforcement, such as PVC and fibre reinforced plastics - FRP. Plastic includes synthetic rubber and materials of similar thermo/mechanical properties.</p> <p>(2) <u>Fire endurance</u> is the capability of piping to maintain its strength and integrity (i.e. capable of performing its intended function) for some predetermined period of time while exposed to fire.</p> <p>⟨Omitted⟩</p>	<p align="center">Annex 5-6 Plastic Piping System <i>(2023)</i></p> <p>1. Application</p> <p>(1) The requirements in this Annex apply to plastic pipes/piping systems on ships.</p> <p>(2) Plastic pipes may be used for Class III piping system. Proposals for the use of plastic pipes in Class I and Class II piping system will be specially considered.</p> <p>(3) The requirements in this Annex are not applicable to flexible pipes and hoses and mechanical couplings used in metallic piping systems.</p> <p>(3) The use of mechanical joints approved for the use in metallic piping systems only are not permitted.</p> <p>2. Definitions</p> <p>(1) <u>Plastic(s)</u> is both thermoplastic and thermosetting plastic materials with or without reinforcement, such as PVC and fibre reinforced plastics - FRP. Plastic includes synthetic rubber and materials of similar thermo/mechanical properties.</p> <p>(2) <u>Fire endurance</u> is the capability of piping to maintain its strength and integrity (i.e. capable of performing its intended function) for some predetermined period of time while exposed to fire.</p> <p>(3) Essential to the safety of ship is all piping systems that in event of failure will pose a threat to personnel and the ship. Examples for piping systems essential to the safety are provided by Table 1</p> <p>(4) Essential services are those services essential for propulsion and steering and safety of the ship as specified in Pt. 6, Ch 1, 101. 4. (13).</p> <p>⟨Omitted⟩</p>	<p>- IACS UR P4 reflected</p>

Present	Amendment	Note
<p align="center">Annex 5–6 Plastic Piping System</p> <p>4. General requirements</p> <p>The specification of piping is to be in accordance with a recognised national or international standard approved by the Society. In addition, the following requirements apply:</p> <p>(1) Strength <Omitted></p> <p>(E) External pressure(for any installation which may be subject to vacuum conditions inside the pipe or a head of liquid acting on the outside of the pipe; and for any pipe installation required to remain operational in case of flooding damage, as per <u>Regulation 8-1 of SOLAS Chapter II-1, as amended by IMO resolutions up to MSC.436(99)</u>, or for any pipes that would allow progressive flooding to other compartments through damaged piping or through open ended pipes in the compartments).</p> <p>External pressure is to be determined by the following. <Omitted></p>	<p align="center">Annex 5–6 Plastic Piping System</p> <p>4. General requirements</p> <p>The specification of piping is to be in accordance with a recognised national or international standard approved by the Society. In addition, the following requirements apply:</p> <p>(1) Strength <Omitted></p> <p>(E) External pressure(for any installation which may be subject to vacuum conditions inside the pipe or a head of liquid acting on the outside of the pipe; and for any pipe installation required to remain operational in case of flooding damage, as per <u>Regulation 8-1 of SOLAS Chapter II-1, as amended by IMO resolutions up to MSC.436(99) SOLAS Reg. II-1/8-1</u>, or for any pipes that would allow progressive flooding to other compartments through damaged piping or through open ended pipes in the compartments).</p> <p>External pressure is to be determined by the following. <Omitted></p>	<p align="center">– IACS UR P4 reflected</p>

Amendment	Note
<p style="text-align: center;">Annex 5–6 Plastic Piping System</p> <p>5. Requirements for pipes/piping systems depending on service and/or locations</p> <p>(1) Fire endurance</p> <p>(A) Pipes and their associated <u>joints and fittings</u> whose integrity is essential to the safety of ships, including plastic piping required by <u>Regulation 21.4 of SOLAS Chapter II-2 as amended by IMO Resolutions up to MSC.421(98) (hereinafter the same) SOLAS Reg. II-2/21.4</u> to remain operational after a fire casualty, are required to meet the minimum fire endurance requirements of Appendix 1 or 2, as applicable, of IMO Resolution A.753(18), as amended by IMO Resolutions. MSC.313(88) and MSC.399(95).</p> <p>(B) <u>Unless instructed otherwise by the Flag Administration, fire endurance tests are to be carried out with specimen representative for pipes, joints and fittings²:</u></p> <p>(a) <u>Pipes:</u></p> <ul style="list-style-type: none"> <u>– for sizes with outer diameter < 200 mm the minimum outer diameter and wall thickness³</u> <u>– for sizes with outer diameter ≥ 200 mm one test specimen for each category of t/D (D = outer diameter, t = structural wall thickness). A scattering of ±10% for t/D is regarded as the same group. Minimum size approved is equal to the diameter of specimen successfully tested.</u> <p>(b) <u>Joints</u></p> <ul style="list-style-type: none"> <u>– Each type of joint applicable for applied fire endurance level tested on pipe to pipe specimen</u> <p><u>* Footnote:</u></p> <p><u>2 A test specimen incorporating several components of a piping system may be tested in a single test.</u></p> <p><u>3 Test conditions are most demanding for minimum wall thickness and thus larger wall thickness is covered. A key factor determining the fire performance of a pipe component variant is the thickness-to-diameter (t/D) ratio and whether it is larger or smaller than that of the variant which has been fire-tested. If fire-protective coatings or layers are included in the variant used in the fire test, only variants with the same or greater thickness of protection, regardless of the (t/D) ratio, shall be qualified by the fire test.</u></p> <p>(C) <u>Means are to be provided to ensure a constant media pressure inside the test specimen during the fire test as specified in Appendix 1 or 2 of the IMO Res.A.753(18), as amended by IMO Resolutions MSC.313(88) and MSC.399(95). During the test it is not permitted to replace media drained by fresh water or nitrogen.</u></p> <p>(B)(D) Depending on the capability of a piping system to maintain its strength and integrity, there exist three different levels of fire endurance for piping systems.</p> <p>(a) Level 1(L1) : Piping having passed the fire endurance test specified in Appendix 1 of IMO Resolution A.753(18), as amended by IMO Resolutions MSC.313(88) and MSC.399(95) for a duration of a minimum of one hour without loss of integrity in the dry condition is considered to meet level 1 fire endurance standard (L1). Level 1W – Piping systems similar to Level 1 systems except these systems do not carry flammable fluid or any gas and a maximum 5% flow loss in the system after exposure is acceptable (L1W).</p> <p>(b) Level 2(L2) : Piping having passed the fire endurance test specified in Appendix 1 of IMO Resolution A.753(18), as amended by IMO Resolution MSC. 313(88) and MSC. 399(95) for a duration of a minimum of 30 minutes in the dry condition is considered to meet level 2 fire endurance standard (L2). Level 2W – Piping systems similar to Level 2 systems except a maximum 5% flow loss in the system after exposure is acceptable (L2W).</p> <p>(c) Level 3(L3) : Piping having passed the fire endurance test specified in Appendix 2 of IMO Resolution A.753(18) as amended by IMO Resolutions MSC.313(88) and MSC.399(95) for a duration of a minimum of 30 minutes in the wet condition is considered to meet level 3 fire endurance standard.</p> <p>(C)(E) Permitted use of piping depending on fire endurance, location and ^{1,2}piping system is given in Table 1.</p> <p>(D)(F) For Safe Return to Port purposes (<u>Regulation. 21.4 of SOLAS Chapter II-2 SOLAS Reg. II-2/21.4</u>), plastic piping can be considered to remain operational after a fire casualty if the plastic pipes and fittings have been tested to L1 standard.</p>	<p>– IACS UR P4 reflected</p>

Amendment											Note
Annex 5-6 Plastic Piping System											
Table 1 Fire Endurance Requirements Matrix (continued)											
Piping system	Location ¹³										
	A	B	C	D	E	F	G	H	I	J	K
	Machinery spaces of category A	Other machinery spaces & pump rooms	Cargo pump rooms	Ro/Ro cargo holds	Other dry cargo holds	Cargo tanks	Fuel oil tanks	Ballast water tanks	Cofferdams void spaces pipe tunnel & ducts	Accommodation service & control spaces	Open decks
25. Scuppers and discharges (overboard) Sounding/Air	O ^{1.8}	O ^{1.8}	O ^{1.8}	O ^{1.8}	O ^{1.8}	O	O	O	O	O ^{1.8}	O
26. Watertanks/ dry spaces	O	O	O	O	O	O ¹⁰	O	O	O	O	O
27. Oil tanks (f.p > 60°C)	X	X	X	X	X	X ³	O	O ¹⁰	O	X	X
Miscellaneous											
28. Control air	L1 ⁵	L1 ⁵	L1 ⁵	L1 ⁵	L1 ⁵	NA	O	O	O	L1 ⁵	L1 ⁵
29. Service air (non-essential)	O	O	O	O	O	NA	O	O	O	O	O
30. Brine	O	O	NA	O	O	NA	NA	NA	O	O	O
31. Auxiliary low pressure steam (≤ 7MPa)	L2W	L2W	O ⁹	O ⁹	O ⁹	O	O	O	O	O ⁹	O ⁹
32. Central vacuum Cleaners	NA	NA	NA	O	NA	NA	NA	NA	O	O	O
33. Exhaust Gas Cleaning System Effluent line	L3 ¹	L3 ¹	NA	NA	NA	NA	NA	NA	NAO	L3 ^{1,11} NA	NAO
34. Urea transfer/ Supply System (SCR installation)	L1 ¹²	L1 ¹²	NA	NA	NA	NA	NA	NA	O	L3 ^{1,11} NA	O
Abbreviations : <Omitted>											

- IACS UR P4 reflected

Amendment	Note
<p style="text-align: center;">Annex 5–6 Plastic Piping System</p> <p>Table 1 Fire Endurance Requirements Matrix (continued)</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Footnotes :</p> <ol style="list-style-type: none"> 1. Where non-metallic piping is used, remotely controlled valves to be provided at ship's side (valve is to be controlled from outside space). 2. Remote closing valves to be provided at the cargo tanks. 3. When cargo tanks contain flammable liquids with f.p. > 60 °C, "O may replace "NA or "X". 4. For drains serving only the space concerned, "O may replace "L1W" 5. When controlling functions are not required by statutory requirements or guidelines, "O may replace "L1" 6. For pipe between machinery space and deck water seal, "O may replace "L1" 7. For passenger vessels, "X is to replace "L1". 8. Scuppers serving open decks in positions 1 and 2, as defined in Regulation 13 of Protocol of 1988 relating to the International Convention on Load Lines, 1966, as amended by IMO Resolutions up to MSC.375(93), are to be "X throughout unless fitted at the upper end with the means of closing capable of being operated from a position above the freeboard deck in order to prevent downflooding. 9. For essential services, such as fuel oil tank heating and ship's whistle, "X is to replace "O". 10. For tankers where compliance with paragraph 3.6 of regulation 19 of MARPOL Annex I, as amended by IMO Resolutions up to MEPC.314(74) is required, "NA is to replace "O". 11. L3 in service spaces, NA in accommodation and control spaces. 12. Type Approved plastic piping without fire endurance test(0) is acceptable downstream of the tank valve, provided this valve is metal seated and arranged as fail-to-closed or with quick closing from a safe position outside the space in the event of fire. 13. For Passenger Ships subject to Regulation 21.4 of SOLAS Chapter II-2 SOLAS Reg. II-2/21.4 (Safe return to Port), plastic pipes for services required to remain operative in the part of the ship not affected by the casualty thresholds, such as systems intended to support safe areas, are to be considered essential services. In accordance with MSC.1/Circ.1369, interpretation 12, for Safe Return to Port purposes, plastic piping can be considered to remain operational after a fire casualty if the plastic pipes and fittings have been tested to L1 standard. <p><Omitted></p> </div> <p style="text-align: center;">– 15 –</p>	<p>– IACS UR P4 reflected</p>

Amendment	Note
<p style="text-align: center;">Annex 5–6 Plastic Piping System</p> <p>Table 1 Fire Endurance Requirements Matrix (continued)</p> <div style="border: 1px solid black; padding: 10px; margin: 10px 0;"> <p>Footnotes : <Omitted></p> <p>Location definitions</p> <ul style="list-style-type: none"> - A (Machinery spaces of category A) : Machinery spaces of category A as defined in SOLAS* regulation II-2/3.31. <u>SOLAS Reg. II-2/3.31.</u> - B (Other machinery spaces and pump rooms) : Spaces, other than category A machinery spaces and cargo pump rooms, containing propulsion machinery, boilers, fuel oil unit, steam and internal combustion engines, generators and major electrical machinery, oil filling stations, refrigerating, stabilizing, ventilation and air-conditioning machinery, and similar spaces, and trunks to such spaces. - C (Cargo pump rooms) : Spaces containing cargo pumps and entrances and trunks to such spaces. - D (Ro-ro cargo holds) : Ro-Ro cargo holds are Ro-Ro cargo spaces and special category spaces as defined in SOLAS* regulation II-2/3.41 and 3.46. <u>SOLAS Reg. II-2/3.41 and SOLAS Reg. II-2/3.46.</u> - E (Other dry cargo holds) : All spaces other than Ro-Ro cargo holds used for non-liquid cargo and trunks to such spaces. - F (Cargo tanks) : All spaces used for liquid cargo and trunks to such spaces. - G (Fuel oil tanks) : All spaces used for fuel oil (excluding cargo tanks) and trunks to such spaces. - H (Ballast water tanks) : All spaces used for ballast water and trunks to such spaces. - I (Cofferdams, voids, etc.) : Cofferdams and voids are those empty spaces between two bulkheads separating two adjacent compartments. - J (Accommodation, service) : Accommodation spaces, service spaces and control stations as defined in SOLAS * regulation II-2/3.1, 3.45, 3.18 <u>SOLAS Reg. II-2/3.1, SOLAS Reg. II-2/3.45 and SOLAS Reg. II-2/3.18.</u> - K (Open decks) : Open deck spaces as defined in SOLAS* regulation II-2/9.2.2.3.2(5). <u>SOLAS Reg. II-2/9.2.2.3.2(5).</u> <p><u>* SOLAS Chapter II-2 as amended by IMO Resolutions up to MSC.421(98)</u></p> </div>	<p>- IACS UR P4 reflected</p>

Present	Amendment	Note
<p align="center">Annex 5-6 Plastic Piping System</p> <p>6. Installation</p> <p>⟨Omitted⟩</p> <p>(11) Testing after installation on board</p> <p>(A) Piping systems for essential services are to be subjected to a test pressure not less than 1.5 times the design pressure or 0.4 MPa whichever is greater.</p> <p>(B) Piping systems for non-essential services are to be checked for leakage under operational conditions.</p> <p>(C) For piping required to be electrically conductive, earthing is to be checked and random resistance testing is to be conducted.</p> <p>⟨Omitted⟩</p>	<p align="center">Annex 5-6 Plastic Piping System</p> <p>6. Installation</p> <p>⟨Omitted⟩</p> <p>(11) Testing after installation on board</p> <p>(A) Piping systems for essential services are to be subjected to a test pressure not less than 1.5 times the design pressure or 0.4 MPa whichever is greater. <u>Notwithstanding the requirement above, the requirement in 6.(11).(B) of Annex 5-6 may be applied to open ended pipes (drains, effluent, etc.).</u></p> <p>(B) Piping systems for non-essential services are to be checked for leakage under operational conditions.</p> <p>(C) For piping required to be electrically conductive, earthing is to be checked and random resistance testing is to be conducted.</p> <p>⟨Omitted⟩</p>	<p>– IACS UR P4 reflected</p>