

RULES FOR CLASSIFICATION OF SHIPS USING LOW-FLASHPOINT FUELS

2019. 09.



Machinery Rule Development Team

- Main Amendments -

- (1) Effective Date : 1 July 2020 (The contract date for ship construction)
 - The requirements of risk assessment have been amended.
 - Ch 17 and Ch 18 of IGF Code has been newly added.

Present	Amendment	Remark
<p style="text-align: center;">CHAPTER 4 CLASSIFICATION AND SURVEYS</p> <p style="text-align: center;">Section 2 Classification</p> <p>201. Class notations Ships satisfying the requirements of this Rules may be given a notation "LFFS (dual fuel, gas only)" as additional special feature notations.</p> <p>202. <omitted></p> <p>203. Classification Survey during Construction</p> <p>1. ~ 2. <omitted></p> <p>3. Plan and data for approval (1) ~ (8) <omitted> (9) <u>Data for a risk analysis according to Ch 3, 201.</u></p> <p>4. Plans and documents for reference (1) ~ (3) <omitted> (4) <newly added></p>	<p style="text-align: center;">CHAPTER 4 CLASSIFICATION AND SURVEYS</p> <p style="text-align: center;">Section 2 Classification</p> <p>201. Class notations Ships satisfying the requirements of this Rules may be given a notation "LFFS" as additional special feature notations <u>and details are as follows. (2020)</u></p> <p><u>1. LFFS(DF-LNG): Dual fuel engines using LNG as fuel are installed</u></p> <p><u>2. LFFS(SF-LNG): Single fuel engines using LNG as fuel are installed</u></p> <p>202. <omitted></p> <p>203. Classification Survey during Construction</p> <p>1. ~ 2. <omitted></p> <p>3. Plan and data for approval (1) ~ (8) <same as the present> (9) Data for a risk analysis according to Ch 3, 201.</p> <p>4. Plans and documents for reference (1) ~ (3) <same as the present> (4) <u>Data for a risk assessment according to Ch 3, 201.</u></p>	<p>(Amended)</p> <p>- Considered the use of other low-flashpoint fuels.</p> <p>- Data for a risk assessment has been amended for reference only. (The subject of risk assessment is designer's side)</p>

Present	Amendment	Remark
<p><Newly added></p>	<p style="text-align: center;"><u>Section 2 Functional Requirements</u></p> <p>201. Functional Requirements</p> <p><u>This chapter relates to the functional requirements in Ch 2, 201. 1 to 3, 9, 11, 15, 16 and 17. In particular the following apply:</u></p> <ol style="list-style-type: none"> <u>1. a copy of IGF Code, or national regulations incorporating the provisions of this Code, shall be on board every ship covered by IGF Code;</u> <u>2. maintenance procedures and information for all gas related installations shall be available on board;</u> <u>3. the ship shall be provided with operational procedures including a suitably detailed fuel handling manual, such that trained personnel can safely operate the fuel bunkering, storage and transfer systems; and</u> <u>4. the ship shall be provided with suitable emergency procedures.</u> <p style="text-align: center;"><u>Section 3 Regulations for Maintenance</u></p> <p>301. Regulations for maintenance</p> <ol style="list-style-type: none"> <u>1. Maintenance and repair procedures shall include considerations with respect to the tank location and adjacent spaces (see Ch 5).</u> <u>2. In-service survey, maintenance and testing of the fuel containment system are to be carried out in accordance with the inspection/survey plan required by Ch 6, 401., 8.</u> <u>3. The procedures and information shall include maintenance of electrical equipment that is installed in explosion hazardous spaces and areas. The inspection and maintenance of electrical installations in explosion hazardous spaces shall be performed in accordance with a recognized standard. 【See Guidance】</u> 	<p>(Newly added)</p> <p>-Reflected IGF Code Chapter 18</p>

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<p><Newly added></p>	<p style="text-align: center;"><u>Section 4 Regulations for bunkering operations</u></p> <p><u>401. Responsibilities</u></p> <p><u>1. Responsibilities</u></p> <p>(1) Before any bunkering operation commences, the master of the receiving ship or his representative and the representative of the bunkering source (Persons In Charge, PIC) shall:</p> <p>(A) agree in writing the transfer procedure, including cooling down and if necessary, gassing up; the maximum transfer rate at all stages and volume to be transferred;</p> <p>(B) agree in writing action to be taken in an emergency; and</p> <p>(C) complete and sign the bunker safety check-list.</p> <p>(2) Upon completion of bunkering operations the ship PIC shall receive and sign a Bunker Delivery Note for the fuel delivered, containing at least the information specified in the annex to part C-1, completed and signed by the bunkering source PIC.</p> <p><u>2. Overview of control, automation and safety systems</u></p> <p>(1) The fuel handling manual required by 201. 3 shall include but is not limited to:</p> <p>(A) overall operation of the ship from dry-dock to dry-dock, including procedures for system cool down and warm up, bunker loading and, where appropriate, discharging, sampling, inerting and gas freeing;</p> <p>(B) bunker temperature and pressure control, alarm and safety systems;</p> <p>(C) system limitations, cool down rates and maximum fuel storage tank temperatures prior to bunkering, including minimum fuel temperatures, maximum tank pressures, transfer rates, filling limits and sloshing limitations;</p> <p>(D) operation of inert gas systems;</p> <p>(E) firefighting and emergency procedures: operation and maintenance of firefighting systems and use of extinguishing agents;</p> <p>(F) specific fuel properties and special equipment needed for the safe handling of the particular fuel;</p> <p>(G) fixed and portable gas detection operation and maintenance of equipment;</p> <p>(H) emergency shutdown and emergency release systems, where fitted; and</p> <p>(I) a description of the procedural actions to take in an emergency situation, such as leakage, fire or potential fuel stratification resulting in rollover.</p> <p>(2) A fuel system schematic/piping and instrumentation diagram (P&ID) shall be reproduced and permanently mounted in the ship's bunker control station and at the bunker station.</p>	<p>(Newly added)</p> <p>-Reflected IGF Code Chapter 18</p>

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<p><Newly added></p>	<p>3. Pre-bunkering verification</p> <p>(1) <u>Prior to conducting bunkering operations, pre-bunkering verification including, but not limited to the following, shall be carried out and documented in the bunker safety checklist:</u></p> <p>(A) <u>all communications methods, including ship shore link (SSL), if fitted;</u></p> <p>(A) <u>operation of fixed gas and fire detection equipment;</u></p> <p>(A) <u>operation of portable gas detection equipment;</u></p> <p>(A) <u>operation of remote controlled valves; and</u></p> <p>(A) <u>inspection of hoses and couplings.</u></p> <p>(2) <u>Documentation of successful verification shall be indicated by the mutually agreed and executed bunkering safety checklist signed by both PIC's.</u></p> <p>4. Ship bunkering source communications</p> <p>(1) <u>Communications shall be maintained between the ship PIC and the bunkering source PIC at all times during the bunkering operation. In the event that communications cannot be maintained, bunkering shall stop and not resume until communications are restored.</u></p> <p>(2) <u>Communication devices used in bunkering shall comply with recognized standards for such devices acceptable to the Administration.</u></p> <p>(3) <u>PIC's shall have direct and immediate communication with all personnel involved in the bunkering operation.</u></p> <p>(4) <u>The ship shore link (SSL) or equivalent means to a bunkering source provided for automatic ESD communications, shall be compatible with the receiving ship and the delivering facility ESD system</u></p> <p>5. Electrical bonding [See Guidance]</p> <p><u>Hoses, transfer arms, piping and fittings provided by the delivering facility used for bunkering shall be electrically continuous, suitably insulated and shall provide a level of safety compliant with recognized standards.</u></p> <p>6. Conditions for transfer</p> <p>(1) <u>Warning signs shall be posted at the access points to the bunkering area listing fire safety precautions during fuel transfer.</u></p> <p>(2) <u>During the transfer operation, personnel in the bunkering manifold area shall be limited to essential staff only. All staff engaged in duties or working in the vicinity of the operations shall wear appropriate personal protective equipment (PPE). A failure to maintain the required conditions for transfer shall be cause to stop operations and transfer shall not be resumed until all required conditions are met.</u></p>	<p>(Newly added)</p> <p>-Reflected IGF Code Chapter 18</p>

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<p><Newly added></p>	<p>(3) <u>Where bunkering is to take place via the installation of portable tanks, the procedure shall provide an equivalent level of safety as integrated fuel tanks and systems. Portable tanks shall be filled prior to loading on board the ship and shall be properly secured prior to connection to the fuel system.</u></p> <p style="text-align: center;"><u>Section 5 Regulations for Enclosed Space Entry</u></p> <p>501. Regulations for enclosed space entry</p> <p>1. <u>Under normal operational circumstances, personnel shall not enter fuel tanks, fuel storage hold spaces, void spaces, tank connection spaces or other enclosed spaces where gas or flammable vapours may accumulate, unless the gas content of the atmosphere in such space is determined by means of fixed or portable equipment to ensure oxygen sufficiency and absence of an explosive atmosphere.</u></p> <p>2. <u>Personnel entering any space designated as a hazardous area shall not introduce any potential source of ignition into the space unless it has been certified gas-free and maintained in that condition.</u></p> <p style="text-align: center;"><u>Section 6 Regulations for Inerting and Purging of Fuel Systems</u></p> <p>601. Regulations for inerting and purging of fuel systems</p> <p>1. <u>The primary objective in inerting and purging of fuel systems is to prevent the formation of a combustible atmosphere in, near or around fuel system piping, tanks, equipment and adjacent spaces.</u></p> <p>2. <u>Procedures for inerting and purging of fuel systems shall ensure that air is not introduced into piping or a tank containing gas atmospheres, and that gas is not introduced into air contained in enclosures or spaces adjacent to fuel systems.</u></p> <p style="text-align: center;"><u>Section 7 Regulations for hot work on or near fuel systems</u></p> <p>701. Regulations for hot work on or near fuel systems</p> <p><u>Hot work in the vicinity of fuel tanks, fuel piping and insulation systems that may be flammable, contaminated with hydrocarbons, or that may give off toxic fumes as a product of combustion shall only be undertaken after the area has been secured and proven safe for hot work and all approvals have been obtained.</u></p>	<p>(Newly added) -Reflected IGF Code Chapter 18</p>

AMENDMENTS OF GUIDANCE RELATING TO RULES FOR CLASSIFICATION OF SHIPS USING LOW-FLASHPOINT FUELS

(Ch.6, 16 & Annex 1 : Reflecting External Opinion)

2020. 02.



Hull Rule Development Team

- Main Amendments -

(1) Effective Date : 1 July 2020

- Establishment of approval criteria for vacuum insulation systems applied to fuel supply system
- Reflects the acceleration reference of the IGC Code footnoted in the IGF Code

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<p style="text-align: center;">CHAPTER 6 FUEL CONTAINMENT SYSTEM</p> <p style="text-align: center;">Section 3 <omitted></p> <p style="text-align: center;">Section 4 Liquefied gas fuel containment</p> <p>404. ~ 406. <omitted></p> <p>408. Thermal Insulation</p> <p>1. In applying 408. of this Rules, the insulation of vacuum insulated tanks is to be <u>as deemed appropriated by the Society.</u></p> <p>409. Design Loads</p> <p>1. ~ 3. <omitted></p> <p>4. Loads due to ship motion</p> <p>(1) The "Ships for the restricted service" referred to in 409. 4 (1) (A) of the Rules means those ships with notations "Coasting Service" or "Smooth Water Service" affixed. In this case, the dynamic load may be determined by the results of calculation of ship motions carried out on the basis of the data on sea and weather conditions at the navigating area which are considered appropriately by the Society.</p> <p>410. ~ 415. <omitted></p> <p style="text-align: center;">Section 7 ~ Section 9 <omitted></p>	<p style="text-align: center;">CHAPTER 6 FUEL CONTAINMENT SYSTEM</p> <p style="text-align: center;">Section 3 <same as the present></p> <p style="text-align: center;">Section 4 Liquefied gas fuel containment</p> <p>404. ~ 406. <same as the present></p> <p>408. Thermal Insulation</p> <p>1. In applying 408. of this Rules, the insulation of vacuum insulated tanks is to be <u>approved in accordance with the requirements in Annex 1.</u></p> <p>409. Design Loads</p> <p>1. ~ 3. <omitted></p> <p>4. Loads due to ship motion</p> <p>(1) <u>As a "Method to predict accelerations due to ship motion" referred to in the requirement in 409. 4 (1) (A) of the Rules, the formulas for acceleration components in Pt 7, Ch 5, 428. 2 (1) of Rules for the Classification of Steel Ships can be referred to.</u></p> <p>(2) The "Ships for the restricted service" referred to in the requirement in 409. 4 (1) (A) of the Rules means those ships with notations "Coasting Service" or "Smooth Water Service" affixed. In this case, the dynamic load may be determined by the results of calculation of ship motions carried out on the basis of the data on sea and weather conditions at the navigating area which are considered appropriately by the Society.</p> <p>410. ~ 415. <same as the present></p> <p style="text-align: center;">Section 7 ~ Section 9 <same as the present></p>	<p>Establishment of approval criteria for vacuum insulation systems applied to fuel supply system.</p> <p>Reflects the acceleration reference of the IGC Code footnoted in the IGF Code</p>

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<p>CHAPTER 12 EXPLOSION PREVENTION</p> <p>Section 3 General Requirements</p> <p>301. General requirements</p> <p>1. <newly added></p> <p>2. <newly added></p> <p>Section 4 Area classification</p> <p>401. Area classification</p> <p>1. ~ 2. <omitted></p> <p>3. <newly added></p>	<p>CHAPTER 12 EXPLOSION PREVENTION</p> <p>Section 3 General Requirements</p> <p>301. General requirements <i>(2020)</i></p> <p><u>1. In applying 301. 1 of this Rules, a recognized standard means IEC 60092-502, part 4.4.</u></p> <p><u>2. In applying 301. 1 of this Rules, a recognized standard means IEC 60092-502 and IEC 60079-10-1.</u></p> <p>Section 4 Area classification</p> <p>401. Area classification</p> <p>1. ~ 2. <same as the present></p> <p><u>3. Area classification for the categorization of gas admission valves refers to relevant requirements of MSC.1/Circ.1605.</u></p>	<p>(amendment)</p> <p>-제개정요청서 TST4800-18-2020 (IGF Code footnote)</p> <p>- IMO MSC.1/Circ.1605</p>

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<p align="center">Annex 1 Requirements for Equipment Used for Low-flashpoint Fuel Supply Systems</p> <p align="center">Section 1 ~ Section 9 <omitted></p> <p><newly added></p>	<p align="center">Annex 1 Requirements for Equipment Used for Low-flashpoint Fuel Supply Systems</p> <p align="center">Section 1 ~ Section 9 <same as the present></p> <p align="center"><u>Section 10 Vacuum insulation system for vacuum insulated tanks</u></p> <p>1001. General</p> <ol style="list-style-type: none"> <u>The requirements in this Section apply to vacuum insulation systems used for vacuum insulated tanks in accordance with the requirements in Ch 6, 408. of this Guidance.</u> <u>The scope of the requirements in this Section is vacuum insulation system using type C independent tanks as inner vessels and using, as appropriate, filler materials for improvement of insulation performance or layered insulations as countermeasures for heat radiation in a vacuumed space. Such systems also include accessories such as supporting structures and filler materials. Other insulation systems used for vacuum insulated tanks are to be as deemed appropriate by the Society.</u> <u>In general, approval is to be obtained for each ship.</u> <u>For equipment, etc. manufactured in accordance with the requirements of rules or standards which are recognized to be equivalent to those contained in this annex by the Society, may be applied in lieu of application of this Annex in cases where deemed appropriate by the Society.</u> <table border="1"> <thead> <tr> <th>Standard No.</th> <th>Standard Title</th> </tr> </thead> <tbody> <tr> <td>ISO 20421-1</td> <td>Cryogenic vessels – Large transportable vacuum-insulated vessels - Part 1: Design, fabrication, inspection and testing</td> </tr> <tr> <td>ISO 21009-1</td> <td>Cryogenic vessels – Static vacuum-insulated vessels - Part 1: Design, fabrication, inspection and tests</td> </tr> </tbody> </table>	Standard No.	Standard Title	ISO 20421-1	Cryogenic vessels – Large transportable vacuum-insulated vessels - Part 1: Design, fabrication, inspection and testing	ISO 21009-1	Cryogenic vessels – Static vacuum-insulated vessels - Part 1: Design, fabrication, inspection and tests	<p>Establishment of approval criteria for vacuum insulation systems applied to fuel supply system.</p>
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ISO 20421-1	Cryogenic vessels – Large transportable vacuum-insulated vessels - Part 1: Design, fabrication, inspection and testing							
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<newly added>	<p>1002. Submission of Plans and Documents</p> <p><u>1. Plans and documents for approval</u></p> <p>(1) <u>Specification of vacuum insulation system(including and outline of the system, required degree of vacuum, data related to deterioration rate of the degree of vacuum during operation and, if deemed necessary by the society, a degree of vacuum-insulation performance curve)</u></p> <p>(2) <u>Construction drawing(including the arrangement of major elements for the system)</u></p> <p>(3) <u>Detail(specification, standard for manufacturing and quality control, maker, type, etc.) of major elements (outer shell, filler material or layered insulation, if applied, and supporting structure, etc.)</u></p> <p>(4) <u>Other associated accessories which are attached directly to the inner vessel or outer shell and their arrangements</u></p> <p>(5) <u>Test and inspection procedures for the vacuum insulation system (these are to be reflected in the inspection plan in Ch 4, 303. 1 of this Guidance)</u></p> <p>(6) <u>Installation procedure for the vacuum insulation system(installation and manufacturing method/process, arrangement of filler material or layered insulation, procedure and criteria for vacuumization(including means for confirming the degree of vacuum), setting plan for the supporting structure, procedure for quality control, non-destructive testing procedure and standards fro welds and other connection parts, and a repair plan for defects)</u></p> <p><u>2. Plans and documents for reference</u></p> <p>(1) <u>Calculation sheet for performance of insulation</u></p> <p>(2) <u>Strength calculation of major elements</u></p> <p>1003. Materials and welding</p> <p><u>1. Materials used for outer shells are to comply with in Pt 2, Ch 1 of Rules for the Classification of Steel Ships.</u></p> <p><u>2. Welding procedures for outer shells are to be approved in accordance with relevant requirements in Pt 5, Ch 5, Sec 4 and Pt 2, Ch 2 of Rules for the Classification of Steel Ships</u></p>	

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<newly added>	<p>3. <u>Elements of insulation systems which do not contribute to vacuums (such as supporting structures installed between inner vessels and other shells, and layered insulation installed on inner vessels as countermeasure for heat radiation) are to be type approved in accordance with Guidance for the Approval of Manufacturing Process and Type Approval, Etc.</u></p> <p>1004. Construction and Strength</p> <p>1. <u>Construction of insulation systems is to ensure that no excessive stress, failure of supporting structure, reduction of insulation performance, etc. occur due to thermal deformation.</u></p> <p>2. <u>Suitable means are to be provided such as protection from flames or the use of non-combustible materials for elements which are likely to lead to significant deterioration of the performance of insulation systems due to vacuum breaks with melting elements or deformation with changes in the property of elements from heat in cases where insulation system are exposed to the flames.</u></p> <p>1005. Tests and Inspections</p> <p>1. <u>The following tests are to be conducted.</u></p> <p>(1) <u>Non-destructive testing</u> for all welded joints of outer shell.</p> <p>(2) <u>Tightness test of outer shell and measurement of the degree of vacuum in accordance with standards as deemed appropriate by the Society.</u></p> <p>(3) <u>Tests to confirm insulation performance in accordance with standards as deemed appropriate by the Society. In general, such tests are to use appropriate test fluids such as liquid nitrogen and to measure amount of boil-off gas.</u>↓</p>	

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<newly added>	<p>1002. Submission of Plans and Documents</p> <p><u>1. Plans and documents for approval</u></p> <p>(1) <u>Specification of vacuum insulation system(including and outline of the system, required degree of vacuum, data related to deterioration rate of the degree of vacuum during operation and, if deemed necessary by the society, a degree of vacuum-insulation performance curve)</u></p> <p>(2) <u>Construction drawing(including the arrangement of major elements for the system)</u></p> <p>(3) <u>Detail(specification, standard for manufacturing and quality control, maker, type, etc.) of major elements (outer shell, filler material or layered insulation, if applied, and supporting structure, etc.)</u></p> <p>(4) <u>Other associated accessories which are attached directly to the inner vessel or outer shell and their arrangements</u></p> <p>(5) <u>Test and inspection procedures for the vacuum insulation system (these are to be reflected in the inspection plan in Ch 4, 303. 1 of this Guidance)</u></p> <p>(6) <u>Installation procedure for the vacuum insulation system(installation and manufacturing method/process, arrangement of filler material or layered insulation, procedure and criteria for vacuumization(including means for confirming the degree of vacuum), setting plan for the supporting structure, procedure for quality control, non-destructive testing procedure and standards fro welds and other connection parts, and a repair plan for defects)</u></p> <p><u>2. Plans and documents for reference</u></p> <p>(1) <u>Calculation sheet for performance of insulation</u></p> <p>(2) <u>Strength calculation of major elements</u></p> <p>1003. Materials and welding</p> <p><u>1. Materials used for outer shells are to comply with in Pt 2, Ch 1 of Rules for the Classification of Steel Ships.</u></p> <p><u>2. Welding procedures for outer shells are to be approved in accordance with relevant requirements in Pt 5, Ch 5, Sec 4 and Pt 2, Ch 2 of Rules for the Classification of Steel Ships</u></p>	

Present	Amendment	Remark
<p><newly added></p>	<p>3. <u>Elements of insulation systems which do not contribute to vacuums (such as supporting structures installed between inner vessels and other shells, and layered insulation installed on inner vessels as countermeasure for heat radiation) are to be type approved in accordance with Guidance for the Approval of Manufacturing Process and Type Approval, Etc.</u></p> <p>1004. Construction and Strength</p> <p>1. <u>Construction of insulation systems is to ensure that no excessive stress, failure of supporting structure, reduction of insulation performance, etc. occur due to thermal deformation.</u></p> <p>2. <u>Suitable means are to be provided such as protection from flames or the use of non-combustible materials for elements which are likely to lead to significant deterioration of the performance of insulation systems due to vacuum breaks with melting elements or deformation with changes in the property of elements from heat in cases where insulation system are exposed to the flames.</u></p> <p>1005. Tests and Inspections</p> <p>1. <u>The following tests are to be conducted.</u></p> <p>(1) <u>Non-destructive testing</u> for all welded joints of outer shell.</p> <p>(2) <u>Tightness test of outer shell and measurement of the degree of vacuum in accordance with standards as deemed appropriate by the Society.</u></p> <p>(3) <u>Tests to confirm insulation performance in accordance with standards as deemed appropriate by the Society. In general, such tests are to use appropriate test fluids such as liquid nitrogen and to measure amount of boil-off gas.↓</u></p>	