

# Guidance for Fuel Cell Systems on Board Ships

(Development Review : For external opinion inquiry)

2024. 01.



Machinery Rule Development Team

## – Main Amendments –

(1) Effective date : 1 Jul. 2024 (Date of contracts for construction)

- The requirements for class notations and redundancy requirements for fuel cell power system have been revised.
- The requirement for switch disconnecter for maintenance purposes in case of fuel cell failure has been added.

Present	Amendment	Note
<p><b>Guidance for Fuel Cell Systems <u>on Board of Ships</u></b></p> <p><b>CHAPTER 1 GENERAL</b></p> <p><b>Section 1 General</b></p> <p><b>101. Application (2020)</b></p> <ol style="list-style-type: none"> <li>1. This Guidance is to apply to with fuel cell power installations <u>on board of ships</u> used as auxiliary or main source of power.</li> <li>2. The scope of this Guidance mainly covers the requirements for the arrangement and design of fuel cell power installations in <b>102. 3 (4)</b> and the spaces containing such installations. Regulations such as storage, preparation, distribution, etc. of fuel other than this guidance are to be covered by the relevant regulations of <b>Rules for Ships using Low-flashpoint Fuels</b> depending on the fuel used. (2022)</li> <li>3. ~ 5. &lt;omitted&gt;</li> </ol> <p><b>102. &lt;omitted&gt;</b></p> <p><b>103. Class notations</b></p> <ol style="list-style-type: none"> <li>1. <u>Fuel cell power installations used as auxiliary or main source of power is to comply with this Guidances and is to be given a notation as additional special feature notations as follows:</u> <ol style="list-style-type: none"> <li>(1) Where the fuel cell power is used for propulsion, essential or emergency services, a notation "FC-PWR" is to be assigned.</li> <li>(2) Where the fuel cell power is not used for propulsion, essential or emergency services, a notation "FC" is to be assigned.</li> </ol> </li> </ol> <p>(hereafter, omitted)</p>	<p><b>Guidance for Fuel Cell Systems <u>on Board Ships</u></b></p> <p><b>CHAPTER 1 GENERAL</b></p> <p><b>Section 1 General</b></p> <p><b>101. Application (2020)</b></p> <ol style="list-style-type: none"> <li>1. This Guidance is to apply to with fuel cell power installations <u>on board ships</u> used as auxiliary or main source of power.</li> <li>2. The scope of this Guidance mainly covers the requirements for the arrangement and design of fuel cell power installations in <b>102. 3 (6)</b> and the spaces containing such installations. Regulations such as storage, preparation, distribution, etc. of fuel other than this guidance are to be covered by the relevant regulations of <b>Rules for Ships using Low-flashpoint Fuels</b> depending on the fuel used. (2022)</li> <li>3. ~ 5. &lt;same as the present&gt;</li> </ol> <p><b>102. &lt;same as the present&gt;</b></p> <p><b>103. Class notations (2024)</b></p> <ol style="list-style-type: none"> <li>1. <u>As additional special feature notations, a notation is to be assigned as follows:</u> <ol style="list-style-type: none"> <li>(1) <u>Ships installing fuel cell power installations are to comply with the requirements of this Guidance and a notation "FC" is to be assigned.</u></li> <li>(2) <u>In addition to above, where the fuel cell power is used for propulsion or essential services and the redundancy requirements of Ch 2, 101. are satisfied, a notation "FC-PWR" is to be assigned.</u></li> </ol> </li> </ol> <p>(hereafter, same as the present)</p>	<p>&lt;Guidance for Fuel Cell Systems on Board Ships&gt;</p> <p>(Amendment) Reflect Request for Establishment /Revision of Classification Technical Rules 'EAT4400 -2676-2023' &lt;application date: the date of contract for construction on or after 1 July. 2024&gt;</p> <p>- Edit English title</p> <p>- Error correction (Reflect Request for Establishment /Revision of Classification Technical Rules EAT4400 -2309-2023 and HUT4000-2156-2023)</p> <p>- Clarification of the requirements for class notation.</p>

Present	Amendment	Note
<p style="text-align: center;"><b>CHAPTER 2 CONSTRUCTION AND INSTALLATION (2020)</b></p> <p style="text-align: center;"><b>Section 1 General</b></p> <p><b>101. General</b></p> <p>1. <u>In case where the power supply to propulsion or essential service is delivered by the fuel cell power installations this power supply to propulsion or essential service is to be maintained in accordance with Pt 6, Ch 1, 1601. 3 of Rules for the Classification of Steel Ships even if one component of the fuel cell power installation becomes inoperative.</u></p> <p>2. <u>If the power from the fuel cell power installations is needed for restoration of power in a black out or dead ship situation, the recovery arrangements have to be documented and approved in each case.</u></p> <p>(hereafter, omitted)</p>	<p style="text-align: center;"><b>CHAPTER 2 CONSTRUCTION AND INSTALLATION (2024)</b></p> <p style="text-align: center;"><b>Section 1 General</b></p> <p><b>101. Redundancy of fuel cell power system (2024)</b></p> <p><u>A notation "FC-PWR" is to be assigned where the following requirements are satisfied.</u></p> <p>1. <u>The fuel cell power system is to consist of at least two independent systems located in two independent fuel cell spaces. In case of applying a hybrid system, one of the two independent systems can be used as generator or battery or other types of energy sources.</u></p> <p>2. <u>Under normal sea-going conditions, when one system is out of service, the capacity of the remaining systems is to be sufficient to carry all of the loads for vessel services (essential services and services for habitability). Also when fuel cell power system is used for electric propulsion, in addition to above capacity, it is to be sufficient to carry the propulsion loads to provide for a speed of not less than 7 knots or one half of the design speed, whichever is the lesser.</u></p> <p>3. <u>The fuel cell power system is to be so arranged that the electrical supply to equipment necessary for propulsion and steering and to ensure safety of the ship will be maintained or immediately restored in the case of loss of any one of the systems in service. Preference tripping or other equivalent arrangements are to be provided to protect the fuel cell power systems against sustained overload.</u></p> <p>4. <u>Where the power from the fuel cell power installations is needed for restoration of power in a black out or dead ship situation, the recovery arrangements have to be documented and approved in each case.</u></p> <p>(hereafter, same as the present)</p>	<p>〈Guidance for Fuel Cell Systems on Board Ships〉</p> <p>– Reorganized notation FC-PWR requirements, i.e. redundancy requirements for fuel cell power system.</p>

Present	Amendment	Note
<p style="text-align: center;"><b>Section 4 Electrical Systems</b></p> <p><b>401. General provisions on electrical systems</b></p> <ol style="list-style-type: none"> <li>1. Electrical equipment is not to be installed in hazardous areas unless essential for operational purposes or safety enhancement.</li> <li>2. Where electrical equipment including components of fuel cell systems is installed in hazardous areas, it is to be selected, installed and maintained in accordance with IEC 60079 and IEC 60092-502 or standards at least equivalent to those.</li> <li>3. Means are to be provided for protection of the fuel cell installation against short circuits and flow of reverse current.</li> </ol> <p>(hereafter, omitted)</p> <p style="text-align: center;"><b>Section 5 Control, Monitoring and Safety Systems</b></p> <p><b>501. ~ 505. &lt;omitted&gt;</b></p> <p><b>506. Actions of the alarm system and safety system (2023)</b></p> <ol style="list-style-type: none"> <li>1. ~ 5. &lt;omittd&gt;</li> <li>6. Fire detection Fire detection within the fuel cell space is to initiate automatic shut-down and isolation of the fuel supply.</li> </ol> <p>(hereafter, omitted)</p>	<p style="text-align: center;"><b>Section 4 Electrical Systems</b></p> <p><b>401. General provisions on electrical systems</b></p> <ol style="list-style-type: none"> <li>1. Electrical equipment is not to be installed in hazardous areas unless essential for operational purposes or safety enhancement.</li> <li>2. Where electrical equipment including components of fuel cell systems is installed in hazardous areas, it is to be selected, installed and maintained in accordance with IEC 60079 and IEC 60092-502 or standards at least equivalent to those.</li> <li>3. Means are to be provided for protection of the fuel cell installation against short circuits and flow of reverse current.</li> <li>4. <u>The outgoing circuits on the fuel cell power system is to be provided with a switch disconnecter for maintenance purposes. (2024)</u></li> </ol> <p>(hereafter, same as the present)</p> <p style="text-align: center;"><b>Section 5 Control, Monitoring and Safety Systems</b></p> <p><b>501. ~ 505. &lt;same as the present&gt;</b></p> <p><b>506. Actions of the alarm system and safety system (2023)</b></p> <ol style="list-style-type: none"> <li>1. ~ 5. &lt;same as the present&gt;</li> <li>6. Fire detection Fire detection within the fuel cell space is to initiate automatic shut-down <u>of fuel cell and ventilation fans for fuel cell space, and isolation of the fuel supply. (2024)</u></li> </ol> <p>(hereafter, same as the present)</p>	<p>&lt;Guidance for Fuel Cell Systems on Board Ships&gt;</p> <p>– Add the requirement for switch disconnecter for maintenance purposes in case of fuel cell failure.</p> <p>– Added automatic shut-down of ventilation fans to match Table 2.2.</p>