Requirements for Accumulator Battery Systems

Object of Amendment

Rules for the Survey and Construction of Steel Ships Part H

Reason for Amendment

Since the number of ships equipped with lithium-ion batteries has been increasing in recent years, the Society, taking into account recent technological trends and input from relevant industry members, established requirements related to the installation of large-capacity lithium-ion batteries on ships as Annex 2.11.1-2, Part H of Rules for the Survey and Construction in December 2022. These requirements make reference to existing guidelines and international standards.

Since the establishment of these requirements, the Society has received various feedback about their application, including some points needing further review from the viewpoint of clarification and consistency with other requirements.

Accordingly, relevant requirements for accumulator battery systems are amended for the purpose of clarification.

Outline of Amendment

The main details of this amendment are as follows:

(1) Clarifies exclusions for requirements related to the location of accumulator battery systems compartments.
(2) Clarifies accumulator battery system compartments are to be treated as Zone 2 within 450 *mm* from the ceiling.
(3) Clarifies requirements for control stations in accumulator battery system compartments.
(4) Clarifies decks are included in the fire integrity scope of accumulator battery system compartments.
(5) Amends requirements for parallel running in frequency fluctuation tests.
(6) Clarifies requirements for rated frequency do not include DC distribution systems with respect to confirmation of transient voltage fluctuation characteristics.
(7) Clarifies exclusions for requirements related to steady short-circuit tests when accumulator battery systems are produced in series of identical unit types.
(8) Clarifies steady short-circuit tests cannot be substituted for by simulation models.

Effective Date and Application

This amendment applies to ships for which the date of contract for construction is on or after 1 July 2025.
(Notwithstanding the above, this amendment may be applied in advance of the effective date upon shipowner request.)

ID: DD24-24

Amended-Original Requirements Comparison Table (Requirements for Accumulator Battery Systems)

Amended	Original	Remarks
RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS **Part H ELECTRICAL INSTALLATIONS** **Annex 2.11.1-2 Accumulator Battery Systems** **1.2 Safety Requirements** **1.2.1 Installation Compartments** **1** Accumulator battery system compartments are to be located aft of collision bulkheads, except in cases where permitted by the Society. Accumulator battery system compartments are to not be located in accommodation areas. In cases where accumulator battery system compartments are adjacent to accommodation areas, the entrances and exits of accumulator battery system compartments are to be fitted at locations which faces areas other than accommodation areas. **2** (Omitted) **3** (Omitted) **4** (Omitted)	**RULES FOR THE SURVEY AND CONSTRUCTION OF STEEL SHIPS** **Part H ELECTRICAL INSTALLATIONS** **Annex 2.11.1-2 Accumulator Battery Systems** **1.2 Safety Requirements** **1.2.1 Installation Compartments** **1** Accumulator battery system compartments are to be located aft of collision bulkheads. Accumulator battery system compartments are to not be located in accommodation areas. In cases where accumulator battery system compartments are adjacent to accommodation areas, the entrances and exits of accumulator battery system compartments are to be fitted at locations which faces areas other than accommodation areas. **2** (Omitted) **3** (Omitted) **4** (Omitted)	The exclusion of " except, under exceptional circumstances, in cases where permitted by the Society" described in 3.3.1-2, Part H for emergency sources of electrical power was also regulated in the requirements for Accumulator battery system. An example in which “except, under exceptional circumstances, in cases where permitted by the Society” can be considered is when risk assessment, etc. is

Amended	Original	Remarks
		carried out for "non-emergency power source applications" and "Additional installations other than the main power supply required by SOLAS" and fire risks are sufficiently considered.
5 Electrical equipment installed at locations 450 *mm* or closer to the ceilings of accumulator battery system compartments are to be explosion-protected electrical equipment suitable for use in explosive mixtures classified as apparatus group *IIC* and temperature class *T*2 and construction suitable for use in Zone 2 as specified in *IEC* 60079, be equivalent thereto, or be of a higher standard (explosion-protected type is not limited). However, this does not apply in cases where it is judged that explosion-protected electrical equipment is not needed per the results of the risk assessments specified in **1.2.4-1(13)**. In addition, mechanical ventilators do not need to be explosion-protected electrical equipment in cases where the ventilator is of the external motor driven type. **6** (Omitted)	**5** Electrical equipment installed at locations 450 *mm* or closer to the ceilings of accumulator battery system compartments are to be explosion-protected electrical equipment suitable for use in explosive mixtures classified as apparatus group *IIC* and temperature class *T*2 as specified in *IEC* 60079, be equivalent thereto, or be of a higher standard (explosion-protected type is not limited). However, this does not apply in cases where it is judged that explosion-protected electrical equipment is not needed per the results of the risk assessments specified in **1.2.4-1(13)**. In addition, mechanical ventilators do not need to be explosion-protected electrical equipment in cases where the ventilator is of the external motor driven type. **6** (Omitted)	According to the requirement of 1.2.2-4, Part H, the area within 1.5 m around the outlet of the ventilation of the accumulator battery room is categorized a zoon 2. Therefore, it was clarified by adding that within 450 mm from the ceiling of the Accumulator battery system compartments should be an equivalent hazardous area.
1.2.3 Fire Considerations **1** Accumulator battery system compartments are to be classified as either **(1)** to **(3)** below and **Chapter 9, Part R** is to be applied. (1) In cases where accumulator battery systems fall under **1.3.1-1(1)** or **(2)**: Machinery Spaces of category *A* (2) Other than **(1)** above: Other machinery spaces (3) In cases where accumulator battery system corresponds to the following **(a)** to **(d)**: Control	**1.2.3 Fire Considerations** **1** Accumulator battery system compartments are to be classified as either **(1)** or **(2)** below and **Chapter 9, Part R** is to be applied. (1) In cases where accumulator battery systems fall under **1.3.1-1(1)** or **(2)**: Machinery Spaces of category *A* (2) Other than **(1)** above: Other machinery spaces (Newly added)	The compartment which installed the accumulator battery for emergency use, etc. is categorized the control station according to the R3.2.18-4, guidance of part R. The accumulator battery

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station (a) Batteries for the emergency source of electrical power specified in **3.3.3, Part H of the Rules**. (b) Batteries for the transitional source of emergency electrical power specified in **3.3.4, Part H of the Rules**. (c) Batteries for starting of the emergency generator specified in **3.4.1, Part H of the Rules**. (d) Batteries for the reserve source of energy specified in Regulation 13, Chapter IV of *SOLAS*.		system compartment was also clarified to be treated in the same way.
2 In cases where accumulator battery system compartments are adjacent to either (1) or (2) below, fire integrity of in-between bulkheads and decks is to be A-60. (1) Machinery Spaces of category *A* (2) Cargo spaces in which dangerous goods are intended to be carried	**2** In cases where accumulator battery system compartments are adjacent to either (1) or (2) below, fire integrity of in-between bulkheads is to be A-60. (1) Machinery Spaces of category *A* (2) Cargo spaces in which dangerous goods are intended to be carried	It also clarified that decks such as ceilings and floors will be covered.
1.3 Additional Requirements for Electrical Propulsion, Main Electrical Power Source or Emergency Electrical Power Source Purposes	**1.3 Additional Requirements for Electrical Propulsion, Main Electrical Power Source or Emergency Electrical Power Source Purposes**	
1.3.5 Electrical Power Converters **1** Electrical power converters for feeding power from accumulator battery systems to main switchboards are to comply with the following **(1)** to **(5)** items. For DC distribution systems (e.g. **Fig. 3(a)(ii)**, **Fig. 3(b)(ii)**, **Fig. 3(e)**), only **(3)** through **(5)** apply; however, in cases where electric propulsion ships (such as shown in **Fig. 3(e)**) depend entirely on accumulator battery system power for their power requirements, **(3)** and **(4)** need not be satisfied as long as there are no problems supplying power to each load. (1) (Omitted) (2) The following frequency characteristics are to be	**1.3.5 Electrical Power Converters** **1** Electrical power converters for feeding power from accumulator battery systems to main switchboards are to comply with the following **(1)** to **(5)** items. For DC distribution systems (e.g. **Fig. 3(a)(ii)**, **Fig. 3(b)(ii)**, **Fig. 3(e)**), only **(3)** through **(5)** apply; however, in cases where electric propulsion ships (such as shown in **Fig. 3(e)**) depend entirely on accumulator battery system power for their power requirements, **(3)** and **(4)** need not be satisfied as long as there are no problems supplying power to each load. (1) (Omitted) (2) The following frequency characteristics are to be	

Amended-Original Requirements Comparison Table (Requirements for Accumulator Battery Systems)

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provided. (a) Accumulator battery systems that fall under **1.3.1-1(2)** i) (Omitted) ii) Momentary frequency variations are, in principle, to be 10 % or less of maximum rated frequency when 50 % of the rated loads of electrical power converters are suddenly thrown on followed by the remaining 50 % of such loads suddenly being thrown on after an interval to restore the steady state. On the other hand, momentary frequency variations are to be 10 % or less of maximum rated frequency when 100 % of the rated loads of electrical power converters are suddenly thrown on, and frequencies are to return to within 1 % of final steady frequencies in not more than 5 *seconds*. In cases where such throwing-on methods are difficult according to the above requirements, and where a three-stage or more throwing-on method is adopted, throw-on power calculation sheets which take into consideration the following **1)** to **4)** are to be submitted to the Society for approval. 1) Power restoration after blackout 2) Sequential starting 3) Starting with large start-up loads 4) Instantaneous load transfers in cases where one set of main sources of electrical power fails (during parallel running) (b) (Omitted)	provided. (a) Accumulator battery systems that fall under **1.3.1-1(2)** i) (Omitted) ii) Momentary frequency variations are, in principle, to be 10 % or less of maximum rated frequency when 50 % of the rated loads of electrical power converters are suddenly thrown on followed by the remaining 50 % of such loads suddenly being thrown on after an interval to restore the steady state. On the other hand, momentary frequency variations are to be 10 % or less of maximum rated frequency when 100 % of the rated loads of electrical power converters are suddenly thrown on, and frequencies are to return to within 1 % of final steady frequencies in not more than 5 *seconds*. In cases where such throwing-on methods are difficult according to the above requirements, and where a three-stage or more throwing-on method is adopted, throw-on power calculation sheets which take into consideration the following **1)** to **4)** are to be submitted to the Society for approval. 1) Power restoration after blackout 2) Sequential starting 3) Starting with large start-up loads 4) Instantaneous load transfers in cases where one set of generators fails (during parallel running) (b) (Omitted)	In some cases, a generator and electrical power converter are installed in distribution system using accumulator battery systems. In order to clarify that both of them are to be tested when they operate in parallel. To clarify that DC power

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(3) (Omitted) (4) In cases where electrical power converters operating at rated voltages and rated frequencies (except for DC distribution systems) are subjected to sudden changes in symmetrical loads within the limits of specified currents and power factors, voltages are not to fall below 85 % nor exceed 120 % of rated voltage. Voltages of such electrical power converters are then to be restored to within ± 3 % of their rated voltage in a period of not more than 1.5 *seconds*. However, for accumulator battery systems that fall under **1.3.1-1(3)**, such voltage values may be increased to ± 4 % in a period of not more than 5 *seconds*. (5) (Omitted)	(3) (Omitted) (4) In cases where electrical power converters operating at rated voltages and rated frequencies are subjected to sudden changes in symmetrical loads within the limits of specified currents and power factors, voltages are not to fall below 85 % nor exceed 120 % of rated voltage. Voltages of such electrical power converters are then to be restored to within ± 3 % of their rated voltage in a period of not more than 1.5 *seconds*. However, for accumulator battery systems that fall under **1.3.1-1(3)**, such voltage values may be increased to ± 4 % in a period of not more than 5 *seconds*. (5) (Omitted)	sources are not covered.
2 Electrical power converters for supplying power from accumulator battery systems to main switchboards are to be tested at manufacturing plants or other locations in accordance with the following **(1)** and **(2)**. However, the test required by **(2)** below may be omitted for accumulator battery systems produced in a series of identical types with their unit subject to Society approval.	**2** Electrical power converters for supplying power from accumulator battery systems to main switchboards are to be tested at manufacturing plants or other locations in accordance with the following **(1)** and **(2)**.	Similar to the requirements for generators specified in 2.4.15, part H, the test may be omitted subject to the accumulator battery systems which is produced in series having identical type with their unit.
(1) Tests of AC power distribution systems are to be carried out to verify that the voltage total harmonic distortion (*THD*) specified in **-1(1)** above does not exceed 5 % under no load conditions. (2) In cases where accumulator battery systems may be operated alone, steady short-circuit tests are to be conducted to verify that **-1(5)** above is satisfied. Power sources used in such tests do not have to be accumulator battery systems. Regarding the submission of documents when the condition of	(1) Tests of AC power distribution systems are to be carried out to verify that the voltage total harmonic distortion (*THD*) specified in **-1(1)** above does not exceed 5 % under no load conditions. (2) In cases where accumulator battery systems may be operated alone, steady short-circuit tests are to be conducted to verify that **-1(5)** above is satisfied. Power sources used in such tests do not have to be accumulator battery systems. Manufacturer	To clarify that Similar to the requirements for generators specified in 2.4.15(5), part H, steady

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steady short-circuit tests is relaxed in cases of no effect selective tripping, manufacturer simulation models for electrical power converters may be used in cases where such simulations have been validated through tests of identical types of the same model.	simulation models for electrical power converters may be used in cases where such simulations have been validated through tests of identical types of the same model.	short-circuit tests cannot be instead by simulation models.
EFFECTIVE DATE AND APPLICATION **1.** The effective date of the amendments is 1 July 2025. **2.** Notwithstanding the amendments to the Amendments, the current requirements apply to ships for which the date of contract for construction is before the effective date. **3.** Notwithstanding the provision of preceding **2.**, the amendments to the Rules may apply to the surveys for which the application is submitted to the Society before the effective date upon request by the owner.		