

Rules for the Classification of Steel Ships

(Final)

Part 6 Electrical Equipment and Control Systems

2020. 9.



Machinery Rule Development Team

Effective Date : 1 July 2021

(The contract date for ship construction)

Present	Amendment	Remark
<p style="text-align: center;">CHAPTER 1 ELECTRICAL EQUIPMENT</p> <p style="text-align: center;">Section 1 General</p> <p>101. – 102. <same as the present Rules></p> <p>103. Testing and inspection</p> <p> 1. General</p> <p> (1) The electrical equipment and cables in Table 6.1.1 are to be approved(drawing approval, type approval) by the Society or to be tested in accordance with relevant requirements of this Chapter at the manufacturer's works or at other works having the adequate apparatus for testing and inspections.</p> <p> (2) The electrical equipment and cables specified in the Table 6.1.1 are to be type approved in accordance with the 「Guidance for Approval of Manufacturing Process and Type Approval, etc.」before being taken into use. 【See Guidance】</p> <p> 2. – 6. <same as the present Rules></p> <p>Table 6.1.1 <see next page></p>	<p style="text-align: center;">CHAPTER 1 ELECTRICAL EQUIPMENT</p> <p style="text-align: center;">Section 1 General</p> <p>101. – 102. <same as the present Rules></p> <p>103. Testing and inspection</p> <p> 1. General</p> <p> (1) The electrical equipment and cables in Table 6.1.1 are to be approved(drawing approval, type approval) by the Society or to be tested in accordance with relevant requirements of this Chapter at the manufacturer's works or at other works having the adequate apparatus for testing and inspections.</p> <p> (2) The electrical equipment and cables specified in the Table 6.1.1 are to be type approved in accordance with the 「Guidance for Approval of Manufacturing Process and Type Approval, etc.」before being taken into use. 【See Guidance】</p> <p> 2. – 6. <same as the present Rules></p> <p>Table 6.1.1 <see next page></p>	<p>(Amended)</p> <p>- In Table 6.1.1, the power semi-conductor rectifiers is included in the electric power converters and the “test and inspection” and “type approval” items for the electric power converters are specified.</p>

Present	Amendment	Remark
<p style="text-align: center;">CHAPTER 1 ELECTRICAL EQUIPMENT</p> <p style="text-align: center;">Section 1 <same as the present Rules></p> <p style="text-align: center;">Section 2 System Design</p> <p>201. – 202. <same as the present Rules></p> <p>203. Emergency source of electrical power</p> <p>1. – 2. <same as the present Rules></p> <p>3. Kind and performance of emergency source of electrical power</p> <p>The emergency source of electrical power is to be a generator, an accumulator battery or an uninterruptible power system(UPS), which is to comply with the following ;</p> <p>(1) – (2) <same as the present Rules></p> <p>(3) Where the emergency source of electrical power is an uninterruptible power system(UPS), it is to comply with the requirements which the Society considers appropriate. [See Guidance]</p> <p>(4) <same as the present Rules></p> <p>4. – 5. <same as the present Rules></p>	<p style="text-align: center;">CHAPTER 1 ELECTRICAL EQUIPMENT</p> <p style="text-align: center;">Section 1 <same as the present Rules></p> <p style="text-align: center;">Section 2 System Design</p> <p>201. – 202. <same as the present Rules></p> <p>203. Emergency source of electrical power</p> <p>1. – 2. <same as the present Rules></p> <p>3. Kind and performance of emergency source of electrical power</p> <p>The emergency source of electrical power is to be a generator, an accumulator battery or an uninterruptible power system(UPS), which is to comply with the following ;</p> <p>(1) – (2) <same as the present Rules></p> <p>(3) Where the emergency source of electrical power is an uninterruptible power system(UPS), it is to comply with the requirements which the Society considers appropriate. [See Guidance] 1203. (2021)</p> <p>(4) <same as the present Rules></p> <p>4. – 5. <same as the present Rules></p>	<p>(Amended)</p> <p>- The referenced clause has been amended as the requirements for UPS moved from the Guidance to Ch 1, Sec 12 of the Rules.</p>

Present	Amendment	Remark
<p>6. Starting arrangements for emergency generating sets</p> <p>(1) - (2) <same as the present Rules></p> <p>(3) The stored energy is to be maintained at all times, as follows :</p> <p>(A) - (B) <same as the present Rules></p> <p>(C) All of these starting, charging and energy storing devices are to be located in the emergency generator space.</p> <p>(4) - (5) <same as the present Rules></p> <p>204. - 205. <same as the present Rules></p> <p>Section 3 - Section 11 <same as the present Rules></p>	<p>6. Starting arrangements for emergency generating sets</p> <p>(1) - (2) <same as the present Rules></p> <p>(3) The stored energy is to be maintained at all times, as follows :</p> <p>(A) - (B) <same as the present Rules></p> <p>(C) All of these starting, charging and energy storing devices are to be located in the emergency generator space. <u>These devices are not to be used for any purpose other than the operation of the emergency generating set. This does not preclude the supply to the air receiver of the emergency generating set from the main or auxiliary compressed air system through the non-return valve fitted in the emergency generator space. (2021)</u></p> <p>(4) - (5) <same as the present Rules></p> <p>204. - 205. <same as the present Rules></p> <p>Section 3 - Section 11 <same as the present Rules></p>	<p>(Amended)</p> <p>- Reflecting SOLAS Reg. II-1/44.3.3, the requirements for the starting arrangements for emergency generating sets have been amended to clarify the application of the regulations.</p>

Present	Amendment	Remark
<p>Section 12 <u>Semi-Conductor Rectifiers for Power</u></p> <p>1201. General</p> <p>1. <u>The requirements in this Section are to be applied to the semi-conductor rectifiers for power (hereinafter referred to as "rectifiers") not less than 5 kW. Further, the rectifiers specified in this Section are to be taken as a rectifier including thyristor.</u></p> <p>2. <same as the present Rules></p> <p>1202. <Newly added></p>	<p>Section 12 <u>Semi-Conductor Rectifiers for Power Converters (2021)</u></p> <p>1201. General</p> <p>1. The requirements in this Section are to be applied to the semi-conductor rectifiers for power (hereinafter referred to as "rectifiers") not less than 5 kW. Further, the rectifiers specified in this Section are to be taken as a rectifier including thyristor.</p> <p><u>1. The requirements in this Section apply to semi-conductor converters for motor drives, uninterruptible power system(UPS) and semi-conductor rectifiers(hereinafter referred to as "rectifiers") not less than 5 kW.</u></p> <p>2. <same as the present Rules></p> <p>1202. <u>Semi-conductor converters for motor drives</u></p> <p>1. <u>Design requirements</u></p> <p><u>(1) The specified capacity shall at least include a 100% continuous load, and a specified overload capacity given by a current of maximum duration of time.</u></p> <p><u>(2) Converters for motor drives (including soft starters), shall as a minimum withstand two consecutive start attempts immediately followed after stopping, or starting up from cold without being overheated.</u></p> <p>2. <u>Creepage and clearance distances</u></p> <p><u>(1) Creepage and clearance distances shall be in accordance with relevant product standard, The clearance and creepage distances given in the relevant IEC standards are reproduced in Table 6.1.20 to Table 6.1.22.</u></p>	<p>(Amended)</p> <p>- The requirements have been revised to stipulate in Section 12 (Electric Power Converters) by gathering all the requirements for electric power converters including semi-conductor rectifiers, UPS and frequency converters.</p> <p>(Newly added)</p> <p>- Requirements for "design requirements" and "creepage and clearance distance" of electric power converters have been newly added.</p>

Present	Amendment	Remark																				
	<p data-bbox="981 284 1756 352">Table 6.1.20 Clearance distance for low voltage semi-conductor converter (2021)</p> <table border="1" data-bbox="981 363 1756 616"> <thead> <tr> <th data-bbox="981 363 1359 419">Rated voltage (V)</th> <th data-bbox="1359 363 1756 419">Clearance distance (mm)</th> </tr> </thead> <tbody> <tr> <td data-bbox="981 419 1359 469">120</td> <td data-bbox="1359 419 1756 469">0.80</td> </tr> <tr> <td data-bbox="981 469 1359 518">220, 230, 240</td> <td data-bbox="1359 469 1756 518">1.5</td> </tr> <tr> <td data-bbox="981 518 1359 568">380, 400, 415, 440, 480</td> <td data-bbox="1359 518 1756 568">3.0</td> </tr> <tr> <td data-bbox="981 568 1359 616">600, 630, 660, 690</td> <td data-bbox="1359 568 1756 616">5.5</td> </tr> </tbody> </table> <p data-bbox="981 699 1756 767">Table 6.1.21 Clearance distance for high voltage semi-conductor converter (2021)</p> <table border="1" data-bbox="981 778 1756 1031"> <thead> <tr> <th data-bbox="981 778 1359 834">Rated voltage (V)</th> <th data-bbox="1359 778 1756 834">Clearance distance (mm)</th> </tr> </thead> <tbody> <tr> <td data-bbox="981 834 1359 884">1732</td> <td data-bbox="1359 834 1756 884">8.0</td> </tr> <tr> <td data-bbox="981 884 1359 933">6235</td> <td data-bbox="1359 884 1756 933">25</td> </tr> <tr> <td data-bbox="981 933 1359 983">12470</td> <td data-bbox="1359 933 1756 983">60</td> </tr> <tr> <td data-bbox="981 983 1359 1031">20785</td> <td data-bbox="1359 983 1756 1031">90</td> </tr> </tbody> </table>	Rated voltage (V)	Clearance distance (mm)	120	0.80	220, 230, 240	1.5	380, 400, 415, 440, 480	3.0	600, 630, 660, 690	5.5	Rated voltage (V)	Clearance distance (mm)	1732	8.0	6235	25	12470	60	20785	90	
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	<p data-bbox="983 320 1715 347">Table 6.1.22 Creepage distances for semi-conductor converters (2021)</p> <table border="1" data-bbox="987 360 1760 1382"> <thead> <tr> <th data-bbox="987 360 1364 416">Rated voltage (V)</th> <th data-bbox="1364 360 1760 416">Creepage distance (mm)</th> </tr> </thead> <tbody> <tr><td data-bbox="987 416 1364 464">100</td><td data-bbox="1364 416 1760 464">2.2</td></tr> <tr><td data-bbox="987 464 1364 512">160</td><td data-bbox="1364 464 1760 512">2.5</td></tr> <tr><td data-bbox="987 512 1364 560">200</td><td data-bbox="1364 512 1760 560">3.2</td></tr> <tr><td data-bbox="987 560 1364 608">250</td><td data-bbox="1364 560 1760 608">4.0</td></tr> <tr><td data-bbox="987 608 1364 655">320</td><td data-bbox="1364 608 1760 655">5.0</td></tr> <tr><td data-bbox="987 655 1364 703">400</td><td data-bbox="1364 655 1760 703">6.3</td></tr> <tr><td data-bbox="987 703 1364 751">500</td><td data-bbox="1364 703 1760 751">8.0</td></tr> <tr><td data-bbox="987 751 1364 799">630</td><td data-bbox="1364 751 1760 799">10.0</td></tr> <tr><td data-bbox="987 799 1364 847">800</td><td data-bbox="1364 799 1760 847">12.5</td></tr> <tr><td data-bbox="987 847 1364 895">1000</td><td data-bbox="1364 847 1760 895">16</td></tr> <tr><td data-bbox="987 895 1364 943">1250</td><td data-bbox="1364 895 1760 943">20</td></tr> <tr><td data-bbox="987 943 1364 991">1600</td><td data-bbox="1364 943 1760 991">25</td></tr> <tr><td data-bbox="987 991 1364 1038">2000</td><td data-bbox="1364 991 1760 1038">32</td></tr> <tr><td data-bbox="987 1038 1364 1086">2500</td><td data-bbox="1364 1038 1760 1086">40</td></tr> <tr><td data-bbox="987 1086 1364 1134">3200</td><td data-bbox="1364 1086 1760 1134">50</td></tr> <tr><td data-bbox="987 1134 1364 1182">4000</td><td data-bbox="1364 1134 1760 1182">63</td></tr> <tr><td data-bbox="987 1182 1364 1230">5000</td><td data-bbox="1364 1182 1760 1230">80</td></tr> <tr><td data-bbox="987 1230 1364 1278">6300</td><td data-bbox="1364 1230 1760 1278">100</td></tr> <tr><td data-bbox="987 1278 1364 1326">8000</td><td data-bbox="1364 1278 1760 1326">125</td></tr> <tr><td data-bbox="987 1326 1364 1374">10000</td><td data-bbox="1364 1326 1760 1374">160</td></tr> </tbody> </table>	Rated voltage (V)	Creepage distance (mm)	100	2.2	160	2.5	200	3.2	250	4.0	320	5.0	400	6.3	500	8.0	630	10.0	800	12.5	1000	16	1250	20	1600	25	2000	32	2500	40	3200	50	4000	63	5000	80	6300	100	8000	125	10000	160	
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Present	Amendment	Remark
	<p>3. Cooling</p> <p>(1) <u>Semiconductor converter assemblies are to be installed away from sources of radiant energy in locations where the circulation of air is not restricted to and from the assembly and where the temperature of the inlet air to air-cooled converters will not exceed that for which the converter has been designed.</u></p> <p>(2) <u>Where arrangements for forced cooling have been provided, the equipment is, unless otherwise specifically required, to be designed such that power cannot be applied to, or retained on, the semiconductor circuits, unless effective cooling is maintained. Other effective means of protection against equipment over-temperature such as reduction in the driven load may also be acceptable.</u></p> <p>(3) <u>Semiconductor assemblies with forced cooling are to be provided with a means of monitoring the temperature of the cooling medium. Over-temperature of the cooling medium is to be alarmed and the equipment shutdown when temperature exceeds the manufacturer specified value.</u></p> <p>(4) <u>Semi-conductor assemblies with liquid cooling are to be provided with a means to detect leakage. In case of leakage, an audible and visible alarm is to be initiated. Means to contain any leakage are to be provided so that the liquid does not cause a failure of the semi-conductor assembly or any other electrical equipment located near the converter. Where the cooling liquid is required to be non-conducting, the conductivity of the cooling liquid is to be monitored and an alarm is to be initiated if the conductivity exceeds the manufacturer specified value.</u></p>	<p>(Newly added)</p> <p>- Requirements for cooling of semiconductor converters have been newly added.</p>

Present	Amendment	Remark
<p>1203. <Moved></p>	<p>(5) <u>In case of failure of the cooling system, an alarm is to be initiated and the output current is to be reduced automatically. Cooling liquids which are in contact with live unearthed parts of the assembly are to be non-conductive and non-flammable.</u></p> <p>4. Emergency stop</p> <p><u>When required, semiconductor converter assemblies shall be provided with an emergency stop function. The emergency stop circuit is to be hard-wired and independent of any control system signal.</u></p> <p>1203. Uninterruptable power system (UPS)</p> <p>1. Application</p> <p><u>These requirements are to apply to interruptible power system (hereinafter referred to as “UPS”) units installed in ships as an emergency source of electrical power.</u></p> <p>2. Definitions</p> <p>(1) <u>UPS means a source of electrical power with converters, switches and batteries, constituting for maintaining continuity of load power in case of input power failure.</u></p> <p>(2) <u>Off-line UPS unit means an electrical power where under normal operation the output load is powered from the bypass line and only transferred to the inverter if the bypass supply fails or goes outside preset limits.</u></p> <p>(3) <u>Line interactive UPS unit means a system specified in (B) above where the bypass line switch to stored energy power when the input power goes outside the preset voltage and frequency limits.</u></p> <p>(4) <u>On-line UPS unit means a system where under normal operation the output load is powered from the inverter, and will therefore continue to operate without break in the event of the supply input failing or going outside preset limits.</u></p>	<p>(Newly added)</p> <p>- Requirements for emergency stop of semiconductor converters have been newly added.</p> <p>(Moved)</p> <p>- 203. 3 (2) of the Guidance has been moved to 1203. of the Rules.</p>

Present	Amendment	Remark
	<p><u>3. Design and construction</u></p> <p>(1) <u>UPS units are to be constructed in accordance with IEC 62040 or an acceptable and relevant national or international standard.</u></p> <p>(2) <u>The operation of the UPS units is not to depend on external services.</u></p> <p>(3) <u>The type of UPS unit (off-line, line-interactive, on-line) is to be appropriate to the power supply requirements of the connected load equipment.</u></p> <p>(4) <u>UPS units are to have an external bypass circuit.</u></p> <p>(5) <u>UPS units are to have a self-monitoring function, and audible and visual alarms are to be activated in the space where crews normally attend in the following cases.</u></p> <p>(A) <u>Power supply failure (abnormal voltage or frequency)</u></p> <p>(B) <u>Earth fault</u></p> <p>(C) <u>Operation of battery protective device</u></p> <p>(D) <u>Discharge of battery</u></p> <p>(E) <u>Operation of bypass circuit for on-line UPS units</u></p> <p><u>4. Arrangement</u></p> <p>(1) <u>UPS units are to be suitably located for use in an emergency condition.</u></p> <p>(2) <u>UPS units utilizing valve regulated sealed batteries may be located in compartments with normal electrical equipment, provided the ventilation arrangements are in accordance with the requirements of IEC 62040 or an acceptable and relevant national or international standard.</u></p>	

Present	Amendment	Remark
	<p><u>5. Performance</u></p> <p>(1) <u>The output power is to be maintained for the duration time required for the connected equipment as specified in 203. 2 of the Rules.</u></p> <p>(2) <u>No additional circuits are to be connected to the UPS unit without verification that the UPS unit has adequate capacity. The UPS battery capacity is, at all times, to be capable of supplying the designated loads for the time specified in the regulations.</u></p> <p>(3) <u>On restoration of the input power, the rating of the charge unit shall be sufficient to recharge the batteries while maintaining the output supply to the load equipment.</u></p> <p><u>6. Testing and inspection</u></p> <p>(1) <u>UPS units of 50 kVA and over are to be tested by this Society at the manufacturer's works or at other works.</u></p> <p>(2) <u>Appropriate test is to be carried out to demonstrate that the UPS unit is suitable for its intended environment. This is expected to include as a minimum the following tests:</u></p> <p>(A) <u>Visual inspection</u></p> <p>(B) <u>Functionality, including operation of alarms</u></p> <p>(C) <u>Temperature rise</u></p> <p>(D) <u>Ventilation rate</u></p> <p>(E) <u>Battery capacity</u></p> <p>(3) <u>In case where input power failure of UPS is happened, if the continuous power supply is necessary without power interruption, this operation condition is to be verified after installation by practical test.</u></p>	

Present	Amendment	Remark
<p>1202. Construction and location</p> <p>1. same as the present Rules</p> <p>2. <u>Location</u> (1) - (2) same as the present Rules</p> <p>1203. Protective devices, etc.</p> <p>1. <u>Protective devices</u> (1) - (2) same as the present Rules</p> <p>2. <u>Temperature of rectifier cells</u> The maximum permissible temperature rise of junction of rectifier cells is to be such a value as will be specified by the manufacturer. Where the information is not available, the maximum permissible temperature rise of junction of rectifier cells is not to exceed the following values :</p> <p>Selenium : 70°C Silicon : 150°C (thyristor : 125°C)</p> <p>3. <u>Transformers for rectifiers</u> Transformers for rectifier are to be of two separate windings.</p> <p>1204. Thyristor control</p> <p>1. <u>Gate control circuits</u> Gate control circuits are to comply with the following requirements. (1) - (2) same as the present Rules</p> <p>2. <u>Thyristor control for d.c. motor</u> Where d.c. motors are controlled by thyristor, the following requirements are to be applied. (1) - (3) same as the present Rules</p>	<p>1202. Construction and location 1204. Rectifiers</p> <p>1. same as the present Rules</p> <p>2. <u>Location Arrangement</u> (1) - (2) same as the present Rules</p> <p>1203. Protective devices, etc.</p> <p>1. <u>3. Protective devices</u> (1) - (2) same as the present Rules</p> <p>2. <u>4. Temperature of rectifier cells</u> The maximum permissible temperature rise of junction of rectifier cells is to be such a value as will be specified by the manufacturer. Where the information is not available, the maximum permissible temperature rise of junction of rectifier cells is not to exceed the following values :</p> <p>Selenium : 70°C Silicon : 150°C (thyristor : 125°C)</p> <p>3. <u>5. Transformers for rectifiers</u> Transformers for rectifier are to be of two separate windings.</p> <p>6. <u>Thyristor control</u> (1) <u>Gate control circuits</u> Gate control circuits are to comply with the following requirements: (A) - (B) same as the present Rules (2) <u>Thyristor control for d.c. motor</u> Where d.c. motors are controlled by thyristor, the following requirements are to be applied. (A) - (C) same as the present Rules</p>	<p>(Numbering) : 1202. → 1204.</p> <p>: 1203. 1 → 1204. 3 : 1203. 2 → 1204. 4 : 1203. 3 → 1204. 5 : 1204. → 1204. 6 : 1 → (1) : (1) - (2) → (A) - (B) : 2 → (2) : (1) - (3) → (A) - (C)</p>

Present	Amendment	Remark
<p>1205. Testing and inspection</p> <p>1. General [See Guidance]</p> <p>Rectifiers and their accessories are to be tested in accordance with the following requirements. The test required by Par 2, however, may be omitted subject to the Society's permission for each product which is produced in series having identical type with its first unit tested in the presence of the Surveyor.</p> <p>2. Temperature test [See Guidance]</p> <p>Temperature test of rectifiers and their accessories is to be carried out under normal working conditions, and the test results are to comply with the requirements in 1203. 2 not exceeding the values specified in the requirements in 702. as well.</p> <p>3. Operation test [See Guidance]</p> <p>Instruments, switching devices and protective devices are to be checked under operating conditions.</p> <p>4. High voltage test</p> <p>Rectifiers are to withstand the high voltage by applying the test voltage of Table 6.1.18 for 1 minute between rectifier cells or live parts of components charged with main circuit potential and earth. (2018)</p> <p>Table 6.1.18 Test voltages for equipment connected to main circuits (2018)</p> <p>5. Insulation resistance test</p> <p>After the high-voltage test, insulation resistance between live parts of rectifiers and their accessories and earth is not to be less than 1 MΩ when tested with <i>d.c.</i> voltage of at least 500 V.</p>	<p>7. Testing and inspection</p> <p>(1) General [See Guidance]</p> <p>Rectifiers and their accessories are to be tested in accordance with the following requirements. The test required by Par 2; (2), however, may be omitted subject to the Society's permission for each product which is produced in series having identical type with its first unit tested in the presence of the Surveyor.</p> <p>(2) Temperature test [See Guidance]</p> <p>Temperature test of rectifiers and their accessories is to be carried out under normal working conditions, and the test results are to comply with the requirements in 1203. 2 4 not exceeding the values specified in the requirements in 702. as well.</p> <p>(3) Operation test [See Guidance]</p> <p>Instruments, switching devices and protective devices are to be checked under operating conditions.</p> <p>(4) High voltage test</p> <p>Rectifiers are to withstand the high voltage by applying the test voltage of Table 6.1.18 6.1.23 for 1 minute between rectifier cells or live parts of components charged with main circuit potential and earth. (2018)</p> <p>Table 6.1.18 6.1.23 Test voltages for equipment connected to main circuits (2018)</p> <p>(5) Insulation resistance test</p> <p>After the high-voltage test, insulation resistance between live parts of rectifiers and their accessories and earth is not to be less than 1 MΩ when tested with <i>d.c.</i> voltage of at least 500 V.</p>	<p>(Numbering)</p> <p>: 1205. → 1204. 7</p> <p>: 1 → (1)</p> <p>: 2 → (2)</p> <p>: 3 → (3)</p> <p>: 4 → (4)</p> <p>: Table 6.1.18 → Table 6.1.23</p> <p>: 5 → (5)</p>

Present	Amendment	Remark																				
<p style="text-align: center;">CHAPTER 2 CONTROL SYSTEMS</p> <p style="text-align: center;">Section 1 <same as the present Rules></p> <p style="text-align: center;">Section 2 System and Control</p> <p>201. – 203. <same as the present Rules></p> <p>204. Control system of electric generating sets</p> <p>1. <same as the present Rules></p> <p>2. Emergency Source of Electric Power</p> <p>Automatic or remote control devices for diesel engines to drive emergency generators are to be complied with the following requirements: (2020)</p> <p>(1) Alarm devices to be activated in the event of the abnormal conditions given in Table 6.2.2 are to be provided.</p> <p>(2) – (5) <same as the present Rules></p> <p>Table 6.2.2 Alarms for diesel engines to drive emergency generators</p> <table border="1" data-bbox="197 1050 943 1300"> <thead> <tr> <th colspan="2">Monitored parameters [H=High L=Low O=Abnormal status]</th> <th>AA</th> <th>Auto Shut down with alarm</th> <th>Notes [AA=Alarm Activation ●=apply]</th> </tr> </thead> <tbody> <tr> <td>Others</td> <td>Fuel oil leakage from pressure pipes</td> <td>O</td> <td>●</td> <td></td> </tr> </tbody> </table> <p>205. – 206. <same as the present Rules></p> <p style="text-align: center;">Section 3 – 4 <same as the present Rules></p>	Monitored parameters [H=High L=Low O=Abnormal status]		AA	Auto Shut down with alarm	Notes [AA=Alarm Activation ●=apply]	Others	Fuel oil leakage from pressure pipes	O	●		<p style="text-align: center;">CHAPTER 2 CONTROL SYSTEMS</p> <p style="text-align: center;">Section 1 <same as the present Rules></p> <p style="text-align: center;">Section 2 System and Control</p> <p>201. – 203. <same as the present Rules></p> <p>204. Control system of electric generating sets</p> <p>1. <same as the present Rules></p> <p>2. Emergency Source of Electric Power</p> <p>Automatic or remote control devices for diesel engines to drive emergency generators are to be complied with the following requirements: (2020)</p> <p>(1) Alarm devices to be activated in the event of the abnormal conditions given in Table 6.2.2 are to be provided.</p> <p>(2) – (5) <same as the present Rules></p> <p>Table 6.2.2 Alarms for diesel engines to drive emergency generators (2021)</p> <table border="1" data-bbox="1021 1050 1767 1300"> <thead> <tr> <th colspan="2">Monitored parameters [H=High L=Low O=Abnormal status]</th> <th>AA</th> <th>Auto Shut down with alarm</th> <th>Notes [AA=Alarm Activation ●=apply]</th> </tr> </thead> <tbody> <tr> <td>Others</td> <td>Fuel oil leakage from <u>high</u> pressure pipes</td> <td>O</td> <td>●</td> <td></td> </tr> </tbody> </table> <p>205. – 206. <same as the present Rules></p> <p style="text-align: center;">Section 3 – 4 <same as the present Rules></p>	Monitored parameters [H=High L=Low O=Abnormal status]		AA	Auto Shut down with alarm	Notes [AA=Alarm Activation ●=apply]	Others	Fuel oil leakage from <u>high</u> pressure pipes	O	●		<p>(Amended)</p> <p>- The fuel oil leakage alarm of the emergency generator cannot be applied to a single piping of low pressure, so the requirement has been amended to apply to the high pressure pipe.</p>
Monitored parameters [H=High L=Low O=Abnormal status]		AA	Auto Shut down with alarm	Notes [AA=Alarm Activation ●=apply]																		
Others	Fuel oil leakage from pressure pipes	O	●																			
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Revised Guidance Relating to the Rules for the Classification of Steel Ships

(Development Review : For external opinion inquiry)

Part 6 Electrical Equipment and Control Systems

2020. 9.



Machinery Rule Development Team

Effective Date : 1 July 2021

(The contract date for ship construction)

Present	Amendment	Remark
<p style="text-align: center;">CHAPTER 1 ELECTRICAL EQUIPMENT</p> <p style="text-align: center;">Section 1 <same as the present Rules></p> <p style="text-align: center;">Section 2 System design</p> <p>201. – 202. <same as the present Rules></p> <p>203. Emergency source of electrical power</p> <p>1. – 2. <same as the present Rules></p> <p>3. Kind and performance of emergency source of electrical power</p> <p>(1) <same as the present Rules></p> <p>(2) The requirements of uninterruptible power system(UPS) units 【See Rule】 <u>In application to 203. 3 (3) of the Rules, the requirements which the Society considers appropriate are to be as follows:</u></p> <p>(A) Application <u>These requirements are to apply to interruptible power system (hereinafter referred to as “UPS”) units installed in ships as an emergency source of electrical power.</u></p> <p>(B) Definitions</p> <p>(a) UPS means a source of electrical power with converters, switches and batteries, constituting for maintaining continuity of load power in case of input power failure.</p> <p>(b) Off-line UPS unit means an electrical power where under normal operation the output load is powered from the bypass line and only transferred to the inverter if the bypass supply fails or goes outside preset limits.</p>	<p style="text-align: center;">CHAPTER 1 ELECTRICAL EQUIPMENT</p> <p style="text-align: center;">Section 1 <same as the present Rules></p> <p style="text-align: center;">Section 2 System design</p> <p>201. – 202. <same as the present Rules></p> <p>203. Emergency source of electrical power</p> <p>1. – 2. <same as the present Rules></p> <p>3. Kind and performance of emergency source of electrical power</p> <p>(1) <same as the present Rules></p> <p>(2) The requirements of uninterruptible power system(UPS) units 【See Rule】 <u>In application to 203. 3 (3) of the Rules, the requirements which the Society considers appropriate are to be as follows:</u></p> <p>(A) Application <u>These requirements are to apply to interruptible power system (hereinafter referred to as “UPS”) units installed in ships as an emergency source of electrical power.</u></p> <p>(B) Definitions</p> <p>(a) UPS means a source of electrical power with converters, switches and batteries, constituting for maintaining continuity of load power in case of input power failure.</p> <p>(b) Off-line UPS unit means an electrical power where under normal operation the output load is powered from the bypass line and only transferred to the inverter if the bypass supply fails or goes outside preset limits.</p>	<p>(Moved)</p> <p>– 203. 3 (2) of the Guidance has been moved to 1203. of the Rules.</p>

Present	Amendment	Remark
<p>(c) <u>Line interactive UPS unit means a system specified in (B) above where the bypass line switch to stored energy power when the input power goes outside the preset voltage and frequency limits.</u></p> <p>(d) <u>On-line UPS unit means a system where under normal operation the output load is powered from the inverter, and will therefore continue to operate without break in the event of the supply input failing or going outside preset limits.</u></p> <p>(C) <u>Design and Construction</u></p> <p>(a) <u>UPS units are to be constructed in accordance with IEC 62040 or an acceptable and relevant national or international standard.</u></p> <p>(b) <u>The operation of the UPS units is not to depend on external services.</u></p> <p>(c) <u>The type of UPS unit (off-line, line-interactive, on-line) is to be appropriate to the power supply requirements of the connected load equipment.</u></p> <p>(d) <u>UPS units are to have an external bypass circuit.</u></p> <p>(e) <u>UPS units are to have a self-monitoring function, and audible and visual alarms are to be activated in the space where crews normally attend in the following cases.</u></p> <p>(i) <u>Power supply failure (abnormal voltage or frequency)</u></p> <p>(ii) <u>Earth fault</u></p> <p>(iii) <u>Operation of battery protective device</u></p> <p>(iv) <u>Discharge of battery</u></p> <p>(v) <u>Operation of bypass circuit for on-line UPS units</u></p>	<p>(c) Line interactive UPS unit means a system specified in (B) above where the bypass line switch to stored energy power when the input power goes outside the preset voltage and frequency limits.</p> <p>(d) On-line UPS unit means a system where under normal operation the output load is powered from the inverter, and will therefore continue to operate without break in the event of the supply input failing or going outside preset limits.</p> <p>(C) Design and Construction</p> <p>(a) UPS units are to be constructed in accordance with IEC 62040 or an acceptable and relevant national or international standard.</p> <p>(b) The operation of the UPS units is not to depend on external services.</p> <p>(c) The type of UPS unit (off-line, line-interactive, on-line) is to be appropriate to the power supply requirements of the connected load equipment.</p> <p>(d) UPS units are to have an external bypass circuit.</p> <p>(e) UPS units are to have a self-monitoring function, and audible and visual alarms are to be activated in the space where crews normally attend in the following cases:</p> <p>(i) Power supply failure (abnormal voltage or frequency)</p> <p>(ii) Earth fault</p> <p>(iii) Operation of battery protective device</p> <p>(iv) Discharge of battery</p> <p>(v) Operation of bypass circuit for on-line UPS units</p>	

Present	Amendment	Remark
<p>(D) Arrangement</p> <p>(a) UPS units are to be suitably located for use in an emergency condition.</p> <p>(b) UPS units utilizing valve regulated sealed batteries may be located in compartments with normal electrical equipment, provided the ventilation arrangements are in accordance with the requirements of IEC 62040 or an acceptable and relevant national or international standard.</p> <p>(E) Performance</p> <p>(a) The output power is to be maintained for the duration time required for the connected equipment as specified in 203. 2 of the Rules.</p> <p>(b) No additional circuits are to be connected to the UPS unit without verification that the UPS unit has adequate capacity. The UPS battery capacity is, at all times, to be capable of supplying the designated loads for the time specified in the regulations.</p> <p>(c) On restoration of the input power, the rating of the charge unit shall be sufficient to recharge the batteries while maintaining the output supply to the load equipment.</p> <p>(F) Testing and inspection</p> <p>(a) UPS units of 50 kVA and over are to be tested by this Society at the manufacturer's works or at other works.</p> <p>(b) Appropriate test is to be carried out to demonstrate that the UPS unit is suitable for its intended environment. This is expected to include as a minimum the following tests:</p> <p>(i) Functionality, including operation of alarms</p> <p>(ii) Temperature rise</p> <p>(iii) Ventilation rate</p> <p>(iv) Battery capacity</p>	<p>(D) Arrangement</p> <p>(a) UPS units are to be suitably located for use in an emergency condition.</p> <p>(b) UPS units utilizing valve regulated sealed batteries may be located in compartments with normal electrical equipment, provided the ventilation arrangements are in accordance with the requirements of IEC 62040 or an acceptable and relevant national or international standard.</p> <p>(E) Performance</p> <p>(a) The output power is to be maintained for the duration time required for the connected equipment as specified in 203. 2 of the Rules.</p> <p>(b) No additional circuits are to be connected to the UPS unit without verification that the UPS unit has adequate capacity. The UPS battery capacity is, at all times, to be capable of supplying the designated loads for the time specified in the regulations.</p> <p>(c) On restoration of the input power, the rating of the charge unit shall be sufficient to recharge the batteries while maintaining the output supply to the load equipment.</p> <p>(F) Testing and inspection</p> <p>(a) UPS units of 50 kVA and over are to be tested by this Society at the manufacturer's works or at other works.</p> <p>(b) Appropriate test is to be carried out to demonstrate that the UPS unit is suitable for its intended environment. This is expected to include as a minimum the following tests:</p> <p>(i) Functionality, including operation of alarms</p> <p>(ii) Temperature rise</p> <p>(iii) Ventilation rate</p> <p>(iv) Battery capacity</p>	

Present	Amendment	Remark
<p>(c) In case where input power failure of UPS is happened, if the continuous power supply is necessary without power interruption, this operation condition is to be verified after installation by practical test.</p> <p>(3) Starting from dead ship condition 【See Rule】 In application to 203. 3 (4) of the Rules, the followings are to be complied with. (A) - (B) <same as the present Rules></p> <p>4. - 5. <same as the present Rules></p> <p>204. - 205. <same as the present Rules></p> <p>Section 3 - 11 <same as the present Rules></p>	<p>(c) In case where input power failure of UPS is happened, if the continuous power supply is necessary without power interruption, this operation condition is to be verified after installation by practical test.</p> <p>(3) (2) Starting from dead ship condition 【See Rule】 In application to 203. 3 (4) of the Rules, the followings are to be complied with. (A) - (B) <same as the present Rules></p> <p>4. - 5. <same as the present Rules></p> <p>204. - 205. <same as the present Rules></p> <p>Section 3 - 11 <same as the present Rules></p>	<p>(Numbering) : (3) → (2)</p>

Present	Amendment	Remark
<p style="text-align: center;">Section 12 <u>Semi-Conductor Rectifiers for Power</u></p> <p><u>1205. Testing and inspection</u></p> <p>1. General [See Rule]</p> <p>In application to <u>1205. 1</u> of the Rules, the term “subject to the Society’s permission” means type approval, test report’s confirmation, etc.</p> <p>2. Temperature test [See Rule]</p> <p>In application to <u>1205. 2</u> of the Rules, the appropriateness for requirements in <u>1203. 2</u> of the Rules may be identified by temperature measuring of cooling pin, case, refrigerant, etc. But, where the temperature rising limit for cooling pin, case, refrigerant, etc. is in the limit, it is presumed the temperature of joining parts as the designated case not exceeded the allowable maximum temperature.</p> <p>3. Operation test [See Rule]</p> <p>In application to <u>1205. 3</u> of the Rules, operation test for protection devices means interlocking test between cooling fan and switch, and destructive test such as protection fuse test for rectifier elements may be omitted.</p> <p style="text-align: center;">Section 13 - 18 <same as the present Rules></p> <p>CHAPTER 2 <same as the present Rules></p>	<p style="text-align: center;">Section 12 <u>Semi-Conductor Rectifiers for Power Electric Power Converter (2021)</u></p> <p><u>1205. Testing and inspection 1204. Rectifiers</u></p> <p>1. General [See Rule]</p> <p>In application to 1205. 1 <u>1204. 7 (1)</u> of the Rules, the term “subject to the Society’s permission” means type approval, test report’s confirmation, etc.</p> <p>2. Temperature test [See Rule]</p> <p>In application to 1205. 2 <u>1204. 7 (2)</u> of the Rules, the appropriateness for requirements in 1203. 2 <u>1204. 4</u> of the Rules may be identified by temperature measuring of cooling pin, case, refrigerant, etc. But, where the temperature rising limit for cooling pin, case, refrigerant, etc. is in the limit, it is presumed the temperature of joining parts as the designated case not exceeded the allowable maximum temperature.</p> <p>3. Operation test [See Rule]</p> <p>In application to 1205. 3 <u>1204. 7 (3)</u> of the Rules, operation test for protection devices means interlocking test between cooling fan and switch, and destructive test such as protection fuse test for rectifier elements may be omitted.</p> <p style="text-align: center;">Section 13 - 18 <same as the present Rules></p> <p>CHAPTER 2 <same as the present Rules></p>	<p>(Amended)</p> <p>- Section title and item number have been modified according to the amendments of the Rules.</p>