

## MARINE SAFETY MANAGEMENT SYSTEM

### TIER I - POLICY - REQUIREMENTS FOR VESSELS USING NATURAL GAS AS FUEL

#### 1 Policy Objective

- 1.1 This policy addresses the need to clarify and provide guidance on the requirements involved in designing and constructing natural gas-fuelled vessels, 24 meters in length or above, under the Canadian flag.
- 1.2 This policy establishes how the *International Code of Safety for Ships using Gases or other Low Flashpoint Fuels* (IGF code), which is a sub-instrument of the *International Convention for the Safety of Life at Sea* (SOLAS), will be applied to vessels under the Canadian flag.

#### 2 Policy Statement

- 2.1 International standards for the design and construction of vessels using natural gas as a fuel have recently been developed by the International Maritime Organization (IMO), in the form of the IGF Code adopted by IMO Resolution MSC.391(95). The IGF Code provides mandatory provisions for design and construction of vessels using low-flashpoint fuels, such as liquefied natural gas (LNG) or compressed natural gas (CNG).
- 2.2 Considering that the existing regulations, specifically Schedule XII, Part 1, Item 1 of the *Marine Machinery Regulations*, and SOLAS regulation II-2/4.2.1 prohibit the use of low-flashpoint fuels (i.e. fuels with flashpoints below 60 degrees Celsius), this policy outlines the interim requirements for the use of natural gas fuels, with Canadian modifications as appropriate.
- 2.3 In order to meet the requirements for natural-gas fuelled vessels, the Authorized Representative (AR) of the Canadian flag vessel in question must:
  - a) Apply for a Marine Technical Review Board (MTRB) equivalency;
  - b) Apply the requirements of the IGF Code;
  - c) Apply the Canadian modifications, as set out in the Annex to this policy; and

- d) Apply the Ship Classification Rules of a Canadian Recognized Organization applicable to the type of vessel, including the provisions for the use of natural gas as a fuel.
- 2.4 The Annex of this policy, as amended from time to time, states the Canadian modifications that are applicable in addition to the IGF Code for the use of natural gas as a fuel.
- 2.5 When a vessel has been granted an MTRB in accordance with this policy, in case of a conflict between documents, the following prioritization list applies:
- 1) The MTRB decision
  - 2) The Canadian modifications in the Annex of this policy
  - 3) The IGF Code
  - 4) Classification Society rules
- 2.6 In addition to the above, the MTRB application referred to in 2.3(a) should include any deviations or non-compliance to the requirements of the instruments stated in 2.3. These deviations or non-compliances will be considered on a case-by-case basis.

### **3 Scope**

- 3.1 This policy applies to all Canadian vessels of 24 metres in length and above, which intend to use a fuel type covered by the IGF Code.
- 3.2 Vessels of less than 24 metres in length shall follow the same principles, however, applications of this policy to such vessels will be considered on a case-by-case basis.
- 3.3 Specifically, this policy will apply to:
- New vessels built to the SOLAS regime; and
  - Existing vessels built to the SOLAS regime or the Canadian regime, which are being converted for the use of low-flashpoint fuel, such as LNG or CNG.

- 3.4 This policy does not apply to gas carriers certified to the *International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk* (IGC Code), which use their cargoes as fuel, or use other low-flashpoint gaseous fuels, provided that the vessel's fuel storage and distribution system comply with the requirements of the IGC Code for gas as a cargo.

#### **4 Authority**

- 4.1 This policy is authorized by the Marine Safety & Security Executive (MSSE) of Transport Canada, and is in accordance with the objectives of the *Canada Shipping Act, 2001*.

#### **5 Responsibility/ further information**

- 5.1 The Executive Director, Domestic Vessel Regulatory Oversight and Boating Safety (AMSD), is responsible for the development, approval and maintenance of this policy.
- 5.2 The Manager, Arctic and Large Vessel Design and Equipment Standards (AMSDDL), is the Office of Primary Interest (OPI) for this policy.
- 5.3 Comments or queries related to this policy and its application should be addressed to:

Manager, Arctic and Large Vessel, Design and Equipment Standards (AMSDDL):

330 Sparks Street

Ottawa, ON, K1A 0N8

Fax: 613-991-4818

Email: [tc.amsdl.tc@tc.gc.ca](mailto:tc.amsdl.tc@tc.gc.ca)

## 6 Related Documents

- 6.1 The *International Code of Safety for Ships Using Gases or other Low-Flashpoint Fuels* (IGF Code), IMO Resolution MSC. 391(95) as amended.
- 6.2 The *International Code of the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk* (IGC Code), IMO Resolution MSC. 370(93) as amended
- 6.3 The *International Convention for the Safety of Life at Sea* (SOLAS).
- 6.4 LNG Incident Report Form no 85-0510.

## 7 Background

- 7.1 The IMO has adopted rigorous emission regulations through Annex VI of the *International Convention for the Prevention of Pollution from Ships* (MARPOL). The emission regulations in Annex VI include, among other requirements, a tiered compliance system introducing increasingly stricter limits on emissions of sulfur oxide (SO<sub>x</sub>), nitrogen oxide (NO<sub>x</sub>), and particulate matter (PM). In addition to these global requirements, designated areas called Emission Control Areas (ECAs) are subject to more stringent requirements for the same emissions. Two separate ECAs are currently enforced in the North American region: the North American ECA and the US Caribbean Sea ECA.
- 7.2 The effect of stricter air emissions legislation, together with favorable financial conditions for the use of natural gas as a fuel, has led to an increasing number of vessel owners who are considering the use of natural gas as fuel. Due to this trend, the marine industry is aiming to provide flexibility and capability in vessel designs to enable conversions to this type of alternative fuel system.
- 7.3 Recently, an international standard for the design and construction of natural gas fuelled vessels has been developed and adopted by the IMO, in the form of the IGF Code. The IGF Code provides mandatory provisions for the arrangement, installation, control and monitoring of machinery, equipment and systems using natural gas as fuel, such as liquefied natural gas (LNG) or compressed natural gas (CNG), to minimize the risk to the vessel, its crew and the environment. The IGF currently addresses the use of CNG and LNG, while the IMO is working on adding other low flashpoint fuels such as methanol in the near future.

- 7.4 Existing Canadian regulations, specifically the *Marine Machinery Regulations*, do not address the design and installation of natural gas fuel systems on commercial vessels, and prohibit the use of fuels with flashpoints below 60 degrees Celsius (with some exceptions at 43 degrees Celsius).
- 7.5 The harmonization of Canadian regulations with international standards has been identified in the Government of Canada's Cabinet Directive on Regulatory Management, by Transport Canada, and by the industry as necessary in establishing an effective and appropriate regulatory framework. Incorporating the IGF Code into Canadian regulations would be in keeping with this approach.
- 7.6 The IGF Code will enter into force on 1 January, 2017 through amendments to SOLAS identified in IMO Resolution MSC.392(95), and will become mandatory for vessels on international voyages subject to the SOLAS Convention. The IGF Code will be incorporated into the Canadian regulatory regime via the proposed *Vessel Construction and Equipment Regulations* (VCER) for application to Canadian-flagged vessels.
- 7.7 However, until incorporation of the IGF Code into SOLAS and the coming-into-force of the VCER occurs, application of the IGF Code to Canadian-flagged vessels must be authorized by the MTRB, taking into account this policy and the accompanying Annex.

## 8 Definitions

- 8.1 *IGF Code*: the *International Code of safety for ships using gases or other low-flashpoint fuels* as adopted by the Maritime Safety Committee of the International Maritime Organization by resolution MSC.391(95).
- 8.2 *Low-flashpoint fuel*: a gaseous or liquid fuel having a flashpoint lower than otherwise permitted under regulation II-2/4.2.1.1 of SOLAS.
- 8.3 *Liquefied Natural Gas (LNG)*: a natural gas (predominantly methane, CH<sub>4</sub>) that has been converted to liquid form by cooling to approximately -161 degree Celsius (-258 degree Fahrenheit).
- 8.4 *Compressed Natural Gas (CNG)*: a natural gas (predominantly methane, CH<sub>4</sub>) that has been compressed to a pressure typically in the range of 200-248 bar (2900-3600 psi).

## 9 Date of Application

- 9.1 This policy will come into effect on July 28<sup>th</sup>, 2017.

## 10 Date for Review or Expiry

- 10.1 This policy will either be reviewed within [2] years of its effective date, or will expire upon the coming into force of the *Vessel Construction and Equipment Regulations*.

## 11 RDIMS Reference

- 11.1 The English version of this document is saved in RDIMS under reference number 11153519. The applied naming convention is (PUBLICATION - TP 13585 - POLICY - Requirements for Vessels using Natural Gas as Fuel). This is the first approved and finalized revision of the English version of this document.
- 11.2 La version française du présent document est dans le SGDDI et porte le numéro de référence 11852857. La règle d'affectation des noms est (PUBLICATION - TP 13585 - POLITIQUE - Exigences pour les bâtiments utilisant le gaz naturel comme combustible).

## 12 Keywords

- IGC Code
- IGF Code
- Compressed Natural Gas
- CNG
- Liquefied Natural Gas
- LNG
- Low-flashpoint Fuel
- Natural Gas Fuel

## ANNEX 1 – CANADIAN SUPPLEMENT TO THE IGF CODE

### 1 GENERAL

#### 1.1 EXISTING VESSELS

1.1.1 The machinery, electrical installation, and low-flashpoint fuel storage and distribution systems design and arrangements of existing vessels converted to low-flashpoint fuel propulsion must comply with all the requirements of the IGF as amended on the date the conversion starts.

1.1.2 In all spaces where machinery, electrical installation, and low-flashpoint fuel storage and distribution systems are located the following requirements, as amended on the date the conversion starts, must be met:

- a) SOLAS Chapter II-1, Part B to E;
- b) SOLAS Chapter II-2; and
- c) The related requirements of the *Canadian Supplement to the SOLAS Convention* (TP 15211).

1.1.3 The spaces subject to paragraph 1.1.2 include:

- a) machinery spaces;
- b) fuel storage hold spaces, interbarrier spaces, tanks connection spaces, airlocks;
- c) fuel preparation room;
- d) bunkering stations;
- e) any space classified as hazardous area due to low-flashpoint fuel vapours;
- f) any space open to spaces a) to e)

1.1.4 All vessels converted to low-flashpoint fuel propulsion must be re-inclined after the conversion.

1.1.5 Instead of the subdivision and damage stability requirements of regulations 6 to 8 of SOLAS Chapter II-1 a vessel may comply with the requirements of the *Passenger Vessel Operations and Damaged Stability Standards (2007)* TP10943.

## 1.2 ALTERNATIVE DESIGN AND ARRANGEMENTS

- 1.2.1 Any deviation from the machinery, electrical installation, and low-flashpoint fuel storage and distribution systems design and arrangements prescribed by the IGF Code must be subject to the requirement of paragraph 2.3 of the IGF Code and the engineering analysis prescribed in Regulation 55 of chapter II-1 of SOLAS.
- 1.2.2 The engineering analysis must be submitted to the Recognized Organization for review and acceptance before being submitted to the MTRB.

## 1.3 SAFETY MANAGEMENT SYSTEMS

- 1.3.1 The Company and vessel must operate under a Safety Management System (SMS) in accordance with the International Safety Management (ISM) Code that is audited and certified by a Canadian Recognized Organization.

## 1.4 INCIDENT REPORTING

- 1.4.1 Any incidents related to the use of LNG or CNG as fuel that occurs during vessel operations or bunkering need to be reported to TCMSS.
- 1.4.2 Incidents that are considered to be reportable occurrences under the *Transportation Safety Board Regulations (SOR/2014-37)* must be reported to the Transportation Safety Board or a Canadian Radio Ship Reporting Station using the normal process.
- 1.4.3 Incidents that are not reportable occurrences to the TSB must be reported to TCMSS not later than 30 days after the event, using the LNG or CNG Fuel Incident Reporting Form (Form 85-0510). Events to be reported include:
- a) LNG or CNG leaks or spills;
  - b) bunkering operations aborted after initiation;
  - c) Gas monitoring alarm conditions referred to in IGF code, Chapter 15 Table 1;
  - d) LNG or CNG propulsion system failure requiring the vessel or its machinery to stop, or to transfer to another fuel source;
- 1.4.4 A copy of the Fuel Incident Reporting Form (Form 85-0510) shall be sent to TCMSS by mail, fax, or email to:
- Domestic Vessel Regulations Oversight and Boating Safety (AMSD)  
Transport Canada Marine Safety and Security  
Tower C, Place de Ville

330 Sparks Street, 11th Floor, Ottawa, ON  
K1A 0N5  
Fax: (613) 991-4818  
Email: [insp.stand-norm.insp@tc.gc.ca](mailto:insp.stand-norm.insp@tc.gc.ca)

## 1.5 APPROVAL, ACCEPTANCE AND CONSIDERATION BY THE ADMINISTRATION

- 1.5.1 In cases where the IGF Code is referring to “approval by”, “consideration of”, “acceptance of”, “satisfaction of”, or “modified by” the administration, the approval is to be carried out by the Recognized Organization on the behalf of Transport Canada, except for the elements stated in paragraph 1.5.2.
- 1.5.2 The information required for paragraphs 2.3.3, 4.2.3, 6.4.1.4, 6.6.4, 6.7.2.7.3, 6.7.3.1.1.2, 6.9.2, and paragraph 4.4 of the Annex to Part A-1 and note 2 in paragraph 4.8.3 of the Annex to Part A-1 must be submitted to the Recognized Organization for review and recommendations, before being submitted to Transport Canada for acceptance.
- 1.5.3 In cases where the IGF Code is referring to “recognized standards”, the Rules of the Recognized Organization or a standard referred by these Rules is acceptable, unless a specific standard is prescribed by Canadian regulations or this Policy.

## 2 IGF CODE – PART A

### 2.1 General

- 2.1.1 Except as provided otherwise, a reference into the IGF code to:
- a) “should” is to be read as “must”; and
  - b) “Administration” is to be read as Transport Canada.
- 2.1.2 When a footnote in the IGF Code is referring to instruments published by standards organizations, industrial organizations/associations, or classification society, other instruments providing an equivalent level of safety may be used subject to the acceptance of the Recognized Organisation (RO). Alternatives cannot be used for any reference to an IMO instrument in a footnote.

### 2.2 Section 4.2 - RISK ASSESSMENT

- 2.2.1 The risk assessment required by paragraph 4.2 of the IGF Code must be conducted using a recognized methodology acceptable to the RO.

- 2.2.2 The results of the risk assessment, including details of risk control measures and related procedures, must be submitted to the Recognized Organization for review and acceptance using their risk based design verification process before being submitted to the MTRB with the application required under paragraph 2.3 of the Policy.
- 2.2.3 In addition to the elements stated in paragraph 4.2.2 of the IGF Code, the risk assessment must take into consideration the risk criterion described in paragraph 3.2.1 of the IGF Code to address the risk created by:
- a) The LNG or CNG tank when located adjacent to accommodation spaces;
  - b) The LNG or CNG tank if located in an open deck that may be subject to damage resulting for cargo handling or similar operation;
  - c) The use of the ESD-Protected machinery spaces concept;
  - d) Operation in low temperature environment, ice accretion and snow accumulation; and
  - e) The bunkering arrangement and operation.

### **3 IGF CODE PART A-1 - SPECIFIC REQUIREMENTS FOR SHIPS USING NATURAL GAS AS FUEL**

#### **3.1 Section 6.4.13 - Materials and construction**

- 3.1.1 For the purpose of 6.4.13.3.4 the fire resistance properties of the thermal insulation materials must comply with non-combustibility requirements of the FTP Code, CAN/ULC-S114, ASTM E136 or an equivalent standard. The low flame spread characteristics must comply with FTP Code requirements or must have a flame spread rating or index of 25 or less when tested in accordance with CAN/ULC-S102, ASTM E 84 or an equivalent standard.
- 3.1.2 For the purpose of 6.4.13.3.5 the thermal insulation must comply with low flame spread requirements of the FTP Code or must have a flame spread rating or index of 25 or less when tested in accordance with CAN/ULC-S102, ASTM E 84 or an equivalent standard.

#### **3.2 Section 6.5 - Regulations for portable liquefied gas fuel tanks**

- 3.2.1 In addition of 6.5.1 the portable tank must meet the requirements of the *Transport of Dangerous Goods Regulations*.

#### **3.3 Section 6.6 - Regulations for CNG fuel containment**

- 3.3.1 For the purpose of 6.6.1, CNG portable tanks must meet the requirements of the *Transport of Dangerous Goods Regulations*.

3.3.2 Permanent CNG tanks must meet the *ASME Boiler and Pressure Vessel Code* or another standard providing an equivalent level of safety acceptable to the RO.

### 3.4 Section 8 - BUNKERING

3.4.1 Bunkering should normally be carried out from overboard installations either from:

- a) fixed land-based installations;
- b) road or rail tanker(s); or
- c) tanker vessels;

3.4.2 Bunkering carried out using means other than those indicated in 3.4.1 is considered to be a non-standard operation and must be subject to special consideration during the risk assessment, the RO approval, and submitted to the MTRB with the application required under 2.3 of the Policy. Particular measures must be incorporated in the design to prevent liquid or gas leaks on or into the vessel during the bunkering operation and measures must be implemented to minimize the consequences and to respond to emergencies in case of an incident resulting in a liquid or gas leak.

Particular attention must address, but not be limited to, the impact of the non-standard bunkering operation on the following elements:

- Enclosed or semi-enclosed spaces – gas dispersion analysis
- Protection of vessel surfaces against LNG leaks
- Equipment certified for hazardous areas
- Simultaneous operations
- Fire safety and emergency response
- Environmental conditions

3.4.3 For the purposes of 8.3.2 ship's fuel hoses for bunkering must comply with appropriate recognized standards such as EN 1474-2, EN 12434 or BS 4089.

3.4.4 Ship's fuel hoses must be pressure tested at 1.5 the maximum working pressure and tested for electrical continuity while under pressure and upon completion of the pressure test at least every year. In addition the manufacturer of these hoses may lay down requirements relating to service life, inspection and maintenance. The manufacturer's instructions should be followed.

### 3.5 **Section 11 - Fire Safety**

3.5.1 For the purposes of paragraph 11.3.5 the fire protection of fuel pipes that are not purged by nitrogen and led through ro-ro spaces must be insulated to A-60 standards or located inside a trunk insulated to A-60 standard.

## 4 **IGF CODE PART B-1**

No modifications

## 5 **IGF CODE PART C-1**

### 5.1 **Section 17 - DRILLS AND EMERGENCY EXERCISES**

5.1.1 Drills and emergency exercises must be conducted at least as per the interval prescribed by the *Fire and Boat Drills Regulations*.

### 5.2 **Section 18 - OPERATION**

#### 5.2.1 **Regulations for maintenance**

5.2.1.1 In addition to the requirements of 18.3.1 the maintenance and repair procedures in place for the LNG or CNG fuel system must include the instructions and recommendations of the equipment manufacturers.

#### 5.2.2 **Regulations for bunkering operations**

5.2.2.1 Procedures for the safe bunkering of the vessel and for dealing with emergencies must be established, for the vessel and shore-side operations, taking into consideration the requirements of regulations 18.4, the results of the risk analysis, and appropriate International Standards and industry best practices.

5.2.2.2 The Authorized Representative and the Master of the vessel must ensure that the bunkering facility complies with national and provincial regulations and appropriate International Standards and best practices.

## **6 IGF CODE PART D**

### **6.1 Section 19 – TRAINING**

- 6.1.1 Masters, officers, ratings and other personnel on ships subject to the IGF Code must be trained and qualified in accordance with the requirements of Chapter V of the STCW Convention as adopted by Resolution MSC.396(95) and the related provisions of the STCW Code as adopted by Resolution MSC.397(95).
- 6.1.2 In addition to the requirement of 6.1.1 the Person in Charge (PiC) of the bunkering operation for the vessel must have participated in a minimum of three bunkering operations on the vessel, or a vessel with similar LNG or CNG bunkering installations, on which the person will be the PiC, using the same bunkering methods and procedures. Two of these three bunkering operations can be performed on simulator.
- 6.1.3 In addition to the requirement of 6.1.1 each person with responsibilities for the bunkering operation must have participated, as a trainee, in a minimum of one real or simulated bunkering operation on the vessel on which the person will be participating. The trainee shall be an additional person and not be considered to be one of the persons required by the bunkering procedure to perform the bunkering operation.
- 6.1.4 Participation of PiCs and other persons with responsibilities for bunkering in the commissioning of the LNG or CNG system for a new vessel or a conversion to LNG or CNG, under the supervision of the LNG or CNG equipment supplier, may be considered as meeting the requirements of 6.1.2 and 6.1.3.