Testing of Gas Compressors and Pumps

Object of Amendment

Guidance for the Survey and Construction of Steel Ships Part GF and N

Reason for Amendment

IACS Unified Requirements (UR) G3 specifies requirements related to the cargo and process piping of ships carrying liquified gases in bulk. These requirements have already been incorporated into the NK Rules.

This UR specifies that cargo pumps to which the IGC Code applies are subject to type tests and product inspections, but no similar tests or inspections are specified for cargo gas compressors. In view of the confirmed cases of re-liquefaction compressors failing in adverse weather conditions, IACS adopted UR G3(Rev.8) in October 2023 with new provisions specifying that cargo gas compressors undergo the same type tests and product inspections as cargo pumps.

Accordingly, relevant requirements are amended based upon UR G3(Rev.8). In addition, relevant requirements in Annex I, Part GF and in Part N were reviewed and amended.

Outline of the Amendment

The main contents of this amendment are as follows:

(1) Adds requirements related to types tests for gas compressors to which the IGC Code applies and amends requirements related to product inspections for such compressors.
(2) Amends requirements related to type tests and product inspections of pumps to which the IGC Code applies.
(3) Amends requirements for gas compressors and pumps to which IGF Code applies, in accordance with (1) and (2) above.
(4) Amends relevant requirements of Annex I, Part GF and in Part N to ensure they more accurately reflect actual situation.

Effective Date and Application

(1) Amendments (1), (2) and (3)
This draft amendment applies to the following:
   (a) Pumps and compressors for which the application for type testing is submitted to the Society on or after 1 January 2025; or
   (b) Pumps and compressors installed on ships for which the date of contract for construction is on or after 1 January 2025.
(2) The above outline of the amendment (4)
The effective date of this draft amendment is the date of establishment.

ID: DD24-08

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS **Part GF SHIPS USING LOW-FLASHPOINT FUELS** **Annex 1 GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS USING LOW-FLASHPOINT FUELS** **Chapter 2 FUEL VAPOUR COMPRESSORS** **2.2 Submission of Plans and Documents** **2.2.1 Plans and Documents for Reference** **1** In addition to the requirements specified in the **1.2(2)**, the following **(1)** to **(3)** are to be submitted: (1) data relating to the thermal deformation of the low temperature parts, (2) piping and pipe connection procedures, and (3) casing insulation procedures. **2** In order to verify that the design is suitable for use in the marine environment as specified in **2.3.3-7**, manufacturers are to submit documents showing that the design complies with **2.3.3-7(1)** to **(4)**.	**GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS** **Part GF SHIPS USING LOW-FLASHPOINT FUELS** **Annex 1 GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS USING LOW-FLASHPOINT FUELS** **Chapter 2 FUEL VAPOUR COMPRESSORS** **2.2 Submission of Plans and Documents** **2.2.1 Plans and Documents for Reference** In addition to the requirements specified in the **1.2(2)**, the following **(1)** to **(3)** are to be submitted: (1) data relating to the thermal deformation of the low temperature parts, (2) piping and pipe connection procedures, and (3) casing insulation procedures. (Newly added)	UR G3 (Rev.8) G3.6.3 is applied mutatis mutan-dis.

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
2.3 Materials, Construction and Strength	**2.3 Materials, Construction and Strength**	
2.3.1 General **1** Each size and type of gas compressor is to be subjected to a design assessment. **2** For the design assessment of gas compressors, *API* 617:2014+ERR1:2016, *API* 618:2016 or *API* 619:2010, as applicable, may be used or other applicable recognised standards acceptable to the Society may be considered.	(Newly added)	UR G3 (Rev.8) G3.6.3.2 is applied mutatis m
2.3.2 Materials (-1 to -4 are omitted.)	**2.3.1 Materials** (-1 to -4 are omitted.)	
2.3.3 Construction and Installation (-1 to -5 are omitted.) **6** Gas compressors, including driving machines and power transmission systems, are to be capable of withstanding the mechanical and thermal loads, and vibrations encountered under normal working conditions.	**2.3.2 Construction and Installation** (-1 to -5 are omitted.) **6** Gas compressors, including driving machines and power transmission systems, are to be capable of withstanding the mechanical and thermal loads, and vibrations encountered under normal working conditions. In addition, they are to be capable of continuing undisturbed operation at the angles of inclination specified in the upper column of **Table D1.1, Part D of the Rules**.	UR G3 (Rev.8) G3.6.3 is applied mutatis mutandis.
7 Compressors are to be suitable for their intended purpose. All equipment and machinery are to be adequately designed to ensure suitability within a marine environment with due consideration to **Table D1.1, Part D of the Rules** and **Table H1.2, Part H of the Rules**. Such items to be considered would include, but not be limited to: (1) environmental; (2) shipboard vibration and accelerations; (3) effects of pitch, heave and roll motions, etc.; and (4) physical and chemical properties of product	(Newly added)	UR G3 (Rev.8) G3.6.3 is applied mutatis mutandis. UR3.6.3 above is specified with reference to IGF Code 9.9.
8 In cases where the generation of harmful surging is	**7** In cases where the generation of harmful surging is	

Amended	Original	Remarks
likely at low loads depending upon the type of gas compressor, effective preventive means, such as the provision of recirculation lines, are to be taken. **9** In cases where excessive temperature rise due to recirculation is anticipated, effective preventive means are to be taken. **10** Gas compressors are to be constructed so as to allow gas purging without difficulty at times of overhauling and are to be provided with suitable purge connections. **2.3.4 Strength** (-1 to -5 are omitted.) **2.6 Tests and Inspections** **2.6.1 Type Tests** **1** Each size and type of gas compressor is to be subjected type tests in the presence of a Society surveyor and approved for use in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**. **2** The type testing in the preceding **-1** is to be consistent with the applicable standard as applied for the design assessment in **2.3.1**. In addition, at least the following **(1)** to **(6)** tests and inspections are to be carried out. (1) Material tests are to be carried out in accordance with relevant requirements in **Part K of the Rules** and **Table GF7.4, Part GF of the Rules**. (2) Hydrostatic tests or pressure tests are to be carried out on pressure-bearing parts for at least 30 minutes at test pressures 1.5 *times* design pressure (or 1.25 *times* design pressure where the test fluid is compressible). Pressure tests are to use air or another	likely at low loads depending upon the type of gas compressor, effective preventive means, such as the provision of recirculation lines, are to be taken. **8** In cases where excessive temperature rise due to recirculation is anticipated, effective preventive means are to be taken. **9** Gas compressors are to be constructed so as to allow gas purging without difficulty at times of overhauling and are to be provided with suitable purge connections. **2.3.3 Strength** (-1 to -5 are omitted.) **2.6 Tests and Inspections** (Newly added)	UR G3 (Rev.8) G3.6.3.2(a) and (b) are applied mutatis mutandis.

Amended	Original	Remarks
suitable gas. (3) Mechanical running tests and performance tests are to record the following **(a)** to **(f)** to ensure that limits do not exceed those proposed by manufacturers and that other features relating to the performance of the equipment are in accordance with specifications. (a) the gas used; (b) temperatures and pressures; (c) testing of alarm and shut down; (d) pressure relief devices activation and deactivation pressure; (e) vibration measurements; and (f) power consumption and the gas loads (performance test only) (4) Vibration evaluation criteria for machinery and equipment, consistent with applicable recognised standards as applied to the design, are to be submitted by manufacturers. The term "the applicable recognised standard as applied to the design" here refers to the following **(a)** to **(g)**. Otherwise, when the data on the vibration criteria are not available, justification is to be submitted for criteria used as reference in terms of overall Root Mean Square (RMS) vibrational velocity value for normal operation conditions. (a) *ISO* 7919-3:2009/AMD 1:2017 (b) *ISO* 10816-3:2009/AMD 1:2017 (c) *ISO* 10816-7:2009 (d) *ISO* 10816-8:2014 (e) *ISO* 20816-1:2016 (f) *ISO* 20816-8:2018 (g) Other recognised standards deemed appropriate by the Society.		

Amended	Original	Remarks
(5) With respect to the vibration evaluation criteria specified in the preceding **(4)**, alternative limits demonstrated by fatigue calculations, may be accepted by the Society. (6) Other tests and inspections as deemed necessary by the Society depending on the type of gas compressor.		
2.6.2 Product Inspections **1** Gas compressors are to subjected to the following **(1)** to **(3)** tests and inspections during manufacturing in the presence of a Society surveyor. (1) Material tests are to be carried out in accordance with relevant requirements in **Part K of the Rules** and **Table GF7.4, Part GF of the Rules**. (2) Pressure-bearing parts of gas compressors are to be subjected to hydrostatic tests or pressure tests for at least 30 *minutes* at test pressures 1.5 *times* design pressure (or 1.25 *times* design pressure where the test fluid is compressible). Pressure tests are to use air or another suitable gas. (3) Upon completion of manufacturing, operating tests are to be carried out using gases deemed appropriate by the Society according to design temperature. **2** The presence of a Society surveyor at the tests and inspections specified in the preceding **-1**, may be omitted upon manufacturer request when the following **(1)** to **(3)** are satisfied. (1) Gas compressors have been approved in accordance with the type tests specified in **2.6.1-2.** (2) Manufacturers have been separately assessed and approved in accordance with the **Rules for Approval of Manufactures and Service Supplies**. (3) Manufacturer quality control plans contains information on the implementation of the tests	**2.6.1 Tests and Inspections During Manufacturing** **1** Pressure-bearing parts of compressors are to be subjected to hydraulic tests or pressure tests. Pressure tests are to use air or another suitable gas. (Newly added) **2** Compressors are to be subjected to operating tests upon completion of manufacturing, but prior to installation on board ship. The tests are to use a gas deemed appropriate by the Society according to design temperature. (Newly added) (Newly added)	UR G3 (Rev.8) G3.6.3.2(c) and (d) are applied mutatis mutandis.

Amended	Original	Remarks
specified in **2.6.1-2(2)** and **(3)**. In such cases, manufacturers are to maintain records of such tests. **3** The leak tests specified in **16.7.3-3, Part GF of the Rules** are to be carried out after installation on board ship. **4** Gas compressors are to be subjected to the service tests specified in **16.7.3-5, Part GF of the Rules** after installation on board ship.	**3** Compressors are to be subjected to the service tests specified in **16.7.3-5, Part GF of the Rules**.	UR G3 (Rev.8) G3.6.3.2(d) is applied mutatis mutandis.
Chapter 3 FUEL PUMPS	**Chapter 3 FUEL PUMPS**	
3.2 Submission of Plans and Documents	**3.2 Submission of Plans and Documents**	
3.2.1 Plans and Documents for Reference **1** In addition to the plans and documents specified in **1.2(2)**, the following **(1)** and **(2)** are to be submitted for reference: (1) data related to thermal deformation of the low temperature parts; and (2) sectional assembly plans for driving motors of submerged type pumps which indicate total rating, principal dimensions, materials (including electrical insulation materials) and weight.	**3.2.1 Plans and Documents for Reference** In addition to the plans and documents specified in **1.2(2)**, the following **(1)** and **(2)** are to be submitted for reference: (1) data related to thermal deformation of the low temperature parts; and (2) sectional assembly plans for driving motors of submerged type pumps which indicate total rating, principal dimensions, materials (including electrical insulation materials) and weight.	UR G3 (Rev.8) G3.6.3 is applied mutatis mutandis.
2 In order to verify that the design is suitable for use in the marine environment as specified in **3.3.3-8**, manufacturers are to submit documents showing that the design complies with **3.3.3-8(1)** to **(4)**.	(Newly added)	

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
3.3 Materials, Construction and Strength	**3.3 Materials, Construction and Strength**	
3.3.1 General **1** Each size and type of pump is to be subjected to a design assessment. **2** For the design assessments of pumps, *ISO* 13709:2009 and *ISO* 24490:2016, as applicable, may be used, or other applicable recognised standards acceptable to the Society may be considered.	**(Newly added)**	UR G3 (Rev.8) G3.6.3.1 is applied mutatis mutandis.
3.3.2 Materials (-1 to -4 are omitted.)	**3.3.1 Materials** (-1 to -4 are omitted.)	
3.3.3 Construction and Installation (-1 to -4 are omitted.) **5** The shaft sealing assemblies of deepwell type pumps and deck-mounted type pumps are to be of the construction specified in **2.3.3-3**. (-6 and -7 are omitted.) **8** Pumps are to be suitable for their intended purpose. All equipment and machinery are to be adequately designed to ensure suitability within a marine environment with due consideration to **Table D1.1, Part D of the Rules** and **Table H1.2, Part H of the Rules**. Such items to be considered would include, but not be limited to: (1) environmental; (2) shipboard vibration and accelerations; (3) effects of pitch, heave and roll motions, etc.; and (4) physical and chemical properties of product	**3.3.2 Construction and Installation** (-1 to -4 are omitted.) **5** The shaft sealing assemblies of deepwell type pumps and deck-mounted type pumps are to be of the construction specified in **2.3.2-3**. (-6 and -7 are omitted.) (Newly added)	Reference number correction UR G3 (Rev.8) G3.6.3 is applied mutatis mutandis. UR3.6.3 above is specified with reference to IGF Code 9.9.
3.3.4 Strength (-1 to -5 are omitted.)	**3.3.3 Strength** (-1 to -5 are omitted.)	

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
3.6 Tests and Inspections	**3.6 Tests and Inspections**	
3.6.1 Type Tests **1** Each size and type of pump is to be subjected to type tests in the presence of a Society surveyor and approved for use in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use.**	**3.6.1 Type Tests** **1** Each size and type of pump is to be subjected to design assessments and type tests.	UR G3 (Rev.8) G3.6.3.1 is applied mutatis mutandis.
2 The type tests specified in **-1** above are to be the tests and inspections specified in the following **(1)** to **(6)**.	**2** The type tests specified in **-1** above are to be the tests and inspections specified in the following **(1)** to **(5)**. Such tests and inspections, however, may be substituted for by manufacturer tests and inspections in cases where deemed appropriate by the Society.	
(1) Material tests are to be carried out in accordance with relevant requirements in **Part K of the Rules** and **Table GF7.4, Part GF of the Rules**.	(1) Material tests are to be carried out in accordance with relevant requirements in **Part K of the Rules** and **Table GF7.4, Part GF of the Rules**.	UR G3 (Rev.8) G3.6.3.1(a) is applied mutatis mutandis.
(2) Hydrostatic tests or pressure tests are to be carried out on pressure-bearing parts at test pressures 1.5 *times* design pressure. Pressure tests are to use air or another suitable gas.	(2) Hydraulic tests or pressure tests are to be carried out on pressure-bearing parts at test pressures 1.5 times design pressure. Pressure tests are to use air or another suitable gas.	
(3) Operating tests are to be carried out on pumps according to design temperature. For submerged electric motor driven pumps, the operating test is to be carried out with the design medium or with a medium below the minimum working temperature. For shaft driven deep well pumps, the operating test may be carried out with water. In addition, for shaft driven deep well pumps, a spin test to demonstrate satisfactory operation of bearing clearances, wear rings and sealing arrangements is to be carried out at the minimum design temperature. The full length of shafting is not required for the spin test, but must be of sufficient length to include at least one bearing	(3) Operating tests are to be carried out on pumps according to design temperature. Capacity tests are to be carried out on submerged electric motor driven pumps, and such tests are to use the fluid the pump is designed to handle or a fluid deemed appropriate by the Society at a test temperature not exceeding the minimum working temperature of the pump. Capacity tests for shaft driven deep well pumps test may be carried out using water, but spin tests at the minimum design temperature are also to be carried out to verify there are no abnormalities present in bearing clearances, wear rings and sealing arrangements. The full length of shafting is not	The writing style has been unified to UR G3 G3.6.3.1(b).

Amended	Original	Remarks
and sealing arrangements.	required for spin tests, but the test length must be sufficient to include at least one bearing and sealing arrangements.	
(4) Pumps are to be opened up and inspected for abnormalities upon completion of the tests specified in **(3)** above.	(4) Pumps are to be opened up and inspected for abnormalities upon completion of the tests specified in **(3)** above.	
(5) Vibration evaluation criteria for machinery and equipment, consistent with applicable recognised standards as applied to the design, are to be submitted by manufacturers. The term "the applicable recognised standard as applied to the design" here refers to the following **(a)** to **(g)**. (a) *ISO* 7919-3:2009/AMD 1:2017 (b) *ISO* 10816-3:2009/AMD 1:2017 (c) *ISO* 10816-7:2009 (d) *ISO* 10816-8:2014 (e) *ISO* 20816-1:2016 (f) *ISO* 20816-8:2018 (g) Other recognized standards as deemed appropriate by the Society.	(Newly added)	UR G3 (Rev.8) G3.6.3.1(b) is applied mutatis mutandis.
(6) Other tests and inspection deemed necessary by the Society according to pump type.	(5) Other tests and inspection deemed necessary by the Society according to pump type.	
3.6.2 Product Inspections **1** Pumps are to subjected to the tests and inspections specified in the following **(1)** to **(3)** during manufacturing in the presence of a Society surveyor:	**3.6.2 Product Inspections** **1** Pumps are to be subjected to the tests and inspections specified in the following **(1)** to **(3)** during manufacturing:	
(1) Material tests are to be carried out in accordance with relevant requirements in **Part K of the Rules** and **Table GF7.4, Part GF of the Rules**.	(1) Material tests are to be carried out in accordance with relevant requirements in **Part K of the Rules** and **Table GF7.4, Part GF of the Rules**.	
(2) Pressure-bearing parts of pumps are to be subjected to hydrostatic tests or pressure tests at a test pressure of 1.5 *times* design pressure. Pressure tests are to use air or another suitable gas.	(2) Pressure-bearing parts of pumps are to be subjected to hydraulic tests or pressure tests at a test pressure of 1.5 times design pressure. Pressure tests are to use	

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
	air or another suitable gas.	
(3) Pumps are to be subjected to operating tests according to design temperature. For submerged electric motor driven pumps, the operating test is to be carried out with the design medium or with a medium below the minimum working temperature. For shaft driven deep well pumps, the operating test may be carried out with water.	(3) Pumps are to be subjected to operating tests according to design temperature. Submerged electric motor driven pumps are to be subject to capacity tests. Such tests are to be carried out using the fluid the pump is designed to handle or a fluid deemed appropriate by the Society at a test temperature not exceeding the minimum working temperature of the pump. Capacity tests for shaft driven deep well pumps may be carried out using water.	The writing style has been unified to UR G3 G3.6.3.1(c).
2 The presence of a Society surveyor for the tests and inspections specified in **-1**, may be omitted upon manufacturer request when the following **(1)** to **(3)** are satisfied.	(Newly added)	
(1) Pumps have been approved in accordance with the type tests specified in **3.6.1-2.**		UR G3 (Rev.8) G3.6.3.1(c) is applied mutatis mutandis.
(2) Manufacturers have been separately assessed and approved in accordance with the **Rules for Approval of Manufactures and Service Supplies**.		
(3) Manufacturer quality control plan contains information on the implementation of the tests specified in **3.6.1-2(2)** and **(3)**. In such cases, manufactures are to maintain records of such tests.		
3 The leak tests specified in **16.7.3-3, Part GF of the Rules** are to be carried out after installation on board ship.	(Newly added)	
4 Pumps are to be subjected to the service tests specified in **16.7.3-5, Part GF of the Rules** after installation on board ship.	**2** Pumps are to be subjected to the service tests specified in **16.7.3-5, Part GF of the Rules** after installation on board ship.	

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS **Part N SHIPS CARRYING LIQUEFIED GASES IN BULK** **Annex 1 GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS CARRYING LIQUEFIED GASES IN BULK** **Chapter 2 CARGO COMPRESSORS** **2.2 Submission of Plans and Documents** **2.2.1 Other Plans and Documents for Reference** **1** In addition to the requirements specified in the preceding **1.2(2)**, those given in the following **(1)** to **(3)** are to be submitted: (1) Data relating to thermal deformation of the low temperature parts, (2) Piping and pipe connection procedures (3) Casing insulation procedure **2** In order to verify that the design is suitable for use in the marine environment as specified in **2.3.3-7**, manufacturers are to submit documents showing that the design complies with **2.3.3-7(1)** to **(4)**.	**GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS** **Part N SHIPS CARRYING LIQUEFIED GASES IN BULK** **Annex 1 GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS CARRYING LIQUEFIED GASES IN BULK** **Chapter 2 CARGO COMPRESSORS** **2.2 Submission of Plans and Documents** **2.2.1 Other Plans and Documents for Reference** In addition to the requirements specified in the preceding **1.2(2)**, those given in the following **(1)** to **(3)** are to be submitted: (1) Data relating to thermal deformation of the low temperature parts, (2) Piping and pipe connection procedures (3) Casing insulation procedure (Newly added)	UR G3(Rev.8) G3.6.3

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
2.3 Materials, Construction and Strength	**2.3 Materials, Construction and Strength**	UR G3(Rev.8) G3.6.3.2
2.3.1 General **1** Each size and type of gas compressor is to be subjected to a design assessment. **2** For the design assessments of gas compressors, *API* 617:2014+ERR1:2016,*API* 618:2016 or *API* 619:2010, as applicable, may be used, or other applicable recognised standards acceptable to the Society may be considered.	**(Newly added)**	
2.3.2 Materials **1** The materials used for main structural parts are to be suitable for their working condition such as service temperature, pressure, etc. and to be in accordance with the relevant requirements, **Part K of the Rules** for use of pressure bearing parts. **2** The materials used for main structural parts with the design temperature not exceeding -55℃ are to be in accordance with the requirements in the relevant requirements in **Part K of the Rules** and **Table N6.4, Part N of the Rules**. **3** When deemed necessary by the Society, non-destructive testing specified in **5.1.10** or **6.1.10, Part K of the Rules** may be requested for main structural parts. **4** The main structural parts of gas compressors specified in this Chapter mean, as a rule, those as given in the following **(1)** to **(3)**: (1) Centrifugal gas compressors (a) Impeller (b) Inducer (c) Guide vane (d) Casing (e) Shaft and coupling	**2.3.1 Materials** **1** The materials used for structural members are to be suitable for their working condition such as service temperature, pressure, etc. and to be in accordance with the relevant requirements, **Part K of the Rules** for use of pressure bearing parts. **2** The materials used for structural members with the design temperature not exceeding -55℃ are to be in accordance with the requirements in the relevant requirements in **Part K of the Rules** and **Table N6.4, Part N of the Rules**. **3** When deemed necessary by the Society, non-destructive testing specified in **5.1.10** or **6.1.10, Part K of the Rules** may be requested for the structural members. **4** The structural members of gas compressors specified in this Chapter mean, as a rule, those as given in the following **(1)** to **(3)**: (1) Centrifugal gas compressors (a) Impeller (b) Inducer (c) Guide vane (d) Casing (e) Shaft and coupling	To be consistent with the terminology in UR G3 (Rev. 8), "structural members" is revised to "main structural parts"

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
(2) Displacement gas compressors (a) Cylinder cover and cylinder liner (b) Piston and piston rod/connecting rod (c) Crankshaft and shaft coupling (d) Bed (e) Screw or gear (in case of rotary type) (f) Casing (in case of rotary type) (3) Others as required by the Society depending on the construction system	(2) Displacement gas compressors (a) Cylinder cover and cylinder liner (b) Piston and piston rod/connecting rod (c) Crankshaft and shaft coupling (d) Bed (e) Screw or gear (in case of rotary type) (f) Casing (in case of rotary type) (3) Others as required by the Society depending on the construction system	
2.3.3 Construction and Installation (-1 to -5 are omitted.) **6** The gas compressors including the driving machine and power transmission system are to withstand the mechanical and thermal load and vibration in normal working condition.	**2.3.2 Construction and Installation** (-1 to -5 are omitted.) **6** The gas compressors including the driving machine and power transmission system are to withstand the mechanical and thermal load and vibration in normal working condition, and to be capable of continuing undisturbed operation at an angle of inclination specified in the upper column in **Table D1.1, Part D of the Rules**.	UR G3(Rev.8) G3.6.3
7 Compressors are to be suitable for their intended purpose. All equipment and machinery are to be adequately designed to ensure suitability within a marine environment with due consideration to **Table D1.1, Part D of the Rules** and **Table H1.2, Part H of the Rules**. Such items to be considered would include, but not be limited to: (1) environmental; (2) shipboard vibration and accelerations; (3) effects of pitch, heave and roll motions, etc.; and (4) physical and chemical properties of product	(Newly added)	UR G3(Rev.8) G3.6.3 UR G3.6.3 above is specified with reference to IGF Code 9.9.
8 In case where generation of harmful surging is likely at low load depending on the type of gas compressor, effective preventive steps such as the provision of recirculation line are to be taken.	**7** In case where generation of harmful surging is likely at low load depending on the type of gas compressor, effective preventive steps such as the provision of recirculation line are to be taken.	
9 Where an excessive temperature rise due to recirculation is anticipated, effective preventive means are	**8** Where an excessive temperature rise due to recirculation is anticipated, effective preventive means are	

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
to be taken. **10** The gas compressors are to have such a construction as to allow gas purging at time of overhauling without difficulty and are to be provided with suitable purge connections. **2.3.4 Strength** **1** The gas compressors are to be designed with due considerations taken on the following items **(1)** through **(11)**: ((1) to (6) are omitted.) (7) Own weights of main structural parts and attached insulation materials ((8) to (11) are omitted.) (-2 to -4 are omitted.) **5** The strength of main structural parts which undergo rotating or reciprocating motions is left to the discretion of the Society. **2.6 Tests and Inspections** **2.6.1 Type Tests** **1** Each size and type of gas compressor is to be subjected type tests in the presence of a Society surveyor and approved for use in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**. **2** The type testing in the preceding **-1** is to be consistent with the applicable standard as applied for the design assessment in **2.3.1**. In addition, at least the following **(1)** to **(6)** tests and inspections are to becarried out. (1) Material tests are to be carried out in accordance with relevant requirements in **Part K of the Rules**	to be taken. **9** The gas compressors are to have such a construction as to allow gas purging at time of overhauling without difficulty and are to be provided with suitable purge connections. **2.3.3 Strength** **1** The gas compressors are to be designed with due considerations taken on the following items **(1)** through **(11)**: ((1) to (6) are omitted.) (7) Own weights of structural members and attached insulation materials ((8) to (11) are omitted.) (-2 to -4 are omitted.) **5** The strength of the structural members which undergo rotating or reciprocating motions is left to the discretion of the Society. **2.6 Tests and Inspections** **(Newly added)**	UR G3(Rev.8) G3.6.3.2(a) and (b)

Amended	Original	Remarks
and **Table N6.4, Part N of the Rules**. (2) Hydrostatic tests or pressure tests are to be carried out on pressure-bearing parts for at least 30 *minutes* at test pressures 1.5 *times* design pressure (or 1.25 *times* design pressure where the test fluid is compressible). Pressure tests are to use air or another suitable gas. (3) Mechanical running tests and performance tests are to record the following **(a)** to **(f)** to ensure that limits do not exceed those proposed by manufacturers and that other features relating to the performance of the equipment are in accordance with specifications. (a) the gas used; (b) temperatures and pressures; (c) testing of alarm and shut down; (d) pressure relief devices activation and deactivation pressure; (e) vibration measurements; and (f) power consumption and the gas loads (performance test only) (4) Vibration evaluation criteria for machinery and equipment, consistent with applicable recognised standards as applied to the design, are to be submitted by manufacturers The term “the applicable recognised standards as applied to the design” here refers to the following **(a)** to **(g)**. Otherwise, when the data on the vibration criteria are not available, justification is to be submitted for criteria used as reference in terms of overall Root Mean Square (RMS) vibrational velocity value for normal operation conditions. (a) *ISO* 7919-3:2009/AMD 1:2017 (b) *ISO* 10816-3:2009/AMD 1:2017		

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
(c) *ISO* 10816-7:2009 (d) *ISO* 10816-8:2014 (e) *ISO* 20816-1:2016 (f) *ISO* 20816-8:2018 (g) Other recognised standards deemed appropriate by the Society. (5) With respect to the vibration evaluation criteria specified in the preceding **(4)**, alternative limits demonstrated by fatigue calculations may be accepted by the Society. (6) Other tests and inspections as deemed necessary by the Society depending on the type of gas compressor.		
2.6.2 Product Inspections **1** Gas compressors are to subjected to the following **(1)** to **(3)** tests and inspections during manufacturing in the presence of a Society surveyor. (1) Material tests are to be carried out in accordance with relevant requirements in **Part K of the Rules** and **Table N6.4, Part N of the Rules**. (2) Pressure-bearing parts of gas compressors are to be subjected to hydrostatic tests or pressure tests for at least 30 *minutes* at test pressures 1.5 *times* design pressure (or 1.25 *times* design pressure where the test fluid is compressible). Pressure tests are to use air or another suitable gas. (3) Upon completion of manufacturing, operating tests are to be carried out using gases deemed appropriate by the Society according to design temperature.	**2.6.1 Tests and Inspections during Manufacturing** **1** The pressure bearing parts of the compressor are to be subjected to a hydrostatic test or pressure test by air or suitable other fluid. (Newly added)	UR G3(Rev.8) G3.6.3.2(c) and (d)
2 The presence of a Society surveyor at the tests and inspections specified in the preceding **-1**, may be omitted upon manufacturer request when by the following **(1)** to **(3)** are satisfied. (1) Gas compressors have been approved in accordance	**2** The compressors are to be subjected to operating tests after completion of manufacture but before placing on board the ship by using the gas as deemed appropriate by the Society depending on the design temperature. (Newly added)	UR G3(Rev.8) G3.6.3.2(d)

Amended	Original	Remarks
with the type tests specified in **2.6.1-2.** (2) Manufacturers have been separately assessed and approved in accordance with the **Rules for Approval of Manufactures and Service Supplies.** (3) Manufacturer quality control plans contains information on the implementation of the tests specified in **2.6.1-2(2)** and **(3)**. In such cases, manufacturers are to maintain records of such tests. **3** The leak tests specified in **5.13.2-3, Part N of the Rules** are to be carried out after installation on board ship. **4** Gas compressors are to be subjected to the service tests specified in **5.13.2-5, Part N of the Rules** after installation on board ship.	(Newly added) **3** The compressors are to be subjected to service tests specified in **5.13.2-5, Part N of the Rules**.	
Chapter 3 CARGO PUMPS	**Chapter 3 CARGO PUMPS**	
3.2 Submission of Plans and Documents	**3.2 Submission of Plans and Documents**	
3.2.1 Plans and Documents for Reference **1** In addition to the plans and documents specified in **1.2(2)**, the following **(1)** and **(2)** are to be submitted for reference: (1) data related to thermal deformation of the low temperature parts; and (2) sectional assembly plans for driving motors of submerged type pumps which indicate total rating, principal dimensions, materials (including electrical insulation materials) and weight. **2** In order to verify that the design is suitable for use in the marine environment as specified in **3.3.3-8**, manufacturers are to submit documents showing that the	**3.2.1 Plans and Documents for Reference** In addition to those specified in the preceding **1.2(2)**, plans and documents for reference given in the following **(1)** and **(2)** are to be submitted. (1) Data relative to thermal deformation of the low temperature parts (2) Sectional assembly noted with the total rating of the driving motor of the submerged type pump, principal dimensions, materials (including electrical insulation materials) and weight (Newly added)	UR G3(Rev.8) G3.6.3

Amended	Original	Remarks
design complies with **3.3.3-8(1)** to **(4)**. **3.3 Materials, Construction and Strength**	**3.3 Materials, Construction and Strength**	
3.3.1 General **1** Each size and type of pump is to be subjected to a design assessment. **2** For the design assessments of pumps, *ISO* 13709:2009 and *ISO* 24490:2016, as applicable, may be used, or other applicable recognised standards acceptable to the Society may be considered.	**(Newly added)**	UR G3(Rev.8) G3.6.3.1
3.3.2 Materials **1** The materials used for main structural parts are to be suitable for their working condition such as service temperature, pressure, etc. and pressure bearing parts are to be in accordance with the relevant requirements in **Part K of the Rules**. **2** The materials used in main structural parts with the design temperature not exceeding -55℃ are to conform to the relevant requirements in **Part K of the Rules** and the requirements of **Table N6.4** in **Part N of the Rules**. **3** When it is deemed necessary by the Society, the non-destructive tests specified in **5.1.10** or **6.1.10, Part K of the Rules** may be requested for main structural parts. **4** The main structural parts of pump specified in this Chapter mean generally those as given in the following **(1)** through **(5)**: (1) Casing (including cargo discharge outlet in the case of deepwell type) (2) Impeller (3) Inducer (4) Shaft and shaft coupling (5) Others as designated by the Society according to the	**3.3.1 Materials** **1** The materials used for structural members are to be suitable for their working condition such as service temperature, pressure, etc. and pressure bearing parts are to be in accordance with the relevant requirements in **Part K of the Rules**. **2** The materials used in the structural members with the design temperature not exceeding -55℃ are to conform to the relevant requirements in **Part K of the Rules** and the requirements of **Table N6.4** in **Part N of the Rules**. **3** When it is deemed necessary by the Society, the non-destructive tests specified in **5.1.10** or **6.1.10, Part K of the Rules** may be requested for the structural members. **4** The structural members of pump specified in this Chapter mean generally those as given in the following **(1)** through **(5)**: (1) Casing (including cargo discharge outlet in the case of deepwell type) (2) Impeller (3) Inducer (4) Shaft and shaft coupling (5) Others as designated by the Society according to the	To be consistent with the terminology in UR G3 (Rev. 8), "structural members" is revised to "main structural parts"

Amended	Original	Remarks
structural type	structural type	
3.3.3 Construction and Installation (-1 to -4 are omitted.) **5** The shaft sealing assemblies of deepwell type pumps and deck-mounted type pumps are to be of the construction specified in **2.3.3-3**. (-6 and -7 are omitted.) **8** Pumps are to be suitable for their intended purpose. All equipment and machinery are to be adequately designed to ensure suitability within a marine environment with due consideration to **Table D1.1, Part D of the Rules** and **Table H1.2, Part H of the Rules**. Such items to be considered would include, but not be limited to: (1) environmental; (2) shipboard vibration and accelerations; (3) effects of pitch, heave and roll motions, etc.; and (4) physical and chemical properties of product	**3.3.2 Construction and Installation** (-1 to -4 are omitted.) **5** The shaft sealing assemblies of deepwell type pumps and deck-mounted type pumps are to be of the construction specified in **2.3.2-3**. (-6 and -7 are omitted.) (Newly added)	Reference number correction UR G3(Rev.8) G3.6.3
3.3.4 Strength (-1 to -4 are omitted.) **5** The strength of main structural parts such as the shaft, shaft coupling and impeller excluding the pressure-bearing parts is left to the discretion of the Society.	**3.3.3 Strength** (-1 to -4 are omitted.) **5** The strength of the structural members such as the shaft, shaft coupling and impeller excluding the pressure-bearing parts is left to the discretion of the Society.	To be consistent with the terminology in UR G3 (Rev. 8), "structural members" is revised to "main structural parts"
3.6 Tests and Inspections	**3.6 Tests and Inspections**	
3.6.1 Type Tests **1** Each size and type of pump is to be subjected to type tests in the presence of a Society surveyor and approved for use in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and Type Approval of Materials and**	**3.6.1 Type Tests** **1** Each size and type of pump are to be subjected to design assessments and type testing.	UR G3(Rev.8) G3.6.3.1

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
Equipment for Marine Use. **2** The type tests specified in **-1** above are to be the tests and inspections specified in the following **(1)** to **(6)**.	**2** Regarding the tests specified in **-1** above, the tests and inspections specified in the following **(1)** through **(5)** are to be conducted. However, where a satisfactory in-service history of an existing pump design previously approved by the Society is submitted by the manufacturer and deemed appropriate by the Society, tests and inspections in the presence of the Surveyor may be substituted for manufacturer tests and inspections.	UR G3(Rev.8) G3.6.3.1(a)
(1) Material tests are to be carried out in accordance with relevant requirements in **Part K of the Rules** and **Table N6.4, Part N of the Rules**.	(1) Material tests: As per the requirements given in the relevant Chapters of **Part K of the Rules** and **Table N6.4, Part N of the Rules**.	
(2) Hydrostatic tests or pressure tests are to be carried out on pressure-bearing parts at test pressures 1.5 *times* design pressure. Pressure tests are to use air or another suitable gas.	(2) Hydraulic tests or hydrostatic tests: The pressure bearing parts of pumps are to be subjected to a hydrostatic test or a pressure test by air or other suitable fluid. The test pressure is to be 1.5 times design pressure.	
(3) Operating tests are to be carried out on pumps according to design temperature. For submerged electric motor driven pumps, the operating test is to be carried out with the design medium or with a medium below the minimum working temperature. For shaft driven deep well pumps, the operating test may be carried out with water. In addition, for shaft driven deep well pumps, a spin test to demonstrate satisfactory operation of bearing clearances, wear rings and sealing arrangements is to be carried out at the minimum design temperature. The full length of shafting is not required for the spin test, but must be of sufficient length to include at least one bearing and sealing arrangements.	(3) Operating tests: Pumps are to be subjected to design temperature operational tests. For submerged electric motor driven pumps, the capacity test is to be carried out with the design medium or with a medium below the minimum working temperature. For shaft driven deep well pumps, the capacity test may be carried out with water. In addition, for shaft driven deep well pumps, a spin test to demonstrate satisfactory operation of bearing clearances, wear rings and sealing arrangements is to be carried out at the minimum design temperature. The full length of shafting is not required for the spin test, but must be of sufficient length to include at least one bearing and sealing arrangements.	

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
(4) Pumps are to be opened up and inspected for abnormalities upon completion of the tests specified in **(3)** above.	(4) Open up inspections: After the completion of the tests specified in **(3) above**, pumps are to be opened up and inspected for abnormalities.	
(5) Vibration evaluation criteria for machinery and equipment, consistent with applicable recognised standards as applied to the design, are to be submitted by manufacturers. The term "the applicable recognised standard as applied to the design" here refers to the following **(a)** to **(g)**. (a) *ISO* 7919-3:2009/AMD 1:2017 (b) *ISO* 10816-3:2009/AMD 1:2017 (c) *ISO* 10816-7:2009 (d) *ISO* 10816-8:2014 (e) *ISO* 20816-1:2016 (f) *ISO* 20816-8:2018 (g) Other recognised standards deemed appropriate by the Society.	(Newly added)	UR G3(Rev.8) G3.6.3.1(b)
(6) Other tests and inspection deemed necessary by the Society according to pump type.	(5) Other tests and inspection as deemed necessary by the Society depending on the type of pumps.	
3.6.2 Product Inspections **1** Pumps are to subjected to the tests and inspections specified in the following **(1)** to **(3)** during manufacturing in the presence of a Society surveyor:	**3.6.2 Product Inspections** **1** At time of manufacture, pumps are to be subjected to the tests and inspections specified in the following **(1)** through **(3)**:	
(1) Material tests are to be carried out in accordance with relevant requirements in **Part K of the Rules** and **Table N6.4, Part N of the Rules**.	(1) Material tests: As per the requirements given in the relevant Chapters of **Part K of the Rules** and **Table N6.4, Part N of the Rules**.	
(2) Pressure-bearing parts of pumps are to be subjected to hydrostatic tests or pressure tests at a test pressure of 1.5 *times* design pressure. Pressure tests are to use air or another suitable gas.	(2) Hydraulic tests or hydrostatic tests: The pressure bearing parts of pumps are to be subjected to a hydrostatic test or a pressure test by air or other suitable fluid. The test pressure is to be 1.5 times design pressure.	

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
(3) Pumps are to be subjected to operating tests according to design temperature. For submerged electric motor driven pumps, the operating test is to be carried out with the design medium or with a medium below the minimum working temperature. For shaft driven deep well pumps, the operating test may be carried out with water.	(3) Operating tests: Pumps are to be subjected to design temperature operational tests. For submerged electric motor driven pumps, the capacity test is to be carried out with the design medium or with a medium below the minimum working temperature. For shaft driven deep well pumps, the capacity test may be carried out with water.	
2 The presence of a Society surveyor for the tests and inspections specified in the preceding **-1**, may be omitted upon manufacturer request when the following **(1)** to **(3)** are satisfied. (1) Pumps have been approved in accordance with the type tests specified in **3.6.1-2.** (2) Manufacturers have been separately assessed and approved in accordance with the **Rules for Approval of Manufactures and Service Supplies.** (3) Manufacturer quality control plan contains information on the implementation of the tests specified in **3.6.1-2(2)** and **(3)**. In such cases, manufacturers are to maintain records of such tests.	**3** With respect to the tests and surveys specified in **-1**, in cases where manufacturers have been assessed in accordance with the "**Rules for Approval of Manufacturers and Service Suppliers**", the items requiring testing in the presence of a surveyor may be reduced by the submission of test results.	UR G3(Rev.8) G3.6.3.1(c)
3 The leak tests specified in **5.13.2-3, Part N of the Rules** are to be carried out after installation on board ship.		
4 Pumps are to be subjected to the service tests specified in **5.13.2-5, Part N of the Rules** after installation on board ship.	**2** After being installed onboard ships, pumps are to be subjected to the service tests specified in **5.13.2-5, Part N of the Rules**.	

Amended	Original	Remarks

EFFECTIVE DATE AND APPLICATION

1. The effective date of the amendments is 1 January 2025.

2. Notwithstanding the amendments to the Rules, the current requirements apply to pumps and gas compressors other than those that fall under the following:

(1) Pumps and compressors for which the application for type testing is submitted to the Society on or after 1 January 2025.

(2) Pumps and compressors installed on ships for which the date of contract for construction* is on or after 1 January 2025.

* "contract for construction" is defined in the latest version of IACS Procedural Requirement (PR) No.29.

IACS PR No.29 (Rev.0, July 2009)

1. The date of "contract for construction" of a vessel is the date on which the contract to build the vessel is signed between the prospective owner and the shipbuilder. This date and the construction numbers (i.e. hull numbers) of all the vessels included in the contract are to be declared to the classification society by the party applying for the assignment of class to a newbuilding.

2. The date of "contract for construction" of a series of vessels, including specified optional vessels for which the option is ultimately exercised, is the date on which the contract to build the series is signed between the prospective owner and the shipbuilder.

For the purpose of this Procedural Requirement, vessels built under a single contract for construction are considered a "series of vessels" if they are built to the same approved plans for classification purposes. However, vessels within a series may have design alterations from the original design provided:

(1) such alterations do not affect matters related to classification, or

(2) If the alterations are subject to classification requirements, these alterations are to comply with the classification requirements in effect on the date on which the alterations are contracted between the prospective owner and the shipbuilder or, in the absence of the alteration contract, comply with the classification requirements in effect on the date on which the alterations are submitted to the Society for approval.

The optional vessels will be considered part of the same series of vessels if the option is exercised not later than 1 year after the contract to build the series was signed.

3. If a contract for construction is later amended to include additional vessels or additional options, the date of "contract for construction" for such vessels is the date on which the amendment to the contract, is signed between the prospective owner and the shipbuilder. The amendment to the contract is to be considered as a "new contract" to which **1.** and **2.** above apply.

4. If a contract for construction is amended to change the ship type, the date of "contract for construction" of this modified vessel, or vessels, is the date on which revised contract or new contract is signed between the Owner, or Owners, and the shipbuilder.

Note:
This Procedural Requirement applies from 1 July 2009.

Amended	Original	Remarks
GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS **Part GF SHIPS USING LOW-FLASHPOINT FUELS** **Annex 1 GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS USING LOW-FLASHPOINT FUELS** **Chapter 4 HEAT EXCHANGERS** **4.3 Tests and Inspections** **4.3.1 Prototype Tests** Prototypes of heat exchangers for fuel liquids, vapours or refrigerants used at temperatures below −55°C are to be subjected to tests deemed appropriate by the Society depending upon the type of heat exchanger, except for those types which have sufficient service histories. The tests are to verify that heat exchanger performance is satisfactory.	**GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS** **Part GF SHIPS USING LOW-FLASHPOINT FUELS** **Annex 1 GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS USING LOW-FLASHPOINT FUELS** **Chapter 4 HEAT EXCHANGERS** **4.3 Tests and Inspections** **4.3.1 Prototype Tests** Prototypes of heat exchangers for fuel liquids, vapours or refrigerants used at temperatures below -55°C are to be subjected to tests deemed appropriate by the Society depending upon the type of heat exchanger. The tests are to verify that heat exchanger performance is satisfactory.	Clarification that prototype testing can be omitted for heat exchangers with sufficient service histories..

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
Chapter 5 VALVES	**Chapter 5 VALVES**	
5.2 Materials, Construction and Strength	**5.2 Materials, Construction and Strength**	
(Moved)	**2** Valves whose design temperatures are below -55°C are to be subject to the type tests specified in **16.7.1, Part GF of the Rules** and approved for use as specified in the **Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**.	
2 The construction and strength of valves are to be in accordance with the *JIS* or other standards deemed appropriate by the Society.	**3** The construction and strength of valves are to be in accordance with the *JIS* or other standards deemed appropriate by the Society.	Provisions for approval of use moved to testing requirements.
(Moved)	**4** For valves not conforming to the requirements in **-3** above, detailed data on construction and strength are to be submitted to the Society and the valves are subject to the type approval specified in the **Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**.	
5.3 Tests and Inspections	**5.3 Tests and Inspections**	
5.3.1 Type Tests **1** Valves whose design temperatures are below −55°C are to be subjected to the tests and inspections specified in **(1)** to **(9)** below, taking into consideration **16.7.1, Part GF of the Rules** and approved for use in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**.	**5.3.1 Type Tests** The tests specified in **5.2-2** above are to be the tests and inspections specified in the following **(1)** to **(9)**:	
((1) to (9) are omitted.)	((1) to (9) are omitted.)	
2 For valves not conforming to **5.2-2**, detailed data on construction and strength are to be submitted to the Society,	(Moved)	

Amended	Original	Remarks
and such valves are to be type approved in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use.**		
Chapter 6 RELIEF VALVES	**Chapter 6 RELIEF VALVES**	
6.4 Tests and Inspections	**6.4 Tests and Inspections**	
6.4.1 Prototype Tests **1** Relief valves, not including those whose design temperatures are −55°C or higher, fitted to fuel piping and process piping, are to be subjected to prototype tests, and are to be approved for use in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**. The tests are to verify that the relief valves possess necessary performance.	**6.4.1 Prototype Tests** **1** Relief valves, not including those whose design temperatures are -55°C or higher, fitted to fuel piping and process piping, are to be subjected to prototype tests. The tests are to verify that the relief valves possess necessary performance.	Clarify approval of use requirements.
Chapter 7 BELLOWS AND EXPANSION JOINTS (For Fuel Piping and Process Piping Systems)	**Chapter 7 BELLOWS AND EXPANSION JOINTS (For Fuel Piping and Process Piping Systems)**	
7.2 Materials, Construction and Strength	**7.2 Materials, Construction and Strength**	
7.2.2 Construction and Strength (-1 to -10 are omitted.)	**7.2.2 Construction and Strength** (-1 to -10 are omitted.)	Clarify that designs based on EJMA standards are allowed.

Amended	Original	Remarks
11 Notwithstanding the preceding **-7** and **-8**, bellows may be designed in accordance with *EJMA* standards or standards deemed appropriate by the Society.	(Newly added)	
7.3 Tests and Inspections	**7.3 Tests and Inspections**	
7.3.1 Type Tests Bellows and expansion joints, not including those used for piping with open pipe ends and installed in fuel tanks, are to be subjected to the type tests specified in **16.7.2, Part GF of the Rules** for each type and are to be approved for use in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**.	**7.3.1 Type Tests** Bellows and expansion joints, not including those used for piping with open pipe ends and installed in fuel tanks, are to be subjected to the type tests specified in **16.7.2, Part GF of the Rules** for each type.	Clarify approval of use requirements.
Chapter 11 TEMPERATURE INDICATING DEVICES	**Chapter 11 TEMPERATURE INDICATING DEVICES**	
11.3 Temperature Measuring Sensors	**11.3 Temperature Measuring Sensors**	
11.3.1 General **4** Mercury thermometers used for temperature measuring are to comply with *JIS* B 7549 "Liquid Filled Pressure Type Temperature Indicating Devices" or other standards deemed appropriate by the Society.	**11.3.1 General** **4** Mercury thermometers used for temperature measuring are to comply with *JIS* B 7528 "Mercury Filled Pressure Type Temperature Indicating Devices" or other standards deemed appropriate by the Society.	Modification of JIS standard.

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
Chapter 20 FUEL HOSES **20.5 Tests and Inspections** **20.5.1 Approval of Use Tests** **1** In principle, fuel hoses are to be subjected to the prototype tests in **-2** for each type and hose bore. In addition, fuel hose are to be approved for use in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**.	**Chapter 20 FUEL HOSES** **20.5 Tests and Inspections** **20.5.1 Approval of Use Tests** **1** Fuel hoses intended for Approval of Use are, in principle, to be subjected to the prototype tests in **-2** for each type and hose bore.	Clarify approval of use requirements.

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS **Part N SHIPS CARRYING LIQUEFIED GASES IN BULK** **Annex 1 GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS CARRYING LIQUEFIED GASES IN BULK** **Chapter 2 CARGO COMPRESSORS** **2.1 General** **2.1.1 Application** **1** This chapter applies to gas compressors used for cargo gas.	**GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS** **Part N SHIPS CARRYING LIQUEFIED GASES IN BULK** **Annex 1 GUIDANCE FOR EQUIPMENT AND FITTINGS OF SHIPS CARRYING LIQUEFIED GASES IN BULK** **Chapter 2 CARGO COMPRESSORS** **2.1 General** **2.1.1 Application** **1** The requirements in this Chapter apply to the displacement type or centrifugal type gas compressors used for compression of boil-off gas from the cargo or pressure transfer in accordance with the requirements in **N5.6.2-2** and **N7.3.1-2(1)(b)vii) of the Guidance**.	Deleted references to provisions that are not limited to specific gas compressors

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
Chapter 3 CARGO PUMPS	**Chapter 3 CARGO PUMPS**	
3.1 General	**3.1 General**	
3.1.1 Application **1** This chapter applies to pumps used for liquid or vapour cargo.	**3.1.1 Application** **1** The requirements in this Chapter apply to the centrifugal pumps of submerged type, deepwell type and deck-mounted type used for cargo discharging or transfer according to the requirements in **N5.6.1-3 of the Guidance**.	Deleted references to provisions that are not limited to specific pumps.
Chapter 4 HEAT EXCHANGERS	**Chapter 4 HEAT EXCHANGERS**	
4.1 General	**4.1 General**	
4.1.1 Application This chapter applies to heat exchangers used for liquid or vapour cargo.	**4.1.1 Application** The requirements in this Chapter apply to heat exchangers used for the heating, evaporation or cooling of cargo liquid or vapour in accordance with the requirements in **N7.3.1-2 of the Guidance.**	Deleted references to provisions that are not limited to specific heat exchangers.
4.3.1 Prototype Test Prototype of heat exchangers for cargo liquid, vapour or refrigerant used at temperatures below −55°C are to be subjected to tests as deemed appropriate by the Society depending on the type of heat exchanger whereby it is to be verified that the performance is satisfactory, except for those types which have sufficient service histories.	**4.3.1 Prototype Test** The prototype of heat exchangers for cargo liquid, vapour or refrigerant used at a temperature below -55°C is to be subjected to tests as deemed appropriate by the Society depending on the type of the heat exchanger whereby it is to be verified that the performance is satisfactory.	Clarification that prototype testing can be omitted for heat exchangers with sufficient service histories.

Amended	Original	Remarks
Chapter 5 VALVES	**Chapter 5 VALVES**	
5.2 Materials, Construction and Strength	**5.2 Materials, Construction and Strength**	
(Moved)	**2** Valves with the design temperature below -55°C are to be subject to type testing specified in **5.13.1-1, Part N of the Rules** and approved for use as specified in the **Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use.**	Provisions for approval of use moved to testing requirements.
2 The construction and strength of valves are to be in accordance with the requirements in recognized standards.	**3** The construction and strength of valves are to be in accordance with the requirements in recognized standards.	
(Moved)	**4** For valves not conforming to the requirements in the preceding **-3**, detailed data on the construction and strength are to be submitted to the Society for type approval specified in **Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use.**	
5.3 Tests and Inspection	**5.3 Tests and Inspection**	
5.3.1 Type Test	**5.3.1 Type Test**	
1 Valves whose design temperatures are below −55°C are to be subjected to the tests and inspections specified in **(1)** to **(9)** below, taking into consideration **5.13.1-1, Part N of the Rules** and approved for use in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use.**	In the tests specified in the preceding **5.2-2**, the test and inspection specified in the following **(1)** to **(9)** are to be conducted in addition to the requirements of **5.3.1(1), Part N of the Rules**:	
((1) to (9) are omitted.)	((1) to (9) are omitted.)	
2 For valves not conforming to **5.2-2**, detailed data on construction and strength are to be submitted to the Society, and such valves are to be type approved in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and**	(Moved)	

Amended	Original	Remarks
Type Approval of Materials and Equipment for Marine Use.		
Chapter 6 RELIEF VALVES	**Chapter 6 RELIEF VALVES**	
6.4 Tests and Inspection	**6.4 Tests and Inspection**	
6.4.1 Prototype Test **1** Relief valves other than those fitted to cargo piping and process piping with a design temperature of -55°C or above are to be subjected to prototype tests to verify that they are possess the necessary performance and are to be approved for use in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**.	**6.4.1 Prototype Test** **1** Relief valves other than those fitted to cargo piping and process piping with a design temperature of -55°C or above are to be subjected to prototype tests to verify that they are possess the necessary performance.	Clarify approval of use requirements.
Chapter 7 EXPANSION JOINTS (For Cargo Piping and Process Piping Systems)	**Chapter 7 EXPANSION JOINTS (For Cargo Piping and Process Piping Systems)**	
7.2 Materials, Construction and Strength	**7.2 Materials, Construction and Strength**	
7.2.2 Construction and Strength (-1 to -10 are omitted.) **11** Notwithstanding the preceding **-7** and **-8**, bellows may be designed in accordance with *EJMA* standards or standards deemed appropriate by the Society.	**7.2.2 Construction and Strength** (-1 to -10 are omitted.) (Newly added)	Clarify that designs based on EJMA standards are allowed.

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
7.3 Tests and Inspection **7.3.1 Type Test** Expansion joints, except for those provided in the piping with open pipe ends and installed in the cargo tanks, are to be subjected to the type test specified in **5.13.1-2, Part N of the Rules** for each type. In addition, such expansion joints are to be approved for use in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**.	**7.3 Tests and Inspection** **7.3.1 Type Test** Expansion joints, except for those provided in the piping with open pipe ends and installed in the cargo tanks, are to be subjected to the type test specified in **5.13.1-2, Part N of the Rules** for each type.	Clarify approval of use requirements.
Chapter 11 TEMPERATURE INDICATING DEVICES **11.3 Temperature Measuring Sensors** **11.3.1 General** **4** The pressure thermometers used in temperature measurements are to conform to the requirements in *JIS B* 7549 “Liquid Filled Pressure Type Temperature Indicating Devices” or other standards deemed appropriate by the Society.	**Chapter 11 TEMPERATURE INDICATING DEVICES** **11.3 Temperature Measuring Sensors** **11.3.1 General** **4** The mercury thermometers used in temperature measurements are to conform to the requirements in *JIS B* 7528 Mercury Filled Pressure Type Temperature Indicating Devices or those of the equivalent standards.	Modification of JIS standard.

Amended-Original Requirements Comparison Table (Testing of Gas Compressors and Pumps)

Amended	Original	Remarks
Chapter 20 CARGO HOSES **20.5 Tests and Inspections** **20.5.1 Approval Test for Use** **1** In principle, cargo hoses are to be subjected to the prototype tests in **-2** for each type and hose bore and are to be approved for use in accordance with **Chapter 2, Part 6 of the Guidance for the Approval and Type Approval of Materials and Equipment for Marine Use**.	**Chapter 20 CARGO HOSES** **20.5 Tests and Inspections** **20.5.1 Approval Test for Use** **1** Cargo hoses for which approval for use is intended are, as a rule, to be subjected to prototype test given in the preceding **-2** for each type and hose bore.	Clarify approval of use requirements.

EFFECTIVE DATE AND APPLICATION

1. The effective date of this draft amendment is [the date of establishment].