# RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

## Part GF Ships Using Low-Flashpoint Fuels

**Rules for the Survey and Construction of Steel Ships**
**Part GF 2022 AMENDMENT NO.1**
**Guidance for the Survey and Construction of Steel Ships**
**Part GF 2022 AMENDMENT NO.1**

Rule No.45 / Notice No.31 30 June 2022
Resolved by Technical Committee on 26 January 2022

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An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

# RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

RULES

## Part GF Ships Using Low-Flashpoint Fuels

**2022 AMENDMENT NO.1**

Rule No.45 30 June 2022

Resolved by Technical Committee on 26 January 2022

An asterisk (*) after the title of a requirement indicates that there is also relevant information in the corresponding Guidance.

Rule No.45 30 June 2022
AMENDMENT TO THE RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

“Rules for the survey and construction of steel ships” has been partly amended as follows:

# Part GF SHIPS USING LOW-FLASHPOINT FUELS

Amendment 1-1

## Chapter 12 EXPLOSION PREVENTION

### 12.4 Hazardous Areas (*IGF Code* 12.4)

Paragraph 12.4.2 has been amended as follows.

**12.4.2 Classification of Hazardous Areas***

In order to facilitate the selection of appropriate electrical apparatus and the design of suitable electrical installations, hazardous areas are divided into zones 0, 1 and 2~~ in accordance with the requirements of **12.5**~~. See also **12.5** below.

EFFECTIVE DATE AND APPLICATION (Amendment 1-1)

**1.** The effective date of the amendments is 30 June 2022.

Amendment 1-2

# Chapter 7 MATERIAL AND GENERAL PIPE DESIGN

## 7.4 Regulations for Materials (with reference to *IGF Code* 7.4)

### 7.4.2 Marking

Steels which have satisfactorily complied with the required test are to be marked with identification mark in accordance with the requirements in **Part K** and in case the impact test has been required, the impact testing temperature and "*T*" are to be suffixed to the markings. (Example: *KL*33-50*T*. -0*T* as suffix for 0°C.)

Table GF7.1 has been amended as follows.

Table GF7.1 Plates, Pipes (Seamless and Welded)[(1),(2)], Sections and Forgings for Fuel Tanks and Process Pressure Vessels for Design Temperatures not Lower than 0°C

| | | |
|---|---|---|
| CHEMICAL COMPOSITION AND HEAT TREATMENT<br>Carbon-manganese steel<br>Fully killed fine grain steel<br>Small additions of alloying elements by agreement with the Society<br>Composition limits to be approved by the Society<br>Normalized, or quenched and tempered[(4)] | | |
| TENSILE AND TOUGHNESS (IMPACT) TEST REGULATIONS<br>Sampling frequency<br>Plates: Each "piece" to be tested<br>Sections and forgings: Each "lot" to be tested.<br>Mechanical properties<br>Tensile properties: Specified minimum yield stress not to exceed 410 *N/mm*$^2$[(5)]<br>Toughness (Charpy *V* -notch impact test)<br>Plates: Transverse test pieces. Minimum average energy value (*KV*) 27 *J*<br>Sections and forgings: Longitudinal test pieces. Minimum average energy value (*KV*) 41 *J* | | |
| Test temperature | Thickness (*mm*)[(3)] | Test temperature(℃) |
| | $t \leq 20$ | 0 |
| | $20 < t \leq 40$[(3)] | -20 |
| | $40 < t \leq 50$[(6)] | -20[(7)] |
| | | -30[(8)] |

Notes

(1) For seamless pipes and fittings the requirements of **Part K** applies. The use of longitudinally and spirally welded pipes is to be specially approved by the Society

(2) Charpy *V*-notch impact tests are not required for pipes.

(3) This Table is generally applicable for material thicknesses up to ~~40~~ 50 *mm*. Proposals for greater thicknesses are to be approved by the Society.

(4) A controlled rolling procedure or thermo-mechanical controlled processing (TMCP) may be used as an alternative.

(5) Materials with specified minimum yield stress exceeding 410 *N/mm*$^2$ may be approved by the Society. For these materials, particular attention is to be given to the hardness of the welded and heat affected zones.

(6) In addition to **16.2.2-2**, test specimens are to be taken at portions where the axis of the test specimen corresponds to approximately 1/2 the thickness from the surface. This, however, does not apply to the rolled steels for hulls and high strength rolled steels for offshore structures respectively specified in **3.1** and **3.8, Part K of the Rules**.

(7) Applicable to type *C* independent tanks and process pressure vessels. In addition, post-weld stress relief heat treatment is to be performed. When an alternative approach is to be used lieu of post-weld stress relief heat treatment, the Society's approval is required.

(8) Applicable to fuel tanks other than type *C* independent tanks.

Table GF7.2 has been amended as follows.

Table GF7.2 Plates, Sections and Forgings[1] for Fuel Tanks, Secondary Barriers and Process Pressure Vessels for Design Temperatures below 0°C and down to -55°C (Maximum Thickness 25 *mm*[2])

| | | | | |
|---|---|---|---|---|
| Chemical composition and heat treatment | | | | |
| Carbon-manganese steel (Fully killed, aluminium treated fine grain steel) | | | | |
| Chemical composition (ladle analysis) | | | | |
| $C$ | $M_n$ | $S_i$ | $S$ | $P$ |
| 0.16% max[3] | 0.7~1.60% | 0.10~0.50% | 0.025% max | 0.025% max |
| Optional additions : Alloys and grain refining elements may be generally in accordance with the following | | | | |
| $N_i$ | $C_r$ | $M_0$ | $C_u$ | $N_b$ |
| 0.80% max | 0.25% max | 0.08% max | 0.35% max | 0.05% max |
| $V$ | | | | |
| 0.10% max | | | | |
| Al content total 0.02% min (Acid soluble 0.015% min) | | | | |
| Normalized, or quenched and tempered[4] | | | | |
| Tensile and toughness (impact) test regulations | | | | |
| Sampling frequency | | | | |
| Plates | Each “piece” to be tested | | | |
| Sections and forgings | Each “lot” to be tested | | | |
| Mechanical properties | | | | |
| Tensile properties | Specified minimum yield stress not to exceed 410 $N/mm^2$[5] | | | |
| Toughness (Charpy *V* -notch impact test) : | | | | |
| Plates | Transverse test pieces. Minimum average energy value (*KV*) 27*J* | | | |
| Sections and forgings | Longitudinal test pieces. Minimum average energy value (*KV*) 41*J* 5°C below the design temperature or -20°C whichever is lower | | | |
| Test temperature | | | | |

Notes

(1) The Charpy *V*-notch impact tests and chemistry regulations for forgings may be specially considered by the Society.

(2) For material thickness of more than 25 *mm*, Charpy *V*-notch impact tests are to be conducted as follows:

| Material thickness (*mm*) | Test temperature (℃) |
|---|---|
| $25 < t \leq 30$ | 10℃ below design temperature or -20℃ whichever is lower |
| $30 < t \leq 35$ | 15℃ below design temperature or -20℃ whichever is lower |
| $35 < t \leq 40$ | 20℃ below design temperature |
| ~~$40 < t$~~ | ~~Temperature approved by the Society~~ |
| Type *C* independent tanks and process pressure vessels | |
| $40 < t \leq 50$ | 5℃ below design temperature or -20℃ whichever is lower |
| $50 < t$ | Temperature approved by the Society |
| Fuel tanks other than type *C* independent tanks | |
| $40 < t \leq 45$ | 25℃ below design temperature |
| $45 < t \leq 50$ | 30℃ below design temperature |
| $50 < t$ | Temperature approved by the Society |

The impact energy value is to be in accordance with the table for the applicable type of test specimen.

Materials for tanks and parts of tanks which are completely thermally stress relieved after welding may be tested at a temperature 5°C below design temperature or -20°C whichever is lower.

For thermally stress relieved reinforcements and other fittings, the test temperature is to be the same as that required for the adjacent tank-shell thickness.

Where thickness is greater than 40 *mm*, in addition to **16.2.2-2**, test specimens are to be taken at portions where the axis of the test specimen corresponds to approximately 1/2 the thickness from the surface. This, however, does not apply to the rolled steels for hulls and high strength rolled steels for offshore structures respectively specified in **3.1** and **3.8, Part K of the Rules**.

Where steels with thicknesses greater than 40 *mm* but not more than 50 *mm* are used for type *C* independent tanks and

process pressure vessels, post-weld stress relief heat treatment is to be performed. When an alternative approach is to be used in lieu of post-weld stress relief heat treatment, the Society's approval is required.

(3) By special agreement with the Society, the carbon content may be increased to 0.18% maximum provided the design temperature is not lower than -40°C

(4) A controlled rolling procedure or thermo-mechanical controlled processing (TMCP) may be used as an alternative.

(5) Materials with specified minimum yield stress exceeding 410 $N/mm^2$ may be approved by the Society. For these materials, particular attention is to be given to the hardness of the welded and heat affected zones.

Guidance:

For materials exceeding 25 *mm* in thickness for which the test temperature is -60°C or lower, the application of specially treated steels or steels in accordance with **Table GF7.3** may be necessary.

Table GF7.3 has been amended as follows.

Table GF7.3 Plates, Sections and Forgings[1] for Fuel Tanks, Secondary Barriers and Process Pressure Vessels for Design Temperatures below -55°C and down to -165°C[2] (Maximum Thickness 25 *mm*[3],[4])

| Minimum design temp. (℃) | Chemical composition[5] and heat treatment | Impact test temp. (℃) |
|---|---|---|
| -60 | 1.5%nickel steel - normalized or normalized and tempered or quenched and tempered or TMCP[6] | -65 |
| -65 | 2.25%nickel steel - normalized or normalized and tempered or quenched and tempered or TMCP[6][7] | -70 |
| -90 | 3.5%nickel steel - normalized or normalized and tempered or quenched and tempered or TMCP[6][7] | -95 |
| -105 | 5%nickel steel - normalized or normalized and tempered or quenched and tempered[6][7][8] | -110 |
| -165 | 9%nickel steel - double normalized and tempered or quenched and tempered[6] | -196 |
| -165 | Austenitic stainless steels, such as types *304*, *304L*, *316*, *316L*, *321* and *347* solution treated[9] | -196 |
| -165 | Aluminium alloys[10]: such as type *5083* annealed | Not required |
| -165 | Austenitic *Fe-Ni* alloy (36% nickel)<br>Heat treatment as agreed | Not required |
| Tensile and Toughness (Impact) Test Requirements: | | |
| Sampling frequency: | | |
| Plates | Each “piece” to be tested | |
| Sections and Forgings | Each “lot” to be tested | |
| Toughness (Charpy *V*- Notch Impact Test): | | |
| Plates | Transverse test pieces. Minimum average energy value (*KV*) 27*J* | |
| Sections and Forgings | Longitudinal test pieces. Minimum average energy value (*KV*) 41*J* | |

Notes

(1) The impact test required for forgings used in critical applications is to be subject to special consideration by the Society.

(2) The regulations for design temperatures below -165°C are to be specially agreed with the Society.

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

| Material thickness (*mm*) | Test temperature (℃) |
|---|---|
| $25 < t \leq 30$ | 10℃ below design temperature |
| $30 < t \leq 35$ | 15℃ below design temperature |
| $35 < t \leq 40$ | 20℃ below design temperature |
| $40 < t \leq 45$ | 25℃ below design temperature |
| $45 < t \leq 50$ | 30℃ below design temperature |

In no case is the test temperature to be above that indicated in **Table GF7.3**.

The minimum average energy value is to be in accordance with the table for the applicable type of test specimen. For material thickness of more than 40 *mm*, minimum average energy values are to be specially considered.

Where thickness is greater than 40 *mm*, in addition to **16.2.2-2**, test specimens are to be taken at a portion where the axis of the test specimen corresponds to approximately 1/2 of the thickness from the surface.

(4) For 9% *Ni* steels, austenitic stainless steels and aluminium alloys, thickness greater than 25 *mm* may be used.

(5) The chemical composition limits are to be in accordance with recognized standards deemed appropriate by the Society.

(6) Thermo-mechanical controlled processing (TMCP) *Ni* steels will be subject to acceptance by the Society.

(7) A lower minimum design temperature for quenched and tempered steels may be specially agreed with the Society.

(8) A specially heat treated 5% *Ni* steel, for example triple heat treated 5% nickel steel, may be used down to -165°C, provided that the impact tests are carried out at -196°C.

(9) The impact test may be omitted subject to agreement with the Society.

(10) For aluminimum alloys other than type 5083, additional tests may be required to verify the toughness of the material.

## EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

**1.** The effective date of the amendments is 1 July 2022.

**2.** Notwithstanding the amendments to the Rules, the current requirements apply to ships for which the date of contract for construction* is before the effective date.

* "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.

Amendment 1-3

# Chapter 11 FIRE SAFETY

## 11.7 Fire Detection and Alarm System (*IGF Code* 11.7)

### 11.7.1 General

Sub-paragraph -3 has been added as follows.

**1** A fixed fire detection and fire alarm system complying with **Chapter 29**, **Part R** is to be provided for the fuel storage hold spaces and the ventilation trunk to the tank connection space and in the tank connection space, and for all other rooms of the fuel gas system where fire cannot be excluded.
**2** Smoke detectors alone are not to be considered sufficient for rapid detection of a fire.
**3** The system specified in **-1** above is to be approved by the Society or an organization deemed appropriate by the Society.

EFFECTIVE DATE AND APPLICATION (Amendment 1-3)

**1.** The effective date of the amendments is 1 July 2022.
**2.** Notwithstanding the amendments to the Rules, the current requirements apply to ships for which the date of contract for construction is before the effective date.

# GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

GUIDANCE

## Part GF Ships Using Low-Flashpoint Fuels

**2022 AMENDMENT NO.1**

Notice No.31 30 June 2022

Resolved by Technical Committee on 26 January 2022

Notice No.31 30 June 2022
AMENDMENT TO THE GUIDANCE FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS

"Guidance for the survey and construction of steel ships" has been partly amended as follows:

Amendment 1-1

# Part GF SHIPS USING LOW-FLASHPOINT FUELS

## GF12 EXPLOSION PREVENTION

### GF12.4 Hazardous Areas

Sub-paragraphs -1 to -3 have been added as follows.

**1** Risk assessments in accordance with the relevant standards on hazardous area classification in **12.4, Part GF of the Rules** are to be understood as a procedure equivalently applicable to the examples for hazardous area zones laid out in **12.5, Part GF of the Rules** for the categorisation of gas admission valves for dual fuel engines and gas engines. Above-mentioned "relevant standards" means those listed below.
(1) *IEC* 60092-502
(2) *IEC* 60079-10-1
**2** The provision of **12.4.2, Part GF of the Rules** is to be interpreted as the guiding methodology for the categorisation of gas admission valves at dual fuel engines and gas engines. If no additional safety measures and no corresponding risk assessment in accordance with **-1** are available, the examples in **12.5, Part GF of the Rules** are to apply.
**3** In applying **12.4.2, Part GF of the Rules**, applicable requirements of **Chapter 4, Part H of the Rules** are to be complied with.

Paragraph GF12.4.2 has been deleted.

~~**GF12.4.2 Classification of Hazardous Areas**~~
~~In applying **12.4.2, Part GF of the Rules**, applicable requirements of **Chapter 4, Part H of the Rules** are to be complied with.~~

Section GF12.5 has been amended as follows.

### GF12.5 Hazardous Area Zones

In applying **12.5, Part GF of the Rules**, **GF12.4-1** and **-2** are to be taken into account.

### GF12.5.2 Hazardous Area Zone 1

**1** Measuring instruments and electrical equipment are to be capable of being used in the

hazardous area zone 1.

**2** Fuel storage hold spaces for type *C* tanks are normally not considered as hazardous area zone 1. The detailed classification of such fuel storage hold spaces are as follows:

(1) Fuel storage hold spaces with all potential leakage sources in a tank connection space and having no access to any hazardous area, are to be considered non-hazardous.

(2) Where the fuel storage hold spaces include bolted access to the tank connection space, they are to be considered hazardous area zone 2.

(3) Where the fuel storage hold spaces include potential leak sources, e.g. tank connections, they are to be considered hazardous area zone 1.

**3** The wording "areas on open deck, or semi-enclosed spaces on deck, within 3 *metre* of any fuel tank outlet, gas or vapour outlet" specified in **12.5.2(3), Part GF of the Rules** means, for example, all areas within 3 *metre* of fuel tank hatches, ullage openings or sounding pipes for fuel tanks located on open deck and gas vapour outlets.

**GF12.5.3 Hazardous Area Zone 2**

Measuring instruments and electrical equipment are to be capable of being used in the hazardous area zone 2.

EFFECTIVE DATE AND APPLICATION (Amendment 1-1)

**1.** The effective date of the amendments is 30 June 2022.

Amendment 1-2

# GF7 MATERIAL AND GENERAL PIPE DESIGN

## GF7.4 Regulations for Materials

### GF7.4.1 Metallic Materials

Sub-paragraph -1(4) has been deleted.

**1** For the purpose of the requirements in **Table GF7.1**, **Part GF of the Rules**, the following requirements **(1)** to **(4)** are to be complied with:

(1) The use of the longitudinally or spirally welded pipes given in the Note 1 of the Table is to be in accordance with the relevant requirements in **Chapter 4**, **Part K of the Rules**.

(2) Fittings of Type *C* independent tanks and process pressure vessels with the design pressure not exceeding 3*MPa* and design temperature of 0°C or more and nominal diameter less than 100*A*.

(3) The controlled rolling as a substitution for normalizing may be of the temperature controlled rolling or Thermo-Mechanical Controlled Processing (*TMCP*).

~~(4) For materials with the thickness of greater than 40 *mm* and not more than 50 *mm*, the impact test is to be carried out at the temperature of -30°C.~~

## EFFECTIVE DATE AND APPLICATION (Amendment 1-2)

**1.** The effective date of the amendments is 1 July 2022.

**2.** Notwithstanding the amendments to the Guidance, the current requirements apply to ships for which the date of contract for construction* is before the effective date.

* "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.

Amendment 1-3

# Annex 3 GUIDANCE FOR HIGH PRESSURE GAS-FUELLED ENGINES

## Chapter 2 CONSTRUCTION AND EQUIPMENT OF HIGH PRESSURE GAS-FUELLED ENGINES

### 2.3 Safety Systems

### 2.3.2 Protection Against Explosions

Sub-paragraph -1 has been amended as follows.

**1** Relief valves approved in accordance with **Table D2.~~4~~5, Part D of the Rules** are to be provided for crankcases.

EFFECTIVE DATE AND APPLICATION (Amendment 1-3)

**1.** The effective date of the amendments is 1 July 2022.

**2.** Notwithstanding the amendments to the Guidance, the current requirements may apply to reciprocating internal combustion engines for which the application for approval is submitted to the Society before the effective date.

Amendment 1-4

# Annex 4 GUIDANCE FOR LOW PRESSURE GAS-FUELLED ENGINES

## Chapter 2 CONSTRUCTION AND EQUIPMENT OF LOW PRESSURE GAS-FUELLED ENGINES

### 2.4 Accessory Equipment

### 2.4.4 Gas Fuel Pipes

Sub-paragraph -5(5) has been amended as follows.

**5** For piping attached to low pressure gas-fuelled engines, the following **(1)** to **(5)** also apply.

(1) (Omitted)

(2) (Omitted)

(3) (Omitted)

(4) (Omitted)

(5) Gas admission valves

Gas admission valves are to be certified safe as follows:

((a) to (c) are omitted.)

(d) However, if they are not rated for the zone they are intended for, it is to be documented that they are suitable for that zone. Documentation and analysis is to be based on *IEC* 60079-10-1:2015 or *IEC* 60092-502:1999.

EFFECTIVE DATE AND APPLICATION (Amendment 1-4)

**1.** The effective date of the amendments is 1 July 2022.

**2.** Notwithstanding the amendments to the Guidance, the current requirements apply to gas-fuelled engines other than those which fall under the following:

(1) gas-fuelled engines for which the application for approval of use is submitted to the Society on or after the effective date; or

(2) gas-fuelled engines for which the date of renewal of approval of use is on or after the effective date.